

The American Society of Breast Surgeons
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2021 Annual Meeting
Scientific Session Abstracts

Scientific Session Awards

Abstracts presented at the Society's virtual scientific session will be considered for the following awards:

- The **George Peters Award** recognizes the best presentation by a breast fellow. In addition to a plaque, the winner receives \$1,000. The winner is selected by the Society's Publications Committee.

The award was established in 2004 by the Society to honor Dr. George N. Peters, who was instrumental in bringing together the Susan G. Komen Breast Cancer Foundation, The American Society of Breast Surgeons, the American Society of Breast Disease, and the Society of Surgical Oncology to develop educational objectives for breast fellowships. The educational objectives were first used to award Komen Interdisciplinary Breast Fellowships. Subsequently the curriculum was used for the breast fellowship credentialing process that has led to the development of a nationwide matching program for breast fellowships.

- The **Scientific Presentation Award** recognizes an outstanding presentation by a resident, fellow, or trainee. The winner of this award is also determined by the Publications Committee. In addition to a plaque, the winner receives \$500.
- All presenters are eligible for the **Scientific Impact Award**. The recipient of the award, selected by audience vote, is honored with a plaque.
- The **Best Poster Award** recognizes the best poster presentation by a resident, fellow, or trainee. The recipient of the award, selected by audience vote, is honored with a plaque.

All awards are supported by The American Society of Breast Surgeons Foundation.



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Scientific Oral Presentations I

Friday, April 30, 2021 1:30 pm–2:30 pm
Moderators: Sarah Blair, MD; Henry Kuerer, MD, PhD

243 - Cryoablation Without Excision for Early-Stage Breast Cancer; ICE3 Trial Update on Ipsilateral Breast Tumor Recurrence

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Background/Objective: The ICE3 Trial was designed to evaluate safety and efficacy of cryoablation, allowing women age ≥ 60 with low-risk, early-stage breast cancers to benefit from a non-operative treatment of their tumor and avoid the associated risks of surgery. Ipsilateral breast tumor recurrence (IBTR) at 5 years was the primary outcome.

Methods: The ICE3 trial is an IRB-approved, multi-centered, single-arm, non-randomized trial including women ≥ 60 years with unifocal, ultrasound visible invasive ductal carcinoma ≤ 1.5 cm in size, HR+, HER2-, and breast size allowing safe cryoablation. Four patients < 60 years were added after IRB adjustment to the protocol. The office-based procedure performed under ultrasound guidance with local anesthesia requires 20-40 minutes for a freeze-thaw-freeze treatment cycle, depending on lesion size. Decision to perform sentinel lymph node biopsy and the choice of appropriate adjuvant treatment was left to the discretion of the treating physician. Patients were followed at 6 months and annually to 5 years with clinical and imaging assessment, as well as patient satisfaction. The NCCN Distress Tool was administered at baseline treatment and again at 6 months. Local Failure Free Probability (FFP) was calculated with Kaplan-Meier estimates and 95% CI.

Results: Of the 211 patients screened, 5 failed screening, and an additional 9 were enrolled but ineligible by protocol. Thus, 197 patients were in the intention-to-treat cohort, 3 of whom did not receive complete protocol mandated treatment. One hundred ninety-four patients met eligibility, received successful cryoablation treatment per protocol, and are included for analysis. The mean age is 75 (55-94), and the mean tumor size is 7.4 mm Transverse (2.8 mm-14 mm) and 8.1 mm Sagittal (8 mm-14.9 mm). Among the protocol-treated patients, there were no significant device-related adverse events or complications reported. Most of the adverse events reported were minor (ex: bruising, localized edema, minor skin freeze burn, rash, minor bleeding from needle insertion, minor local hematoma, skin induration, minor infection, and pruritis). Two of 15 patients who underwent sentinel lymph node biopsies had a positive sentinel node (1 with CLL and 1 with adenocarcinoma, consistent with breast primary and is without recurrence at 60 months of follow-up). Twenty-seven patients underwent adjuvant radiation, 1 patient received chemotherapy, and 148 began endocrine therapy. More than 95% of the patients and 98% of physicians reported satisfaction from the cosmetic results during the follow-up visits. With a mean of 34.83 months, only 4 of the protocol-treated patients have recurred (2.06% overall recurrence rate). The 36-month local FFP is 99.22% (95% CI 94.58-99.89%).

Conclusions: The ICE3 trial is the largest controlled liquid nitrogen-based cryoablation trial of early-stage, low-risk breast cancer without subsequent tumor excision. Breast cryoablation, an office-based

procedure performed under local anesthesia, is a promising treatment alternative to surgery and offers the benefits of a minimally invasive procedure with minimal risks. Further study within a clinical trial or registry is needed to confirm cryoablation as a viable alternative to surgical excision in the appropriately selected patients.

Table. Summary of clinical, imaging, and pathological data of total eligible cryo-ablated patients

<i>Patients Characteristics</i>	<i>(n=194)</i>
N = 194	
Age (years)	
Mean (range)	75 (55-94)
Median ± SD	75.7±7
Race	
White	159 (82%)
African American	15 (7.7%)
Hispanic or Hispanic origins	12 (6.2%)
Asian	1 (0.5%)
Not specified/ decline to answer/ unknown	5 (2.6%)
Tumor characteristics	
Histology	
Infiltrating ductal	194 (100%)
Other	0 (0%)
Nottingham tumor score (combine histologic grading)	
Low - I (3-5)	98 (51%)
Intermediate - II (6-7)	96 (49%)
High – III (8-9)	0 (0%)
Receptor status	
ER+	194 (100%)
PR+	184 (92.9%)
Her 2-*	194 (100%)
Tumor size by US (day of procedure)	
Mean (range), mm	Sagittal: 8.1 (8 -14.9) Transverse: 7.4 (2.8 -14)
Median ± SD, mm	Sagittal: 8.0 ± 2.9 Transverse: 7. ± 2.7
Sentinel node bx	15
Positive	2 ^[1]
Clinically LN Negative**	194 (100%)
<p>Data are expressed as n (%) unless otherwise specified. SD, standard deviation. ER, estrogen receptor, PR, progesterone receptor, HER2 human epidermal growth factor receptor 2 *HER2 was tested with IHC and if equivocal was add a FISH assay [1] Positives were found in biopsies performed after study enrollment 1 patient with adenocarcinoma, c/w breast, 1 + with CLL (chronic lymphocytic leukemia **Clinical lymph node was assessed per US and clinical exam</p>	

76 - Routine Perioperative and Post-Discharge Use of Non-Steroidal Anti-Inflammatory Drugs: What Is the Risk of Hematoma after Lumpectomy and Sentinel Lymph Node Biopsy?

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Background/Objective: Non-steroidal anti-inflammatory drugs (NSAIDs) are increasingly used in enhanced recovery after surgery (ERAS) protocols for ambulatory breast surgery. Use of intravenous ketorolac and oral NSAIDs reduces perioperative opioid requirement and post-discharge pain, respectively, but the risk of bleeding complications (hematoma) associated with NSAID use in these settings after lumpectomy and sentinel lymph node biopsy (L/SLNB) is unclear. We compared the risk of hematoma after L/SLNB between patients treated on an ERAS protocol with discharge analgesic regimens including opioids only vs. NSAIDs with or without opioids.

Methods: We retrospectively identified L/SLNB patients treated from 1/2018 - 4/2020 on an ERAS protocol, which included intraoperative ketorolac, acetaminophen, and limited perioperative opioids. Standard discharge medications included opioids from 1/2018 - 8/2018 (opioid study period); during the NSAID study period, NSAIDs plus opioids (1/2019 - 8/2019) and NSAIDs only (9/2019 - 4/2020) were routinely prescribed. Discharge regimens included acetaminophen in each period and were adjusted if medical contraindications were present. Hematomas occurring on post-operative days (POD) 0-30 were categorized by management (observation vs. in-office drainage vs. re-operation [ROR]) and were compared between patients in the opioid study period vs. NSAID study period. Patients in the NSAID period were surveyed on POD 1-5 to assess NSAID consumption between the study periods with and without opioids.

Results: There were 2724 patients identified: 858 in the opioid study period and 1866 in the NSAID period. Of patients in the NSAID period, 867 (46%) were discharged with NSAIDs plus opioids and 999 (54%) with NSAIDs alone. Perioperative ketorolac was administered more frequently in the NSAID period compared to the opioid period (78% vs. 64%; $p < 0.001$), but demographic and other perioperative characteristics were otherwise similar between groups (Table). The incidence of hematoma in the entire cohort was 3.8% (103/2724). Neither the incidence of hematoma (4.1% vs 3.6%; $p = 0.6$) nor the rate of ROR (0.5% vs. 0.6%; $p = 0.8$) differed between the opioid vs. NSAID periods. A multivariable logistic regression model adjusted for perioperative ketorolac, chronic aspirin or anticoagulant/antiplatelet use and pathologic tumor stage found no association between study period and odds of hematoma, including those requiring ROR (OR 0.89; 95% CI 0.58-1.36; $p = 0.6$). Among NSAID period survey respondents (41%; 760/1866), NSAID use was unchanged after discontinuation of routine opioid prescriptions (median number of pills consumed in the NSAID/opioid period: 6 [IQR 3-10] vs. NSAID only period: 6 [3-9]; $p = 0.06$); hematoma incidence was similarly unchanged (4% vs. 3.3%; $p = 0.5$).

Conclusions: In patients having L/SLNB under an ERAS protocol and discharged with opioids vs. NSAIDs plus opioids vs. NSAIDs alone, we observed no differences in the incidence of postoperative hematomas, rates of ROR, or (in the NSAID era) NSAID consumption. NSAID-based pain control regimens following L/SLNB are preferable to opioids and should be routine unless medically contraindicated.

Demographic/perioperative characteristics	Opioid study period (n=858)	NSAID study period (n=1866)	p-value*
Age, median (IQR)	59 (50-67)	59 (51-67)	0.9
BMI (kg/m ²)			0.2
<18.5	8 (0.9%)	25 (1.3%)	
18.5-24.9	313 (36%)	607 (33%)	
25.0-29.0	251 (29%)	585 (31%)	
≥30	286 (33%)	649 (35%)	
ASA score			0.4
1	10 (1.2%)	26 (1.4%)	
2	558 (65%)	1148 (62%)	
3	289 (34%)	690 (37%)	
4	1 (0.1%)	2 (0.1%)	
Pathologic T stage			0.1
T0	12 (1.4%)	10 (0.5%)	
T1	638 (74%)	1391 (75%)	
T2	197 (23%)	444 (24%)	
T3	11 (1.3%)	21 (1.1%)	
Home medications [†]			
Aspirin	108 (13%)	206 (11%)	0.2
Anticoagulant or other antiplatelet	22 (2.6%)	56 (3.0%)	0.6
Perioperative ketorolac [‡]	549 (64%)	1463 (78%)	<0.001
Bleeding complications			
Any hematoma	35 (4.1%)	68 (3.6%)	0.6
Re-operation for evacuation	4 (0.5%)	11 (0.6%)	0.8
Aspiration/drainage (in-office procedure)	23 (2.7%)	40 (2.1%)	0.4
Observation	8 (0.9%)	17 (0.9%)	>0.9
*Statistical tested performed: Wilcoxon rank sum test; Chi-square test of independence; Fisher's exact test			
[†] Chronic aspirin for cardiac indications was routinely continued in the perioperative period; anticoagulants and other antiplatelets were preoperatively discontinued and resumed at the treating surgeon's discretion			
[‡] Perioperative ketorolac includes ketorolac administered in the operating room and/or post-anesthesia recovery unit			

107 - Contralateral Axillary Nodal Metastases: Stage IV Disease or a Manifestation of Progressive Locally Advanced Breast Cancer?

Amanda L. Nash¹, Samantha M. Thomas^{2,3}, Jennifer K. Plichta^{1,2}, Oluwadamilola M. Fayanju^{1,2}, E. Shelley Hwang^{1,2}, Rachel A. Greenup^{1,2}, Laura H. Rosenberger^{1,2}

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Background/Objective: The American Joint Committee on Cancer (AJCC) classifies breast cancer with contralateral axillary nodal metastases (CAM) as Stage IV disease, implying an event occurring from circulating tumor cells. In prior studies, many patients with CAM have had dermal involvement, suggesting contiguous, a locoregional origin via dermal lymphatic involvement. Additional studies have shown CAM to be associated with aberrant lymphatic drainage following prior axillary surgery,

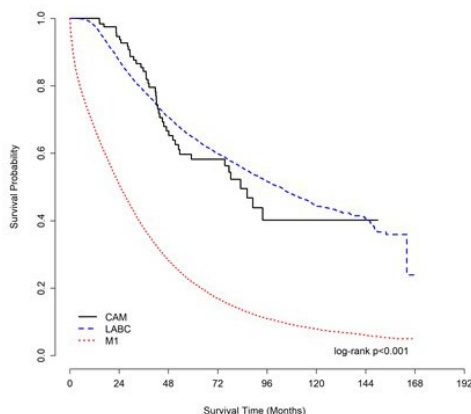
prompting many centers to approach CAM with curative intent. We hypothesized that patients with isolated CAM treated with multimodal therapy with curative intent would have better overall survival (OS) than patients with distant metastatic disease (M1) and may be more similar to those with locally advanced breast cancer (LABC).

Methods: Using the National Cancer Database (2004-2015), we identified adult patients with node-positive breast cancer who were categorized into 3 study groups: patients with 1) LABC (cN2b/3a-c, M0, who completed surgery and radiation), 2) CAM (cM1 with metastatic site classified as “distant lymph node(s): cervical, contralateral or bilateral axillary and/or internal mammary, or other distant lymph nodes,” who completed surgery and radiation, including resection of distant lymph nodes), and 3) M1 (metastatic disease at any site(s) other than “distant lymph node(s).” Node-positive patients who could not be categorized into 1 of these 3 groups were excluded. A Kaplan-Meier curve was used to visualize the unadjusted OS. A Cox proportional hazards model was used to estimate the association of study group with OS after adjusting for covariates.

Results: There were 94,487 patients identified with LABC (n=12,325), CAM (n=122), and M1 (n=82,040). Median follow-up was 63.6 months (95% CI 63.0-64.2). Progressively advanced disease (LABC > CAM > M1) was associated with progressively older age, (median ages 55, 57, and 62, respectively, $p < 0.001$). LABC and CAM patients had many similarities, including histology (ductal 75.7% vs. 80.3%), grade (grade 3, 59.0% vs. 63.1%), tumor size (median 3.70 vs. 3.95 cm), and receipt of adjuvant chemotherapy (94.6% vs. 95.1%) and endocrine therapy (55.9% vs. 55.7%). However, the CAM group had significantly more advanced T-stage (cT4, 22.4% vs. 41.0%), and underwent mastectomy more frequently (78.2% vs. 84.4%) than the LABC group. When compared to M1 patients, CAM patients were more likely to have grade 3 and cT4 tumors. Patients with CAM and LABC had similar 5-year unadjusted OS (58.2% [95% CI 46.7-68.1] vs. 64.7% [63.7-65.7]) that was also significantly better than that of M1 patients (21.6% [21.3-22.0]) (Figure). After adjustment, LABC and CAM patients had improved, but similar OS as compared to M1 patients (LABC: HR 0.48, 95%CI 0.46-0.50; CAM: HR 0.44 95%CI 0.33-0.61).

Conclusions: Patients with CAM without evidence of distant disease who are treated with multimodal therapy and curative intent have comparable OS to patients with locally advanced, M0 disease. These data support that it may be more appropriate to classify CAM as AJCC Clinical Prognostic Stage III, rather than M1 disease, to more accurately reflect the prognosis of this unique patient population.

Figure. Kaplan-Meier curve showing the unadjusted overall survival for breast cancer patients with LABC, CAM, and M1 disease



238 - Ongoing Symptoms Experienced by Low-Risk Breast Cancer Survivors Following Active Treatment

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University of Wisconsin-Madison, Madison, WI

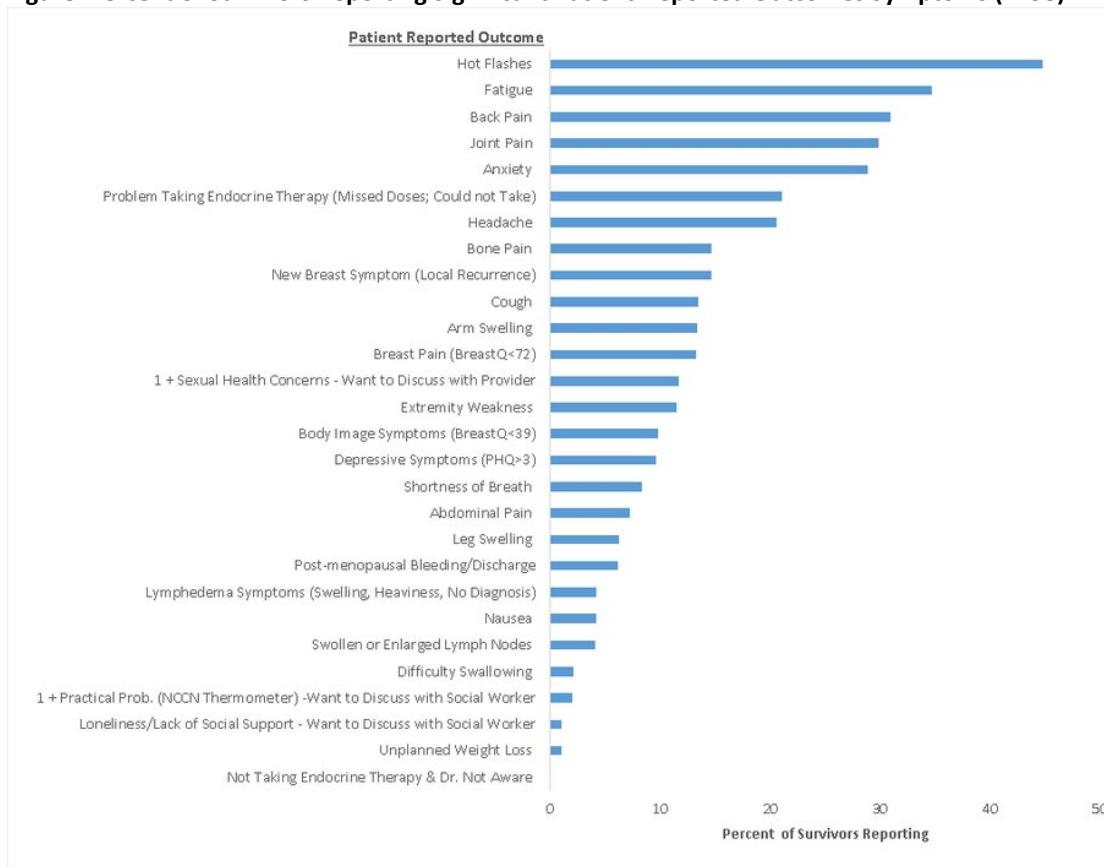
Background/Objective: More than 3.5 million breast cancer survivors living in the United States require follow-up care for recurrence, treatment adherence, and symptom management. Because of the time-limited nature of a follow-up face-to-face oncology visit, the current approach to follow-up does not readily allow for a comprehensive assessment of survivor symptoms or concerns during the visit. Although prior studies have described the symptom experience of survivors during treatment or diagnosed with later-stage breast cancer, less is known about the symptom experience of survivors with early-stage disease and low risk of recurrence. The study objective was to assess the prevalence of symptoms and concerns experienced by survivors with early-stage breast cancer following active treatment.

Methods: Survivors were eligible if they had a history of Stage I-II estrogen or progesterone receptor-positive, HER2neu-negative breast cancer, were 6 months to 5 years post-diagnosis, were cancer free, and did not receive chemotherapy. Survivors were enrolled at the time of their follow-up visit at the University of Wisconsin Breast Center and emailed a link to a REDCap survey. Survivors who preferred a paper survey were sent the instrument by mail. Reminder emails and calls were initiated 48 hours after enrollment if there was no response. The survey included patient-reported outcomes (PRO) addressing survivorship domains informed by ASCO survivorship guidelines and 10 survivor and provider stakeholders (Figure). Survivors were asked about the presence/absence of these concerns, along with frequency and the extent to which concerns interfered with their life. Concerns were considered to be clinically significant if they: 1) were moderate to severe, 2) interfered with their life quite a bit or very much, or 3) otherwise met a validated clinically relevant threshold identified for the PRO scale (e.g., depression screening). The proportion of survivors experiencing these clinically significant concerns are reported.

Results: Of 130 patients approached, 76.1% (n=99) enrolled, and 99.0% (n=98) of those who enrolled completed the assessment. On average, participants were 61.3 years of age (SD=11.5) and 2.5 years from diagnosis (SD=1.2), with 71.3% undergoing a breast-conserving procedure. On average, the percentage of participants who chose not to respond to certain topics was low (2.0%), with the topic of sexual health skipped most frequently (14.3%). The vast majority (86.7%) of survivors experienced clinically significant concerns, with 38.8% reporting 1-2, and 47.9% reporting 3 or more concerns. The most common clinically significant concerns are presented in the figure.

Conclusions: Early-stage breast cancer survivors report a high burden of symptoms and concerns. Given that nearly 50% of survivors report 3 or more concerns, many topics may not be discussed or addressed during the course of a regular time-limited follow-up visit. Some concerns, such as sexual health, may not be feasible to address in the clinic visit given their complex and sensitive nature. Use of patient-reported outcomes to assess symptoms and concerns in survivors diagnosed at an early stage allows for a comprehensive evaluation with identification of previously unrecognized needs. This represents a clear opportunity to improve survivorship care.

Figure. Percent of Survivors Reporting Significant Patient-Reported Outcomes Symptoms (n=98)



139 - Improvement in Breast Reconstruction Disparities Following Medicaid Expansion Under the Affordable Care Act

Kirithiga Ramalingam¹, Liang Ji¹, Saeed Pairawan¹, David Caba Molina¹, Sharon S. Lum^{1,2}

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Background/Objective: Disparities in breast reconstruction have been well documented. With enactment of the Affordable Care Act in 2010, subsequent Medicaid expansion effective January 1, 2014 aimed to increase access to health care. We sought to determine the effect of Medicaid expansion on use of breast reconstruction.

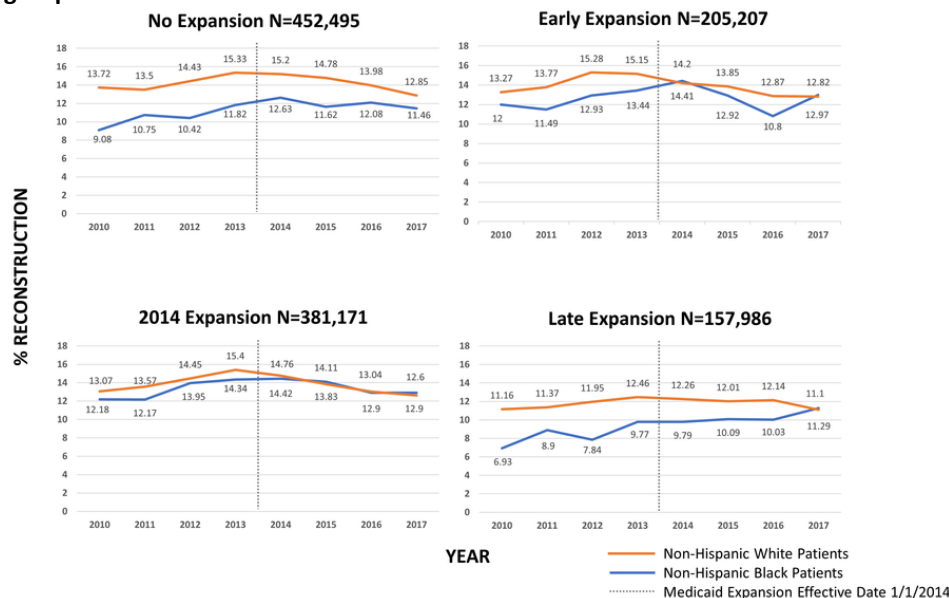
Methods: All non-Hispanic black (NHB) and non-Hispanic white (NHW) breast cancer patients ≥ 40 years who underwent mastectomy with or without reconstruction between 2010-2017 were selected from the National Cancer Database (NCDB). Multivariable logistic regression was used to evaluate the association between breast reconstruction, age, race/ethnicity (R/E), residence area, median income, education level, insurance type, Charlson-Deyo score, stage, year of diagnosis, and state Medicaid expansion status. Medicaid expansion was categorized by expansion date as early (2010-2013), 2014 (1/2014), late (after 1/2014), or no expansion. Difference in difference regression analyses with

interaction terms were used to test if annual trends for use of breast reconstruction by NHB vs. NHW patients, income quartiles, and 4 education levels differed by Medicaid expansion status.

Results: Of 1,196,859 patients, 13.49% (n=161,480) underwent reconstruction, 12.48% (n=149,332) were NHB, 20.16% (n=241,285) had median income <\$40,227, and 15.67% (n=187,542) were in the lowest education level. An upward annual trend in the proportion of patients undergoing reconstruction peaked in 2013 at 13.83% and then declined (10.98% in 2010 and 11.45% in 2017, $p < 0.0001$). Multivariable analysis confirmed that patients who were younger, NHW, higher income or education levels, lower comorbidity index, insured, and non-metastatic had significantly higher odds of undergoing reconstruction. Unadjusted proportions of NHB vs. NHW patients who underwent reconstruction by Medicaid expansion group are shown in the Figure. In non-expansion states, lower proportions of NHB patients underwent reconstruction than NHW patients in all years, with the smallest disparity [NHB%-NHW%] (-1.39%) in 2017. The proportion of NHB patients who underwent reconstruction exceeded that of NHW patients for the first time in early-expansion states in 2014 (+0.21%), in 1/2014 expansion states in 2015 (+0.28%), and in late-expansion states in 2017 (+0.19%). Similar findings for convergence of reconstruction utilization rates for lowest education levels and income quartiles were found regarding timing of Medicaid expansion, with no convergence seen in non-expansion states over the study period. Parity in reconstruction was achieved by 4th vs. 3rd income quartiles in early-expansion states in 2013 (+0.12%) and in late-expansion states in 2015 (+0.72%) but remained unimproved in non-expansion states in 2017 (-1.69%). The 2 lowest education levels achieved parity in 1/2014 expansion states in 2015 (+0.01%) but remained disparate in non-expansion states in 2017 (-1.73%). Annual trends for utilization of breast reconstruction by R/E, income, and education category when comparing Medicaid expansion status showed significant differences ($p < 0.0001$ for all tests of interactions).

Conclusions: Improvement in disparities in utilization of breast reconstruction for NHB, lower income, and less educated patients undergoing mastectomy for breast cancer followed temporal patterns of Medicaid expansion. Despite a recent overall decline in breast reconstruction, failure to achieve parity without Medicaid expansion should raise caution about reducing Medicaid access.

Figure. Unadjusted proportions of NHB vs. NHW patients who underwent reconstruction by Medicaid expansion group 2010-2017



Scientific Oral Presentations II

Sunday, May 2, 2021 10:30 am – 11:30 am

Moderators: Henry Kuerer, MD, PhD; Elizabeth Shaughnessy, MD

167 - Cutting Instruments to Cut Costs: A Simple Initiative with Breast Surgical OR Trays That Resulted in Substantial Savings

Jandie Schwartz, Lindsey Kirkpatrick, Joanna Lee, Jennifer Steiman, Atilla Soran, Ronald Johnson, Priscilla McAuliffe, Emilia Diego

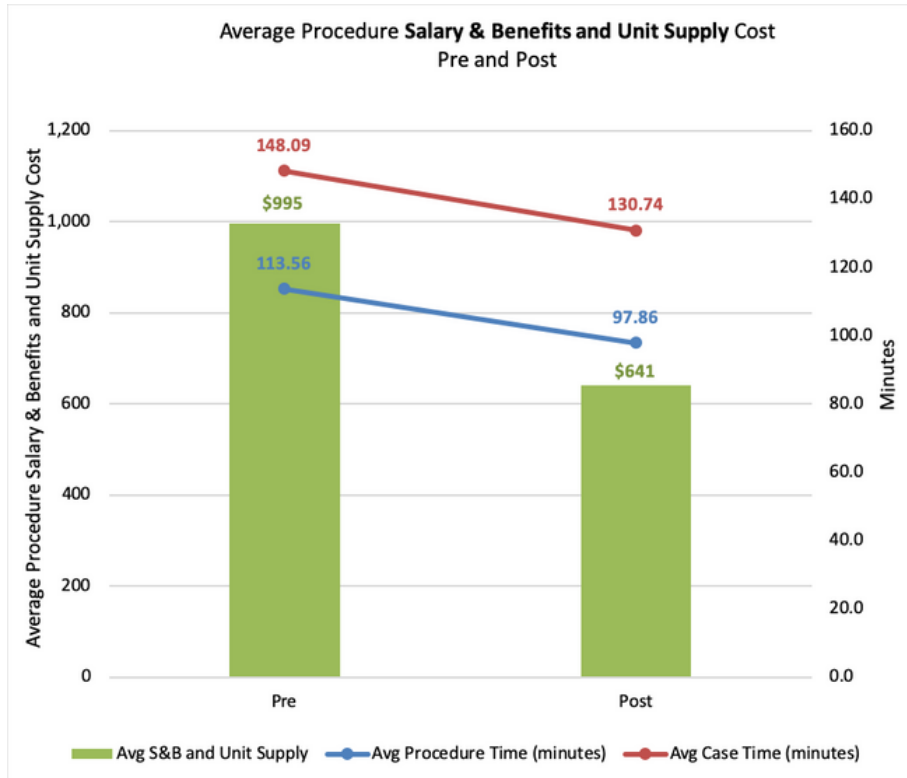
University of Pittsburgh, Magee Women's Hospital, Pittsburgh, PA

Background/Objective: Health care systems aim to deliver high-quality, value-based, and cost-effective patient care. Though most strategies for cost-effectiveness are system-wide initiatives, service line adjustments on a smaller scale may also have a meaningful impact. A substantial expense in surgical care is cost incurred in the operating room (OR). We therefore sought to evaluate the financial effect of a systematic reduction in breast instruments tray on the charges for specific procedures. We hypothesized that this simple intervention would have a direct and measurable effect on the procedure charges and translate into substantial cost-savings in a high-volume center.

Methods: With approval of the institutional quality improvement board and in collaboration with the Quality, Safety and Innovation Center, a catalog of the OR tray historically used for breast procedures (excisional breast biopsy, segmental mastectomy, and total mastectomy with or without axillary staging) was reviewed by 5 dedicated breast surgeons and downsized to a single tray accommodating all surgeon preferences in March 2019. Using OR scheduling software, a matched-case comparison was performed pre- and post-downsizing. Cost analysis for salary and benefits (S&B) and unit supply cost (USC: variable unit OR, drug supply, and operating cost) pre- and post-downsizing were carried out as these variables most directly reflect the impact of the intervention. Combination cases with plastic surgery were excluded to reduce variability. A 2-sample 2-tailed t-test was calculated per procedure type with significance set at a p-value <0.05. Instrument number, OR tray weights, set-up, and breakdown times were also compared.

Results: Comparing 449 matched cases (239 pre- and 210 post-downsizing), there was a significant decrease in combined S&B and USC post-downsizing for all procedures when analyzed collectively (p<0.05). With an average variance of S&B and USC (post- to pre-intervention) of \$354, and an annualized case load of 813 procedures, this could translate into an annualized S&B and USC savings of \$287,852 (Figure). Post-downsizing, there was a 49% reduction in instrument count (132 to 67) and 34% reduction in tray weight (30 to 20 pounds). Scrub technician set-up was faster by 2 minutes and breakdown shorter by 20 seconds. Incidental note was also made of a decrease in average procedure time (cut-to-close) from 114 to 98 minutes and average case time (wheels-in to wheels-out) from 148 to 131 minutes.

Conclusions: The simple intervention of downsizing the breast tray resulted in a decrease in combined S&B and USC per procedure, leading to a substantial benefit in cost-savings for the health system. This measure aligns with a value- and quality-based approach to patient care and can be easily replicated across institutions and specialties. Further investigation should be performed to determine if this intervention also impacted procedure and case times to extrapolate OR cost savings, as well as staff satisfaction given the change in tray weights and set-up times.



211 – Nipple-Sparing Mastectomy: Are We Providing Proper Prophylactic Antibiotic Coverage?

Ayat S ElSherif, Daniela Cocco, Andi Cummins, Steven Bernard, Risal Djohan, Graham Schwarz, Chao Tu, Stephanie A Valente
Cleveland Clinic, Cleveland, OH

Background/Objective: Infection following implant-based reconstruction (IBR) can be a devastating complication for both patient and surgeon, potentially resulting in reconstruction failure. There are multiple components for surgical site infection (SSI) prevention, with a main factor being perioperative antibiotic coverage of gram-positive organisms and other skin flora. However, with the rise in popularity of nipple-sparing mastectomy (NSM) for its oncologic safety and superior aesthetic outcomes, there is a possibility that intact nipple areolar complex acts as a portal and/or nidus for different ductal organisms, such as gram-negatives and anaerobes. As such, bacteriology of SSI seen in this setting may not be adequately covered by current antibiotic recommendations. This study sought to better identify the

appropriate prophylactic antibiotic choice and examine the impact of these infections on reconstruction failure rate and microbial species implicated.

Methods: An IRB-approved prospective database identified all patients who underwent NSM with IBR at a large academic institution from 2010-2019. Patient characteristics, operative details including mastectomy incision, IBR type (tissue expander (TE)/implant), and placement (subpectoral/prepectoral) were recorded. Perioperative antibiotic regimen was documented. SSI incidence, management and causative organisms were analyzed. Logistic regression evaluated effect of antibiotics on SSI. Multivariate analysis was used to identify factors associated with SSI.

Results: A total of 571 NSM and IBR were performed in 347 patients. Median age was 48 years. NSM was performed through inframammary incision in 73%. IBR type was direct to implant in 55% (n=312) and TE in 45% (n=259), placed sub-pectoral 64%, and pre-pectoral 36%. Preoperative intravenous antibiotics were administered in 98% of reconstructions, which consisted of cephalosporin (65%), combination of cephalosporin and ciprofloxacin (15%), clindamycin (9%), or other. Postoperative oral antibiotics were given in 97% of reconstructions and continued until time of drain removal. The incidence of nipple/skin ischemia was 8.5%. Overall, 13% of patients required post-mastectomy radiation. SSI developed in 12% of reconstructions (n=69); 47% managed with antibiotics alone, and 53% required reoperation. Patients with TE developed SSI at greater frequency than implant reconstruction (15% vs 9%, $p=0.04$) and were more likely to develop a delayed SSI (after 90 days) ($p<0.001$), but also had a higher incidence of radiation (19% TE vs 7% implant). In total, 67% of patients with SSI had wound culture identifying no bacterial growth 41%, staphylococcal species 26%, MRSA 9%, pseudomonas 9%, serratia marcescens 7%, or others 8%. There was no difference between incidence or severity of SSI infection and antibiotic choice. MVA showed that BMI (≥ 30), radiation, and chemotherapy were significant risk factors for developing SSI, but not antibiotic choice. Ultimately, 25% of patients with SSI had reconstruction failure.

Conclusions: Although infection is a well-known complication of IBR, few studies have specifically examined the bacterial flora in NSM patients in relation to antibiotic coverage. This study demonstrates that patient and treatment factors continue to carry the highest risk for SSI. A more aggressive antibiotic choice, specifically dual coverage, does not reduce SSI incidence and is unnecessary, as it carries a potential hazard of antibiotic resistance emergence.

90 - Clinical Course of Breast Cancer Patients with Local Regional Progression During Neoadjuvant Systemic Therapy

Leisha C Elmore, Henry M Kuerer, Carlos H Barcenas, Benjamin D Smith, Makesha V Miggins, Anthony Lucci, Abigail S Caudle, Funda Meric-Bernstam, Kelly K Hunt, Mediget Teshome
The University of Texas MD Anderson Cancer Center, Houston, TX

Background/Objective: Neoadjuvant systemic therapy (NST) represents the standard for locally advanced breast cancer and is now frequently considered for earlier-stage and node-positive patients. Although progression of disease during NST is infrequent, the prognostic significance of progression with current systemic therapies has not been recently evaluated. Our study aimed to evaluate the treatment course and clinical outcomes in patients with disease progression during NST.

Methods: A prospectively collected institutional database was queried to identify clinicopathologic and treatment information for women diagnosed with unilateral Stage I-III breast cancer between 2005-2015. Patients with bilateral breast cancer, another synchronous malignancy, or recurrent disease were excluded. Patients undergoing NST with documented local-regional progression by clinical exam and/or imaging after 2 or more cycles of chemotherapy were included. Patients were classified by receipt of surgery, and outcomes compared. The Kaplan-Meier method was used to determine overall and distant disease-free survival. Factors associated with survival were modeled with univariate and multivariate Cox proportional hazard regression.

Results: Of 6364 patients treated with NST during the study period, 126 (2.0%) developed local-regional disease progression. Clinicopathologic features describing this population are outlined in the Table. At a median live follow-up of 71 months, 23% (n=29) were alive without disease. Median overall survival time for patients with progression was 26 months (95% CI 21.3, 30.7), and median distant disease-free survival was 14 months (95% CI 11.6, 16.4). Triple-negative receptor status (TNBC) was associated with a higher likelihood of death (HR 2.65, 95% CI 1.66,4.23; p=.001) and development of distant metastatic disease (HR 1.99, 95% CI 1.18, 3.23; p=0.01), compared to those with hormone receptor-positive, HER2-negative disease. Patients with cN3 nodal disease had significantly lower survival (HR 1.86, 95% CI 1.01 to 3.42; p=0.047) when compared to patients with cN0 disease at time of presentation. One hundred two patients (81.0%) were treated with surgery after progression on NST. Mastectomy was performed in 93 (91.2%) women and axillary lymph node dissection in 80 (78.4%) patients. Negative surgical margins were achieved at index operation in 96 (94.1%) patients. No patients had a pCR. Among patients who had surgery, 39 (38.2%) developed locoregional recurrence, and 65 (63.7%) developed distant metastasis at a median overall follow-up of 26.5 months. Median overall survival time was 32 months (95% CI 25.9, 38.1), and median distant disease-free survival was 17 months (95% CI 10.1, 23.9) in patients who had surgery. Patients with TNBC treated with surgery had a median overall survival of 18 months (95% CI 13.4,22.6, n=45). Of 33 patients with inflammatory breast cancer, 20 (60.1%) had surgery with a median overall survival of 21 months (95% CI 12.5,29.5).

Conclusions: Local-regional disease progression during neoadjuvant systemic therapy was relatively rare and associated with poor prognosis. The high rates of locoregional and distant failure in this population suggests aggressive tumor biology and the need to study novel systemic therapies. Poor survival outcomes despite surgical management highlight the importance of careful patient selection when considering operative intervention after progression on NST.

Table. Clinicopathologic features and clinical outcomes of patients with local regional disease progression while on neoadjuvant systemic therapy

Demographic/Characteristic	Entire Cohort (n=126)		No Surgery (n=24)		Surgery (n=102)	
	N	%	N	%	N	%
Age, years						
Median	48		47		48	
Range	23-76		29-76		23-74	
Race/Ethnicity						
White	74	58.7	11	45.8	63	61.8
African American	26	20.6	6	25.0	20	19.6
Asian/Pacific Islander	9	7.1	1	4.2	8	7.8
Spanish/Hispanic Origin	13	10.3	5	20.8	8	7.8
Other	4	3.2	1	4.2	3	2.9
Menopausal Status						
Premenopausal	66	52.4	15	62.5	51	50.0
Peri/postmenopausal	60	47.6	9	37.5	51	50.0
Clinical T stage						
T1	5	4.0	1	4.2	4	3.9
T2	53	42.1	0	0.0	46	45.1
T3	25	19.8	7	29.2	25	24.5
T4	43	34.1	16	66.7	27	26.5
Clinical N Stage						
N0	47	37.3	7	29.2	40	39.2
N1	49	38.9	7	29.2	42	41.2
N2	7	5.6	2	8.3	5	4.9
N3	23	18.3	8	33.3	15	14.7
Histology						
Ductal	107	84.9	22	91.7	85	83.3
Lobular	5	4.0	0	0	5	4.9
Mixed Ductal/Lobular	2	1.6	0	0	2	2.0
Metaplastic	8	6.3	0	0	8	7.8
Breast cancer, Other	4	3.2	2	8.3	2	2.0
Receptor Status						
HR+, HER2+	10	7.9	2	8.3	8	7.8
HR+, HER2-	48	38.1	8	33.3	40	39.2
HR-, HER2+	10	7.9	1	4.2	9	8.8
HR-, HER2-	58	46	13	54.2	45	44.1
Nuclear Grade						
I	2	1.6	0	0	2	2.0
II	13	10.3	2	8.3	11	10.8
III	104	82.5	20	83.3	84	82.4
Not Reported	7	5.6	2	8.3	5	4.9
Ki-67 score						
Median	70		80		67	
Range	10-97		50-95		10-97	
Median Overall Follow-Up, Months						
Median	25.0		13		26.5	
Range	4-166		4-44		4-166	
Median Live Follow-Up, Months						
Median	71.0		6		74	
Range	4-166		4-8		4-166	
Distant Metastasis						
No	39	31.0	2	8.3	37	36.3
Yes	87	69.0	22	91.7	65	63.7
Disease Status at Last Follow-up						
Alive – No Evidence of Disease	29	23.0	0	0	29	28.4
Alive – Disease Recurrence	6	4.8	2	8.3	4	3.9
Death from Disease	88	69.8	21	87.5	67	65.7
Death from Other Cause or Unspecified	3	2.4	1	4.2	2	2.0
Median Distant Disease-Free Survival, months						
Median	14.0		6.0		17.0	
95% CI	11.6, 16.4		4.8, 7.2		10.1, 23.9	
Median Overall Survival, months						
Median	26.0		14.0		32.0	
95% CI	21.3, 30.7		8.3, 19.7		25.9, 38.1	

245 – High-Resolution, Full-3D Specimen Imaging for Lumpectomy Margin Assessment

Swati Kulkarni¹, Ingrid Reiser², David Schacht¹, Sonya Bhole¹, Kirti Kulkarni², Hiroyuki Abe², Jean Bao², Kevin Bethke¹, Nora Hansen¹, Nora Jaskowiak², Seema Khan¹, Jennifer Tseng², Buxin Chen², Jennifer Pincus¹, Jeffrey Mueller², Bazil LaBomascus¹, Zheng Zhang², Dan Xia², Xiaochuan Pan², Christian Wietholt³, Dimple Modgil³, David Lester³, Li Lan³, Bidur Bohara³, Xiao Han³

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Background/Objective: Reducing re-excision rates is of significant interest for breast surgeons. The availability of fast, accurate, intraoperative margin assessment is essential to achieving this goal. Current 2D and tomosynthesis imaging yields image data that lack high depth resolution leading to the need for additional surgery. Recently, a volumetric specimen imager (VSI) has been developed to provide full-3D and thin-slice cross-sectional visualization at 360-degree view angle, allowing more precise localization and orientation of close or positive margins. In this multi-institutional prospective clinical trial, we hypothesize that VSI allows us to obtain intraoperative margin status that better correlates with final pathologic margin status compared to currently available imaging modalities.

Methods: There were 379 patients undergoing wire or seed localized lumpectomy for benign or malignant disease who were accrued from 2 different institutions. After standard-of-care specimen imaging and interpretation was performed, the lumpectomy specimen was imaged with the VSI device before pathology evaluation. Image interpretation was performed post-surgery by 3 breast imagers (2 at site #1 and 1 at site #2) based on VSI, 2D specimen mammography (site #1), tomosynthesis (site # 1), and Faxitron (site # 2). For each specimen, the radiologist assigned a likelihood value for each of the 6 lumpectomy main specimen margins being a positive margin, where 0% indicates “definitely negative margin,” and 100% indicates “definitely positive margin.” Final histopathology margin status was obtained from surgical pathology reports, which was used for calculating true positives and false positives in the imaging-based margin assessment results. For malignant disease, positive margins were defined as ink on tumor for invasive carcinoma and 2mm for ductal carcinoma in situ. Finally, true-positive rates and false-positive rates were computed, and the data were plotted in a receiver operating characteristic (ROC) curve for each modality. Area-under-the-curve (AUC) was computed to characterize the performance of the imaging modality interpreted by each user.

Results: Of the 200 malignant lesions analyzed to date, (site #1:82 (IDC:61, ILC: 5, DCIS:16), site #2: 118 (IDC: 91, ILC: 6, DCIS: 21)), 1200 margins were interpreted. The Figure shows example images of mammography, tomosynthesis, and VSI, along with ROC curves from 1 reader. The AUC values of VSI for 3 readers are 0.92, 0.89, and 0.95, which show relative improvement of over AUCs of 2D mammography (56.4% and 61.6%), Faxitron (43.7%), and tomosynthesis (47.3% and 66%). The VSI has sensitivity ranging 86.7% - 93.8%, specificity 85.4% - 89.6%, positive predictive value 53.4% - 57.7%, and negative predictive value 97.4% - 99.0%.

Conclusions: VSI’s ROC curves are considerably higher than those of other specimen-imaging modalities under comparison. Full-3D specimen imaging for breast cancer can improve correlation between the main specimen margin status and final pathology results. Findings from this study suggest that using the VSI device for performing intraoperative margin assessment in conjunction with shave margin techniques could further reduce the re-excision rates in women with malignant disease.

Figure. Example specimen images and ROC curves

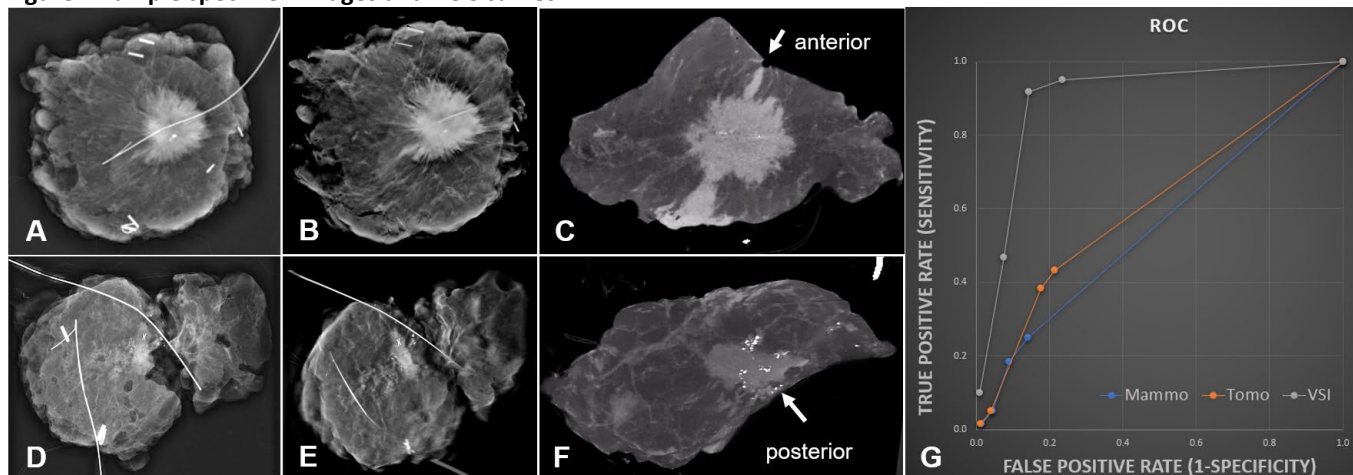


Figure 1 Example specimen images and ROC curves.

A-C: Specimen with invasive carcinoma involving the anterior margin imaged using mammography (A), tomosynthesis (B), and VSI (C). D-F: Specimen with ductal carcinoma in situ at the posterior margin imaged using mammography (A), tomosynthesis (B), and VSI (C). G: ROC curves of the interpretation from mammography, tomosynthesis, and VSI by one of the study radiologists.

242 - Analysis of the Impact of the COVID-19 Pandemic on the Multidisciplinary Management of Breast Cancer: Review From the First 8 Months of the American Society of Breast Surgeons COVID and Mastery Registries

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Background/Objective: The COVID-19 pandemic resulted in rapid and regionally different approaches to breast cancer care as well as prioritization based on tumor subtype. We hypothesized that the percentage of patients with estrogen-positive cancer receiving neoadjuvant endocrine therapy (NET) would increase. To evaluate this and other changes, a COVID-specific registry was developed within the American Society of Breast Surgeons (ASBrS) Mastery program. Herein, we report the initial impact of the COVID-19 pandemic through analysis of the first 8 months of the COVID-19-specific as well as Mastery registries.

Methods: In March 2020, surgeons began entering patient demographic data as well as surgical and medical care (NET vs Neoadjuvant chemotherapy (NCT)) into an embedded COVID-19 specific registry. Data fields tracked whether decisions were usual for that practice or modified due to COVID-19. Surgeons could also continue to enter data into the Mastery without COVID-19-specific information.

Results: Between 3/1 and 10/28/2020, 172 surgeons entered data on 2476 unique COVID registry and 2303 Mastery registry patients with receptor data. The majority of surgeons entered 10 to 99 patients (73%), were from urban/large urban areas (65%) and reported stopping mammographic screening

during part of this time period (95%). Regional surgeon distribution was Northeast 38%, Midwest 22%, Southeast 17%, Southwest 12%, Northwest 11%. Mean patient age was 62.7, with 9.3% African American and 6.4% Hispanic. In the COVID-19 registry, initial consultation occurred infrequently via telehealth (6.8%; 170), and only 1.5% developed COVID-19 (38). The mean invasive tumor size was 2.1cm, 19% were node-positive (389), and 11% (214) triple-negative. The Table describes treatment approaches for these patients. IN ER +/HER2-disease, NET was used as a “usual” approach in 100 (6.5%) patients in the COVID-19 registry, which was similar to 64 patients (7.8%) undergoing NET in the Mastery. NET was used due to COVID-19 in an additional 554 (36%) patients. In multinomial regression with surgery first/usual practice as the reference, patients were more likely to receive NET due to COVID-19 with increasing age as well as if they lived in the North or Southeast (OR 1.1, 2.2 and 1.6; p<0.05). Genomic testing was performed on 643 patients, of which 154 (24%) had the testing done on the core due to COVID-19. Patients were less likely to have genomic testing on the core due to COVID-19 if they were older (OR 0.89; p=0.01) and more likely if they were node-positive (OR 3.9; p<0.05). A change in surgical approach due to COVID-19 was reported for 269 patients (10.8%) with primary reasons noted as planned return for mastectomy (27%) or reconstruction (15%).

Conclusions: Greater than one-third of patients with ER-positive breast cancer were treated with NET due to COVID-19. Genomic testing on cores helped guide first treatment decisions. More than 10% of patients will return for another surgery. The ASBrS COVID-19 registry represents an important platform to report management changes encountered during the initial 8 months of the pandemic and highlights both treatment changes as well as adherence to standard therapeutic approaches.

Table. Treatment approach in the COVID-19 registry by approximated subtype

Tumor Subtype	DCIS	Invasive Cancer (total)	Invasive ER+/HER2-	Invasive ER any/HER2+	Invasive Triple negative
Primary Surgery (usual) (Mean time to surgery = 44 days)	242(56%)	786 (39%)	659 (43%)	51 (19%)	66 (31%)
Primary Surgery (due to COVID)	33 (7.6%)	46 (2.3%)	31 (2%)	7 (2.6%)	7 (3.3%)
Neoadjuvant chemotherapy (usual)	NA	471 (23%)	141 (9.2%)	183 (69%)	133 (62%)
Neoadjuvant chemotherapy (due to COVID)	NA	65 (3.2%)	44 (2.9%)	12 (4.5%)	8 (3.7%)
Neoadjuvant endocrine therapy (usual)	11 (2.5%)	105 (5.1%)	100 (6.5%)	4 (1.5%)	0
Neoadjuvant endocrine therapy (due to COVID)	148 (34.1%)	569 (28%)	554 (36%)	9 (3.4%)	0

Quickshot Presentations

Saturday, May 1, 2021 10:00 am–10:45 am
Moderators: Eli Avisar, MD, Brigid Killelea, MD, MPH

37 - Controversial Areas in Axillary Staging: Are We Following the Guidelines?

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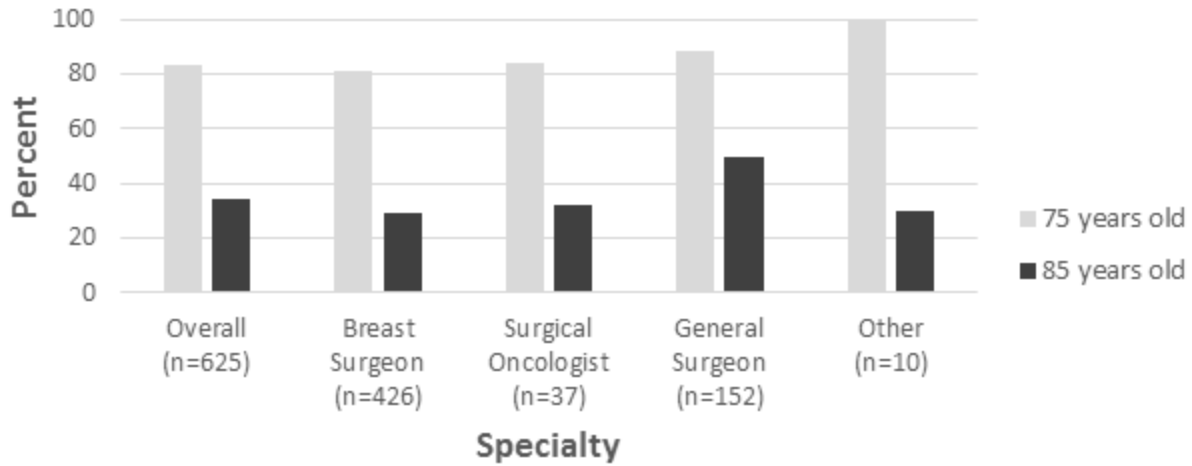
Background/Objective: Sentinel lymph node biopsy (SLNB) has been the standard of care for clinically node-negative women with invasive breast cancer (IBC) for many years. However, there has been less agreement on whether to perform SLNB in patients where the risk of axillary metastasis is low, such as in the setting of high-risk DCIS or in women over 70 years old. We sought to examine the practice patterns of SLNB in these controversial scenarios among the members of the American Society of Breast Surgeons (ASBrS) to determine if better education may benefit our members.

Methods: An IRB-approved online survey was sent via email to all active members of the ASBrS in January 2020 asking in which scenarios a physician would opt for or against axillary staging. Data were collected through February 2020. Descriptive statistics and univariate analysis were performed using SPSS software.

Results: Out of 2864 active members, 666 responded to the survey, and 625 completed the survey in its entirety. Of these 625 members, 68% identified as breast surgical oncologists, 6% surgical oncologists, 24% general surgeons, and 2% other. The majority practiced in a community setting (65%) versus an academic setting (35%). In a healthy female with clinical T1N0 hormone receptor-positive (HR+) IBC, 83% favored SLNB if the patient was 75 years old, versus 35% if the patient was 85 years old. Surgeons practicing in an academic setting were less likely to perform axillary staging in a healthy 75-year-old ($p=0.004$) or a healthy 85-year-old ($p<0.001$) patient. Breast surgical oncologists were also less likely to perform a SLNB in a healthy 85-year-old patient ($p<0.001$) than other specialties. Fifty-seven percent of respondents stated they changed their practice for women over age 70 in the last 1-3 years based on new guidelines, especially in female respondents as compared to males (69% versus 31%, respectively, $p<0.001$). For DCIS, 33% endorsed SLNB in women 55 and younger undergoing lumpectomy, regardless of hormone receptor status. Breast surgical oncologists and those practicing in an academic setting were less likely to perform axillary staging at the time of a lumpectomy for DCIS ($p<0.001$ and $p<0.001$, respectively).

Conclusions: Despite studies showing that omitting axillary staging in older patients with HR+ IBC does not impact regional control or survival, the majority of surgeons are still opting for axillary staging. In addition, one-third are still performing axillary staging for lumpectomies for DCIS. Breast surgical oncologists and surgeons in academic settings were more likely to be practicing based on recent data and guidelines. Practice patterns are changing, but there is still room for improvement. Thus, continued education may benefit our membership.

Figure. Percent of respondents by specialty favoring SLNB for IBC in a healthy 75-year-old woman vs a health 85-year-old woman



46 - A Survey of the American Society of Breast Surgeons Membership on Contemporary Axillary Management in Mastectomy Patients

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Background/Objective: Locoregional axillary treatment in breast cancer has evolved over the past several decades. Recent clinical trials have demonstrated the safety of axillary surgery de-escalation for certain patients. Until now, no large-scale study has specifically analyzed how these trials have impacted axillary management in patients undergoing mastectomy in clinical practice.

Methods: An anonymous, case-based survey was sent to 2,961 members of the ASBrS through Qualtrics™. Descriptive analyses were performed by the survey software and analytical statistics by R (v4.0.2) utilizing ANOVA, t-tests, and chi-squared analysis.

Results: There were 680 surgeons (23% of membership) who participated in the survey. Mean years in practice was 19.5, and 50% were fellowship trained; 42.9% were hospital employed, 31.8% in private practice, and 21.8% in academics; 51.7% routinely send SLNs for frozen section during mastectomies, and if positive, 78% proceed to ALND, while 14% wait for a multidisciplinary team decision. Less than 42% reported that reconstruction influences axillary management. Cases and responses are below:

Case 1: 57yoF with a cT1N0, ER(+), Her2(-) cancer undergoes mastectomy, SLNB, and reconstruction.

Pathology reveals 2/3+ SLNs with 2mm tumor deposits. Survey results show that 60.4% reported they would proceed with axillary radiation therapy (aRT), 23.5% with ALND, 7.4% with ALND+aRT, 7.2% would perform no further therapy, and 1.4% chose “other.” Surgeons who identified that 82% or more of their practice is breast focused were more likely to proceed with some type of axillary therapy, while those

with <68% were more likely to recommend no further therapy ($p=0.018$). Treatment did not vary by experience, practice setting, or fellowship training.

Case 2: 69yoF with a cT1N0 ER/PR(-), Her2(+) cancer undergoes mastectomy and SLNB. Pathology demonstrates 4+ SLNs without extra-nodal extension. Survey results showed that 49.4% reported they would proceed with ALND+aRT, 35% with ALND, 14.6% with aRT, and 1% chose no further therapy/other. On average, those in practice >23 years were more likely to recommend aRT only compared to those in practice for <19 years who more often recommended ALND with or without aRT ($p=0.01$). Surgeons who identified that >81% of their practice is breast focused were more likely to recommend ALND with/or without aRT, while those with <72% recommended aRT ($p<0.001$). Surgeons in academic practice more often recommended dual therapy (61.5%) compared with all other practice types (<48%) ($p=0.008$).

Case 3: 38yoF with a cT1N0 ER(+) Her2(-) cancer undergoes mastectomy, SLNB, and TE reconstruction. You send the SLNs for frozen and 1/2 SLNs has a 4mm tumor deposit. Survey results showed that 42.9% would proceed with ALND, 25.9% with aRT, 6.4% with ALND+aRT, 12.2% with no additional therapy, and 2.6% chose "other." No respondent variables were associated with treatment decisions.

In all cases, decisions were primarily influenced by national guidelines and clinical trial evidence, specifically the Z11 and AMAROS trials. Decisions were occasionally influenced (<19%) by radiation availability and the opinions of radiation oncologist(s) in their practice.

Conclusions: There is significant heterogeneity amongst US breast surgeons in axillary management in node-positive mastectomy patients. Both surgeon education on clinical trial data, multidisciplinary care, and development of clearer axillary guidelines can aid in appropriate axillary de-escalation opportunities.

82 - Objective Assessment of Post-Operative Morbidity Following Breast Cancer Treatments with Wearable Activity Monitors - The BRACELET Study

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Background/Objective: Quality of life in survivorship is an increasing issue given the prevalence and improved survival rate following breast cancer treatment. Many of the treatments responsible for improved outcomes are often associated with long-term morbidity such as pain, reduced movement, weakness, and lymphoedema. Axillary node clearance (ANC) patients experience more upper limb dysfunction (ULD) compared to radiotherapy and sentinel lymph node biopsy (SLNB). The complication rates after breast reconstruction are high and tend to be higher after autologous procedures. Historically, there has been inadequate monitoring of ULD, partly due to a lack of focus on survivorship and treatments. Studies show that rehabilitation can reduce ULD. Validated tools to measure ULD, such as questionnaires are mainly subjective, prone to bias, and provide poor comparison between patients. Wearable activity monitors (WAMs) are a novel tool that can achieve a continuous, objective assessment of functional recovery by measuring activities after breast surgery. The aims of this study

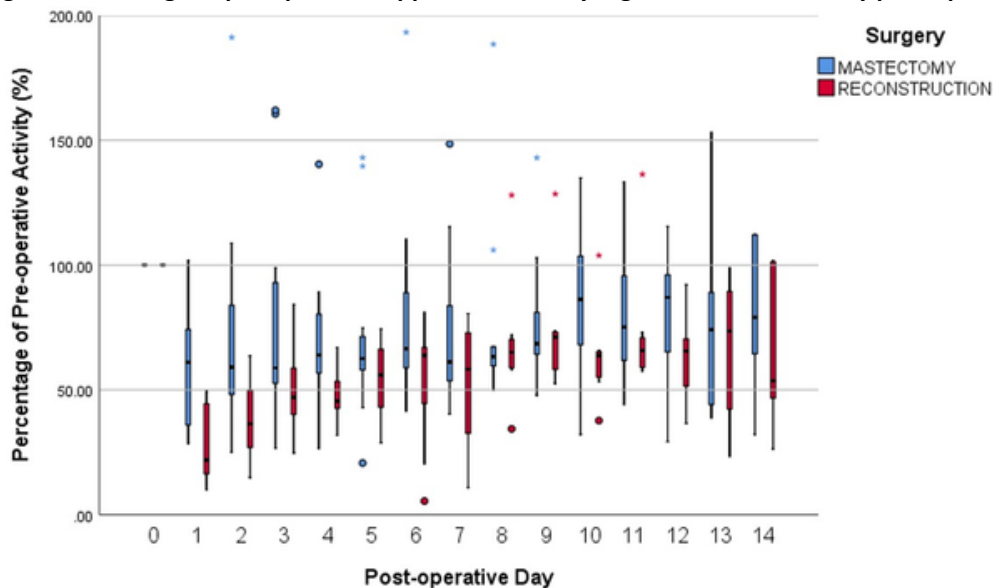
were to: 1) objectively assess arm activities after breast surgery using WAMs; 2) compare between surgery types.

Methods: A single centre, prospective observational study was conducted involving 45 patients. Consecutive patients undergoing lumpectomy, mastectomy, SLNB, ANC, and immediate breast reconstruction (IBR) were identified from theatre lists. Eligible consented patients wore WAMs (AX3, Axivity, UK – triaxial accelerometer) on both wrists at least 1 day pre- and up to 2 weeks post-operatively, and complete Disability of the Arm, Shoulder, and Hand, and quality of life (EQ-5D) questionnaires. Statistical analysis was performed to determine the recovery plateau and differences in activity between arms and surgeries.

Results: Regain of function was seen through the increase of activity during the post-operative period, with the greatest increase between day 1 (mean 39.3+/-17.3, $p<0.05$) and 2 (mean 48.2+/-21.6, $p<0.05$) with recovery plateau at day 6. Greater activity was observed in the control arm compared to the operated arm with a significant difference ($p<0.05$) in week 1. Pre-operative activity levels in the IBR group were 41% greater ($p<0.05$) than those undergoing MTX. The post-operative activity on day 1 reduced to 25% of pre-operative levels before returning to 63.9% on day 14 for IBR. The post-operative activities for MTX reduced to 58.6% of pre-operative levels on day 1 before returning to 91.1% on day 14. IBR patients have significantly lower activities in both week 1 ($p<0.005$) and 2 ($p<0.05$) compared to MTX. A similar pattern was observed in axillary surgery where patients having ANC took longer to reach pre-operative activity levels compared to SLNB.

Conclusions: IBR patients had a greater and more prolonged reduction in post-operative activities than MTX despite IBR having greater pre-operative activity levels. ANC patients showed lower post-operative activity levels compared to SLNB which is in line with anecdotal evidence in the literature. Quantifying or characterising the morbidity of different treatments may help the clinician and patient choose the most suitable modality, particularly where oncological outcomes are equivocal. Furthermore, using technology to monitoring functional recovery after surgery could support existing therapy protocols for enhanced recovery.

Figure. Percentage of pre-operative upper limb activity regained across a 14-day post-operative period



93 - Correlation of Gene-Expression from the 21-Gene Recurrence Score Between Core Biopsy and Surgical Specimen in Patients with Breast Cancer

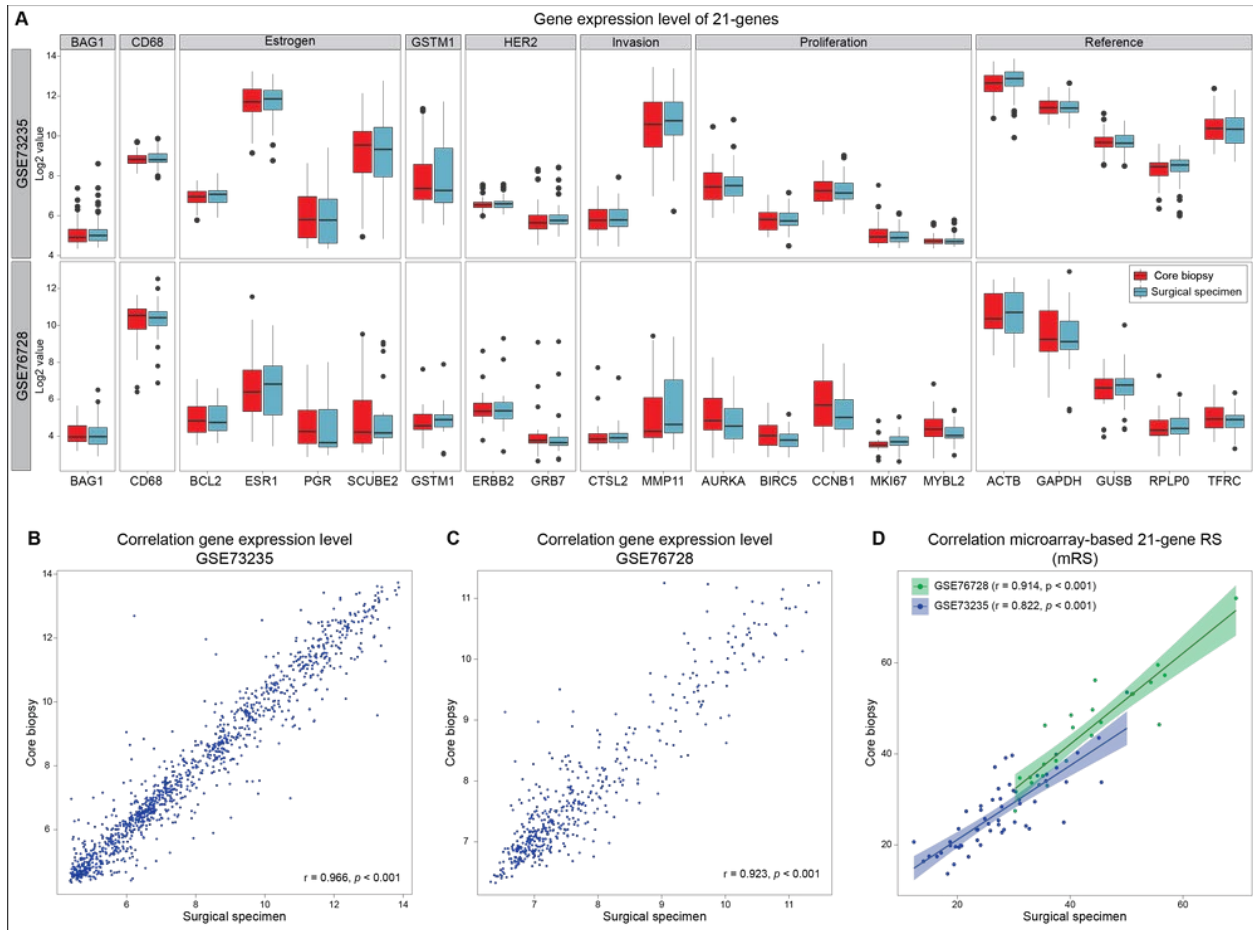
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Background/Objective: Gene expression tests traditionally performed on surgical specimens have been widely accepted as a predictor of disease recurrence in early-stage hormone receptor (HR)-positive, HER2-negative breast cancer, and have been used as a tool to determine the benefit of adjuvant systemic chemotherapy. More recently, molecular testing on core needle biopsy samples has been widely used, especially during the COVID-19 pandemic, to guide neoadjuvant systemic therapy decisions. However, the correlation of gene expression of core biopsy and matched surgical specimens has not been fully explored. Here, we aimed to establish the correlation of gene expression from the 21-gene recurrence score (RS) between paired core biopsy and surgical specimens in patients with early breast cancer (EBC).

Methods: By surveying clinically annotated gene expression array datasets from Gene Expression Omnibus (GEO), we identified a cohort of 93 patients with estrogen receptor (ER)-positive EBC with core biopsies at diagnosis matched with surgical specimens without neoadjuvant systemic therapy (GSE73235 and GSE76728). First, we evaluated gene expression differences of the 21 genes included in the RS platform, applying a paired t-test. Then, we determined the correlation between the gene expression in the core biopsy versus surgical specimens in paired samples. Finally, using the normalized and log₂transformed intensity values, we calculated the 21-gene RS, namely *microarray-based RS* (mRS) following the original RS algorithm (Paik S, et al., *NEJM* 2004;351:2817) by selecting 16 informative genes combined in groups (proliferation, estrogen receptor, HER2, and invasion) and 5 reference genes, and evaluated the mRS correlation in matched samples. Correlations were tested by the Pearson coefficient (*r*) method.

Results: Paired gene expression data were available for 78 ER-positive, HER2-negative EBC patients. Overall, there was no difference in the gene expression level of the 21 genes between core biopsy and surgical specimens in both datasets (**figure 1A**; GSE73235 upper panel, GSE76728 lower panel). Notably, there was a very high correlation in the gene expression of the 21 genes among pairs samples in GSE73235 ($r = 0.966, p < 0.001$, **figure 1B**) and GSE76728 ($r = 0.923, p < 0.001$, **figure 1C**). The correlation of the mRS slightly differed in the 2 datasets, being higher in GSE76728 ($r = 0.914, p < 0.001$) than GSE73235 ($r = 0.822, p < 0.001$, **figure 1D**).

Conclusions: This pilot study found that the gene-expression and 21-gene mRS were consistently similar between the core biopsy and surgical specimens in EBC patients. This supports the current clinical practice of utilizing the 21-gene RS done on core biopsy, especially during the COVID-19 pandemic, to determine neoadjuvant systemic treatment in patients with hormone receptor-positive, HER2-negative EBC. Further validation in paired pathologic samples with the actual 21-gene RS platform should be performed to further confirm these findings.



94 - Apocrine Breast Cancer: Unique Features of a Predominantly Triple-Negative Cancer

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Background/Objective: Apocrine carcinoma is a rare type of breast carcinoma that is interesting biologically as it expresses androgen receptors instead of estrogen and progesterone receptors. We sought to characterize demographic and clinicopathologic features of apocrine cancers and compare outcomes to non-apocrine carcinomas, both overall, and for the subset of patients with triple-negative breast cancer (TNBC).

Methods: Women with invasive apocrine carcinoma (ICD-O-3 8401/3) were retrospectively identified from the Surveillance, Epidemiology, and End-Results (SEER) database. SEERstat was queried to determine the population-based incidence and annual percentage change of apocrine cancers between 1975 and 2017. Clinicopathologic and demographic features of apocrine cancers were then compared with non-apocrine cancers in patients diagnosed from 2004-2017. Finally, data from 2010-2017 were

used to study the subset of patients with TNBC and compare patients with apocrine versus non-apocrine disease. The life table method was used to determine the 7-year breast cancer specific survival (BCSS).

Results: The population-based incidence of apocrine carcinoma increased from 0.05 cases per 100,000 in 1975, to 0.41 in 2017 (annual percentage change 4.86; 95% CI: 3.19-6.55). A total of 2234 apocrine cancers and 855,070 non-apocrine cancers were identified in the SEER database (2004-2017). When compared to non-apocrine tumors, apocrine breast cancer was less prevalent in white women and more common in Asian and black women and was also more common in older women, $p < 0.001$ (see Table). In addition, it presented with larger, higher-grade tumors with a higher percentage of node-positive disease, $p < 0.01$ (see Table). Apocrine carcinomas had a unique molecular signature with 50% triple-negative and 28% HER2-positive; only 22% were luminal A, $p < 0.001$. Despite these aggressive features, the 7-year BCSS for patients with apocrine tumors was no different than their counterparts with non-apocrine disease, (85% for both, $p = 0.643$). We used the SEER database from 2010 to 2017 to identify 1099 apocrine cancers and 471,449 non apocrine cancers. In the TNBC subset of this database, patients with apocrine tumors tended to be older, Asian women with smaller, lower-grade tumors, compared to those with non-apocrine TNBC, $p < 0.005$ (see Table). The 7-year BCSS of patients with apocrine TNBC is significantly better than non-apocrine TNBC (86% vs. 74%, $p < 0.001$).

Conclusions: Overall, while invasive apocrine carcinomas have more aggressive features than their non-apocrine counterparts, BCSS is the same. Furthermore, 50% of these apocrine tumors are triple-negative; these tumors, however, have more favorable features and better BCSS than non-apocrine TNBCs. Appreciating these distinctions may lead to further studies exploring the unique biology of apocrine breast cancer with the aim of developing more tailored treatment approaches.

	All Breast Cancers			Triple-negative Breast Cancers*		
	Apocrine	Non-Apocrine	P value	Apocrine	Non-Apocrine	P value
Race						
White	1690 (76%)	682,769 (80%)	<0.001	400 (72%)	37,014 (71%)	<0.001
Black	277 (12%)	93,510 (11%)		81 (15%)	10,778 (21%)	
Asian	241 (11%)	68,352 (8%)		67 (12%)	3628 (7%)	
Other/unknown	26 (1%)	10,439 (1%)		5 (0.9%)	607 (1.2%)	
Age in Years						
Mean +/- SD	65+/- 13	62+/-13	0.004	67+/-12	59+/-12	<0.001
Tumor size in mm						
Mean +/- SD	24.5+/-26	22.8+/-22	0.001	22.8 +/-22	29.1+/-27	0.002
Grade						
1	160 (8%)	176,386 (22%)	<0.001	43 (8.1%)	1075 (2.2%)	<0.001
2	1075 (51%)	344,887 (44%)		310 (58%)	8771 (18%)	
3	881 (42%)	264,046 (34%)		178 (34%)	39,563 (80%)	
Lymph Nodes						
Positive	694 (36%)	235,325 (33%)	<0.001	160 (32%)	15,086 (33%)	0.499
Negative	1234 (64%)	485,616 (67%)		344 (68%)	30,394 (67%)	
Molecular Type *						

	All Breast Cancers			Triple-negative Breast Cancers*		
HR+, Her2-	241 (22%)	347,553 (74%)	<0.001			
HR+, Her2+	109 (10%)	50,668 (11%)				
HR-, Her2+	196 (18%)	21,201 (4.5%)				
HR-, Her2-	553 (50%)	52,027 (11%)				
7-year Breast Cancer Specific Survival*	85%	85%	0.643	86%	74%	<0.001

* 2010-2017

244 - Guiding Light to Optimize Wide Local Excisions: The “GLOW” Study

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Background/Objective: The risk of re-operative intervention due to close-positive tumor margins in breast-conserving surgery (BCS) remains an unsolved yet prevalent risk, affecting on average 21% of women in the US. Real-time intraoperative visual cues provided by fluorescence-guided surgery (FGS) have the potential to improve tumour visualisation and reduce the costs and morbidity associated with re-operative intervention. Previous studies on FGS in BCS using indocyanine green (ICG) with commercially available camera systems were small pilot studies with poor sensitivity (33-94%) and specificity (31-74%). Our team have developed a dual-color and infrared camera system that provides a Guiding Light to Optimise Wide local excisions (“GLOW”), tailored to the ICG. This trial will assess the diagnostic accuracy of differentiating tumor fluorescence from background normal tissue fluorescence in women undergoing BCS.

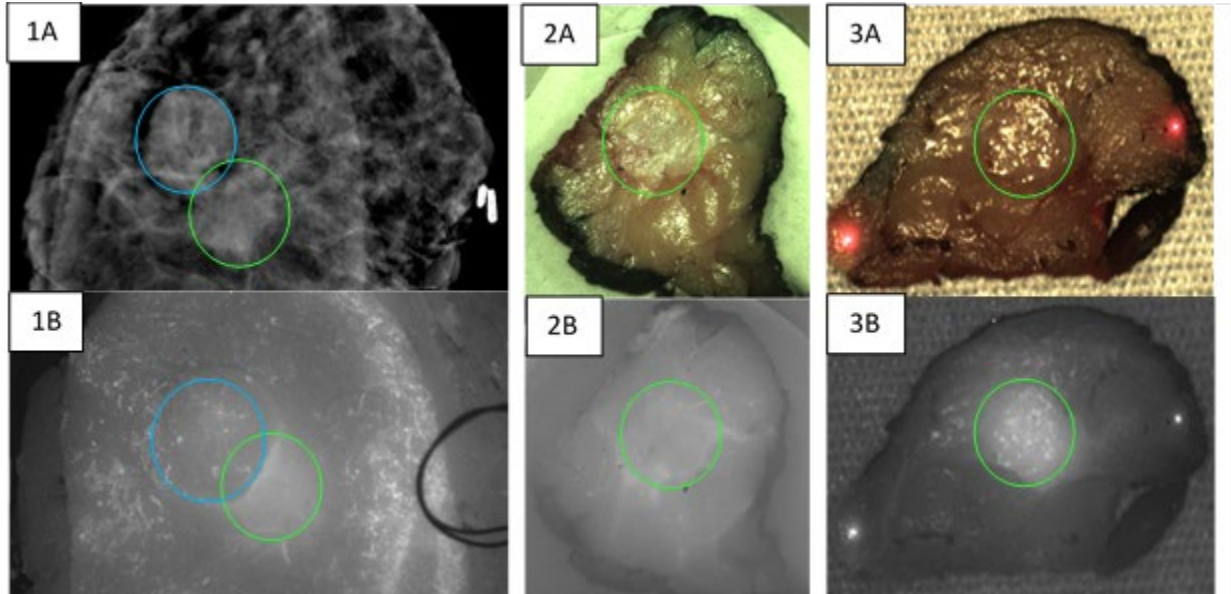
Methods: Forty BCS patients were recruited to this single-centre prospective clinical study as approved by the UK Research Ethics Committee (19/LO/0927). Sample size was calculated from pilot in-vivo FGS data from 10 patients (18/LO/2018). Twenty patients received 0.25mg/kg ICG at the beginning of their operation (thus enabling the enhanced permeability and retention (EPR) effect to take place). Twenty patients received 0.25mg/kg ICG once the skin flaps were raised (for angiographic studies). Images were taken of the tumor *in-situ*, tumor *ex-vivo*, cavity shaves, as well as during histopathological cut-up. Outcomes recorded included patient demographics (age, height, weight, BMI), clinicopathological data (tumor size, location, type, grade, hormonal status, specimen margins), reoperation rate, and adverse events. The images were compared to histopathology and quantitatively assessed for signal strength and accuracy.

Results: Forty women [mean age 57.1 years (33-81), mean body mass index 26.1 kg/m² (19.0-36.6)] were enrolled. Twenty-eight had Invasive ductal carcinoma [22 with concurrent ductal carcinoma in situ (DCIS)], 2 invasive mucinous carcinoma with DCIS, 4 invasive lobular carcinoma (1 with in-situ component), 1 inflammatory breast cancer, 1 fibroadenoma with atypia, and 4 DCIS. One was triple-negative, 2 were triple positive, 1 was ER -/HER2 +, and the remainder were ER +/HER2 -. Fifteen had close positive margins, 10 of whom required re-operation. No adverse events occurred. Tumors were visible up to 0.4cm deep to the surface. Tumor background ratio (TBR) revealed statistically significant

differences between tumor and normal tissue ($TBR_{EPR} = 1.89$, $TBR_{Angiography} = 2.24$). There was no statistically significant difference between the TBR of the 2 cohorts ($p=0.51$).

Conclusions: The current findings suggest that ICG fluorescence images could reveal differences between tumor and normal tissue in breast cancer. A TBR greater than 1.5 *in-vivo* is considered clinically significant, which both the angiography and EPR cohorts surpassed (2.24 and 1.89 respectively). Future work will focus on image pattern analysis and subcohort analysis (i.e., cancer subtypes, hormone receptor status) in view of powering larger clinical trials to improve diagnostic accuracy. Furthermore, our group will adapt the GLOW camera set-up for trials using targeting fluorophores specific to breast cancer in view of one day improving surgical precision and patient outcomes.

Figure: Paired images of wide local excision specimens using different imaging modalities



In each image, the tumor is encircled in green. Image 1A is a specimen radiography image (obtained via Faxitron system) with a corresponding anterior view infrared image in 1B of patient 12 of the EPR cohort. The nipple can be seen in the centre of both images (blue circle), with the lesion of interest visibly highlighted below and to the right of the nipple. This lesion was approximately 1mm deep to the skin. Images 2A and 2B are the paired color and infrared images for the histopathological cut-up from patient 3 of the angiography cohort. This specimen was cut from medial to lateral into 7 slices, of which slice 5 is being displayed. On the infrared image, there are visible patterns from the vasculature surrounding the tumour. Images 3A and 3B are the paired color and infrared images for the histopathological cut-up from patient 1 of the EPR cohort. This specimen was cut from medial to lateral into 11 slices, of which slice 2 is being displayed. The tumor is highlighted in its entirety on the infrared image.

229 - The Relationship Between Breast and Axillary Pathologic Complete Response in Women Receiving Neoadjuvant Chemotherapy for Breast Cancer

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Background/Objective: We aim to delineate the relationship between pathologic complete response in the breast and axilla, stratified by receptor subtype, in women with breast cancer.

Methods: We performed a retrospective cohort study of women diagnosed with breast cancer between January 1, 2014 and December 31, 2019 at an academic metropolitan cancer center and received neoadjuvant chemotherapy (NAC) followed by surgical therapy. The indications for NAC were based on standard clinical practice guidelines. We excluded women with locoregional recurrence or metastatic disease, received upfront or no surgery, or received neoadjuvant endocrine therapy. Clinicopathologic data were abstracted from the medical record, including clinical stage, receptor status, and surgical management of the breast and axilla. Pathology reports were examined for data on pathologic response of the breast and axilla. Pathologic complete response (pCR) of the breast was defined as no evidence of invasive disease on final pathology (ypT0/Tis). With regard to pCR of the axilla, micrometastases were considered as residual disease while isolated tumor cells were considered negative, in keeping with the Alliance 11202 and B51 trials. Women were stratified into receptor subtypes as follows: hormone receptor-positive (HR+)/HER2-negative (HER2-), HR+/HER2+, HR-/HER2+ and HR-/HER2- (triple-negative). The Fisher's exact test was used to compare groups, with $p < .05$ considered significant.

Results: There were 374 eligible women, with 114 (30.4%) achieving breast pCR. The achievement of breast pCR by subtype are as follows: HR+/HER2- (11/123, 8.9%), HR+/HER2+ (21/80, 26.3%), HR-/HER2+ (43/64, 67.1%) and triple-negative (39/107, 36.4%), $p < .0001$. Among women with involved lymph nodes confirmed by fine-needle aspiration biopsy (FNAB) prior to NAC, the achievement of axillary pCR by subtype are as follows: HR+/HER2- (10/110, 9.1%), HR+/HER2+ (23/51, 45.1%), HR-/HER2+ (35/42, 83.3%) and triple-negative (33/54, 61.1%), $p < .0001$. In women achieving breast pCR who had a positive pre-NAC axillary FNAB, the rates of associated axillary pCR by subtype are as follows: HR+/HER2- (3/9, 33.3%), HR+/HER2+ (10/12, 83.3%), HR-/HER2+ (24/27, 88.9%) and triple-negative (20/22, 90.9%), $p = .004$. Conversely, in women with a positive axillary FNAB achieving axillary pCR, the rates of associated breast pCR by subtype are as follows: HR+/HER2- (3/10, 30.0%), HR+/HER2+ (10/23, 43.4%), HR-/HER2+ (24/35, 68.6%) and triple-negative (20/33, 60.6%), $p = .08$.

Conclusions: Breast pCR is a strong predictor of axillary pCR in women with HER2-positive and triple-negative disease. Conversely, axillary pCR is a modest predictor of breast pCR for these subtypes. There is a poor relationship between breast and axillary pCR in hormone receptor-positive disease. These data may inform the success of future de-escalation of surgery in women with HER2-positive and triple-negative disease. If breast surgery remains standard of care, the identification of breast pCR may identify women who could be spared axillary surgery. If breast surgery is omitted and only axillary staging is performed and axillary pCR is identified, more than one-third of women with residual breast disease may be missed. Core needle biopsies of the tumour bed may decrease this false-negative rate if current trials investigating the omission of breast surgery following NAC prove fruitful.

Resident/Fellow Poster Discussion I

Thursday, April 29, 2021 6:00 pm–7:00 pm
Moderators: Zahraa Al-Hilli, MD, Paul Thiruchelvam, MD, PhD

80 - High-Risk Breast Lesions Found on Core Needle Biopsy: Which Ones to Excise?

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Background/Objective: The management of high-risk breast lesions found by core needle biopsy (CNB) can be confusing, complicated, and anxiety provoking for both patients and breast surgeons. A high-risk diagnosis on CNB forces a decision whether to surgically excise or follow the lesion with imaging. Upgrade rates of these high-risk lesions to ductal carcinoma in situ (DCIS) or invasive cancer from CNB in the literature ranges from 0-67%. We analyzed the upgrade rate of non-malignant, high-risk breast lesions diagnosed on CNB, developing a tool, in a table form, to aid in the decision-making process.

Methods: The histopathologic results of CNB followed by surgical excision were compared in 2811 patients during 2015-2019, using a single institution database. Our review included the following CNB diagnoses: invasive carcinoma, low-grade DCIS (nuclear grades 1 and 2), high-grade DCIS (nuclear grade 3), classic lobular carcinoma in situ (LCIS) (nuclear grades 1 and 2), pleomorphic LCIS (nuclear grade 3), atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), flat epithelial atypia (FEA), other atypical lesions, papillary lesions, radial scar without atypia, and benign lesions (most of which were discordant with their imaging features). The CNB results were tabulated and correlated with the final histopathologic results determined after open excision.

Results: The results are shown in the Table. Our results demonstrate that all grades of DCIS and LCIS were upgraded to invasive cancer anywhere from 13.3% to 32.6% of the time. ADH was upgraded to invasive cancer in 4.5% of cases, but if DCIS is included, the upgrade rate was 26.3%. ALH was upgraded to invasive cancer in 4.1% of cases. If DCIS is included, the upgrade rate for ALH was 6.8%. FEA was upgraded to invasive cancer in 1.1% of cases. With the inclusion of DCIS, the upgrade rate of FEA increased to 6.7%. Papillary lesion was upgraded to invasive cancer 1.9% of the time with an increased to 5.6% if DCIS was included. Radial scar was upgraded to 0.6% of the time to invasive cancer and 4.4% if DCIS was included.

Conclusions: Which patients with high-risk breast lesion diagnoses on CNB require open excision? The risk a person is willing to accept varies from patient to patient. Moreover, the upgrade rate for high-risk breast lesions is extremely variable in the literature. The results of our comprehensive institutional data analysis, organized in table form, can be used to help counsel patients, categorize risk, and allow patients to make a more informed and precise decision about surgical excision. For some, a 5% upgrade risk may be a reasonable threshold, above which surgical excision would be considered. This would include cases of DCIS, LCIS, ADH, ALH, FEA, and papillary lesions. With an upgrade rate less than 5%, radial scars without atypia may be considered for observation with short-term follow-up imaging. Long-term studies will be important to better characterize the risk and benefits of excision.

Table. A Comparison of Core Needle Biopsy Pathology with Surgical Pathology

		SURGICAL PATHOLOGY											TOTAL		
NEEDLE CORE BIOPSY PATHOLOGY	BREAST LESIONS (No. Patients)	Invasive CA	DCIS Grade 3	DCIS Grade 1/2	Pleomorphic LCIS Grade 3	LCIS Grade 1/2	ADH	ALH	FEA	Other Atypia	Papillary Lesion	Radial Scar	Benign Non Concordant		
	Invasive CA	99.0% (1198)	0.2% (2)	0.5% (6)	0.0% (0)	0.1% (1)	0.2% (2)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.1% (1)	1210
	DCIS 3	32.6% (43)	50.8% (67)	15.2% (20)	0.0% (0)	0.0% (0)	1.5% (2)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	132
	DCIS Grade 1/2	19.3% (63)	9.2% (30)	68.1% (222)	0.6% (2)	0.3% (1)	1.8% (6)	0.6% (2)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	326
	Pleomorphic LCIS	20.0% (1)	0.0% (0)	0.0% (0)	60.0% (3)	20.0% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	5
	LCIS Grade 1/2	13.3% (2)	0.0% (0)	0.0% (0)	0.0% (0)	60.0% (9)	6.7% (1)	20.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	15
	ADH	4.5% (12)	3.4% (9)	18.4% (49)	0.0% (0)	1.5% (4)	43.8% (117)	3.0% (8)	9.7% (26)	0.4% (1)	2.6% (7)	1.9% (5)	10.9% (29)	267	
	ALH	4.1% (3)	0.0% (0)	2.7% (2)	0.0% (0)	13.5% (10)	18.9% (14)	40.5% (30)	6.8% (5)	0.0% (0)	0.0% (0)	4.1% (3)	9.5% (7)	74	
	FEA	1.1% (1)	1.1% (1)	4.5% (4)	0.0% (0)	0.0% (0)	31.5% (28)	7.9% (7)	32.6% (29)	2.2% (2)	0.0% (0)	2.2% (2)	16.9% (15)	89	
	Other Atypia	8.5% (7)	3.7% (3)	19.5% (16)	0.0% (0)	2.4% (2)	20.7% (17)	1.2% (1)	6.1% (5)	3.7% (3)	11.0% (9)	4.9% (4)	18.3% (15)	82	
	Papillary Lesion	1.9% (4)	0.0% (0)	3.7% (8)	0.0% (0)	0.5% (1)	11.2% (24)	3.7% (8)	2.3% (5)	1.4% (3)	59.8% (128)	3.3% (7)	12.1% (26)	214	
	Radial Scar	0.6% (1)	0.0% (0)	3.8% (6)	0.0% (0)	0.6% (1)	13.5% (21)	5.8% (9)	7.1% (11)	0.0% (0)	3.2% (5)	55.8% (87)	9.6% (15)	156	
	B9 Non Concordant	5.4% (13)	0.4% (1)	3.7% (9)	0.0% (0)	0.8% (2)	4.1% (10)	2.1% (5)	2.5% (6)	0.4% (1)	7.9% (19)	8.7% (21)	63.9% (154)	241	
TOTAL	1348	113	342	5	32	242	73	87	10	168	129	262	2811		

89 - Neoadjuvant Endocrine Therapy and Delays in Surgery for Ductal Carcinoma *In Situ*: Implications for the Coronavirus Pandemic

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Background/Objective: Surgical delays have been associated with increased incidence of invasive cancer in patients with ductal carcinoma *in situ* (DCIS). Non-emergency surgery was halted in the spring of 2020 due to the COVID-19 pandemic, and many patients were treated with neoadjuvant endocrine therapy (NET) as a bridge until surgery resumed. We sought to determine the impact of NET on the rate of invasive cancer on final pathology in patients who had a surgical delay compared to those not treated with NET.

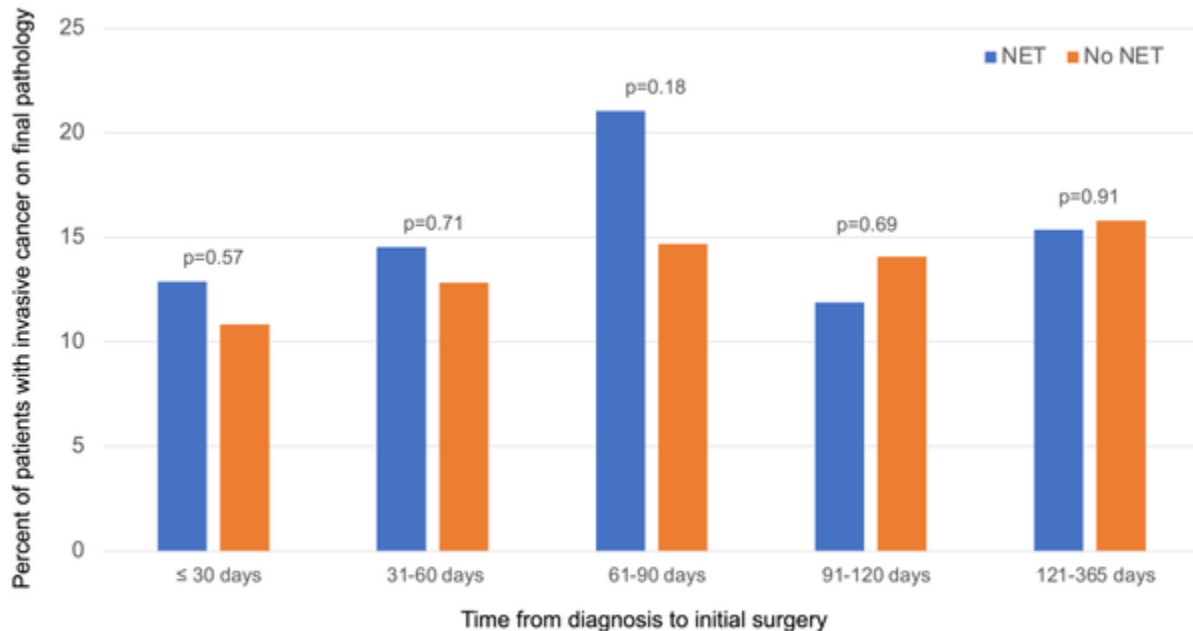
Methods: Using the National Cancer Database (2006-2017), we identified women with hormone-receptor-positive (HR+) DCIS and grouped them according to whether they received NET, defined as hormone therapy started prior to initial surgery. The presence of invasion on final pathology was

evaluated in each group after stratifying into intervals based on time of diagnosis to surgery (30, 31-60, 61-90, 81-120, and 121-365 days). Multivariate analysis was performed to determine the association of patient, tumor, and treatment factors with invasion.

Results: A total of 109,990 women with HR+ DCIS were identified, 276 (0.3%) of whom underwent NET. The use of NET increased over the study period and was lowest among younger women, White and Hispanic women, those without insurance, high-grade DCIS and those undergoing mastectomy (all $p < 0.05$). The mean duration of NET was 74.4 days, and the median time to surgery was greater among those receiving NET (87.5 v. 35 days, $p < 0.001$). The overall unadjusted rate of invasive cancer was similar between those who did and did not receive NET (15.6 v. 12.3%, respectively, $p = 0.10$), and there were no statistical differences in each of the time-to-surgery intervals (Figure). On multivariate analysis, neither the time to surgery (OR 1.00, 95% C.I. 1.00-1.01, $p = 0.33$) nor the duration of NET use (OR 1.00, 95% C.I. 1.00-1.00, $p = 0.96$) was independently associated with invasion.

Conclusions: In this analysis of a pre-COVID cohort, the use of NET in HR+ DCIS does not appear to decrease the rate of invasive cancer on final pathology. Although selection bias may have influenced these results, they may also illustrate an expected baseline rate of occult, undetected invasion prior to initiation of NET. This illustrates the need to distinguish indolent DCIS from DCIS that develops invasive capability. Further study of the rate of invasive cancer in patients treated with NET during the pandemic may also shed further light on the efficacy of NET.

Figure. Rate of invasive cancer on final pathology in patients with hormone-receptor-positive ductal carcinoma *in situ* stratified by whether they received neoadjuvant endocrine therapy (NET) and the time from diagnosis to initial surgery



104 - Improving the Breast Surgeon’s Ergonomic Workload for Nipple-Sparing Mastectomies Using Exercise and an Operating Room Positioning Protocol

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Background/Objective: Previous work from our group demonstrated that nipple-sparing mastectomy (NSM) was associated with increased muscle workload and was more mentally and physically demanding than skin-sparing mastectomy (SSM). The objective of this study was to examine if an exercise program and standardized operating room positioning protocol (EOPP) would improve muscle workload or perceived mental/physical difficulty of NSM.

Methods: This IRB-approved prospective study analyzed 4 surgeons performing NSM in a single university-affiliated health system. We compared muscle workload during NSM as measured by EMG before and after a kinesiologist developed exercise program. The exercise program was designed to strengthen the muscles used in NSM and was started 1 month prior to the study and continued for the duration of the study (Figure). A protocol that specified OR table and surgeon positioning for the NSM procedures was implemented: (1) OR table in Trendelenburg for the anterior dissection inferior to the nipple (2) OR table in Reverse Trendelenburg for the anterior dissection superior to the nipple (3) Surgeon moves to the opposite side of the table for the upper outer quadrant anterior flap dissection. Survey data were assessed using Wilcoxon rank-sum and Fisher’s exact tests. EMG data was analyzed using repeated-measures ANOVA, controlling for surgeon, first assistant, duration, and difficulty of procedure, left or right side, and 1st or 2nd breast of the procedure.

Results: Fifty-six NSM cases performed by 3 surgeons were analyzed. One surgeon was excluded due to a muscle injury and undergoing active physical therapy during the study period. After implementation of the EOPP, both the left and right upper trapezii muscles had a statistically significant decrease in ergonomic workload (p values of 0.005 and 0.02 respectively). The bilateral cervical erector spinae, anterior deltoid, and lumbar erector spinae muscle groups did not have a significant change in ergonomic workload following the EOPP. When analyzing muscle group exertion by surgeon, there was significant variability in all muscle groups except the left cervical erector spinae. Interestingly, following the EOPP, the surgeons felt that the procedures were more physically (p= 0.01) and mentally (p= 0.002) demanding and they were less satisfied with their visualization (p= 0.04). The breast laterality and sequence did not affect muscle exertion.

Conclusions: An exercise and operating room positioning protocol decreased some of the ergonomic workload for surgeons performing NSM, but these interventions were not enough to significantly improve visualization or perceived difficulty of the procedure. Future studies should investigate other interventions to improve NSM for the surgeon.

Table. Descriptions of Stretches

Stretch	Description
1. Pectoral Stretch	(best if done in a doorway, with body in doorway or slightly in front of doorway) -Arms up on an angle against door frame hold for 20 seconds

	-Arms out at a T with elbows bent slightly (depending on height), hold for 20 seconds -Arms on an angle down against door frame, hold for 20 seconds
<u>2. Lateral Pull</u>	Arms up at a V with palms facing forward, bend elbows down as you slide shoulder blades down your back. Be sure to keep chest tall and abdominal muscles pulled here so that low back does not overextend. 20 reps
<u>3. Scapular Retraction</u>	Arms straight out in front of shoulders with palms facing each other; Keep elbows straight and pull shoulder blades in toward spine. 20 reps
<u>4. Rear Deltoid Flies</u>	Arms straight out in front of shoulders with palms or fists facing down; Bend elbows (keeping them in line or slightly below shoulders - do not shrug shoulders) and pull shoulder blades toward spine. 20 reps
<u>5. Neck Stretches</u>	-Arms hang down at sides; Drop right ear toward right shoulder and hold for 20 seconds. -Keeping right ear toward right shoulder, slowly tilt chin toward right shoulder and hold for 20 seconds. -Slowly reset head center and repeat on the left side.

Series should be repeated 2 times

129 - The Risk of Contralateral Breast Cancer: A SEER-Based Analysis

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Background/Objective: Many women with unilateral breast cancer pursue contralateral prophylactic mastectomy due to an overestimated risk of contralateral breast cancer. Accurate and personalized knowledge of risk may facilitate counselling surrounding contralateral prophylactic mastectomy. We aim to characterize the annual risk and 25-year cumulative risk of contralateral breast cancer among women with Stage 0-III unilateral breast cancer. We aim to further delineate the extent to which patient, tumour, and treatment factors impact this risk.

Methods: We identified 812,851 women with a first primary unilateral Stage 0–III breast cancer in the SEER database from 1990 to 2015 and followed them for either 25 years, the development of contralateral invasive breast cancer, or the end of the study period. Women having bilateral mastectomy were excluded. We calculated the annual risk of contralateral breast cancer by age of diagnosis, by time since diagnosis, and by current age. The cumulative actuarial risk of contralateral cancer in the 25-year period was estimated using the Kaplan-Meier method. Hazard ratios (HRs) were estimated for subgroups defined by age, race, histological subtype, tumour grade and size, nodal status, receptor status, chemotherapy, and radiotherapy. $P < .05$ was considered significant. For each woman, given her risk factor profile based on the inputted covariates, we estimated a personalized 25-year risk of contralateral breast cancer probability using a Cox proportional hazards model.

Results: There were 25,958 cases of contralateral invasive breast cancer diagnosed (3.2%), with a mean interval time of 7.1 years. The annual risk of contralateral breast cancer for the entire cohort was 0.37%, and this risk did not appear to decline at the end of the follow-up period. The annual risk varied to a small degree by age of diagnosis, by time since diagnosis, and by current age. The rate of contralateral breast cancer following a diagnosis of DCIS was similar to that following invasive disease. The 25-year cumulative incidence of contralateral breast cancer was similar for women of all ages (mean 9.9%). The cumulative risk was higher for Black than for White women (12.7% vs. 9.7%, $P < .0001$). Compared with invasive ER+/PR+ breast cancer, the adjusted HR for contralateral breast cancer in the first 10 years for ER+/PR- was 0.92 ($P = 0.0036$), ER-/PR+ was 1.30 ($P < .0001$) and ER-/PR- was 1.40 ($P < .0001$). The 20-year actuarial risk of contralateral cancer for women with invasive disease in various subgroups are presented (Table). The mean predicted 25-year cumulative risk, based on each woman's risk profile, was 10.2% and for 80% of the cohort; the risk estimate was between 7.7% and 13.2%.

Conclusions: Women with unilateral Stage 0-III breast cancer experience a 0.4% annual risk of contralateral invasive breast cancer, which does not vary materially by age at diagnosis, by years since diagnosis, or by attained age. Most women have a predicted 25-year cumulative risk within 2 percentage points of 10%. Based on these data, we question whether contralateral risk should be tailored for individual women. Other than age, there was little information in our model that helped to refine the risk.

Table. Regression analysis on contralateral invasive breast cancer risk among invasive first primary breast cancer patients

Variable	Value	20-year Cumulative Incidence	Unadjusted		Adjusted*	
			Hazard Ratio	P-value	Hazard Ratio	P-value
Overall		7.9% (7.8-8.1)				
Age at diagnosis	30-39	8.7% (8.2-9.3)	1.22 (1.15-1.29)	<.0001	1.22 (1.15-1.29)	<.0001
	40-49	7.2% (7.0-7.5)	0.97 (0.94-1.01)	0.1809	0.98 (0.94-1.02)	0.2743
	50-59	8.0% (7.7-8.3)	1.00 [Reference]		1.00 [Reference]	
	60-69	8.4% (8.1-8.7)	1.04 (1.00-1.07)	0.0637	1.03 (1.00-1.07)	0.0719
	70-79	7.5% (7.1-7.9)	0.87 (0.84-0.91)	<.0001	0.87 (0.83-0.91)	<.0001
Race	White	7.7% (7.5-7.9)	1.00 [Reference]		1.00 [Reference]	
	Black	10.0% (9.4-10.6)	1.21 (1.16-1.26)	<.0001	1.17 (1.12-1.22)	<.0001
	Asian	8.1% (7.5-8.7)	1.03 (0.98-1.09)	0.2723	1.03 (0.97-1.09)	0.3387
	Other/Unknown	8.0% (6.9-9.3)	0.93 (0.84-1.03)	0.1502	0.93 (0.84-1.02)	0.1318
Histological type	Ductal	7.8% (7.6-7.9)	1.00 [Reference]		1.00 [Reference]	
	Lobular	8.0% (7.4-8.5)	1.01 (0.96-1.06)	0.6876	1.05 (1.00-1.11)	0.0633
	Mixed	9.8% (9.1-10.5)	1.21 (1.15-1.27)	<.0001	1.28 (1.22-1.35)	<.0001
Tumour grade	I	7.6% (7.2-8.0)	1.00 [Reference]		1.00 [Reference]	
	II	7.6% (7.4-7.9)	0.98 (0.94-1.02)	0.3673	0.98 (0.94-1.02)	0.2904
	III/IV	8.4% (8.1-8.7)	1.06 (1.02-1.10)	0.0064	0.98 (0.93-1.02)	0.2879
	Unknown	8.3% (7.9-8.6)	1.15 (1.10-1.22)	<.0001	1.07 (1.02-1.13)	0.0094
Tumour size	<1cm	7.3% (7.0-7.6)	1.03 (0.99-1.07)	0.1069	1.01 (0.97-1.05)	0.7135
	1-2cm	7.5% (7.3-7.8)	1.00 [Reference]		1.00 [Reference]	
	2-3cm	8.0% (7.7-8.3)	0.99 (0.96-1.03)	0.6759	1.00 (0.97-1.04)	0.8315
	3-5cm	9.0% (8.5-9.5)	1.03 (0.99-1.08)	0.1333	1.05 (1.00-1.10)	0.0407
	5-10cm	10.2% (9.3-11.1)	1.13 (1.06-1.20)	<.0001	1.15 (1.08-1.22)	<.0001
	10-15cm	11.0% (8.6-14.0)	1.53 (1.31-1.78)	<.0001	1.53 (1.31-1.79)	<.0001
	Unknown	9.0% (8.2-9.9)	1.31 (1.21-1.41)	<.0001	1.19 (1.10-1.29)	<.0001
Nodal status	N0	7.8% (7.7-8.0)	1.00 [Reference]		1.00 [Reference]	
	N1	7.8% (7.5-8.2)	0.90 (0.86-0.93)	<.0001	0.90 (0.87-0.94)	<.0001
	N2	8.5% (7.9-9.3)	0.88 (0.83-0.94)	<.0001	0.86 (0.81-0.92)	<.0001
	N3	9.1% (8.2-10.2)	0.99 (0.92-1.06)	0.7129	0.92 (0.85-0.99)	0.0368
ER status	Negative	9.3% (9.0-9.7)	1.00 [Reference]		1.00 [Reference]	
	Positive	7.5% (7.3-7.7)	0.77 (0.74-0.79)	<.0001	0.73 (0.69-0.76)	<.0001
	Unknown	8.3% (7.9-8.7)	0.92 (0.88-0.97)	0.0009	0.75 (0.68-0.83)	<.0001
PR status	Negative	8.7% (8.4-9.0)	1.00 [Reference]		1.00 [Reference]	
	Positive	7.5% (7.3-7.7)	0.88 (0.85-0.91)	<.0001	1.06 (1.01-1.10)	0.0111
	Unknown	8.4% (8.0-8.7)	1.04 (1.00-1.09)	0.0557	1.20 (1.10-1.31)	<.0001
Radiotherapy	No	7.7% (7.5-7.9)	1.00 [Reference]		1.00 [Reference]	
	Yes	8.1% (7.9-8.4)	1.05 (1.02-1.08)	0.0002	1.08 (1.05-1.12)	<.0001
	Unknown	7.2% (6.2-8.4)	0.91 (0.82-1.01)	0.0766	0.91 (0.82-1.01)	0.084
Chemotherapy	No/Unknown	7.8% (7.6-8.0)	1.00 [Reference]		1.00 [Reference]	
	Yes	8.1% (7.9-8.4)	0.97 (0.95-1.00)	0.0679	0.92 (0.89-0.95)	<.0001

Analysis conducted using the Fine and Gray proportional sub-hazards model to account for competing risks of death.

*Hazard ratios adjusted for all values included in the table.

224 - The Emerging Role of Telehealth in Preoperative Evaluation of Breast Cancer Patients During the COVID-19 Pandemic

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Background/Objective: The COVID-19 pandemic and social distancing have driven a dramatic shift in health care delivery from doctor's office visits (DOV) to telehealth (TH), within a short period of time. When the California Shelter-in-Place (SiP) order was issued on March 17, 2020, a large, integrated health care system promoted TH visits, both telephone and video, to minimize potential exposure of patients and staff to COVID-19. Since our system already had mechanisms in place to deliver TH, we were able to expand the practice relatively quickly and offer TH consultations to newly diagnosed breast cancer patients. There are limited data on whether breast cancer TH consultations without physical examinations are sufficient for preoperative evaluation. We evaluated the frequency of TH consultations and surgical outcomes for breast cancer patients during SiP.

Methods: Using our prospectively maintained breast cancer database, we identified patients newly diagnosed with breast cancer between the SiP order on March 17, 2020, when elective surgeries were stopped, and May 18, 2020, when elective surgeries resumed. We performed a retrospective chart review to determine patient characteristics and evaluate type of visit (office, telephone or video), time from biopsy to first surgical consultation (TTC), time from biopsy to surgery (TTS), and re-excision rates. We compared TTC and TTS of different types of visits using Kruskal-Wallis and Wilcoxon rank-sum tests, and compared categorical variables using Fisher's exact and Chi-squared tests.

Results: Of 248 breast cancer patients diagnosed during SiP, 222 had a surgical consultation after diagnosis. Fifty-four percent of initial consultations were performed using TH (22% telephone, 32% video). Patient characteristics including race, stage, and comorbidities were similar for all initial visit types. Patients ≥ 65 years old had more telephone consultations compared to video or DOV consultations (53% vs 19% and 36%, $p=0.004$). After surgical consultation, 175 patients underwent surgery as the initial treatment. Only 31% of telephone visit and 24% of video visit patients had an additional DOV for a physical examination before surgery. TTC for TH visits was shorter than for DOVs (median 7 vs 9 days, $p<0.001$), and TTS for patients with surgery was similar between the groups (median 20 vs 20, $p=0.99$). Although re-excision rates were higher for the patients with an initial telephone visit (20% for telephone visits vs 3% for DOV, $p = 0.008$), re-excision rates did not differ between TH (telephone plus video visits) only and TH with an additional preoperative office visit (12% vs 18%, $p=0.31$).

Conclusions: During SiP, more than half of new breast cancer patients had TH initial consultations, and 73% of TH patients did not have a physical examination until the day of surgery. TH did not adversely affect TTC and TTS. Performing additional preoperative physical examinations did not affect re-excision

rates for TH patients. We conclude that TH consultations can be safely used prior to breast cancer surgery.

Table. Characteristics and Outcomes of Surgical Consultations

Characteristic	All Consults	Office Consults	Telephone Consults	Video Consults	p-value ^a
Total, <i>N</i> (%)	222 (100%)	103 (46)	49 (22%)	70 (32%)	
Age, <i>N</i> (%)					0.004
<40	9 (5%)	5 (5%)	0 (0%)	5 (7%)	
40-64	124 (62%)	61 (59%)	23 (47%)	50 (71%)	
≥65	66 (33%)	37 (36%)	26 (53%)	15 (19%)	
Race, <i>N</i> (%)					0.56
White	128 (58%)	61 (59%)	31 (63%)	36 (51%)	
Asian	38 (17%)	15 (15%)	8 (16%)	15 (21%)	
Hispanic	24 (11%)	14 (14%)	4 (8%)	6 (9%)	
Black	17 (8%)	9 (9%)	3 (6%)	5 (7%)	
Other/Unknown	15 (7%)	4 (4%)	3 (6%)	8 (11%)	
Charlson Comorbidity Index, <i>N</i> (%)					1.00
Greater than 3	18 (8%)	8 (8%)	4 (8%)	6 (9%)	
Stage, <i>N</i> (%)					0.11
0	18 (8%)	4 (4%)	9 (18%)	5 (7%)	
1	130 (59%)	60 (58%)	28 (57%)	42 (60%)	
2	45 (20%)	25 (24%)	9 (18%)	11 (16%)	
3	18 (8%)	9 (9%)	1 (2%)	8 (11%)	
4	11 (5%)	5 (5%)	2 (4%)	4 (6%)	
TTC, median days (IQR)	7 (5)	9 (5)	7 (5)	7 (5)	<0.001
Surgery First, <i>N</i> (%)	175 (100%)	71 (41%)	45 (26%)	59 (34%)	
TTS, median days (IQR)	20 (14)	20 (4)	20 (23)	19 (17)	0.89
Re-excision, <i>N</i> (%)	16 (9%)	2 (3%)	9 (20%)	5 (9%)	0.008
			All Telehealth ^b		
			Additional DOV	No Additional DOV	
Total, <i>N</i> (%)	N/A	N/A	28 (27%)	76 (73%)	0.52
Re-excision, <i>N</i> (%)	N/A	N/A	5 (18%)	9 (12%)	0.31

TTC = Time from biopsy to initial consult; TTS = Time from biopsy to surgery; IQR = Interquartile range; N/A = Not applicable; DOV= Doctor's office visit; ^a Fisher's exact or chi-squared test for categorical variables and Kruskal-Wallis or Wilcoxon Rank-Sum for continuous variables; ^b Includes all patients with an initial telehealth consultation who completed surgery Total N=104

Resident/Fellow Poster Discussion II

Saturday, May 1, 2021 2:30 pm–3:30 pm
Moderators: Preeti Subhedar, MD, Katharine Yao, MD

66 - RNA-seq and Tumor-Infiltrating Lymphocytes as Markers of Tumor Microenvironment Changes After Cryoablation

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Background/Objective: Immunological microenvironment and tumor-infiltrating lymphocytes (TILs) in breast cancer are becoming increasingly relevant as new therapeutic targets. This study explored changes in TILs and RNA-seq in breast cancers after cryoablation of low-risk tumors.

Methods: Women diagnosed with ER⁺, PR⁺, and HER2⁻ infiltrating ductal carcinomas ≤1.5 cm were treated with cryoablation using a Visica[®] 2 Treatment System for a single probe freeze-thaw-freeze cycle. Repeat biopsy of tumor bed was performed at 6-month follow-up for pathology, TIL, and RNA-seq evaluation. TIL scores were calculated utilizing the guidelines developed by the International TIL Working Group. Whole transcriptome sequencing was performed on an Illumina NextSeq 500 instrument generating 15 million paired-end reads per sample. Sequencing reads were mapped to the human reference genome Hg38 and differentially expressed genes were identified between pre- and post-cryoablation as ≥2-fold changes and a correction p-value of ≤0.05. Log₂ fold-change, and p-value were input into Ingenuity Pathway Analysis Software (IPA[®], QIAGEN) tool core analysis for canonical pathways, upstream regulators, molecular networks, and regulator effects associated with immune system responses.

Results: Out of 15 breast cancer patients treated with cryoablation between 1/1/2017 and 10/15/2020, 5 (33.3%) had pre- and post-cryoablation tissues available for analysis. Mean ± (SD) tumor size at presentation was 9.34 ± (2.86) mm. All tumors were completely ablated with no residual disease seen on mammogram, ultrasound, and MRI at 6 months. Histopathology showed fat necrosis, collagen, foamy histocytes, and lymphocytes. Average TIL scores increased from 4.8% (range 1-10%) to 5.6% (range 1-15%) post cryoablation. TIL percentages did not correlate with tumor size. RNA-seq analysis comparing cryoablation to pre-cryoablation identified 1646 significant differentially expressed genes with 1096 genes up-regulated and 550 genes down-regulated. Overall, gene expression associated with immune cell functions were increased. IPA gene analysis showed increase gene expression for immune canonical pathways: HMGB1 Signaling, IL-8 Signaling, CXCR4 Pathway, Leukocyte Extravasation, FCγ Receptor Mediated Phagocytosis in Macrophages and Monocytes, Dendritic Cell Maturation, Natural Killer Cell Signaling, CD28 Signaling in T Helper Cells, IL-15 Production, and decreases in genes associated with the PD-1, PD-L1 Cancer Immunotherapy Pathway.

Conclusions: Although histopathology TIL scores pre vs. post-cryoablation were not significantly different, RNA-seq analysis revealed considerable differences in the tumor microenvironment with an active immune response at 6 months post-cryoablation. Immune canonical pathways showed gene expression changes associated with tissue damage signaling, recruitment of leukocytes, phagocytic

tissue damage clean up, increased antigen presentation, both TH1 and TH2 T cell immune responses, and decreased adaptive immune resistance enhancing antitumor immunity. Larger sample size is needed to study clinical relevance of immune response to cryoablation.

108 - The Effect of Age on Outcomes After Neoadjuvant Chemotherapy for Breast Cancer

Francys C Verdial, Anita Mamtani, Kate R Pawloski, Varadan Sevilimedu, Mary Gemignani, Andrea V Barrio, Monica Morrow, Audree B Tadros
Memorial Sloan Kettering Cancer Center, New York, NY

Background/Objective: Young women (≤ 40 years) with breast cancer (BC) undergoing neoadjuvant chemotherapy (NAC) have higher overall rates of pathologic complete response (pCR) among hormone receptor (HR)-positive and triple-negative (TN) subtypes than older women in clinical trials. However, it is not known whether rates of axillary or breast downstaging differ by age. We examine the incidence of breast, axillary, and overall pCR by age and subtype and rates of surgical downstaging of the breast and axilla after modern NAC in young patients compared to older age groups.

Methods: We identified 1383 consecutive patients with Stage I-III BC treated with NAC from November 2013 to December 2018 from a prospective database. We compared rates of pCR (ypT0/is ypN0), as well as breast and axillary downstaging rates following NAC between patients ≤ 40 years ($n=300$), 41-60 years ($n=772$), and ≥ 61 years of age ($n=311$), overall and according to BC receptor subtype.

Results: Women ≤ 40 years were significantly more likely to have ductal histology, poorly differentiated tumors, and BRCA mutations compared to older women. Thirty-five percent of women had HR+/HER2- cancers, 36% had HER2+, and 29% had TN, with similar subtype distribution across age groups. Axillary pCR rates were higher among women ≤ 40 years vs. older women (53% vs. 45%, $p=0.04$). No differences in rate of breast (33% vs. 28%, $p=0.3$) or overall pCR between women ≤ 40 years vs. older women (30% vs. 27%, $p=0.5$) were seen. Among the TN subtype ($n=394$), younger women had significantly higher rates of overall pCR (47% vs. 28% vs. 19%, $p<0.001$), breast pCR (56% vs. 37% vs. 33%, $p=0.01$), and axillary pCR (70% vs. 51% vs. 39%, $p=0.01$) compared to women 41-60 years and women ≥ 61 years, respectively. Young women with TNBC were more likely to have a BRCA mutation than older women (27% vs. 10%, $p=0.001$). Rates of overall (7.6%), breast (10%), and axillary pCR (21%) were low among all HR+/HER2- patients ($n=487$) regardless of age. Conversion to breast-conserving surgery (BCS) following NAC among BCS-ineligible patients at presentation was similar across age groups (Table). However, younger patients were less likely to choose BCS when eligible (43%) and more likely to opt for bilateral mastectomy (47%) compared to older patients ($p<0.001$). Among biopsy proven cN1 patients ($n=813$), 94% of women ≤ 40 years became cN0 after NAC, compared to 89% and 85% in older age groups ($p=0.02$). Among cN1 patients who converted to cN0, rates of axillary pCR on SLNB were highest among young women (55% vs. 48% vs. 48%. $p=0.001$).

Conclusions: Young women ≤ 40 years are more likely to have an axillary pCR and successfully downstage to SLNB than women >40 years; however, rates of overall and breast pCR do not differ among these groups. Among TN patients, pCR is higher among younger patients likely due to higher number of BRCA carriers with enhanced chemosensitivity. Despite equivalent rates of downstaging in the breast and

eligibility for BCS across age groups, younger women are less likely to ultimately undergo BCS. Age is an important factor to consider when determining the benefit of NAC.

Table. Breast and axillary downstaging following neoadjuvant chemotherapy by age group

BCS ineligible patients at presentation	All N = 1,004	Age ≤ 40 years N = 237	Age 41-60 years N = 556	Age ≥ 61 years N = 211	p value
BCS-eligible post-NAC					0.8
No	483 (48%)	110 (46%)	269 (48%)	104 (49%)	
Yes	521 (52%)	127 (54%)	287 (52%)	107 (51%)	
Breast surgery performed					< 0.001
BCS0	325 (62%)	54 (43%)	185 (64%)	86 (80%)	
Unilateral mastectomy	63 (12%)	13 (10%)	33 (11%)	17 (16%)	
Bilateral mastectomy	133 (26%)	60 (47%)	69 (24%)	4 (3.7%)	
cN1 patients at presentation	All N = 813	Age ≤ 40 years N = 180	Age 41-60 years N = 447	Age ≥ 61 years N = 186	p value
Residual palpable adenopathy after NAC					0.02
Yes	87 (11%)	11 (6%)	48 (11%)	28 (15%)	
No	726 (89%)	169 (94%)	399 (89%)	158 (85%)	
cN1 patients at presentation downstaged to cN0 after NAC	All N = 726	Age ≤ 40 years N = 169	Age 41-60 years N = 399	Age ≥ 61 years N = 158	p value
Final pathologic stage					0.001
pN0	333 (46%)	93 (55%)	172 (43%)	68 (43%)	
pN+	393 (54%)	76 (45%)	227 (57%)	90 (57%)	

BCS Breast conservation Surgery

124 - Multidisciplinary Management of Intraductal Papilloma of the Breast Can Identify Patients Safely Managed Without Surgical Excision

Shahrazad Abbassi-Rahbar, Stephen Sack, Kelsey E. Larson, Jamie L. Wagner, Lyndsey J. Kilgore, Christa R. Balanoff, Onalisa D. Winblad, Amanda L. Amin
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Background/Objective: The decision of when to excise intraductal papilloma identified on percutaneous biopsy remains controversial. We sought to define contemporary management recommendations for intraductal papilloma identified on core needle biopsy with and without atypia and to stratify patients into either low or high risk for upgrade to define who benefits from surgical excision.

Methods: A single institution retrospective chart review from 02/2015-9/2020 was performed for all patients diagnosed with intraductal papilloma on percutaneous biopsy. The patients were identified from a prospectively maintained database of all benign and high-risk breast biopsies reviewed at a multidisciplinary concordance conference. Patient demographics, imaging and biopsy details, pathology presence or absence of atypia, and final surgical pathology were analyzed. Exclusion criteria included men and patients less than 18 years. Categorical variables were analyzed using Fisher's exact test and continuous variables using Mann-Whitney U test.

Results: The median age at presentation was 56 years for the 416 percutaneous biopsies demonstrating intraductal papilloma. Presentation and imaging findings are listed in the Table. A small number of women had concurrent ipsilateral (9.9%) and contralateral (12.7%) cancers. The median size of the biopsy target was 0.9 cm, and the majority had greater than 50% of the target excised by the biopsy. The majority were pure papilloma without atypia, and a small number had atypia either involving the papilloma (6.7%) or incidentally identified in the surrounding breast tissue (3.4%). Surgical excision was performed for 127/416 biopsies (30.5%) based on patient and surgeon preference. The papilloma site upgraded to malignancy in 15 (11.8%) of those excised: 9 to ductal carcinoma in situ (DCIS) and 6 to invasive cancer. Upgrade was most strongly associated with concurrent ipsilateral breast cancer ($p=0.009$), larger target size ($p=0.004$), less than 50% excised with the biopsy ($p=0.01$), and the presence of atypia involving the papilloma ($p=0.07$). Age, presenting symptoms, and concurrent contralateral cancer were not associated with upgrade risk. (Table) Of the 401 biopsies that did not upgrade or undergo excision, 7 (1.7%) developed a subsequent breast cancer over a median follow-up of 23.5 months (IQR 11-41). All subsequent cancers were either in the contralateral breast or in a different quadrant of the ipsilateral breast to the original papilloma site.

Conclusions: After comprehensive multidisciplinary review, management of intraductal papilloma identified on percutaneous biopsy can be safely stratified into high risk and low risk for upgrade. Contemporary upgrade rates in the literature range from 0-6% for pure papilloma and increase to 10-38% for atypical papilloma. This study confirms in our cohort the group at lowest risk for upgrade (0%) are those with a target lesion of less than or equal to 1.0 cm, greater than 50% of the target sampled, and pathology confirming papilloma without atypia. These patients can safely omit surgical excision, as the risk of identifying a subsequent malignancy at this site is also 0%.

Variables	Entire Cohort (n=416)	Upgrade to malignancy (n=15)	No upgrade to malignancy (n=112)	P-value
Age (years, median, IQR)	56 (46-66)	64 (44-67)	57 (45-66)	0.71
Presentation				0.56
Asymptomatic	265 (63.7%)	7 (46.7%)	62 (55.4%)	
Nipple discharge	117 (28.1%)	5 (33.3%)	38 (33.9%)	
Palpable mass	34 (8.2%)	3 (20.0%)	12 (10.7%)	
Imaging presentation				0.54
Mass	279 (67.1%)	9 (60.0%)	70 (62.5%)	
Calcifications	45 (10.8%)	1 (6.7%)	11 (9.8%)	
MRI mass enhancement	44 (10.6%)	1 (6.7%)	17 (15.2%)	
MRI non-mass enhancement	34 (8.2%)	3 (20.0%)	12 (10.7%)	
Asymmetry/distortion	14 (3.4%)	1 (6.7%)	2 (1.8%)	
Concurrent breast cancer				0.009
Ipsilateral	41 (9.9%)	7 (46.7%)	17 (15.2%)	
Contralateral	53 (12.7%)	0 (0%)	24 (21.4%)	
Biopsy modality				0.73
Ultrasound	314 (75.5%)	11 (73.3%)	85 (75.9%)	
Stereotactic	52 (12%)	1 (6.7%)	12 (10.7%)	
MRI	50 (12%)	3 (20.0%)	15 (13.4%)	
Imaging size (cm, median, IQR)	0.9 (0.6-1.5)	1.7 (1.1-3.6)	1.0 (0.7-1.7)	0.004
Percent excised by biopsy*				0.01
0-50%	142 (34.0%)	13 (86.7%)	49 (43.8%)	
50-100%	233 (56%)	2 (13.3%)	47 (42.0%)	
Presence of atypia				0.07
Pure papilloma	374 (89.9%)	10 (66.7%)	93 (83.0%)	
Atypical papilloma	28 (6.7%)	5 (33.3%)	15 (13.4%)	
Incidental atypia	14 (3.4%)	0 (0%)	4 (3.6%)	

*41 had no report of percent excision by biopsy

134 - Two-Stage Versus One-Stage Nipple-Sparing Mastectomy: Timing of Surgery Prevents Nipple Loss

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Background/Objective: Devascularization of the nipple-areola complex (NAC), that is, dividing the central portion of the breast skin envelope containing the NAC from the underlying breast tissue along the subcutaneous plane, weeks prior to mastectomy has been postulated to minimize nipple loss by allowing for compensatory increase in tissue blood flow. Our study aims to investigate ischemic complications between two-stage devascularization of the NAC followed by delayed nipple-sparing mastectomy (NSM) to one-stage NSM.

Methods: All patients who underwent either two-stage (2S) or one-stage (1S) NSM performed by a single surgical oncologist from 2015-2019 were reviewed. Breast reconstruction after NSM was performed by 4 plastic surgeons. Complications occurring within 60 days following operations were considered. Minor ischemic complications were defined as superficial epidermolysis or reversible partial skin necrosis involving limited areas of the NAC or mastectomy flap, not affecting the integrity or overall appearance of the NAC. Major ischemic complications were defined as full thickness necrosis requiring

resection. Minor and major ischemic changes were similarly used to classify mastectomy flap complications. Outcomes were compared between the 2 groups using chi-squared tests.

Results: A total of 61 patients/109 breasts underwent devascularization of the NAC followed by delayed NSM (2S), while 68 patients/102 breasts underwent one-stage NSM (1S). Median age was 46 years (range 38-66) for the 2S cohort and 49.5 years (range 25-78) for the 1S group. Median BMI was comparable in the 2 cohorts, 25.4 (range 17.2-35.8) 2S and 26 (range 17.8-40.8) 1S. The median time interval between devascularization and NSM was 32 days (range 11- 415). Fifteen (13.8%) patients in the 2S group delayed NSM by 84 to 415 days for receipt of chemotherapy, locoregional radiotherapy, or indecision regarding NSM. Major ischemic complications were more prevalent in the 1S than the 2S group, 12.7% vs 4.6%, $p < 0.05$. Nipple necrosis requiring operative excision occurred in 8/102 (7.8%) 1S breasts compared to 0% in the 2S group. In contrast, minor ischemic changes involving the NAC as well as both minor and major mastectomy flap complications were similar for the 2 groups, $p = 0.68$. The magnitude of time interval between devascularization and NSM were significantly associated with ischemic complications. A short time interval of 11-13 days between surgeries was recorded for 8 breasts and 20-42 days for 74 breasts. Among the shorter interval group, 5 (62.8%) breasts developed minor and major NAC ischemic complications compared to 14 (18.9%) breasts with longer time interval, $p < 0.01$. Similarly, mastectomy flap ischemic events were significantly higher for the short interval, 3 (37.5%) versus 4 (5.4%) with a longer time to NSM, $p < 0.05$.

Conclusions: No nipple loss occurred in the two-stage NSM cohort. Overall, fewer major ischemic complications occurred with devascularization of the NAC and delayed NSM, while mastectomy flap ischemia complications were similar. Post-NSM ischemic events are lower when the time interval between devascularization of the NAC and NSM is 20 days or greater.

199 - Invasive Lobular Breast Cancer: Data to Guide Surgical Decision-Making

Daniela Cocco, Ayat S ElSherif, Matthew D Wright, Marcus S Dempster, Megan L Kruse, Hong Li, Stephanie A Valente
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Background/Objective: Invasive lobular carcinoma (ILC) accounts for 15% of all breast cancer and is thought to be a unique entity compared to invasive ductal cancer. Historically, ILC has more favorable tumor biology, but higher percentage of multifocal/multicentric and bilateral disease. The aim of this study was to evaluate the data regarding the true extent of disease of ILC, risk of bilateral cancer, and the role of MRI to help guide surgical decision-making.

Methods: A retrospective analysis of a large institutional cancer database was performed to identify patients treated for ILC between the years 2004-2017. Patient and tumor characteristics were documented. Imaging modalities used to clinically stage patients were analyzed, and radiographic findings were noted between patients who received a pre-operative MRI versus those who did not. Clinical and pathologic tumor and nodal staging were compared, and follow-up details were recorded.

Results: A total of 692 patients with ILC were identified, with a median age of 61 years at diagnosis and 98% estrogen receptor-positive. At presentation, 43 patients (6.2%) were diagnosed with CBC, and 232

patients (33.5%) had multifocal/multicentric disease. Pre-operative MRI was obtained in 66% of patients, with younger patients receiving MRI at greater frequency ($p < 0.001$). MRI identified additional disease 20% of patients. Specifically, 56% of CBC and 29% of multicentric/multifocal disease was detected only on MRI. Surgical treatment included lumpectomy 45.4%, unilateral mastectomy 40.2%, and bilateral mastectomy 14.4%. Patients who had a pre-operative MRI had a similar clinical and pathologic T stage, whereas those without MRI had a T stage that was underestimated clinically (upstage rate, 16% MRI vs 30% no MRI). There was a significant discordance in clinical and pathologic nodal staging. Clinical staging identified 14% patients with a positive lymph node; however, pathologic lymph nodes were identified in 35% of patients. Moreover, 30% of cN0 patients were found to have at least 1 positive lymph node; with 6.7% of cN0 and 60% of cN1 upstaged to N2/N3 disease on final pathology. Pre-operative MRI did not improve concordance rates for lymph nodes, suggesting ILC had a high rate of imaging occult disease. Median follow-up was 6 years, during which time 2.3% of patients developed a local recurrence and 2.5% CBC. Of the 14 patients who developed CBC, only 6 had received a pre-operative MRI. Distant metastasis occurred in 10% of patients with a 5-year overall survival of 91.4%.

Conclusions: This study confirms that patients with ILC have multifocal/multicentric and bilateral cancer at the time of diagnosis. The incidence of CBC is highest at presentation with a low risk of CBC in follow-up, and this should be taken into consideration when discussing contralateral prophylactic mastectomy for unilateral disease. MRI has a significant benefit in preoperative planning, with a more accurate prediction of tumor size and extent of disease and should be recommended. Importantly, 30% of patients with ILC were found to have imaging occult positive lymph nodes. These data provide guidance for surgeons to better counsel the ILC patient and contribute additional insight toward surgical decision-making.

Virtual Posters

16 - Using Tyrer-Cuzick Risk Modeling to Define Your Population Risk for Breast Cancer: A Critical Access Hospital Experience Shows High Rural Risks

Charles H Shelton¹, Antonio Ruiz², Bryan Jordan³

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Background/Objective: We hypothesized rural risk is higher for breast cancer based on access to care, among other concerns. We implemented a risk assessment tool in 2019 to assess the risk and added it to intake at mammography. We collected data and reported this risk at time of annual mammogram imaging for 4500 women at a small rural hospital that is a critical access facility. We averaged all relative TC scores monthly. We consistently found an elevated TC relative risk monthly, suggesting our population is inherently higher in relative BC risk than the age-adjusted controls for the model. This adds credibility to rural demographics harboring higher risks and can be used as a population metric to define risk and target screening. We hypothesize a population with higher-than-normal risks is not screening enough, and the complement is likely also true- a population with a relative TC score lower than normal is over-screening due to lower risk.

Methods: We assessed women rurally at the time of mammography for their lifetime risk of breast cancer to determine the risk and consider targeted screening. All women were assigned an absolute lifetime risk of breast cancer, and an age-adjusted control risk as provided by the (TC) model. The ratio of the two provides a relative risk of breast cancer, which we find more descriptive. A relative risk greater than 1.0 is higher than normal, and a relative risk less than 1.0 is lower. Our hypothesis is that rural risk is higher than normal, and we tested this hypothesis. The results have implications for comparing populations in different demographic regions, and in targeted screening efforts.

Results: There were 4500 women screened by questionnaire at time of mammography over 12 months to provide annual data. TC scores calculated in 99% of women. Monthly scores tabulated for all patients in terms of absolute lifetime risk and relative risk. These were averaged monthly for all screened patients to analyze monthly population risk and tracked for 1 year. The relative risk was consistently higher than 1.0 every month, with monthly average of 1.10 (range 1.01 to 1.12, median 1.075). This suggests we have overall 10% relatively higher relative risk of breast cancer in our rural population. Breast density was consistent with national results. Body mass index, median age, and family history were high, likely accounting for this above-average relative risk.

Conclusions: The relative risk of breast cancer, as calculated by the ratio of an individual's lifetime risk to age-adjusted control allows a normalization of data within a population to age that lets us examine the local population risk. Rurally, we found the BC risk to be consistently higher than normal by 10%. One might hypothesize women self-select for screening, which may raise this risk, but nevertheless the average TC relative risk allows us to compare typical screening populations as a whole. We suspect rural risk is indeed higher. This relative risk also helps identify populations that are potentially under-screened and may benefit from intervention with risk-adapted screening (RR >1.0) and likewise populations that are over-screened (RR <1.0).

17 - How an Academic-Community Network Model Improves Disparity in Breast Detection Rurally

Charles Shelton¹, Bryan Jordan², Brian Kuszyk³

¹The Outer Banks Hospital, Nags Head, NC ²East Carolina University, Greenville, NC ³Eastern Radiology, Greenville, NC

Background/Objective: Rural disparities in cancer outcomes relate to many factors, including access to care, ethnic differences, and gender differences, among other factors. We are part of a hub-and-spoke wheel network that offers standardized breast imaging with all complementary modalities with centralized interpretation by dedicated fellowship trained breast radiologists. We have improved access to care by offering identical services at all hospitals regionally. We believe rural risks are still inherently high. We analyzed our data at 7 community hospitals within our network covering a mostly rural population of 1.4 million to observe any differences in screening outcomes rurally and compare to national metrics.

Methods: Breast cancer detection rates were measured over a year (2018-2019) at 7 rural facilities and compared to national measures. Outcomes were examined for clinically detected versus screening detected BC, ethnic differences, and other differences (PPV2, sensitivity and specificity, percentage of minimal cancers, abnormal interpretation rates, false positives, etc.).

Results: There were 26501 mammograms regionally (20296 screening, 6205 diagnostic). Overall cancer detection rates (CDR) were much higher than expected within our network (18.3 per 1000, ~1 cancer per 50 scans). These rates were 50%, relatively higher than expected for screening detected (6.4 per 1000) cancers, and also higher than expected for diagnostically (clinically) detected (57.5 per 1000) cancer rates. All facilities performed relatively well with quality metrics compared to national measures, suggesting our radiological evaluation process was optimal, with 97% overall sensitivity for screening, 93.8% specificity, 27.6% PPV2, 6.1% false positives, 0.2 per 1000 false negatives, and 6.8% call back/abnormal interpretation rates. At our most rural critical access hospital, 41% of breast cancers were clinically detected by diagnostic imaging (i.e., not screen-detected), and 15.8% of all annual mammograms were done for diagnostic purposes - the highest within the regional community network, and we averaged 11% (range 7.1% to 15.8%) as a community network versus 50% at the academic hub (tertiary center). This implies we are still not screening enough rurally, although access to care is not a perceived issue within our network. Furthermore, minimal cancers were 29.5% of all screened patients, and 20.4% overall, suggesting we need to screen more. Ethnic differences were noteworthy. Our data also suggests rural risks (e.g., familial BC history) are inherently higher than elsewhere, and we need to educate more about benefits of screening.

Conclusions: Our network of breast care has demonstrated very high-quality measures in screening and cancer detection with high rates in both screening detected and clinically detected cancers. More than 50% of network community hospitals are cancer-accredited, which may skew data slightly since cancer programs are more likely to see abnormal imaging based on referral patterns. Additionally, we hypothesize rural CDR are higher since we use centralized radiology interpretation coordinated through our academic-affiliated hub. We plan to use these data further regionally to increase screening over time as we work together within this network to improve minority representation and improve rural disparity. We also plan to study population risks using risk assessment modeling throughout our network to see why rural risks are inherently high.

18 – Five-Day Accelerated Partial Breast Irradiation (APBI) Using Stereotactic Body Radiation Therapy (SBRT) in Stage 0-II Breast Cancer: A Report of 184 Patients with up to 3-year Follow-up

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Background/Objective: Randomized trials in selected early-stage breast cancer patients with up to 10-year follow-up have proven that accelerated partial breast irradiation (APBI) given via high dose rate (HDR) implant bid in 5 days is equivalent to whole breast external radiation therapy (XRT) given qd in 5-6 weeks in regard to breast tumor local recurrence (LR)^{1,2}. However, complications with APBI implant in a Medicare database review have been significant, with 3.95% of women requiring mastectomy, 16.2% developing infections, and another 16.3% experiencing non-infection complications including rib fractures, fat necrosis, and breast pain³. Recently, APBI using non-invasive intensity modulated radiation therapy (IMRT) or stereotactic body radiation therapy (SBRT) given qd in 5 fractions has been shown in another randomized trial with 10-year follow-up to be equivalent to qd XRT in 6 weeks, with respect to LR [4]. IMRT/SBRT was superior in regard to acute effects, late effects, and cosmesis. Objectives: In the randomized clinical trial of APBI IMRT/SBRT, the clinical target volume (CTV) was defined by the injection of individual fiducial markers bordering the surgical cavity. At our institution, we have used the Biozorb fiducial system to localize the CTV for SBRT. We sought to confirm the APBI SBRT/IMRT results with a simpler fiducial system.

Methods: Between 2017 and 2020, 184 patients have undergone SBRT targeted to a Biozorb defined CTV with the walls of the surgical cavity sewn to the Biozorb device. Eligible patients were older than age 40, had tumor sizes ≤ 3 cm, negative surgical margins, and negative sentinel node dissections. SBRT dose was 30 Gy given in 5 fractions. Dose Constraints were as follows: V-30 Gy <105%, Ipsilateral Breast V-15 Gy <50%, Ipsilateral Lung V-10 Gy <20%, Contralateral Lung V-5 Gy <10%, Heart V-3 Gy <20%, Contralateral Breast Dmax <2 Gy and Skin Dmax <27 Gy. The planning target volume (PTV) ranged from 27 to 355 cc with a median of 80 cc. PTV = CTV + 1-2 cm.

Results: Follow-up ranged from 1-36 months with a median of 18 months. LR has been 0% (0/184). There have been no Biozorb-related infections, reactions, or rejections. There have been no cases of radiation-induced seromas, skin reactions, or soft tissue necrosis. Four patients developed pain around the Biozorb site. Three cases were resolved within 2 days on a 2-week course of steroids. One patient required 3 courses, with the last being 1 month. Cosmetic results as rated by the surgeon, radiation oncologist, and nurse were rated excellent in 98.9% (182/184) of cases.

Conclusions: Non-invasive APBI with SBRT given qd over 5 days targeted to Biozorb has resulted in LR, complications, and cosmetic results that compare favorably to invasive APBI given bid with HDR implant. At last follow-up, there have been no LR, skin reactions, or complications. Cosmesis has been excellent in 98.9% of patients.

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19 - Breast Cancer Management: Surgery Versus Primary Endocrine Therapy. Prep for Pandemic

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Background/Objective: Long-term outcomes after crisis management for breast cancer patients are unknown but critical for prioritization in pandemic times. The objective of this systematic review is to evaluate outcomes of surgery compared to primary endocrine therapy (PET) in patients with nonadvanced breast cancer.

Methods: MEDLINE, EMBASE, PubMed, and Cochrane Library were systematically searched. Inclusion criteria were clinical studies comparing PET to surgery +/- PET. Failure of nonoperative management was defined as local recurrence/progression (tumor failing to decrease in size and/or continuous local tumor growth) or recurrence of breast tumor after a regression interval following PET. Mantel-Haenszel method of meta-analysis (fixed effects model) was used for data synthesis. Effect estimates were expressed in odds ratio and 95% confidence intervals (OR, 95% CI).

Results: The analysis included 20,229 unique patients. Patients treated with PET without surgery had a higher risk of local recurrence or disease progression (OR (95% CI): 4.85 (3.74, 6.29), p<0.001). The median time to local progression was 2.3 years. Patients treated with surgery +/- PET had more favorable outcomes in terms of overall survival (OR (95% CI): 1.16 (0.90, 1.49), p=0.03) and breast cancer specific survival (OR (95% CI): 3.48 (3.23, 3.75), p<0.001).

Conclusions: PET is inferior to surgery +/- PET for definitive treatment of early, noninvasive breast cancer. However, patients treated with solely PET did not develop local recurrence until a median of 2.3 years. Thus, a window of time exists during which patients can be safely treated with PET alone when elective case cancellation policy is mandated.

20 - Partnership with ASBrS Surgeons Increased Prospective Genetic Testing at Rural Community Hospital and Improved Primary Decision-Making in 100% of Cases

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Background/Objective: Rural cancer care lags behind metropolitan care due to limited access to specialists. Familial cancers are very common rurally with >40% of screened women reporting family histories of breast cancer, which can factor into decision-making. Genetic testing is essential part of evaluation and management (NCCN); however, this is difficult in small community hospitals. We hypothesized a partnership with an ASBrS surgeon at a nearby larger community hospital

would increase testing percentages and timeliness (prospectively) to help guide and inform therapeutic decisions.

Methods: We analyzed baseline data and identified a gap in breast care, tracking the changes that occurred over time as we partnered with ASBrS surgeons within our region. Partnering was done primarily with virtual tumor boards biweekly to discuss and prospectively plan care. The ASBrS surgeons did not see all patients during this time, but did help facilitate testing when needed, and 1 later joined our hospital staff 1 day weekly to help with breast surgery locally. Patients were tracked for various metrics, which all improved over time, including virtual tumor boards, use of prospective genetics and genomics in shared decision-making, mastectomy rates, and use of various immediate reconstruction surgical procedures.

Results: One hundred sixty patients diagnosed with breast cancer locally were analyzed at 1 rural community 21-bed hospital. We began ASBrS surgeon collaboration in 2018 after recognizing a gap in services. Metrics were analyzed by year and showed a continued effect by this partnership. Throughout period, 58% of patients consistently met NCCN guidelines for genetic testing. Rates increased from 78% of eligible patients tested (per NCCN guidelines) to 100% over this period. Testing using 2019 ASBrS guidelines (when retrospectively applied prior to 2019) revealed increases from 37% of all patients with BC tested prior to partnership, to 100% of all patients tested. Pathogenic mutation rates increased from 9.1% to 13% per year, due to wider testing, and was invaluable in the treatment planning. Patients with highly penetrant high-risk genes (BRCA and PALB2) were more likely to choose mastectomy than BCT if they knew this prospectively. Women with negative results (or low risk variants) were more likely to choose breast conservation therapy. VUS rates doubled over the time period as we used more extensive panels. Tumor boards increased from 13% of cases prospectively discussed in 2017 to 100% of cases discussed prospectively in 2019/2020, which resulted in improved prospective testing and coordinated care. Patients increasingly seen by ASBrS surgeons (62% baseline to 90% current) increased access to surgical options including BCT, oncoplasty, and reconstruction options. Overall mastectomy rates declined from >30% at baseline to 18% after partnership, and cosmetic mastectomies (nipple sparing, and mastectomies with immediate reconstruction) became attractive option from partnership. We currently discuss 100% of breast cases prospectively to include genetics and genomics, to help shared decision-making.

Conclusions: A rural 21-bed critical access hospital identified a way to improve access to care for breast cancer by partnering with ASBrS surgeon(s) in surrounding metropolitan region. This improved outcomes for these patients tremendously and has helped remove some of the disparity seen rurally.

21 - Adopting Accelerated Radiation Therapy Post-Operatively Is Aided by a Prospective Peer-to-Peer Review Program

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Background/Objective: Accelerated radiation therapy using hypofractionated techniques is slowly becoming adopted in the US for breast cancer (BC), although societal guidelines have endorsed it for years based on large randomized international data. This delay is due to many factors including reimbursements tied to US physician pay, where doing more procedurally is not always better for the patient. We began a robust program of peer review rurally for radiation therapy planning postoperatively in 2014 with the goal of prospective discussions of >95% of curative cases, which has helped in adopting consensus guidelines regionally.

Methods: We collaboratively reviewed all curative cases treated at rural hospitals in a 29-county region by networking with an academic affiliated metropolitan cancer center. Using WebEx platforms 3 times a week, we were able to review all cases before the first radiation treatment was administered. This was done for 5 centers using 10 radiation oncologists, and all aspects of planning were reviewed prior to commencing radiotherapy. This included contouring of at-risk anatomic volumes (regional nodes and primary), planned doses, dose per fractions, techniques, number of treatments, use of boosts or no boosts, use of concurrent or sequential hormone therapy or chemotherapy, and other quality metrics following evidence-based guidelines. Any cases not meeting consensus recommendations were replanned according to peer consensus before primary treatment.

Results: Since 2014, 100% of cases of BC analyzed at rural hospital to highlight changes in practice by peer review process, including adoption of accelerated radiation techniques. Over the 6 years analyzed, peer review was done prospectively in all cases (n=1324 BC) before the start of radiation, resulting in 100% adherence to NCCN guidelines. All patients met all quality metrics in radiation therapy planning before delivery. The average time to start treatment was less than 1 week and was not delayed more than 1 day due to frequency of meetings. The use of hypofractionated (accelerated) radiation techniques increased from 17% of BC patients in 2015 to 70% in 2019/20, which was significant. Currently, we don't hypofractionate patients with large volume disease (e.g., post-op nodal inclusive volumes, post-mastectomy, or women with very large breasts). Analyzing for patients treated with tangents only (typical post BCT early-stage disease) revealed more significant results with 75% of patients treated with accelerated regimens rurally. Results were similar at other regional sites. Boosts were less commonly needed in cases treated primarily by ASBrS surgeons.

Conclusions: Discussing all aspects of radiation before the start of post-operative radiotherapy in breast cancer resulted in all patients being treated appropriately per NCCN guidelines. Furthermore, this prospective peer review process resulted in a consensus and uniformity of breast treatments within a large geographic region (29 counties), which helped improve rural disparity in the care of more than 1300 breast cancer cases. Lastly, it allowed adoption of accelerated techniques more efficiently into practices rurally, which helped improved patient care. This has significant implications as patterns for reimbursement change in the future.

25 - The PREDICT Registry: A Prospective Registry Study to Evaluate the Effect of the DCISionRT Test on Treatment Decisions in Patients with DCIS Following Breast-Conserving Therapy

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Background/Objective: The benefits of adjuvant radiation therapy (RT) in patients with ductal carcinoma in situ (DCIS) treated with breast-conserving surgery (BCS) remains controversial. Although there is level-I evidence supporting the role of RT in reducing the risk of local recurrence, the absolute benefit is variable. Current guidelines generally recommend RT for all patients having BCS, but it is important to develop prognostic and predictive tools to better assess risk and understand the impact such a tool would have on treatment decisions. The DCISionRT Test (PreludeDx, Laguna Hills, CA) is a biologic signature that provides a validated score for assessing 10-year risk of recurrence and RT benefit using individual tumor biology as assessed by clinical and pathologic biomarkers.

Prospective Clinical Trial Design: This is a prospective cohort study for patients diagnosed with DCIS of the breast. Treating physicians complete a treatment recommendation survey before and after receiving DCISionRT test results. Test results, treatment recommendations, patient preferences, and clinico-pathologic features are stored in a de-identified registry for participating institutions from a variety of geographic regions across the US. The study will also collect 5- and 10-year recurrence and survival data.

Eligibility Criteria: The study includes females over age 25 who are candidates for BCS and eligible for RT and/or systemic treatment with sufficient tissue to generate test results. Subjects must not have been previously treated for DCIS or have previous or current invasive or micro-invasive breast cancer.

Specific Aims: The primary endpoints are changes in treatment recommendations for surgical, radiation and hormonal therapy. Secondary endpoints are identification of key drivers for treatment recommendations, including age, size, grade, necrosis, hormone receptor status, and other clinico-pathologic factors.

Statistical Methods: Changes in treatment recommendations will be assessed using McNemar's test with an alpha level of 0.05. Differences in recurrence-free and overall survival will be evaluated by Kaplan-Meier survival analysis using the log-rank test and/or the Cox Proportional Hazards model. A planned early interim analysis based on the first 200 patients has been recently completed and reported.

Present and Planned Accrual: As of October 12, 2020, 1,145 patients have been accrued from 56 institutions. Twenty-eight additional institutions are currently in the process of joining the study. We are planning to enroll up to 2,500 patients from up to 100 institutions.

Contact information for clinicians and patients with an interest in the clinical trial
Steven C. Shivers, PhD, sshivers@preludedx.com

26 - Should We Use Age-Adjusted Relative Risk Instead of Absolute Lifetime Risk for Cancer Screening? An Analysis of a Rural Community Cancer Center

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Background/Objective: Screening for breast cancer (BC), particularly for above-average risk, most often utilizes a validated risk model for a given population, including various commonly used models such as Claus, Tyrer-Cuzick (TC), and modified Gail, to name a few. These commonly result in a lifetime risk for breast cancer that is then used to offer targeted interventions including other screening modalities, such as MRI and US. We believe using relative risk that is appropriately adjusted for age offers a better tool to assess this risk within a population more so than absolute risk. A 71-year-old woman with 12.4% lifetime risk of breast cancer who is 3.0 times normal in her relative risk is someone who should be screened differently rather than relying on absolute numbers. We analyzed our screened population at a small community hospital to assess this risk over 1 year and compare calculated risks using these 2 approaches.

Methods: All patients screened at rural community hospital over 1-year period. Risk assessment done at time of screening using same screening questionnaire, and all calculations done by 1 nurse navigator over 1 year. TC scores calculated for all patients who completed questionnaires, and both scores were recorded including absolute lifetime risk, as well as relative risk. The relative risk is the ratio of the risk of the patient based on the questionnaire divided by the age-adjusted woman in the population. The ratio represents we believe a better estimate of the risk to warrant further testing and targeted screening. An analysis was done on each score for the same patients over the year to measure the difference in the numbers of high (increased) risk defined by absolute percentages as commonly used (>20%) and compared to the relative risk of breast cancer in same women.

Results: There were 4499 patients screened at time of mammogram from July 2019 to July 2020. There were 303 who had previous BC, 22 were too old to calculate TC scores, and 3 patients refused to fill out questionnaire, and were excluded. There were 4160 patients *unaffected* by cancer and below 80 who were therefore screened for their cancer risk using TC risk assessment model. Using absolute lifetime risk >20%, 262 patients (6.3%) met criteria for “high risk” over this period, as defined by >20% lifetime risk. Age-adjusted scores of the same patients revealed 311 patients carry above a 2x risk of BC, and 630 are above 1.6 times risk-the reference ratio of a 20% lifetime:average lifetime of 12.5%, which is currently the overall population risk reference. More women (up to 2.4x) potentially qualify for high-risk screening using the relative risk descriptor rather than an absolute cutoff arbitrarily set >20%. We currently refer all patients with *either* absolute lifetime risk > 20% *or* RR of BC > 2.0 times higher than age adjusted risk for high (increased) risk screening.

Conclusions: Risk modeling for targeted screening and risk reduction should consider relative risk for BC in addition to absolute risk. More women could benefit from this inclusion, particularly from an insurance standpoint where imaging is not covered currently for patients <20%.

27 - Surgery Refusal in Black and Hispanic Women with Non-Metastatic Breast Cancer

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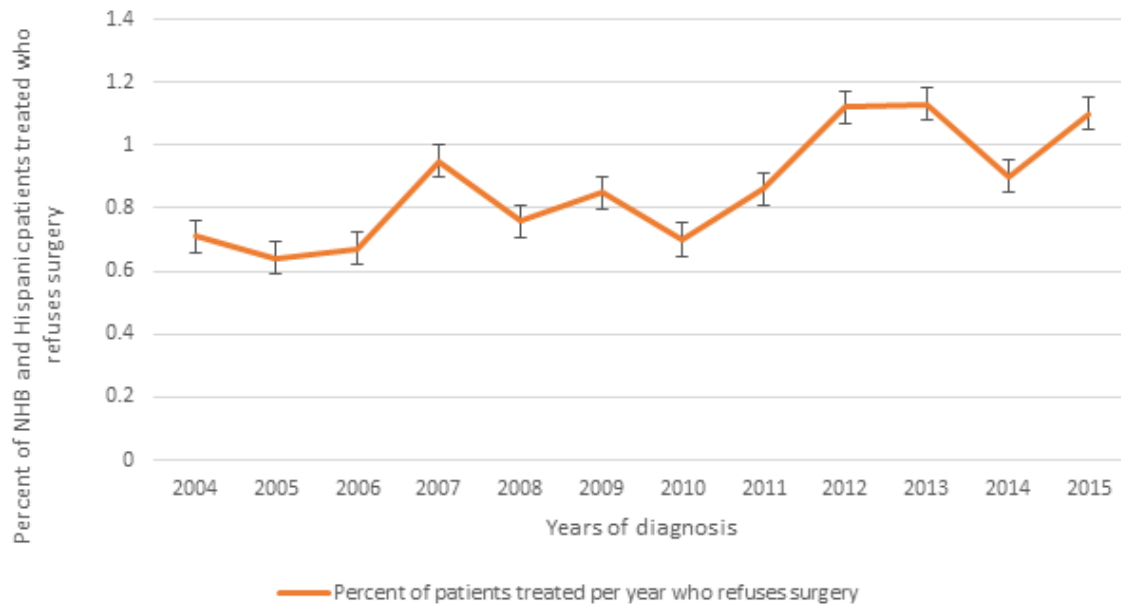
Background/Objective: Although most patients with non-metastatic breast cancer will have definitive surgery, numerous studies have shown lower receipt of treatment including surgery in minority women. Those who refuse surgery have an increased disease-specific mortality; surgery refusal thereby contributes to the disproportionately higher breast cancer mortality in non-Hispanic Black (NHB) and Hispanic women. To investigate these disparities, we reviewed data from the SEER Program to identify factors associated with surgery refusal.

Methods: The Surveillance, Epidemiology and End Results (SEER) Data were used from years 2004-2015 for NHB and Hispanic women diagnosed with non-metastatic breast cancer (n=46,650). The study cohort was divided into those who underwent surgery and those who refused surgery. Sociodemographic (race, age, marital status, insurance status) and tumor clinical/pathological (stage, hormone receptor status) differences were analyzed using Pearson's Chi Square tests and analysis of variance. Multivariate logistic regression of predictors of refusal of surgery and cox-proportional hazard model of disease specific mortality were performed. A p-value of 0.05 was considered statistically significant.

Results: There were 414 patients in the cohort who refused surgery (330 NHB and 84 Hispanic). The percentage of patients refusing surgery increased during the study period, with an observed refusal rate of 0.72% in 2004 increasing to 1.11% in 2015. The mean age observed for women who refused surgery was 66 years, while women who had surgery had a mean age of 58 years (p<0.0001). When compared to surgery recipients, refusers demonstrated decreased marriage rates (72.2% vs 75.7%, p=0.029) and were more likely to be uninsured (3.4% vs 2.7%, p<0.05) or have Medicaid (25.8% vs. 17%, p <0.05). Refusers presented with more advanced disease (40.2% vs. 31% Stage II, 17.2 vs. 11.4% Stage III, p<0.0001). No difference was found in cancer subtype between groups. Breast cancer-specific mortality increased significantly with omission of surgery (p<0.0001). On logistic regression, surgery refusal was associated with age >60 years, being unmarried, and more advanced clinical stage.

Conclusions: Refusal of surgery in Black and Hispanic women with otherwise potentially curative non-metastatic breast cancer is on the rise, especially in NHB women, women over 60, single women, and women with higher stage at diagnosis. Additional studies are needed to analyze qualitative data on this population of women and their underlying health beliefs, communication needs, and possible utilization of alternative and complementary medicine.

Figure. Percent of NHB and Hispanic patients treated per year who refuses surgery by years of diagnosis



29 - Occupational Therapy After Breast Reconstruction: A Retrospective-Matched Case Control Study

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Background/Objective: Our facility created an evidence-based enhanced recovery after surgery (ERAS) interdisciplinary protocol for patients undergoing breast reconstruction. The protocol included preoperative patient education, opioid and nonopioid multimodal medications, pre-operative PEC II blocks, postoperative occupational therapy (OT) education, and postoperative-scheduled nonopioid multimodal medication. Occupational therapy is a distinctive profession that looks at patient care in a holistic manner with the main goal of achieving maximum performance in meaningful daily activities despite physical, emotional, and psychological implications after surgery. The aim of this study was to examine the effects of postoperative OT on readmission rates, out-patient therapy referral rates, and medication consumption after breast reconstruction.

Methods: A retrospective matched case control study was designed to examine 2 time periods where controls (pre-ERAS) did not receive OT and cases (enrolled in ERAS) did receive OT. Total sample size, determined by a priori power analysis was 288, so the final sample was 330, with 165 patients assigned to each group. Subject inclusion was female and over 18 years of age, and subjects were matched on age within 5 years and type of surgery (subpectoral with alloderm, prepectoral with alloderm, or autologous). All cases received at least 1 OT session the day after surgery that included education on surgical restrictions, how to get in and out of bed, modified activities of daily living like putting on a bra, physician prescribed therapeutic exercises, lymphedema risk reduction strategies, and how to safely return to activities like childcare, work, and leisure activities while healing.

Results: From the sample, 104 (31.5%) and 115 (34.2%) patients were observed to need an opioid refill and an outpatient therapy referral, respectively. Patients who received an OT session were associated with lower probability of needing an opioid prescription (OR=0.519, 95% CI: 0.276-0.974) and needing an outpatient therapy referral (OR = 2.175, 95% CI: 1.072-4.411). Patients who received OT were prescribed fewer opioid pills than patients who did not receive OT (Mann-Whitney U test, p=0.002). Although the effect of OT no longer existed after controlling for other covariates using negative binomial regression, the incident rate for patients who received OT was lower than patients who did not receive OT (p=0.1919). Occupational therapy was not associated with decreasing the number of nonopioid pills (p=.4068) or the probability of being readmitted to the hospital (p=0.5017).

Conclusions: Creation of the ERAS protocol and specifically the intentional post-operative occupational therapy education session resulted in significant reductions in postoperative opioid consumption and necessity of needing an outpatient therapy referral. Researchers examined the essential role occupational therapists can have on reducing post-operative rehabilitative and medication-related issues breast cancer survivors can experience during their recovery process. Successful multidisciplinary engagement, including occupational therapy collaboration, has the potential to optimize functional status after breast reconstruction and reduce continued need for opioid prescriptions and therapy services post-operatively.

Regression		Odds Ratio (95% CI)	P Value
Refills (# pills prescribed)			
	Opioids	.747 (.573 - 1.869)	0.1919
	NonOpioids	.3319 (.399 - .451)	0.4068
Refills (Yes or No)			
	Opioids	.519 (.276 - .974)	0.0412
	NonOpioids	.797 (.452 - 1.405)	0.4324
Readmission (Yes or No)			
	30 days	2.354 (.659 - 8.416)	0.1878
	90 days	.600 (.135 - 2.662)	0.5017
Out-Patient Referral (Yes or No)		2.175 (1.072 - 4.411)	0.0312
Mann Whitney U test		Z	P Value
Refills (# pills prescribed)			
	Opioids	3.113	0.002
	NonOpioids	0.156	0.876

31 - Cost-Effectiveness Analysis of No Adjuvant Therapy versus Partial Breast Irradiation Alone versus Combined Treatment for Treatment of Low-Risk DCIS

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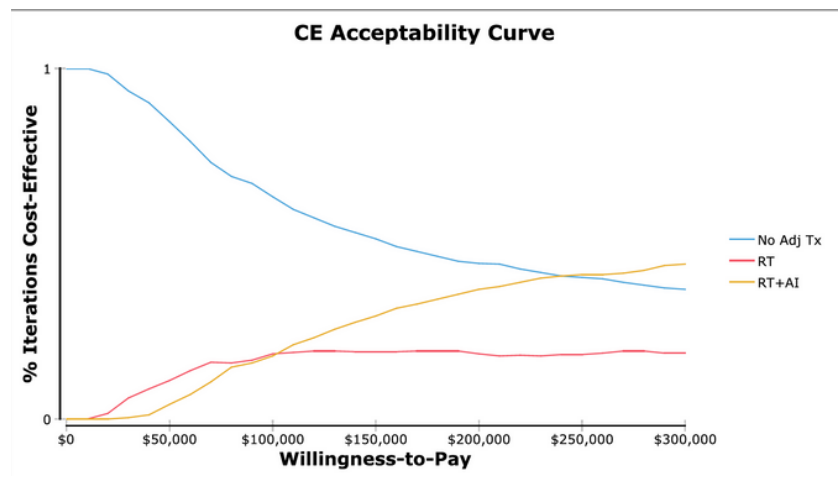
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Background/Objective: The role of adjuvant therapy in patients with DCIS who undergo breast-conserving surgery remains controversial, particularly for low-risk patients (60 years or older, estrogen-positive). We performed a cost-effectiveness Markov microsimulation decision analysis of 3 strategies for the adjuvant treatment of DCIS: no treatment, a 5-fraction course of accelerated partial-breast irradiation using intensity-modulated radiation therapy (APBI-alone), or APBI and endocrine therapy consisting of an aromatase inhibitor for 5 years.

Methods: We constructed a patient-level societal perspective Markov microsimulation. Oncologic outcomes including local recurrence, distant metastases, and survival as well as toxicity data obtained from randomized or prospective trials when possible. Costs of side effects were included. Costs were adjusted to 2019 US dollars and extracted from Medicare reimbursement data. Quality-adjusted life-years (QALY) were calculated based on utilities extracted from the literature.

Results: No adjuvant therapy was the least costly approach (\$5,744) followed by APBI-alone (\$11,070), with combined therapy (\$16,052) the costliest. With respect to lifetime QALYs, similar results were noted with combined therapy having a slightly higher value (No adjuvant 11.320; APBI-alone 11.343; combination 11.381). In the base case, no treatment was the cost-effective strategy with ICERs of \$239,109/QALY with APBI-alone compared to no treatment and \$171,718/QALY for combine therapy compared to no treatment. The ICER for combined therapy as compared to APBI-alone was \$131,949. Probabilistic sensitivity analyses found that no therapy was cost-effective at \$100,000/QALY in 63% of trials, APBI-alone in 19%, and the combination in 18%.

Conclusions: Based on a Markov microsimulation analysis, for patients with low-risk DCIS, no adjuvant therapy represents the least costly approach. The incremental benefit to each adjuvant therapy appears small and should be used selectively.



35 - What's This Lump: A Comparison of Radiologic Outcomes Following Autologous Fat Grafting of Autologous Breast Reconstruction versus Implant-Based Breast Reconstruction

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Background/Objective: Autologous fat grafting (AFG) is increasingly being used as adjunct technique for breast reconstruction to augment volume, achieve symmetry, and improve contour deformities. However, concerns regarding its radiologic and oncologic safety, especially in the long-term, persist. The purpose of this study is to characterize the radiologic findings of women undergoing autologous breast reconstruction (ABR) or implant-based breast reconstruction (IBR) after receiving AFG.

Methods: A retrospective chart review was performed for all patients undergoing fat grafting at a multi-site single health system between 2015 to 2018. There were 228 eligible patients who were identified by Current Procedural Terminology (CPT) codes, and patient, operative, and radiologic characteristics were collected. Patients were divided into 2 groups based on reconstructive technique: IBR and ABR. Patients in the ABR group were further divided by type of free-flap reconstruction. Bivariate analysis comparing baseline characteristics, and radiologic outcomes were performed.

Results: There were 228 breasts included in the study (ABR=129, IBR=99). Forty (17.5%) had a reported palpable lump or nodule after AFG (Table) with no significance found between reconstructive techniques (ABR=25 (18.9%) vs. IBR= 16 (16.2%); $p=0.631$). Furthermore, 44 (18.3%) underwent subsequent non-routine imaging with 23 (17.8%) in the ABR group and 21 (21.2) in the IBR group ($p=0.521$). The most common imaging modality was ultrasound, followed by MRI. Biopsy was performed in 10 (4.4%) patients total (ABR=7 (5.4%) vs. IBR=3 (3.0%); $p=0.520$). Of these biopsies, 50% were found to be fat necrosis with no significant difference between groups ($p=1.00$). Malignancy was found in 3 patients: 2 (28.6%) in ABR and 1 (33.3%) in IBR ($p=1.00$). In a separate analysis of ABR stratified by free-flap type, significant results were only found in rates of palpable breast lumps/nodules ($p=0.003$) and mass excision ($p=0.041$) (Table).

Conclusions: Overall, palpable breast lumps after AFG in patients with breast reconstruction are not uncommon. Our results demonstrate that while this is the case, the majority of patients, regardless of reconstruction technique, had benign masses upon further evaluation. Further studies are necessary to elucidate the influence of free-flap approach and AFG on rates of abnormal nodularities.

Table. Radiologic outcomes after autologous fat grating by reconstructive technique

	Total no. breasts (%) n=228	ABR no. breasts (%) n=129	IBR no. breasts (%) n=99	<i>p</i>
Palpable lump/nodule after FG	40 (17.5)	24 (18.6)	16 (16.2)	0.631
Non-routine imaging	44 (19.3)	23 (17.8)	21 (21.2)	0.521
US	39 (17.1)	21 (16.3)	18 (18.2)	0.705
MRI	10 (4.4)	4 (3.1)	6 (6.1)	0.337
Mammogram	6 (2.6)	3 (2.3)	3 (3.0)	1.000
Biopsy	10 (4.4)	7 (5.4)	3 (3.0)	0.520
Excision	4 (1.8)	2 (1.6)	2 (2.0)	1.000
Biopsy Findings				
Fat Necrosis	5 (50.0)	3 (42.9)	2 (66.7)	1.000

Benign	2 (20.0)	2 (28.6)	0 (0.0)	1.000
Malignancy	3 (30.0)	2 (28.6)	1 (33.3)	1.000

38 – Pegloprastide-Based Ratiometric Fluorescence Imaging Detects Intraoperative Positive Margins in Real-Time

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Background/Objective: Positive margins detected after breast conservation surgery can result in the need for a re-excision or completion mastectomy. We hypothesized that pegloprastide combined with a ratiometric fluorescence imaging system would allow surgeons to detect positive margins in real time.

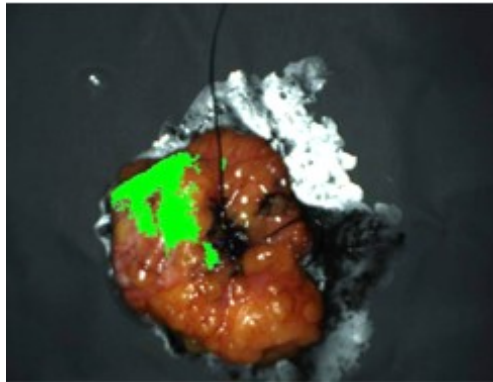
Methods: Pegloprastide (AVB-620) was to be administered to patients 3-20 hours before the start of surgery. During the operation, initial primary tumor removal was performed unaided. Following primary resection, a fluorescence imaging system optimized for use with pegloprastide was used to assess the primary specimen and the cavity. Cavity shaves were taken when fluorescence above pre-specified thresholds were noted. Additional cavity shaves for areas negative by imaging were also sampled. Comparisons were made between images and final pathology results to assess the correlation between pegloprastide-mediated imaging and margin status. Pathologic margins were deemed to be positive if invasive cancer showed tumor on ink (0mm) or DCIS was within 2mm of the surface or a positive shave margin was identified. Preplanned subgroup analysis was performed based on dose timing, comparing Day before Surgery (DBS) versus Same Day as Surgery (SDS).

Results: Ninety-two patients received pegloprastide. There were no drug-related serious adverse events recorded. The average age was 59.5 (40-81), 85% of patients were ER-positive, and 9% of patients were HER2-positive. Ninety-six percent of patients underwent a lumpectomy. Of the 92 patients, 87 were evaluable and were divided into 2 groups based on the timing of the pegloprastide dose, either DBS (n=47) or SDS (n=40). Overall, the positive margin rate as measured at the end of the primary resection was 46% (40/87). The overall patient level positive margin sensitivity and specificity were 45% and 70% respectively. When measured by dosing subgroup, there was a significant difference (p=0.005) in sensitivity with DBS showing a 65% true positive rate (13/20), compared to 25% (5/20) for SDS group. Beyond that, in the DBS patient group, an additional 10% of patients (2/20) with positive margins, who did not have the positive margin area detected by fluorescence (a false negative), had a close margin (defined as invasive tumor within 2mm of the surface) fluorescently detected, such that 75% (15/20) of margin positive patients actually had a positive fluorescent signal seen. Specificity was 78% in the DBS

group and 60% in the SDS group. Sample level accuracy was 82% for DBS and 79% for SDS. Re-excision rates in the trial were 6%.

Conclusions: Pegloprastide is well tolerated. When infused the day before surgery, pegloprastide demonstrates the ability to identify positive margins in at least 65% of patients. Utilization of pegloprastide, particularly when dosed the day before surgery, may aid in allowing surgeons to identify and resolve positive margins in real time in a substantial proportion of patients.

Figure. Positive margin on a lumpectomy specimen highlighted by pegloprastide-based imaging



40 - Experience with Intraoperative Radiation Therapy in an Urban Cancer Center

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Background/Objective: Intra-operative radiation therapy (IORT) is a relatively newer means of delivering radiation (RT) directly to the lumpectomy cavity at the time of surgery and has been shown to be as safe and effective as adjuvant whole breast RT, as published in the TARGIT-A trial. We started enrolling patients on our IORT registry trial in 2018 and aim to report our early results thus far, hypothesizing that they will match those seen in the larger published studies.

Methods: We instituted an IORT practice using Intrabeam® low-energy 50kVp x-rays for selected early stage clinically node-negative breast cancer cases in 2018. Patients were enrolled on our institutional registry protocol which allowed for IORT in ER+ patients with grade 1-2 DCIS \leq 2.5 cm or invasive disease \leq 3.5 cm in patients \geq 45 years of age. We report our experience to date herein. Our cohort of patients seen in radiation oncology consultation for possible IORT was reviewed. Demographic information was recorded and analyzed, as was clinical and pathologic information, work-up, subsequent treatment strategies, and outcomes.

Results: Between January 2018 and March 2020, 110 patients with clinical Stage 0-I ER+ breast cancer were seen for possible IORT. Ninety-six patients ultimately received IORT to 99 sites. Reasons for not proceeding with IORT were: MRI and biopsy findings of additional lesions (5/14; 36%), patient preference (7/14; 50%), technical issues (1/14; 7%), and surgery pending due to other co-morbid

conditions (1/14: 7%). Pre-operative MRI was obtained in 38.2% of the patients (42/110), which changed management and precluded IORT in 3 (7%). Baseline characteristics of our IORT cohort are summarized in the Table. The majority received IORT at the time of initial surgery (89/96; 93%). Three patients received IORT at the time of re-excision (3%), and 4 (4%) received IORT at the time of recurrence/new ipsilateral primary. Of those who received IORT on recurrence, 2/4 patients had previous RT to the ipsilateral breast. Lymph nodes (LN) were sampled in 71/72 (99%) patients with invasive disease and 9/24 (38%) of patients with DCIS. Ten patients had LN involvement on final pathology, of which 6 had macroscopic disease, 2 had microscopic disease, and 2 had isolated tumor cells. Re-excision post IORT occurred in 8 patients (8%). Adjuvant RT to the whole breast +/- LN was ultimately given to 11/96 patients mainly due to positive sentinel LN found on final pathology (7/11; 64%); other reasons were G3 DCIS (2/11; 18%), tumor size (1/11; 9%) and multifactorial (1/11; 9%). Three patients (3%) had post-op complications of wound dehiscence. There were no local recurrences at a median follow-up of 17.6 months (range: 2.7– 33.1 months) for our surviving patients.

Conclusions: IORT has proven to be a safe and patient-centered form of local adjuvant RT for our patient population, in whom compliance with a longer course of RT can be an issue. Long-term efficacy in our patient cohort remains to be evaluated through continued follow-up. In this era of COVID-19, IORT is an increasingly attractive option, as it greatly minimizes patient visits to the clinic.

Table. Baseline demographic, tumor and treatment characteristics of our patient cohort who received IORT (n=96)

Baseline characteristics	N (%)
Age, median (range), yrs	66 (48 – 89)
Clinical tumor size, median (range), mm	9 (3 – 40)
Clinical Stage	
0	24 (25%)
IA	67 (70%)
IB	5 (5%)
BMI, median (range), kg/m ²	29 (21 – 61)
IORT to bilateral breasts	3 (3%)
IORT applicator size, cm	
3	25 (26%)
3.5	40 (42%)
4	25 (26%)
4.5	3 (3%)
5	3 (3%)
Closest skin bridge, median (range), mm	14 (9 – 28)
Skin dose at closest margin, median (range), Gy	1.3 (0.4– 9.1)
Closest surgical margin, median (range), mm	4 (0 – 45)
Grade on final pathology	
1	26 (27%)
2	60 (63%)
3	10 (10%)
Lymphovascular invasion on final pathology	8 (8%)

41 - Seeking Treatment Outside of Local Health Service Area Is Associated with Improved Survival Following Lumpectomy for Breast Cancer

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Background/Objective: Disparity in breast cancer treatment and outcomes due to geographic or socioeconomic variables is an increasingly recognized problem. We sought to compare treatment and outcomes in patients who underwent surgery within their own health service area (HSA) as defined by the Centers for Disease Control and Prevention (CDC) versus patients who underwent surgery outside of their local HSA. We hypothesized that patients who resided outside of their treatment center's HSA would have worse outcomes.

Methods: Data were collected from the Surveillance, Epidemiology, and End Results (SEER) Program database for patients with breast cancer (Stages 0, I, II, and III) who underwent partial mastectomy from 2007-2016. These patients were divided into 2 cohorts based on whether their home ZIP code was located within their treatment center's HSA or outside of their treatment center's HSA. The 2 cohorts were then compared for age, race, sex, ethnicity, income, insurance status, stage, receptor status, whether they received radiation, local recurrence, disease-specific survival, and overall survival.

Results: A total of 297,207 patients met inclusion criteria. There were 228,880 (77.0%) patients who lived within their treatment center's HSA versus 68,327 (23.0%) who lived outside of their center's HSA. Patients living outside of their treatment center's HSA were less likely to receive radiation therapy (69.3% versus 77.3%, $p < 0.0001$), were higher stage ($p < 0.001$), and yet had improved overall survival (90.1% vs. 89.5%, $p < 0.0001$). No statistically significant difference was found between the 2 groups for sex or disease specific survival. Statistically significant differences were also found for local regional recurrence rates, race, ethnicity, insurance status, and receptor status, although the differences were small and thought not to be clinically significant.

Conclusions: Living further away from a treatment center would typically be seen as an impediment to receiving care, and worse outcomes would be expected. Consistent with this, previous studies have shown that patients living further away are more likely to undergo mastectomy and are less likely to receive radiation following partial mastectomy than those who live close to treatment centers. However, in our study, the cohort of patients who lived outside of their treatment center's HSA had an improved overall survival rate despite a higher stage of cancer. This difference may reflect a subset of patients who specifically sought out and travelled to high-volume, well-recognized treatment centers rather than receiving care in their home locale. If so, the improved survival may be due to better treatment and outcomes at high-volume centers, or it may be due to a selection bias among the patients themselves. Although the 2 groups of patients had similar median household incomes (\$64,181 for local patients vs \$62,804 for those who travelled, $p < 0.01$), the patients who travelled for care may have identified themselves as patients who were willing and able to seek out specific care. Further study is needed to determine the underlying reasons for the differences observed.

TABLE. Comparison of Patients Living within Treatment Center’s HSA to Those Living Outside of Treatment Center’s HSA

	Patients within HSA (%)	Patients outside of HSA (%)	P-value
Number of Patients (297,207)	228,880 (77.0)	68,327 (23.0)	
Radiation			
Received XRT	176,854 (77.3)	47,336 (69.3)	p<0.00001
No XRT	52,026 (22.7)	20,991 (30.7)	
Disease specific survival	96.82%	96.80%	p=0.889
Overall survival	89.5%	90.1%	p<0.0001
Stage			
0	3021 (1.3)	395 (0.58)	p<0.00001
I	166,900 (72.9)	47,546 (69.6)	
II	54,702 (23.9)	18,863 (27.6)	
III	4257 (1.86)	51,771 (75.8)	
Median Household Income	64,181	62,804	p<0.00001

42 - Genetic Screening in Annual Rural Mammography Population Reveals 1 in 5 Women Meet Criteria for HBOC Testing versus 3 in 5 Increased Risk Women Who Meet Criteria, Suggesting a Greater Need for Genetic Assessment in Normal to Low-Risk Women

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Background/Objective: Current guidelines recommend we consider genetic screening as part of assessment for women at increased risk, but it is not emphasized in the routine workflow for women with average risk or low risk. We identified a large portion of our screening population with familial breast cancer (and ovarian, pancreatic cancers) who did not meet increased risk scores, but who qualified for genetic testing using current NCCN guidelines. Knowing the status of their genetic risk would profoundly change their lifetime risk, and we analyzed our screening population for their familial risk and whether they met guidelines for genetic testing.

Methods: A total of 4481 women were analyzed for their familial risk at the time of annual mammography at a rural hospital. Questionnaires were used manually to assess for their familial risk including the specific types of cancers, ages of onset, age of death, degree of relation, and other factors. All questionnaires were filled out by patients before their mammogram and culled by a breast nurse navigator daily over this time and tracked in a spreadsheet for the purpose of analyzing this familial risk and considering the role for genetics in the rural population family clustering patterns we have consistently observed. Patients histories were compared to NCCN guidelines for HBOC criteria to see how many women met guidelines for genetic counseling, and compared within the various risk-stratified groups, including *increased* risk (as defined by absolute lifetime TC score >20%), *above-average* risk (as defined by 15% to 19.9%), and *normal-to-low* risk (as defined by <15%).

Results: There were 4481 women screened for familial cancers over analytic period. Of these, 6.7% were former BC patients undergoing annual surveillance, which was the reason for their mammography. There were 93.3% who were unaffected patients without cancer getting annual screen or diagnostic mammograms. Overall, 22% met NCCN guidelines for HBOC testing. In the affected population, it was 55%, and in the unaffected population, it was 20% over the year. We examined the unaffected population by risk-stratification score. In the increased risk group (n=266), 58% met criteria for HBOC testing (n=153), a similar percentage that we observed in the affected patients. In the above-average group, 29% met HBOC testing criteria (n=98/335), and in the normal-to-low risk group, 17% met testing criteria (n=611/3558). We offered genetic counseling and testing to all women in all groups, but had much greater compliance in the higher-risk groups as they made the correlation with their risk moreso than the other groups.

Conclusions: Despite their overall lifetime BC risk, **all** patients have an elevated risk that needs to be evaluated on the basis of familial history. More than 40% of our population reported a family history of breast and ovarian cancers, and therefore, genetic testing should be emphasized also in women with average risk as well as part of newer guidelines. That 1 in 5 women rurally met guidelines for genetic testing regardless of lifetime risk was surprising to us, and it highlights an increased need for genetic assessment tools within our larger population. We are currently piloting a triage process using chatbots to examine this risk further.

43 - The Use of Ultrasound-Guided Erector Spinae Plane Block in Total Mastectomy with Immediate Breast Reconstruction for Pain Management. Case Series

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Background/Objective: Effective postoperative analgesia is challenging in patients who have undergone mastectomy with immediate breast reconstruction. The purpose of this study is to evaluate the analgesic effect of the ultrasound-guided erector spinae plane (ESP) block. Our principal objective is to describe the postoperative requirements of opioids in these patients.

Methods: We studied 30 consecutive female patients with breast cancer and/or BRCA 1 or 2 mutations who underwent total mastectomy with immediate breast reconstruction with tissue expander. Ten cases were bilateral. Ultrasound-guided ESP block was performed with local anesthesia immediately previous to surgery. A bolus of 20 ml of 0.25% of bupivacaine was injected in-between the erector spinae muscle and transverse process guided by ultrasound. Through the Seldinger maneuver, a catheter was introduced, and a continuous infusion regimen of levobupivacaine 0.08% - 0.1% at 5 ml/h was infused through an elastomeric pump during the next 48 postoperative hours. During hospitalization, patients received NSAIDs and acetaminophen, and opioids if requested. Opioid consumption was measured after surgery at Post-Anesthesia Care Unit (PACU) and as inpatients. Numeric pain rating scale (NPRS) scores were recorded both at PACU and on ward for the first 48 postoperative hours. Our main outcome was opioid consumption in the first 48 hours. Secondary outcome was pain management measured with NPRS.

Results: Thirty patients with a median age of 45 with range age from 31 to 65 years old followed this protocol, and 40 ESP blocks were performed. Opioids were required by 12 patients at the PACU. None of the patients asked for opioids at ward. The median NPRS score recorded at PACU was 2.5 (interquartile range (IQR): 5). At 12 and 36 postoperative hours, the median NPRS was 0 at rest (IQR: 2) and 3 at movement (IQR: 4). All patients were discharged with NSAIDs and acetaminophen, and no opioids were needed. There were no adverse events related to ESP block.

Conclusions: This study suggests that ESP block showed low immediate postoperative opioid consumption with no opioids required at ward and at discharge in patients undergoing total mastectomy with immediate breast reconstruction. Pain management was reflected with a low NPRS. Further investigations comparing other analgesia techniques are needed.

45 - Axillary Response to Neoadjuvant Therapy in Node-Positive ER-Positive, HER2-Negative Breast Cancer

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Background/Objective: The role of neoadjuvant therapy (NAT) for patients with node-positive, estrogen receptor (ER)-positive, human epidermal growth factor receptor 2 (HER2)-negative breast cancer is unclear. One of the potential benefits is axillary downstaging in an effort to avoid axillary dissection. The objective of this study is to evaluate axillary response to NAT, either chemotherapy (NCT) or endocrine therapy (NET), and identify potential predictors of response.

Methods: Prospectively collected database was queried for node-positive, ER+, HER2- breast cancer patients treated with NAT and surgery from January 2011 to September 2020. Axillary response was categorized into pathologic complete response (pCR) vs. no pCR and was correlated to demographic and clinicopathologic parameters in a logistic regression model.

Results: A total of 180 patients were identified and included in the study. The overall axillary pCR rate was 12.8% (23/180). NCT and NET achieved a pCR rate of 14.4% (20/139) and 7.3% (3/41), respectively (p=0.23). Among the 23 patients with ypN0, 13 (56.5%) underwent sentinel node biopsy without completion axillary dissection. A significantly higher axillary pCR rate was identified in patients with clinical Stage II at diagnosis, 12/60 (20%), compared to Stage III, 11/120 (9.2%) (p=0.04). No correlation was found between axillary pCR and age at diagnosis, race, grade, progesterone receptor status, or tumor histologic type.

Conclusions: For patients with node-positive ER+, HER2-, breast cancer, a lower burden of disease at time of diagnosis (Stage II) is associated with a significantly higher axillary pCR, enabling to spare those patients an axillary dissection. Further studies are necessary to define the role of genomic profiling in the prediction of axillary response.

47 - American Society of Breast Surgeons' Practice Patterns for Patients At Risk of and Affected by Breast Cancer-Related Lymphedema

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Background/Objective: In 2017, the American Society of Breast Surgeons (ASBrS) published expert panel recommendations for patients at risk for and affected by breast cancer-related lymphedema (BCRL). However, practice patterns are largely unknown. We sought to determine surgeon BCRL practice patterns.

Methods: A survey was sent by electronic mail to 2,975 ASBrS members. Questions evaluated members' clinical practice type, time in practice, and familiarity with BCRL recommendations. Descriptive statistics, chi-square test, and Fisher's exact test were used.

Results: Of those surveyed, 390 (13.1%) responded, of whom 193 (49.5%) were in private practice, 75 (19.2%) in hybrid practice (private practice and academic model), and 119 (30.5%) in academic practice. A total of 250 (64.1%) respondents' practices focused only on breast diseases, while 137 (35.1%) perform breast surgery as a part of their practice. Most (228/390, 58.5%) indicated unfamiliarity with published recommendations. Not unsurprisingly, surgeons in breast-only practice were more likely to indicate familiarity (47.2% vs 30.7%, $p=0.002$). Surgeons in academic practice were more likely to indicate familiarity (52.9%) compared to those in hybrid practice (46.7%) and private practice (32.1%, $p=0.001$). Nearly all (385/390, 98.7%) educate at-risk patients with discussion (377/385, 96.7%). Contrary to recommendations, 234 (60%) instruct patients to avoid venipuncture, injection, or blood pressure measurements in the at-risk arm, and 138 (35.6%) recommend prophylactic compression sleeve use during air travel. In concordance with recommendations, most encourage exercise (380/389, 97.7%) and resistance exercise (331/384 86.2%) in at-risk patients. Breast-only surgeons were most likely to encourage resistance exercise (89.8% vs 79.4%, $p=0.008$). Most do not perform axillary reverse mapping (ARM) (264/389, 67.9%) or lymphatic preventive healing approach (LYMPHA) (331/390, 84.9%) to reduce BCRL risk citing discomfort with technical aspects of the procedures (ARM 133/259, 51.4%; LYMPHA 209/329, 63.5%). Most (296/389, 76.1%) screen at-risk patients with 163 (57.4%) performing screening themselves or having a staff member do it. The most frequently used screening tools are self-reported symptoms (255/390, 65.4%), circumferential tape measure (170/390, 43.6%), and bioimpedance spectroscopy (86/390, 22.1%). Surgeons with >20 years clinical practice were more likely to indicate screening is unnecessary (17.7%) compared to those with 11 to 20 years (12%) or <10 years in practice (5%), $p=0.004$. When a patient is diagnosed with BCRL, the majority (351/390, 90%) refer management to a lymphedema certified physical therapist. For patients diagnosed with BCRL, nearly all encourage exercise (384/388, 99%) with many (171/388, 44.1%) requesting patients meet with a lymphedema professional first. Many (191/390, 49%) refer patients diagnosed with BCRL for lymphovenous bypass or lymph node transfer. Of those who do not refer (199/390, 51%), 72.4% (144/199) cite lack of access to a surgeon offering these procedures.

Conclusions: Most respondents were unfamiliar with ASBrS expert panel recommendations for patients at-risk for and those affected by BCRL. While the majority educate and screen at-risk patients, some

recommendations were not best practice. Comfort with procedures to decrease BCRL risk and access to surgeons who offer procedures to treat BCRL were barriers. Opportunities exist to increase awareness of best practices and acquire ARM and LYMPHA technical expertise.

48 - Recurrence and Survival Data for 1400 Early Breast Tumors Treated with Intraoperative Radiation Therapy (IORT)

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Background/Objective: Intraoperative radiotherapy (IORT) for low-risk breast cancer patients is a safe alternative to whole-breast radiation therapy (WBRT) that permits accurate delivery of radiation directly to the tumor bed at the time of surgery. We report local, regional, and distant recurrence data as well as survival data for the first 1400 tumors treated with X-Ray IORT at our facility.

Methods: A total of 1367 patients (33 bilateral) with 1400 distinct tumors were enrolled in a prospective IORT registry trial and were treated with breast conservation and X-ray IORT (20 Gy), using the Xofig Accent System from June 2010 to March 2020. To be eligible for IORT as the only radiation therapy at our facility, final pathology had to confirm tumor size ≤ 30 mm, tumor margins ≥ 2 mm, negative lymph nodes, and no extensive lymphovascular invasion. Patients that violated any parameters on final pathology were referred for additional surgery and/or WBRT with IORT becoming the boost. Data were collected at 1 week, 1 month, 6 months, 1 year, and yearly thereafter with the primary endpoint of local recurrence. All 5-year probabilities were determined by Kaplan-Meier analysis.

Results: To date, there have been 67 events among 60 patients: 56 ipsilateral local recurrences (17 DCIS and 39 invasive), 7 regional nodal recurrences, and 4 distant recurrences. Ten local recurrences were within the IORT field, 22 were outside of the IORT field but within the same quadrant as the index cancer, and 24 were new cancers in different quadrants. There have been no breast cancer-related deaths to date, and 36 non-breast cancer deaths. With 52-months of median follow-up, the probability of any local recurrence, in any quadrant of the breast, at 5 years was 4.98%. Five-year recurrence probabilities are analyzed by quadrant and/or type of recurrence in the table below. Axillary and distant recurrence probabilities are included as well as overall and breast cancer specific survival.

Conclusions: IORT greatly simplifies delivery of post-excisional breast irradiation. When used as the only adjuvant breast irradiation, it eliminates approximately 15-35 outpatient visits. IORT makes breast conservation possible for women who cannot be available for 4-6 weeks of conventional WBRT. In this patient cohort, more than 100,000 patient-hours were saved. Furthermore, IORT reduces a patients' exposure to hospital and/or cancer center environments, which is of great importance during the current COVID-19 pandemic. The local, regional, and distant recurrence rates observed in this trial were comparable to those reported in the prospective randomized TARGIT-A and ELIOT Trials. The decrease in treatment time, decreased exposure time to medical environments, low complication rates previously reported by our group, and the low recurrence rates reported in this study support the cautious use and continued study of X-ray IORT in women with low-risk breast cancer.

	5-YEAR-PROBABILITY
All Local Recurrences DCIS and Invasive All Quadrants N = 56	4.98%
All Local Recurrences DCIS and Invasive Same Quadrant N = 33	3.01%
Invasive Local Recurrences All Quadrants N = 39	3.59%
Invasive Local Recurrences Same Quadrant N = 25	2.33%
Axillary Recurrences N = 7	0.4%
Distant Recurrences N = 4	0.2%
Overall Survival	97.2%
Breast Cancer Specific Survival	100%

50 - Guideline-Consistent Treatment and Outcomes for Male and Female Patients with DCIS: A National Cancer Database Analysis

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Background/Objective: Ductal carcinoma in situ (DCIS) comprises approximately 20% of incident breast cancers, though it is diagnosed less frequently in men due to lack of screening mammography in this population. We compared the clinical characteristics, treatment, and outcomes of male and female patients with DCIS to determine if men receive the same guideline-consistent care as women.

Methods: Patients with a primary diagnosis of DCIS, non-invasive histology, clinical Stage 0 breast cancer were identified in the National Cancer Database 2004-2016. Those with bilateral breast cancer and unknown AJCC stage or treatment characteristics were excluded. Chi-square analysis compared clinical characteristics and treatment delivered to male and female patients. Overall survival was analyzed using multivariable Cox proportional hazards models. Cox-regression evaluated the factors associated with receipt endocrine and radiation therapy.

Results: Of the 172,669 DCIS patients identified, 975 (0.6%) were male, and 171,694 (99.4%) were female. Male patients were older at diagnosis (49.9% males vs. 44.6% females >age 60, p=0.003), had greater co-morbidity (14.6% males vs. 12.6% females with Charlson/Deyo Score >0, p<0.001), were more frequently African American (18.2% vs. 12.2%, p<0.001), and had public insurance (40.4% vs. 36.3%, p<0.001). High-grade DCIS was more common in women than men (34.8% vs. 29.1%, p=0.004). The majority of all patients were treated with partial mastectomy, although unilateral mastectomy was

more frequently used in men (34.9% men vs. 15.8% women, $p<0.001$, Table). Among the 123,167 partial mastectomy patients, fewer males received adjuvant radiation therapy compared with females (60.7% vs. 70.5%, $p<0.001$). Although most DCIS was hormone receptor (HR)-positive (73.6% males, 74.2% females), fewer male patients received endocrine therapy overall (29.9% vs. 44.3%, $p<0.001$) and across all surgery types (Table). Overall survival was poorer in male patients (85.5% vs 87.2% at 10 years, $p<0.001$). On multivariable analysis, factors associated with improved survival were receipt of endocrine therapy for HR+ patients ($p<0.001$), and treatment with partial mastectomy and radiation vs. unilateral mastectomy ($p<0.001$). Further, survival was greater in men who received radiation vs. no radiation after partial mastectomy, and men who completed partial mastectomy and radiation vs. unilateral mastectomy (both $p<0.002$). Female sex was significantly associated with receipt of endocrine therapy (HR=1.52, $p<0.001$) and radiation therapy (HR=1.30, $p=0.05$). The gender difference in overall survival did not persist in the group treated with partial mastectomy, radiation, and endocrine therapy ($p=0.8573$). Multivariate analysis of overall survival confirmed surgery, radiation, and endocrine therapy are associated with improved survival for DCIS patients.

Conclusions: Male patients less frequently receive guideline-consistent breast cancer care for DCIS, including adjuvant radiation after partial mastectomy, and endocrine therapy for HR+ disease. Omitting these recommended treatments will result in higher local recurrence rates. Further, while overall survival for DCIS is high, these treatment factors strongly predict outcomes regardless of gender and should be emphasized when treating men with DCIS. Men in particular may benefit from partial mastectomy with radiation vs. unilateral mastectomy, and use of endocrine therapy should be encouraged due to low uptake rates in both genders.

Table. Treatment for DCIS in male and female patients, 2004-2016

Characteristics	Male (n=975)		Female (n= 171,694)		P value
	NO.	%	NO.	%	
Hormone receptor status					$P<0.001$
Positive	718	73.6	127,333	74.2	
Negative	71	7.3	21,334	12.4	
Unknown	186	19.1	23,027	13.4	
Surgery					
No surgery	73	7.5	6,912	4.0	$P<0.001$
Partial mastectomy	493	50.6	122,674	71.5	
Unilateral mastectomy	340	34.9	27,059	15.8	
Bilateral mastectomy	63	6.5	14,327	8.3	
Unknown or other	6	0.6	722	0.4	
Radiation after partial mastectomy	Male (n=482)		Female (n= 120,765)		$P<0.001$
Received	299	60.7	86,433	70.5	
Not received	183	37.1	34,332	28.0	
Unknown	11	2.2	1,909	1.6	
Endocrine therapy for HR+	Male (n=718)		Female (n= 127,333)		$P<0.001$
Received	215	29.9	56,373	44.3	
Not received	441	61.4	62,248	48.9	
Unknown	62	8.6	8,712	6.8	
Endocrine therapy for HR+ received by surgery types	Male (n=718)		Female (n=127,333)		

Partial mastectomy without radiation	32	25.4	7,677	33.0	P=0.07
Partial mastectomy with radiation	119	56.1	41,510	65.1	P=0.006
Unilateral mastectomy	50	21.8	5,549	32.7	P<0.001
Bilateral mastectomy	5	11.6	729	7.6	P=0.3

52 - Comparing Intraoperative Radiation Therapy (IORT) at a Single Institution to TARGIT-A Risk-Adapted IORT

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Background/Objective: The TARGIT-A trial set the standard for low kV intraoperative radiation therapy (IORT). If specific high-risk features were identified on final histopathology in the IORT arm, whole-breast radiation therapy (WBRT) was added to the previously delivered IORT. TARGIT-A has reported a 5-year local recurrence probability rate of 2.23% in the IORT arm of the trial, an extremely low rate. We have been performing IORT since 2010, using 50 kV energy X-rays, generating a radiation dose virtually identical to TARGIT-A. Kaplan-Meier analysis of our first 1400 tumors, with a median follow-up of 52 months, revealed a 5-year probability of local recurrence of 4.98%, more than twice as high as TARGIT-A. We hypothesize that the difference in recurrence probability may be due to different entry criteria and in the utilization of WBRT after IORT (our facility accepted higher-risk patients and used WBRT less often).

Methods: A total of 1400 patients received X-ray IORT, using the Xofigo Axxent eBx™ System, as part of a prospective trial from June 2010 to March 2020. The criteria for IORT at our facility and TARGIT-A are compared in the Table. The stricter criteria are marked with an asterisk. Violation of any criteria triggered the addition of WBRT and/or re-excision. One hundred sixty-seven of 1400 (11.9%) of our patients received supplemental WBRT compared to 26.8% in the TARGIT-A IORT arm. Additionally, only 1.4% of patients at our facility underwent mastectomy compared with 3.3% in TARGIT-A. Using computer analysis and random selection, we generated a database with proportions matching that of TARGIT-A. The new database contained a total of 965 patients: 674 (69.8%) who received IORT only, 259 (26.8%) who received IORT plus WBRT, and 32 (3.3%) patients who received mastectomy after IORT. Kaplan-Meier analysis was used to estimate the probability of local recurrence for all patients in the new database. All local events, regardless quadrant or pathology (invasive or noninvasive), were included in the analysis.

Results: For the 965 patients with the same treatment proportions as TARGIT-A, the 5-year probability of local recurrence was 2.96%, only 0.73% higher than TARGIT-A.

Conclusions: When all 1400 IORT tumors treated at our facility are included, the probability of local recurrence appears to be significantly higher than TARGIT-A (4.98% vs 2.23%). We proposed this was predominantly due to the acceptance of higher-risk patients and less patients receiving WBRT in our cohort. When we generated a database with patients that received treatments in proportions equivalent to TARGIT-A, the difference between the curves was <1%. We believe the probability of local

recurrence at our facility is sufficiently low and comparable to international data and that IORT should continue to be offered as a treatment option.

	Our Facility	Target IORT
Age	≥ 40 Years	≥ 45 Years*
Size	≤ 30 mm*	≤ 35 mm
Lymph Nodes	Negative	Negative
Margin Width	≥ 2 mm*	≥ 1 mm
High Grade	OK	No*
LVI	No	No
Invasive Lobular	OK	No*
Pure DCIS	OK	No*
Unifocal	Yes	Yes
EIC ≥ 25%	OK	No*

53 - SENTINOT: Utilization of a Novel Tracer for Patients with Ductal Carcinoma In Situ to Avoid Unnecessary Sentinel Lymph Node Biopsy

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Background/Objective: Sentinel lymph node biopsy (SLNB) is routinely performed with mastectomy or large oncoplastic resections for DCIS patients as these procedures compromise future SLNB identification in the case of upgrade to invasive disease. However, SLNB is unnecessary for the majority of DCIS patients and increases the risk of lymphedema. We explored the utilization of a novel iron oxide nanoparticle dual tracer (Magtrace) to avoid SLNB in DCIS patients.

Methods: Patients with DCIS on core needle biopsy undergoing mastectomy or large oncoplastic resection who received Magtrace injection were identified from a prospectively maintained database. On the day of surgery, 2 ml of Magtrace were injected into the subareolar area, followed by 5 minutes of massage, for a total of 15 minutes minimum prior to incision. The breast procedure was completed per routine. Dissection into the axilla was avoided and sentinel lymph nodes were left intact. Tracer uptake in the mastectomy specimen was recorded if noted. Patients with invasive disease on surgical pathology returned to the operating room (OR) and SLNB was performed using Magtrace as the sole tracer for lymph node identification.

Results: Twenty-two female patients underwent mastectomy, and 1 patient underwent large oncoplastic resection. Mean age was 60.3 years (range 44.7-83.1), and the majority (82.7%) were Caucasian. Five

patients presented with prior breast cancer histories, 3 of which had previous ipsilateral partial mastectomy and radiation; the other 2 had contralateral disease. On surgical pathology, the upgrade rate was 26.2% (6/23), including 2 cases with invasive disease, 2 cases with microinvasion, and 2 cases suspicious for microinvasion. The 2 patients with pathology suspicious for microinvasion and 1 patient with a single focus of microinvasion did not return to the OR for SLNB after consensus at multidisciplinary tumor board. SLNB was therefore avoided in 87% (20/23) of total cases, and 100% of cases in which only DCIS was found on surgical pathology. Pathology for the 3 patients who completed SLNB included multiple foci of microinvasive carcinoma, a single focus of invasive ductal carcinoma, and multiple foci of invasive carcinoma, with extent of disease 1.2-7cm. Tumor size, multifocal or multicentric disease, nuclear grade, hormone receptor status, age, BMI, and race were not associated with upgrade on multivariable analysis. SLNB was successfully completed in all cases at mean 19 days (range 14-21) after injection using only Magtrace, yielding a 100% lymph node identification rate. The number of sentinel nodes removed was 1, 1, and 9; all were negative for malignancy. The only complication was a seroma after SLNB in 1 patient.

Conclusions: The novel iron oxide nanoparticle dual tracer Magtrace detected sentinel lymph nodes successfully up to 21 days after injection, even for patients with recurrent disease who had previously undergone breast conserving therapy. Delayed sentinel lymph node biopsy in DCIS patients undergoing mastectomy or large resections is safe and feasible. Further, the SentiNot procedure avoids the expense and potential complications of axillary surgery for the majority of DCIS patients who do not require SLNB.

54 - Neoadjuvant Endocrine Therapy as an Alternative to Neoadjuvant Chemotherapy Among Hormone Receptor-Positive Breast Cancer Patients: Pathologic and Surgical Outcomes

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Background/Objective: While neoadjuvant chemotherapy (NCT) is used to downstage breast cancer, neoadjuvant endocrine therapy (NET) has more recently been implemented for hormone receptor-positive (HR+) breast cancers, which may be less responsive to NCT. We compared the tumor and axillary downstage status after NCT and NET for HR+ disease.

Methods: Based on criteria for NET use, female patients with cT2-4 HR+ breast cancer, age ≥ 50 who underwent breast surgery were identified in the National Cancer Database between 2004 -2016. Downstage was defined by pathologic stage < clinical stage; complete pathologic response was defined as pathologic Stage 0. Chi-square and logistic regression analysis were performed to determine differences between NCT and NET groups and therapy response.

Results: Of 19,829 patients, 14,025 (70.7%) received NCT, and 5,804 (29.3%) received NET. NET patients were older (mean age 68.9 vs. 60.3, $p < 0.001$) with greater comorbidity (1+ Charlson-Deyo Score 21% vs 16%, $p < 0.001$). The majority of NCT patients were clinically lymph node positive while most NET patients were node-negative (63% vs 32%, $p < 0.001$). NET patients more frequently underwent partial mastectomy (48% NET vs. 32% NCT, $p < 0.001$) while bilateral mastectomy was more common in NCT patients (20% NCT vs 8% NET, $p < 0.001$). After surgery, 87% (12,150/14,025) NCT patients received

endocrine therapy and 26% (1497/4,308) of NET patients received chemotherapy. T-downstage (any) was achieved in 58% NCT patients and 40.5% NET patients, with pathologic complete response in 9.3% and 1.3% respectively ($p < 0.001$). Despite the higher partial and complete T response in NCT patients, NET patients underwent partial mastectomy more frequently (46% NCT vs 57% NET, $p = 0.03$). Further, for patients with pathologic complete response based on T-downstage, 53.6% (645/1,204) mastectomy procedures could have been avoided in NCT patients and 43.8% (32/73) in NET patients. Of the clinically node-positive patients, N-downstage was achieved in 29.0% NCT and 18.3% NET ($p < 0.001$), and complete pathologic response in 20.1% NCT and 12.0% NET ($p < 0.001$). Among clinically node-positive patients with complete pathologic response, axillary lymph node dissection (ALND) instead of sentinel node biopsy (SLNB) was performed in 56% of those who underwent NCT and 45% of those who completed NET. Patients who received NCT or NET with complete or partial pathologic response had an overall survival benefit compared with no response groups ($p < 0.01$).

Conclusions: Though response rates for NCT are higher, NET achieves T and N downstage and complete pathologic response in HR+ patients. NET can be used to avoid mastectomy, and prevent ALND in patients with complete pathologic response when SLNB is used with clinically positive lymph node localization. Both partial mastectomy and SLNB were underused in this patient population. Multigene signature or future predictive assays will assist with decision-making in HR+ disease by identifying which tumors will respond to chemotherapy, potentially allowing more NET use with less morbidity, and increasing response rates to both NET and NCT in appropriately selected patients.

55 - Extrapolation of ACOSOG Z0011 Trial Results – A Survey of Breast Cancer Providers

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Background/Objective: Several patient groups were underrepresented or excluded from the ACOSOG Z0011 trial. Our objective was to investigate breast cancer provider recommendations for axillary management and whether providers believe clinical trials are feasible for these populations.

Methods: We surveyed Alliance's Breast Local-Regional Group to evaluate axillary management recommendations for patients with positive sentinel lymph nodes (+SLNs) underrepresented (premenopausal, HER2+/triple-negative tumors, invasive lobular carcinoma) or excluded (treated with mastectomy or neoadjuvant chemotherapy [NAC]) from ACOSOG Z0011. Descriptive statistics were used to summarize responses. Fisher's exact tests were used to assess the association between respondent recommendations and demographics.

Results: Survey response rate was 94/149 (64%). For patients in underrepresented groups, 45%-63% of providers recommended "no further axillary treatment." For mastectomy patients with 1-2 +SLNs, 45-55% recommend multidisciplinary discussion. There were 43/51 (83%) who felt more data are needed to

guide decision-making, but 26/64 (41%) believe there would be significant accrual challenges. For patients treated with NAC, 20/59 (34%) recommend axillary lymph node dissection (ALND), 8/59 (14%) nodal radiation, 12/59 (20%) ALND + radiation, and 13/59 (22%) multidisciplinary discussion. There were 46/54 (85%) who felt more data are needed, but 16/61 (26%) feel there would be significant accrual challenges. For all underrepresented groups, 86-100% of radiation oncologists recommend axillary radiation, while surgeons were more likely to recommend no further axillary treatment.

Conclusions: This study reveals variations in axillary management recommendations for patients underrepresented or excluded from ACOSOG Z0011. Despite clear need for additional data to guide recommendations, there is significant concern regarding feasibility of clinical trials, so alternative study designs should be explored to address these important questions.

56 - Are Perineural Invasion and Lymphovascular Invasion Significant Predictors of Breast Cancer Outcomes?

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Background/Objective: Lymphovascular invasion (LVI) refers to the presence of cancer cells within the lymphatic or venous channels. LVI is typically associated with higher-grade tumors and worse outcomes; however, there are various studies that contradict one another with regards to LVI as a prognostic factor in breast cancer outcomes. Perineural invasion (PNI) describes the spread of a tumor to the space surrounding a nerve. PNI has been associated with a poorer prognosis in patients with various types of cancer; however, minimal research has been done with regards to PNI in breast cancer. Both LVI and PNI status influence the preferred course of treatment of these patients. This study evaluated a patient database to determine the efficacy of LVI and PNI as prognostic factors in breast cancer patients. It was hypothesized that both LVI and PNI would be associated with a poorer prognosis in patients with breast cancer.

Methods: A database was gathered of every patient that was diagnosed with breast carcinoma over a 5-year period at a breast cancer treatment facility. The patients were separated into 3 categories: patients with LVI, patients with PNI, and patients with neither LVI nor PNI. A multinomial logistic regression was used to estimate category (LVI or PNI compared to neither) using the following variables: age at diagnosis, race, tumor size, grade differentiation, origin, regional nodes tested, Bloom-Richardson (BR) score, estrogen receptor, progesterone receptor, HER2 status, and surgery status. Vital status for all 3 categories was estimated using a binary logistic regression. The characteristics of patients in the 3 categories were compared using Fisher's exact test for categorical variables.

Results: From 2015 to 2020, 965 patients were identified. According to the multinomial logistic regression, patients with LVI were significantly more likely to have a larger tumor size and to have breast cancer of ductal origin. They were significantly less likely to have lower-grade tumors on the BR score. Race, ER status, PR status, HER2 status, surgery status, age at diagnosis, and grade differentiation had no significant correlation with LVI status. Patients with PNI had no significant association with the aforementioned variables. The results from Fisher's exact test showed that patients in the LVI group were significantly more likely to have a larger tumor size, grade 3 differentiation, positive regional

nodes, ER (-) status, and PR (-) status. Patients with PNI were significantly more likely to have grade 2 differentiation.

Conclusions: The results found LVI to be an effective predictor of poorer outcomes in patients with breast cancer. This finding was consistent with a majority of the previous literature on LVI and supported the hypothesis. However, the results found that PNI is not a significant prognostic factor in breast cancer, contradicting both the hypothesis and the current literature on PNI. Currently, patients who are positive for PNI often undergo a more aggressive treatment plan due to the assumption of a poorer prognosis. According to these results, this aggressive approach might not be necessary and could alter their course of treatment.

Multinomial logistic regression predicting Category (LVI or PNI compared to Neither)

Category ^a	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
LVI								
Intercept	-.477	2.039	.055	1	.815			
Age at Diagnosis	-.009	.010	.797	1	.372	.991	.973	1.010
Tumor Size	.021	.006	12.102	1	.001	1.021	1.009	1.033
Grade Differentiation	-.811	.591	1.884	1	.170	.444	.140	1.415
Origin=Ductal	1.682	.774	4.729	1	.030	5.377	1.181	24.489
No Surgery	-.785	.410	3.660	1	.056	.456	.204	1.019
BR = Low Grade	-2.475	1.199	4.264	1	.039	.084	.008	.882
BR = Medium Grade	-.593	.648	.839	1	.360	.552	.155	1.967
Race = White	.069	.256	.072	1	.788	1.071	.649	1.769
Positive Estrogen Receptor	-.222	.391	.323	1	.570	.801	.372	1.723
Positive Progesterone Receptor	-.027	.347	.006	1	.938	.973	.493	1.921
HER2= Positive	-.585	.339	2.969	1	.085	.557	.287	1.084
PNI								
Intercept	-5.126	3.126	2.688	1	.101			
Age at Diagnosis	.014	.016	.847	1	.358	1.014	.984	1.046
Tumor Size	.002	.013	.019	1	.891	1.002	.977	1.027
Grade Differentiation	-.182	.924	.039	1	.844	.834	.136	5.096
Origin=Ductal	1.373	1.065	1.662	1	.197	3.949	.490	31.851
No Surgery	-.939	.766	1.503	1	.220	.391	.087	1.754
BR = Low Grade	-1.038	1.870	.308	1	.579	.354	.009	13.837
BR = Medium Grade	.375	1.051	.127	1	.722	1.455	.185	11.417
Race=White	.614	.442	1.931	1	.165	1.848	.777	4.392
Positive Estrogen Receptor	-.158	.824	.037	1	.848	.854	.170	4.289
Positive Progesterone Receptor	.749	.708	1.119	1	.290	2.115	.528	8.475
HER2=Positive	-1.177	.756	2.423	1	.120	.308	.070	1.357

a. The reference category is: Neither LVI or PNI.

57 - Effect of Neoadjuvant Letrozole and Ribociclib on Nodal Pathologic Response in HR+/Her2-Breast Cancer (FELINE Trial)

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Background/Objective: Combination therapy of CDK 4/6-inhibitor (CDK4/6) added to an aromatase inhibitor (AI) improves outcomes in postmenopausal, hormone receptor-positive (HR+), HER2-negative, advanced breast cancer (BC). While up to 30% of patients undergoing neoadjuvant chemotherapy have a pathologic complete nodal response, the efficacy of neoadjuvant endocrine therapy (NET) in combination with a CDK 4/6 on nodal downstaging is unknown. We sought to evaluate the nodal response rates of patients randomized in a neoadjuvant trial of letrozole (L) and ribociclib (R) vs. letrozole (L) and placebo (P) (FELINE trial).

Methods: FELINE is a randomized, placebo-controlled, multicenter trial. One hundred twenty patients were enrolled from 2/2016 to 8/2018 at 9 academic centers and nodal response to NET +/- CDK 4/6 was evaluated. Postmenopausal women with invasive HR+, HER2- BC, and breast tumor size of at least 2 cm were included. Biopsy-proven positive ipsilateral axillary nodes were allowed. Patients were randomized 1:1:1 to 3 treatment groups for 6 28-day cycles: L+P, L+R (600 mg daily 21/28 days of each cycle), and L+R (400 mg continuously). The 2 L+R groups were combined for the analysis of this study. One hundred three patients had surgical specimens available for assessment of pathologic response to treatment in axillary lymph nodes. A chi-square test of independence was performed to examine the relationship between nodal status and the treatment received.

Results: Seventy-two of the 103 evaluable patients were enrolled in the L+R group and 31 in the L+P group. The groups were evenly matched with a median age of 63 in the L+R group and 67 in the L+P group ($p=0.125$). Median tumor size was 3.5cm for both treatment groups ($p=0.895$). Baseline clinical and post treatment pathologic nodal status and effect of treatment on nodal conversion is shown in the Table. At baseline, 39% of patients were clinically node-positive in the L+R group and 29% in the L+P group. There was a similar proportion of patients between the 2 treatment groups that were cN+ and pN+, (36% L+R and 29% L+P, $p=0.199$). There was also not a statistically significant difference seen in patients who were cN- and pN+ with 18% receiving L+R compared to 32% receiving L+P ($p=1.0$). Only 2 patients converted from cN+ to pN- (2%), both receiving L+R ($p=1.0$). The remaining 43% L+R patients and 39% L+P patients were cN- pre-treatment and pN- at surgery ($p=0.42$).

Conclusions: Patients receiving combination therapy with CDK4/6 and AI in the neoadjuvant setting do not have a significant treatment response in lymph nodes. Conversion from biopsy-proven node-positive disease to pathologically node-negative is rare. Combination therapy of CDK4/6 with AI does not downstage nodal disease; therefore, patients undergoing NET should have local regional management similar to patients undergoing surgery first.

Clinical Nodal Status	Pathologic Nodal Status	All Patients N=103 (%)	L+P N=31 (%)	L+R N=72 (%)	P value
cN +	pN +	35 (34)	9 (29)	26 (36)	0.199
cN +	pN -	2 (2)	0	2 (3)	1.0
cN -	pN +	23 (22)	10 (32)	13 (18)	1.0
cN -	pN -	43 (42)	12 (39)	31 (43)	0.42

59 - Therapy Response Correlation with Circulating Tumor Cells in Patients with Metastatic Breast Cancer as a Stratification Criterion for Surgical Resection

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Background/Objective: Controversy exists regarding whether women with limited metastatic breast cancer can benefit from surgical resection and ablation procedures. This pilot study correlates serial circulating tumor cell (CTC) count with systemic treatment response to identify early indicators of improved prognosis and possible benefit from surgical treatment.

Methods: This single-center prospective study included 60 female participants with metastatic breast cancer of all subtypes, either newly diagnosed or progressing on systemic therapy. Treating medical oncologists were blinded to the study. Progression was defined as either new therapeutic intervention required or death. Blood samples (15mL) were collected from each participant at 3 time points: enrollment, first repeat staging, and second repeat staging. All samples were stored at 4C and processed within 72 hours of collection. CTCs were purified by RareCyte erythrocyte removal and leukocyte depletion with anti-CD45 antibody linked magnetic beads. CTCs were manually counted for fluorescently labeled CD45-negative and pan-cytokeratin-positive cells. The remainder of the CTC isolate is stored at -80C for future RNA sequencing. Statistics were conducted using SPSS version 26.

Results: Eleven (18%) participants had newly diagnosed metastatic breast cancer, and 19 (32%) had more than 3 prior lines of systemic therapy. Baseline CTCs were detected at enrollment in 44 participants (73%, range 2-762 cells/mL). At first repeat staging, 20 (46%) participants presented with stable disease (SD) or partial response (PR), while 24 (54%) showed clinical progression of disease (PD). Mean CTC count at enrollment was not significantly different between participants with SD/PR vs PD (see Table). However, a significant difference in CTC counts was observed between baseline and first restaging with mean CTC count decreased in participants achieving SD/PR compared to an increase in CTC counts in participants with PD (see Table). An increase in mean CTC count of >30 cells/mL after restaging, corresponding to the highest quartile, correlated with clinical progression with a relative risk of 3.0 (95% CI 1.008-8.927, p<0.05).

Conclusions: We established a heterogenous prospective cohort of participants with metastatic breast cancer receiving various systemic therapies to study CTCs in relation to disease progression. An increase in post-treatment CTC count of >30 cells/mL was associated with disease progression. Patients with such a rise in CTC count, therefore, may be less likely to benefit from surgical resection than those with a decreasing count. This metric could help surgical decision-making in the controversial area of treating

breast cancer patients presenting with limited metastatic spread. Future directions include evaluation of resistance mechanisms and response prediction using single-cell CTC gene expression profiles. We also plan to perform serial CTC monitoring in patients with high-risk early breast cancer (Stage II or III) before and after neoadjuvant chemotherapy and surgery. Using CTCs to identify treatment resistance and early adaptation of alternative treatment strategies may improve disease-free survival and overall survival for some patients with breast cancer.

	Mean (range) initial CTC count	p value
Responsive/Stable	108 (0-687) CTC/mL	0.31
Progressive	165 (0-762) CTC/mL	
	Mean change in CTC count between first and second collection	
Responsive/Stable	-110 CTC/mL	0.04
Progressive	+66 CTC/mL	

60 - Oncoplastic Surgery a Good Alternative to Conventional Breast-Conserving Surgery in Low Middle-Income Countries

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Background/Objective: Breast-conserving surgery (BCS) has gained popularity over mastectomy in the past decade having advantages of higher patient satisfaction with cosmetic outcomes and better quality of life. Despite this a frequent pitfall of BCS is need for re-operation for positive surgical margins and local recurrence with a reported frequency of 17 to 59%.^{2,3} Re-excision for wider margins comes at the cost of poor cosmesis and breast asymmetry, which can lead to significant patient dissatisfaction, poor psychosocial function, and increased morbidity.³ Also more than half of patients opt for mastectomy with or without reconstruction when offered second surgery in case of positive margins after BCS,^{4,6} thus adding significant economic cost, which is a major issue to already overburdened health care systems with limited resources in developing world.^{5,6} Oncoplastic surgery (OPS) has addressed this problem concept in developing countries with few trained oncoplastic breast surgeons⁹ without compromising aesthetic outcomes and oncological safety offering a pragmatic alternative to mastectomy and BCS.^{7,8} However, oncoplastic surgery is still an emergent. We sought to determine the rate of positive surgical margins, reoperations, and local recurrences between conventional BCS and OPS so the change in practice can be adopted in developing countries for a more economical approach.

Methods: A retrospective study cross sectional study was conducted on Stage I to Stage III breast cancer patients who underwent BCS or OPS at 2 tertiary care hospitals of Karachi, Pakistan from 1st August 2016 to 31st December 2019. Data were collected by reviewing files and electronic records. Data were analyzed using SPSS version 24.0.

Results: A total of 312 patients were included in the study, where 130 (41.6%) underwent BCS and 182 (58.3%) underwent OPS. The median age of the entire cohort was 50 years. Out of these, 18 patients (5.8%) $p < 0.001$, had positive margins on histopathological analysis, and all were in BCS group. Five patients (1.9%) underwent margin re-excision, and 3 (1.2%) showed presence of residual tumor cells in

the specimens resected. The other 10 patients did not consent for a second surgery. Local recurrence was seen in 8 cases.

Conclusions: Although breast-conserving surgery has taken over total mastectomy, concerns still remain. Oncoplastic surgery has proven to be a safer alternative in terms of cosmetic outcomes, oncological safety, and a more economical approach. This highlights the need to modify current surgical practice in developing countries.

62 - COVID-19 Pandemic: Changes in Care for a Community Academic Breast Center and Patient Perception of Those Changes

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Background/Objective: Philadelphia and its suburbs were an epicenter for the initial COVID-19 outbreak; accordingly, alterations were made in breast cancer care. The objective of our study was to capture changes in breast cancer care in a COVID-19 epicenter and assess patient perception of those changes.

Methods: We developed a prospective database of all patients with invasive or *in situ* breast cancer between March 1st and June 15th at our breast center. Any change in breast cancer plan due to the pandemic was documented, and patients were grouped into 2 cohorts according to whether a change was made (CTX) or no change (NC). Patients were asked a series of questions about their care, including the Generalized Anxiety Disorder 2-item (GAD-2) questionnaire, via telephone.

Results: A total of 73 total patients were included, 41 (56%) patients in NC and 32 (44%) patients CTX. There was no difference between the 2 cohorts in age, race, or stage. Changes included delay in therapy (15%) and use of neoadjuvant endocrine therapy (NET, 28.8%). Time to surgery was a median of 24 days (15-45) for NC and 82 days (52-98) for CTX. The median duration of NET was 78 days. GAD-2 positivity was 29.6% in the CTX and 32.4% in the NC groups ($p=1$). There were 55.6% of CTX patients who believed COVID-19 affected their treatment outlook and 25.7% for NC ($p=0.021$).

Conclusions: In a COVID-19 epicenter breast cancer care was altered for approximately half of our patients. While CTX did not significantly change patient's level of anxiety/depression, it did affect their overall outlook regarding their breast cancer care.

Table. Patient's GAD-2 score and perception by treatment decision: Change in recommended treatment (CTX) or no change in recommended treatment (NC)

	NC (n = 41)	CTX (n = 32)	p-value	Total (n = 73)
GAD-2 Sum¹, n(%)			1.000	
Not Positive	23 (67.7)	19 (70.4)		42 (68.9)
Positive	11 (32.4)	8 (29.6)		19 (31.2)
Missing	7	5		12
How often patient felt nervous, anxious or on edge¹, n(%)			0.142	
Not At All	13 (38.2)	9 (33.3)		22 (36.1)
Several Days	9 (26.5)	10 (37.0)		19 (31.2)
More Than Half the Days	9 (26.5)	2 (7.4)		11 (18.0)
Nearly Every Day	3 (8.8)	6 (22.2)		9 (14.8)
Missing	7	5		12
How often patient was unable to control or stop worrying¹, n(%)			0.284	
Not At All	14 (41.2)	17 (63.0)		31 (50.8)
Several Days	11 (32.4)	6 (22.2)		17 (27.9)
More Than Half the Days	7 (20.6)	2 (7.4)		9 (14.8)
Nearly Every Day	2 (5.9)	2 (7.4)		4 (6.6)
Missing	7	5		12
Patient identified with having a change in treatment^{1,2}, n(%)			0.300	
No	4 (11.4)	6 (23.1)		10 (16.4)
Yes	31 (88.6)	20 (76.9)		51 (83.6)
Missing	6	6		12
Did COVID affect patient's outlook¹, n(%)			0.021	
No	26 (74.3)	12 (44.4)		38 (61.3)
Yes	9 (25.7)	15 (55.6)		24 (38.7)
Missing	6	5		11
Was patient concerned about change, n(%)			N/A	
No	---	12 (52.2)		---
Yes	---	11 (47.8)		---
Missing	---	9		---

1. P-value excludes missing data.

2. Agreement between actual treatment plan and patient's perceived treatment plan.

GAD-2 = Generalized Anxiety Disorder 2-Item Scale, N/A = Not Applicable

63 - Expanded Indications for Nipple-Sparing Mastectomy Is Not Associated with Increased Complications

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Background/Objective: Nipple-sparing mastectomy (NSM) is a safe alternative to conventional mastectomy for treatment of cancer and risk reduction in appropriately selected patients. NSM offers improved cosmetic outcome with more favorable patient satisfaction measures. The 2016 NCCN guidelines suggested that NSM is an oncologically sound procedure in the appropriately selected patients. It was deemed that it was safe to perform NSM in early-stage disease with favorable biology, >2cm from the nipple, no nipple involvement, no nipple discharge or Paget's. Meta-analyses indicate that outcomes for SSM and NSM do not differ from those for non-conservative mastectomies. In the literature, recurrence rates in the nipple areolar complex (NAC) after NSM are acceptably low (0-3.7). Some surgeons consider prior breast reduction or prior radiation as a contraindication to nipple-sparing mastectomy. We aimed to investigate the rate of postoperative return to the operating room after NSM in those breasts with history of radiation or prior oncoplastic reduction.

Methods: Retrospective review of all patients that underwent NSM at our institution between 2015-2019. There were 462 mastectomies analyzed. Of these, 217 were performed for risk reduction and 245 were for therapeutic indications (DCIS/invasive cancer). There were 18 with a history of radiation exposure and 77 who had undergone oncoplastic reduction. Outcome measures were unplanned return to OR, nipple necrosis, and skin flap necrosis.

Results: The rate of post-operative unplanned return to OR was 13.42% in the entire cohort. Rate of nipple necrosis was 2.81%. Rate of skin flap necrosis was 9.52%. There was no statistically significant difference in unplanned return to OR, rate of nipple necrosis, and rate of skin necrosis for history of oncoplastic reduction (p=0.72, p=0.46, p=0.52) or history of radiation (p=0.73, p=0.4, p=0.7) as compared to those without a reduction or radiation treatment.

Conclusions: Our data demonstrate that those patients presenting for nipple-sparing mastectomy with a prior history of breast radiation or oncoplastic reduction are not at increased risk for complications such as unplanned return to OR, nipple necrosis, or skin flap necrosis. This suggests that nipple-sparing mastectomy is a safe option in these groups previously thought of as higher risk.

Table 1	Hx Oncoplastic Reduction (n=77)			History Breast Radiation (n=18)		
	N(%)	p	OR (95% CI)	N(%)	p	OR (95%CI)
Return to OR	9 (11.7%)	0.72	0.86 (0.4-1.8)	3 (16.7%)	0.73	1.25(0.37-4.3)
Nipple Necrosis	3 (3.9%)	0.46	1.51(0.44-5.3)	1 (5.6%)	0.40	2.2(0.19-14.8)
Skin Necrosis	5 (6.5%)	0.52	0.65 (0.27-1.6)	2(11.1%)	0.70	1.1(0.24-4.25)

64 - Determining Biomarkers That Predict Lymph Node-Positive Invasive Breast Cancer in Older Women

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Background/Objective: The Society of Surgical Oncology's Choosing Wisely campaign recommends against the routine use of sentinel lymph node biopsy in older women (≥ 70 y) with clinically node-negative (N0), hormone receptor-positive and HER2-negative invasive breast cancer. Using an age cut-off to make this decision can be misleading as fitness levels are individual. Therefore, it would be beneficial if lymph node-positive (N+) tumors could be predicted using biomarkers within the primary tumor. This study aims to determine biomarkers that predict lymph node metastasis among older women (≥ 70 y) with invasive breast cancer.

Methods: A total of 6,170 breast cancer patients were reviewed across 3 large cohorts with transcriptome: The Cancer Genome Atlas Breast Cancer (TCGA-BRCA), Molecular Taxonomy of Breast Cancer International Consortium (METABRIC), and GSE96058. Immune and connective tissue infiltration was compared between N+ and N0 women.

Results: A total of 1,708 patients were analyzed: TCGA (n=211), METABRIC (n=510), and GSE96058 (n=987). N+ tumors were significantly associated with shorter disease free (DFS), disease specific (DSS), and overall (OS) survival. Compared to N0 tumors, N+ tumors were significantly infiltrated by CD4⁺ cells, dendritic cells, T helper type 2 cells, and B-cells. N+ tumors showed significantly enhanced cytolytic activity compared to N0 tumors. These data were not reproducible in the TCGA cohort due to smaller sample size. Infiltration of fibroblasts, adipocytes, endothelial cells, and pericytes in the primary tumor did not differ between N+ and N0 women. The oxidative phosphorylation gene set was significantly enriched in N+ tumors in the METABRIC cohort (normalized enrichment score = 1.66, false discovery rate = 0.06) but not the TCGA or GSE96058 cohorts. There was no enrichment of cell proliferation-related gene sets amongst N+ women, which we have previously demonstrated to associate with breast cancer progression and metastasis.

Conclusions: To date, no N+ biomarker was identified across several transcriptome cohorts. Additional studies are underway to elucidate biomarkers that predict N+ amongst older women with invasive breast cancer.

65 - The Impact of Nurse Navigation on Timeliness to Treatment for Benign Breast Pathology

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Background/Objective: Benign high-risk breast pathology is associated with an increased incidence of breast cancer. Minimizing time to diagnosis and treatment is crucial. Nurse navigation programs are known to eliminate delays in care and alleviate anxiety among cancer patients. This study evaluates the effect of nurse navigation to timeliness of care for patients with benign, high-risk breast pathology requiring surgical intervention.

Methods: This analysis is a single-institution, retrospective review of patients with benign high-risk breast pathology defined by an image guided core needle biopsy who underwent an excisional biopsy between January 2017 and June 2019. Patients were stratified into 2 cohorts based on a time period with and without nurse navigation. Patients' preoperative and postoperative time to care variables, as well as demographics and pathologic characteristics of the lesion were compared using univariate and multivariate analysis.

Results: There were 100 patients in the nurse navigation group and 29 patients who did not receive nurse navigation. In univariate analysis, nurse navigation reduced median time from referral to first appointment by 5 days (12.6 ± 2.8 days to $7.5 \pm$ days, $p < 0.01$), referral to date of surgery from 48.9 ± 1.9 to 32.1 ± 1.9 days ($p < 0.01$), and first appointment to date of surgery from 34.5 ± 2.0 to 23.3 ± 2.6 days ($p = 0.04$). In multivariate analysis, nurse navigation remained the predominant variable associated with reductions in time to care, time from referral to first appointment ($p < 0.05$), referral to date of surgery ($p < 0.05$), and first appointment to date of surgery ($p < 0.06$). Patients' ethnicity and distance from the care center were not associated with time to care. Patients > 76 years old had a shorter time to first appointment ($p = 0.03$), and patients with Medicare insurance had a reduced time from referral to date of surgery ($p = 0.005$). The overall prevalence of cancer on final surgical pathology for the entire cohort was 19.4% (nurse navigation, 18%; no nurse navigation, 24%; $p = 0.44$).

Conclusions: The implementation of nurse navigation significantly decreased time to care for patients with benign, high-risk breast pathology undergoing surgical excisional biopsy. We recommend the use of a nurse navigation program as part of a comprehensive approach to breast health for patients with high-risk breast pathology.

Table. Multivariate regression analysis for the association of time intervals with availability of nurse navigation, age, race, distance, and type of insurance

	Referral to First Appointment ^a		Referral to Day of Surgery ^b		First Appointment to Day of Surgery ^b		Day of Surgery to Follow-up ^b		Day of 1st Surgery to Day of 2 nd Surgery ^b	
	Coefficient (Std Error)	p-value	Coefficient (Std Error)	p-value	Coefficient (Std Error)	p-value	Coefficient (Std Error)	p-value	Coefficient (Std Error)	p-value
Nurse Navigation (base: no nurse navigation) and Age group (base: <40 years)										
Nurse Navigation	-0.79 (0.29)	0.006	-0.38 (0.14)	0.006	-0.36 (0.19)	0.06	0.09 (0.07)	0.23	-0.60 (0.46)	0.22
Age: 41-60 years	-0.72 (0.46)	0.12	-0.07 (0.22)	0.76	0.21 (0.31)	0.50	-0.17 (0.12)	0.33	-0.64 (0.76)	0.42
Age: 61-75 years	-0.85 (0.48)	0.08	-0.26 (0.23)	0.26	-0.14 (0.32)	0.66	-0.11 (0.12)	0.37	-0.43 (0.68)	0.55
Age: >76 years	-1.10 (0.48)	0.03	-0.36 (0.23)	0.12	-0.13 (0.32)	0.68	-0.13 (0.13)	0.29	-0.03 (0.72)	0.96
Nurse Navigation (base: no nurse navigation) and Race (base: non-Caucasian)										
Nurse Navigation	-0.82 (0.28)	0.004	-0.42 (0.14)	0.003	-0.39 (0.19)	0.04	0.09 (0.07)	0.23	-0.68 (0.45)	0.16
Caucasian	-0.20 (0.25)	0.44	-0.18 (0.12)	0.15	-0.07 (0.17)	0.66	-0.002 (0.07)	0.98	-0.08 (0.43)	0.85
Nurse Navigation (base: no nurse navigation) and Travel distance (base: <25 miles)										
Nurse Navigation	-0.87 (0.29)	0.003	-0.43 (0.14)	0.003	-0.39 (0.19)	0.04	0.09 (0.07)	0.23	-0.89 (0.41)	0.05
Distance: 26-50 miles	-0.28 (0.32)	0.39	-0.09 (0.16)	0.57	-0.01 (0.22)	0.97	0.01 (0.08)	0.86	-0.62 (0.48)	0.23
Distance: 51-75 miles	-0.44 (0.35)	0.21	-0.12 (0.17)	0.53	-0.05 (0.24)	0.82	0.01 (0.09)	0.92	-0.84 (0.63)	0.21
Distance: >76 miles	-0.15 (0.33)	0.66	-0.04 (0.17)	0.82	0.09 (0.23)	0.68	-0.01 (0.09)	0.88	0.18 (0.50)	0.73
Nurse Navigation (base: no nurse navigation) and Insurance (base: Commercial)										
Nurse Navigation	-0.75 (0.29)	0.007	-0.39 (0.14)	0.005	-0.37 (0.19)	0.05	0.08 (0.07)	0.29	-0.85 (0.43)	0.07
Insurance: Medicare	-0.23 (0.26)	0.38	-0.28 (0.14)	0.005	-0.28 (0.17)	0.11	-0.02 (0.07)	0.72	-0.59 (0.48)	0.24
Insurance: Medicaid	0.15 (0.43)	0.72	-0.06 (0.21)	0.78	-0.08 (0.29)	0.79	-0.19 (0.11)	0.10	-0.58 (0.52)	0.29

Values are presented as regression coefficient (standard error of the slope).

^a Variables were square root transformed for the analysis. ^b Variables were log transformed for the analysis.

NN: Nurse navigation. Int: Interaction between covariates

Coefficients that achieved statistical significance are presented in bold text.

67 – LGBTQ-Inclusive Breast Care in the United States: Geographic and Political Trends in 2020

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Background/Objective: In the United States, breast care is continuously evolving to better treat a variety of patients. Patients identifying as lesbian/gay/bisexual/transgender/queer (LGBTQ) may face unique barriers to breast care that binary patients may not encounter. In 2007, the Human Rights Campaign (HRC) developed the Human Equality Index (HEI), a multi-component measure of an institution’s inclusivity. Health care institutions across the country are evaluated with this tool, and a “Leader” designation is given to an institution with a perfect score of 100. This study evaluates trends of centers with a National Accreditation Program for Breast Centers (NAPBC) designation in the US that are also 2020 HEI Leaders, thus estimating the amount of dedicated high-performance breast centers practicing LGBTQ inclusive breast care. In 2018, the trends of National Cancer Institute Comprehensive Cancer Centers were evaluated with geographic regions. However, this is the first study to evaluate the impact of LGBTQ inclusivity in breast specific care, and the potential influence of political party control.

Methods: Using public information from the HRC HEI 2020 Report and the NAPBC search section of the American College of Surgeons website, the number of HEI Top Leaders and number of NAPBC breast centers were evaluated for each state. The impact of state political party control was compared using

the majority composition of each state's 2020 legislature. The estimated state population percentage of LGBTQ citizens was also used for political party trends.

Results: The count of NAPBC HEI Leaders ranged from 0 (22 states) to 14 (Illinois). The largest number of NAPBC HEI Leaders per political party were 14 for a Democrat legislature, Illinois, and 11 for Wisconsin, a Republican legislature. The estimated LGBTQ population was calculated per state, and then analyzed for the number of centers available per LGBTQ population. Wisconsin had the most favorable ratio with 1 NAPBC HEI Leader per 10058.47 citizens, compared to the least favorable ratio in Texas with 1 NAPBC HEI Leader per 584288.00 citizens. There is a statistically significant difference in the percentage of LGBTQ citizens in each state's population per political party state control, with a Republican average of 3.76% compared to a Democrat average of 4.795% ($p < 0.001$). The NAPBC HEI Leaders were evaluated by states controlled with a Democrat versus Republican legislature, showing a higher average of HEI NAPBC Leaders for Democrat states that approached near significance (Republican mean = 1.148, Democrat mean = 3.227, $p=0.057$).

Conclusions: There is a need for LGBTQ patients to access inclusive breast care. The number of inclusive practices vary by state and approach significance by current political party control. Breast surgeons should be aware of these differences and consider implementing inclusive based practices to alleviate potential barriers to care.

68 - Improved Reliability of the SIEA Flap for Autologous Breast Reconstruction Through Surgical Delay

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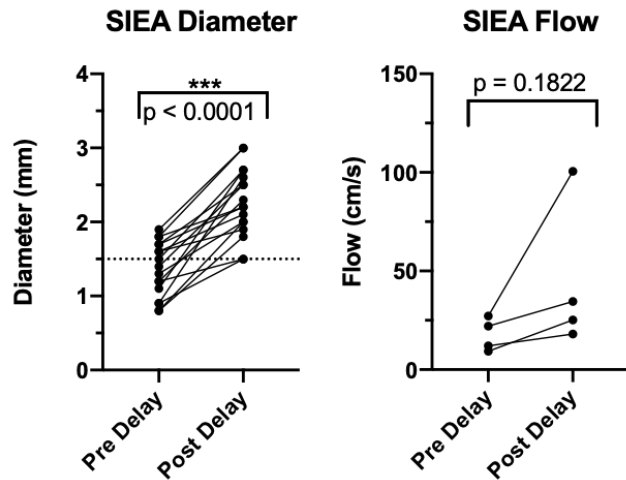
Background/Objective: The lower abdomen is the most prevalent donor site in autologous breast reconstruction (ABR). The deep inferior epigastric artery (DIEA) or transverse rectus abdominus myocutaneous (TRAM) flap may incur surgical morbidity such as abdominal hernia (0- 7.1%) or bulging (2.3- 33%) because the anterior fascia must be entered to varying degrees. Free-flap reconstruction based on the superficial inferior epigastric artery (SIEA) allows transfer of tissue via a lower abdominal incision without violating the rectus fascia. Traditionally, it is best used in single-stage reconstruction when the vessel caliber is 1.5mm; however, 56-70% of SIEAs are <1.5mm and therefore cannot reliably support free tissue transfer. This study seeks to demonstrate the increased reliability of SIEA based ABR through surgical delay by quantifying reconstructive outcomes and delay-induced hemodynamic alterations within the SIEA flap.

Methods: Female patients presenting for autologous breast reconstruction between May 2019 and October 2020 were included in this study. Patients were evaluated with preoperative magnetic resonance angiogram of the deep and superficial inferior epigastric systems and were stratified to receive either delayed SIEA or DIEP reconstruction based on clinical considerations including prior surgery, perforator size/location, tobacco status, and adjuvant radiation. Demographic and clinical data was collected and analyzed for patients who received SIEA reconstruction and included operative time, length of hospital stay, and complications for both flap creation and final reconstructive procedures. In

select patients, pre-delay and post-delay arterial diameter and peak flow was quantified with Doppler ultrasound.

Results: Thirteen women (n=17 delayed SIEA flaps) were included in this study. The mean age (\pm SD) was 46.2 ± 10.55 and the mean BMI was 26.7 ± 4.26 kg/m². SIEA flap creation procedure duration averaged 172.1 ± 108.6 min. We report 1 abdominal seroma requiring drainage. Average hospital stay after flap creation was 0.85 ± 0.90 days and length of delay prior to reconstruction varied based on clinical considerations from 6 days to 14.5 months. There were zero instances of flap failure or anastomotic revision. Delay complications included hematoma requiring re-exploration (n=1, 5.8%) and wound dehiscence (n=1, 5.8%) managed conservatively with local wound care. SIEA diameter prior to delay averaged (mean \pm 95% CI) 1.37 ± 0.20 mm and increased to 2.26 ± 0.24 mm after the delay. A significant increase in diameter was noted to be 0.9 ± 0.22 mm ($p < 0.0001$). Mean flow prior to delay was 14.43 ± 13.38 cm/s and increased to 44.61 ± 60.35 cm/s (n=4, $p = 0.1822$).

Conclusions: Surgical delay of the SIEA flap augments SIEA diameter, increasing the reliability of the SIEA flap for ABR. Delay of the SIEA results in low rates of complications and no failures. While more patients are needed to assess increase in arterial flow, use of surgical delay can expand the implementation of SIEA based reconstruction to a larger number of patients reducing abdominal morbidity associated with ABR.



69 - A More Complete Picture Changes the Story: How Proactive Hereditary Cancer Genetic Testing Can Uncover Details to Inform Management for Patients Seeking Breast Care

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Background/Objective: Recent and growing evidence supports germline genetic testing of all patients with breast cancer (BC). However, a substantial proportion of patients presenting to breast surgery clinics do not have BC, and instead, present with indications such as abnormal mammogram, benign breast biopsy, and family history. Additionally, up to 50% of all women experience benign breast concerns, but evidence-based recommendations to guide treatment are largely lacking (PMID: 29968026). Given that there are currently limited data describing the potential impact of genetic testing to determine risk for BC in this patient population, we performed a study to determine the yield and potential clinical utility of genetic screening for BC risk in healthy adult women with no personal history of breast or ovarian cancer.

Methods: Under an IRB-approved protocol, we analyzed de-identified data from 6,547 healthy adult women (≥ 18 years of age) who underwent cancer genetic screening including the ATM, BARD1, BRCA1, BRCA2, CDH1, CHEK2, NF1, PALB2, PTEN, STK11 and TP53 genes.

Results: Pathogenic/likely pathogenic germline variants (P/LP) in at least 1 of the above genes were observed in 3.4% (220 of 6,547) of individuals. P/LP variant count by gene was CHEK2 (97), ATM (35), BRCA2 (33), BRCA1 (31), PALB2 (11), and <10 for the remaining genes. P/LP rate stratified by ethnicity was Hispanic (4.3%), Black/African-American (4.1%), Caucasian (3.4%), and Asian (1.4%). Four women had >1 P/LP finding within these genes. All positive patients would be eligible for changes in clinical management, such as enhanced screening or risk-reducing interventions, and family variant testing of at-risk relatives.

Conclusions: Our data show that 3.4% of adult women have occult germline genetic risk for breast cancer that would go undiscovered without genetic screening. Notably, our data for healthy women is likely an underestimate of the risk in women presenting to breast surgery clinics, where there is a selection bias towards higher-risk women who present with concerns such as family history. Therefore, broad genetic screening for this patient population is a tool to stratify risk and inform management for women presenting to breast surgery clinics and their at-risk family members.

71 – Post-Mastectomy Referral Patterns Following 2016 ASCO Guidelines

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Background/Objective: Patients with T1 or T2 tumors and 1-3 positive lymph nodes have remained a subject of controversy as to whether post mastectomy radiation (PMRT) is beneficial. The National Comprehensive Cancer Network (NCCN) guidelines indicate PMRT may be used in T1-T2 tumors that have 1-3 positive lymph nodes after axillary lymph node dissection (ALND), as well as in certain patients that do not undergo ALND. This multi-hospital quality improvement study evaluates the frequency that breast cancer patients were referred to radiation oncology (RO), before and after the 2016 ASCO publication.

Methods: A retrospective chart review was conducted from patients within our multi-hospital system who underwent mastectomy between 2012 to 2018. Patients who underwent mastectomy for breast cancer pre-guidelines (2012 to 2015) were compared to those who underwent mastectomy post-guidelines (2016 to 2018). Patients with a prior history of breast cancer, bilateral breast cancer, or metachronous primary cancers were eliminated. Data analyzed included patient demographic and clinical characteristics, tumor features, and information regarding RO referral.

Results: A total of 775 patients from 7 hospitals within the institutional system met eligibility for this project. The percentage of referrals to RO in patients meeting PMRT criteria decreased from an 87.50% referral rate prior to 2016 to a 77.78% referral rate after the 2016 publication. Patients having no axillary disease and a T3 or T4 tumor had an 89.29% RO referral rate prior to 2016 and an 80.00% referral rate for surgeries after the guideline publication. Patients having >3 positive lymph nodes had a 93.23% RO referral rate prior to 2016, and 96.55% were referred after 2016.

Conclusions: In this multi-hospital system, the referral patterns after the 2016 ASCO PMRT guidelines did not change to include more appropriate referrals to radiation oncology for PMRT. There remains a large opportunity for practice referral pattern changes and education for surgeons in our system.

Pathology Characteristics for PMRT Referral	Referral Rate Prior to 2016	Referral Rate After 2016
1-3 Positive Lymph Nodes	87.5%	77.78%
T3 or T4 Tumor with No Positive Lymph Nodes	89.29%	80.00%
>3 Positive Nodes	93.23%	96.55%

72 - Is Image-Guided Core Needle Biopsy of Borderline Axillary Lymph Nodes Beneficial?

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Background/Objective: Ultrasound (US) assessment of axillary lymph nodes (ALN) is often performed for breast cancer clinical staging. When normal or abnormal ALN are visualized, guidelines for clinical management are established, but there is no standard management for borderline ALN (B-ALN). We aimed to determine if core needle biopsy (CNB) is clinically helpful (H) or disruptive (D) for B-ALN, considering final pathologic node status.

Methods: A single center retrospective chart review was performed for patients with invasive ductal carcinoma (IDC) or ductal carcinoma in situ (DCIS) with B-ALN on US from 1/2014–12/2019. Clinicopathologic data for patients who did and did not have CNB was compared using chi-squared analysis. H and D were assessed for the entire cohort. H was defined as proceeding directly to axillary dissection (ALND) with mastectomy or ability to localize a positive ALN after neoadjuvant chemotherapy. D was defined as CNB for pN0 or departure from Z11 management if criteria were otherwise met.

Results: Sixty-five B-ALN patients were included. Most were ER+ (78.5%), HER2- (83.1%) IDC (90.8%); underwent mastectomy (53.8%) and sentinel lymph node alone (64.6%); and were pN0 (55.4%). Clinical size was 2.6±1.8cm for IDC and 4.1±2.5cm for DCIS. CNB was performed in 52.3% (n=34) preoperatively; 35.3% had positive CNB. Tumor factors [IDC versus DCIS (p=0.41), receptor status, grade (p=0.09), size, and location (p=0.34)] were not associated with decision for CNB. Imaging factors [total visualized ALN (p=0.18) and number of B-ALN (p=1.0)] were not associated with decision for CNB. Patients factors were associated with decision for CNB, specifically younger age (p=0.03) and mastectomy (p=0.03). Patients with CNB had more SLN removed in surgery (p=0.005) but had the same number of positive SLN (p=0.26). CNB was H for 32.4%, allowing 14.7% to proceed directly to ALND and 17.6% to have a positive ALN localized after neoadjuvant chemotherapy. CNB was D for 58.8%, with all undergoing CNB for pN0 disease. No patients had departure from Z11 management as a result of CNB results. Three patients CNB was neither H nor D.

Conclusions: CNB for B-ALN is more likely to be clinically disruptive than helpful and did not contribute to increased identification of positive ALN in surgery. It is critical to define the best clinical recommendations for those breast cancer patients with B-ALN as they fall into a gray area where optimum management is not well established. Data on this unique subgroup are lacking. Based on our findings, patients with B-ALN on US should not undergo routine CNB unless it will directly change surgical approach or order of treatment.

	Preoperative CNB (N=34)	No Preoperative CNB (N=31)	P value
Histology			
DCIS	2 (5.9%)	4 (12.9%)	0.41
IDC	32 (94.1%)	27 (87.1%)	
Receptor Status			
ER Positive	26 (76.5%)	25 (80.6%)	0.77
PR Positive	23 (67.6%)	22 (71.0%)	0.79
HER2 Positive	6/32 (18.8%)	4/27 (7.8%)	0.74

Triple-negative	6/32 (18.8%)	3/27 (11.1%)	1.0
Grade			
Low	4 invasive/1 DCIS	8 invasive/0 DCIS	0.09
Intermediate	14 invasive/0 DCIS	14 invasive/3 DCIS	
High	14 invasive/1 DCIS	5 invasive/1 DCIS	
Size (cm), clinical			
DCIS	4.9 ± 5.2	3.7 ± 0.8	0.21
Invasive	2.4 ± 1.6	2.8 ± 2.0	0.37
Location			
Central	6 (17.6%)	4 (12.9%)	0.34
LIQ	2 (5.9%)	3 (9.7%)	
LOQ	3 (8.8%)	8 (25.8%)	
UIQ	5 (14.7%)	2 (6.5%)	
UOQ	18 (52.9%)	14 (45.2%)	
# ALN visualized by US	2.6 ± 1.6	3.6 ± 2.1	0.18
# B-ALN visualized by US	1.4 ± 0.9	1.4 ± 0.8	1.0
Breast Operation			
Lumpectomy	11 (32.3%)	19 (61.3%)	0.026*
Mastectomy	23 (67.6%)	12 (38.7%)	
ALN Operation			
SLN alone	22 (64.7%)	20 (64.5%)	0.11
SLN to ALND	6 (17.6%)	2 (6.5%)	
ALND alone	5 (14.7%)	3 (9.7%)	
None	1 (2.9%)	6 (19.4%)	
# SLN Examined	4.4 ± 2.4	3.1 ± 2.1	0.0055*
# SLN Positive	0.4 ± 0.6	0.7 ± 1.4	0.26

73 - Disparities in the Timeliness of Breast Cancer Treatment in the United States

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Background/Objective: Delays in treatment have been associated with poorer outcomes, and thus have been the focus of several quality measures. Meanwhile, small studies have found disparities in breast cancer care. This study was performed to assess the extent of disparity in the timeliness of local and systemic therapies given for breast cancer in the United States.

Methods: The National Cancer Database was reviewed between 2004 and 2017 for patients diagnosed with nonmetastatic breast cancer managed with surgery first. Times to treatment were measured from the date of diagnosis. Patient, tumor, and treatment factors were assessed with attention to sociodemographic variables including race, Hispanic ethnicity, income, insurance, education, urban/rural setting, and distance to facility.

Results: There were 514,187 patients after exclusions, with 99.3% being female. Of these, 84.3% were White, 10.8% Black, and 3.7% Asian. Hispanics comprised 5.6% of the cohort. Fifteen percent had a median household income of <\$40,277, while 41% made >\$63,333. There were 7.4% of patients who were either on Medicaid or uninsured, while 1.3% lived in a rural area. Only 5.5% lived >50 miles from their treatment facility. Times (days) on multivariable analysis to surgery and chemotherapy were significantly shorter for White as compared to Non-White patients. The greatest disparity was seen for Black vs White patients with additional days to surgery, chemotherapy, radiation, and endocrine treatments, respectively, 5.3, 10.0, 11.1 and 12.4 (all p 's <0.0001). Hispanic ethnicity as well as living in areas with a lower percentage of high school graduates was associated with significant delays to all measured therapies (all p 's \leq 0.0001). Medicaid patients or those who were not insured had longer median adjusted times to surgery (>45 days) as versus private (36.2 d), Medicare (35.3 d), or other governmental insurance (39.4 d). There was a delay to surgery associated with higher median household income (all p 's <0.0001). Living a distance >50 miles from their treatment facility, relative to <25 miles, was associated with a >4-day delay in surgery and chemotherapy. Metropolitan setting, and northeastern or western locations are all associated with significant delays to local and systemic therapies.

Conclusions: There are significant disparities in the timeliness of care for sociodemographic factors, including but not limited to race and ethnicity. Although the exact causes of delay cannot be discerned from the dataset, and these small differences should not affect outcomes, these data do indicate population subsets who are at risk for delay and noncompliance with national quality measures. Efforts to limit delays should be focused on minorities, as well as those with lower education, Medicaid or uninsured, especially those at greatest distance from their treatment facilities. We are attempting to create a nomogram to more precisely predict and quantify their risk and likely delays.

77 - Quantification of Breast Lymphedema and Its Impact: A Pilot Study

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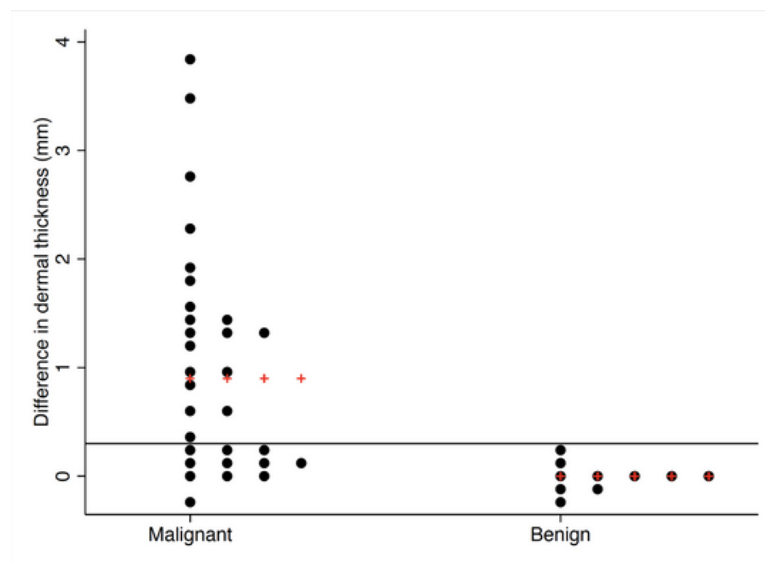
Background/Objective: Surgery and radiation are the major causes of secondary lymphedema. Arm lymphedema after axillary lymph node dissection has been well described and studied. In the modern era of breast conservation therapy with radiation, breast lymphedema has become more common than arm lymphedema. Lymphedema affects quality of life, and is associated with poor wound healing, infection, and unnecessary diagnostic procedures. There is no established tool for evaluation, characterization, and quantification of breast lymphedema. In this pilot study, we explored the feasibility of using ultrasound to identify a reliable measure of breast lymphedema, and evaluated whether this measure correlated with clinical assessment, tumor and treatment factors, and patient-reported outcomes.

Methods: We enrolled 30 women with a history of unilateral malignant breast cancer who had undergone breast conservation, sentinel lymph node biopsy, and whole-breast radiation. We also

enrolled 10 women with benign disease who had not undergone surgery or radiation as control subjects. We performed ultrasound measurements of dermal thickness on the patient’s treated breast and untreated breast at the 6 o’clock position. We performed physical exams to assess for signs of breast lymphedema, evaluated quality of life using a modified DASH questionnaire, and gathered tumor and patient characteristics from medical records. We quantified breast lymphedema as the dermal thickness of the affected breast minus the dermal thickness of the unaffected breast. We defined breast lymphedema status as positive if dermal thickness difference was above the highest-observed value in the benign patients. We used contingency tables and univariate statistics to explore associations with clinical and quality of life factors. As this was a pilot study, no statistical tests were performed.

Results: Mean age (\pm sd) was 59 ± 13 in the malignant group ($n=30$) and 46 ± 17 in the benign group ($n=10$). The malignant and benign groups were similar with regard to body mass index. The figure shows the distribution of dermal thickness differences in these groups. Median dermal thickness difference was higher in the malignant group compared with the benign group (0.9mm and 0mm, respectively). Among patients with malignancy, those with positive breast lymphedema status [$n=21$ (70%)] were more likely (compared with malignant patients without breast lymphedema) to report impacts on sexual activity (24% vs 11%), tingling sensation (52% vs 16%), sleep quality (33% vs 21%), and confidence (24% vs 5%). Clinical features associated with breast lymphedema status included chest wall swelling (10% vs 0%), increased breast size (50% vs 11%), pitting edema (80% vs 11%), nipple fullness (60% vs 21%), and changes in nipple texture (60% vs 16%). Tumor size and radiation dose were positively associated with breast lymphedema.

Conclusions: Breast lymphedema has outpaced arm lymphedema as a serious concern among breast cancer patients. Breast lymphedema is understudied and there are no standard tools available to measure it, correlate it with patient symptoms, and track its response to interventions. Our pilot study demonstrates that ultrasound, physical exam, and patient questionnaires are promising tools for the characterization of breast lymphedema.



79 - Patient Experience Ratings: What Do Breast Surgery Patients Care About?

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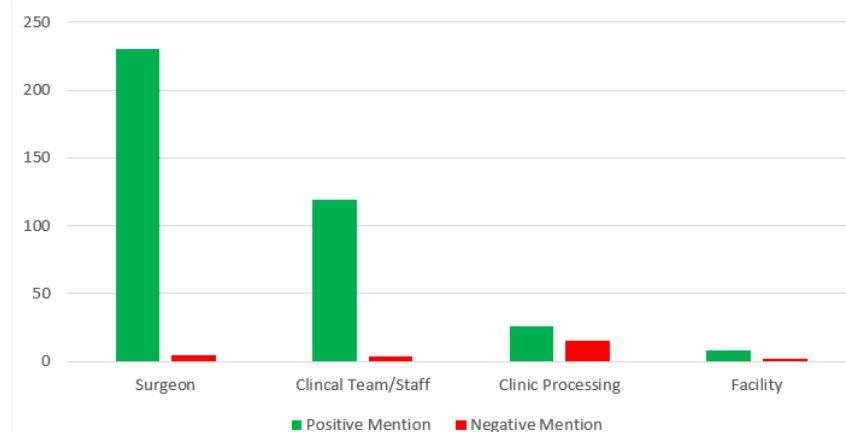
Background/Objective: Patient satisfaction is important, and breast surgeons historically receive patient reviews evaluating their consultation encounter. However, the constructs of a patient experience are complex and often depend on a multitude of factors, some of which may be outside the surgeon’s influence. We sought to evaluate what factors influenced patients’ reviews of their clinic visit.

Methods: A review of all prospective surveys from 2018-2020 was reviewed from a single institution that encompassed 3 separate hospitals and 6 breast surgeons. Institutional surveys were sent to all patients within 48 hours after their visit to 1 of our outpatient breast surgery clinics. Patients were asked at their appointment check-in if they preferred email, text, or a telephone call for their survey. Scores were recorded from 0-10, with 0 as “not likely” and 10 “extremely likely” to recommend the provider office to a friend or family member. Scores 0-6 were considered negative, 7-8 neutral, and 9-10 positive. Comments from patients for their given score were reviewed and classified according to mention of surgeon, clinic staff/team, clinic processing (i.e., wait times, check-in process), and facility amenities (i.e., ease of parking, location) as indicated. Comments may have had more than 1 category mentioned and were recorded as applicable. This study was deemed IRB-exempt.

Results: A total of 331 patient responses and ratings were available for inclusion and analysis. Average patient score was 9.57 and ranged from 0-10. Most ratings were positive comments (92%, 306/331) followed by neutral comments (4%, 13/331). Only 4% (12/331) of ratings were negative. Amongst the positive comments, surgeon-specific remarks were most commonly noted, followed by mentions of the team or clinic staff. Negative comments were most commonly for clinic processes such as long wait times. Few comments were related to facility amenities such as ease of parking or clinic aesthetics. (Figure)

Conclusions: Patient satisfaction surveys provide a window into creating the best patient experience for breast surgery patients. Surgeons are still the primary driver behind positive experiences, but team and staff interactions are also of great importance. Frustrations with clinic processing such as long wait times continue to be the primary reason for dissatisfaction amongst patients. Further efforts to address these factors affecting patient experiences should be made to continue improving patient care.

Figure. Categories mentioned in patient comments



81 - Clinical Outcomes of Intraoperative Radiation Therapy (IORT) and Breast Conservation in Women with Prior Augmentation Mammoplasty with Breast Cancer

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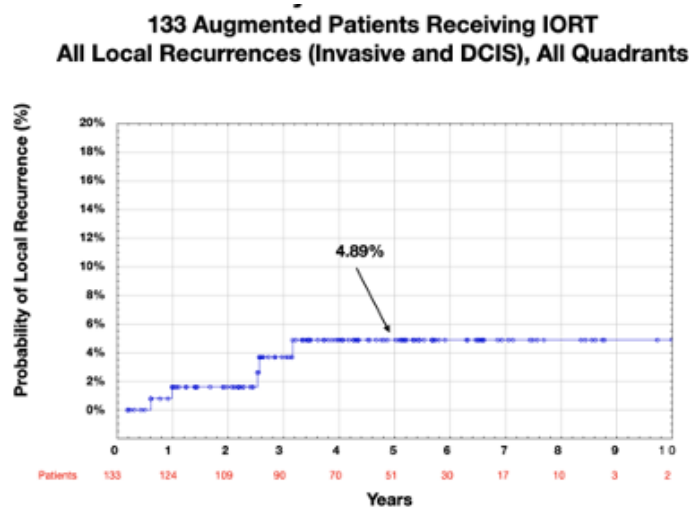
Background/Objective: Women with prior breast augmentation mammoplasty develop breast cancer at the same rate as women without augmentation and have a similar prognosis. Breast conservation in the augmented patient has always been of some concern due to the risk of capsular contracture induced by whole-breast radiation therapy (WBRT). Intraoperative radiation therapy (IORT) used as a single dose has been shown to yield local recurrence rates similar to WBRT. For patients with early-stage breast cancer, IORT is now considered an acceptable alternative. Since IORT treats only a small portion of the breast, the risk of causing a generalized fibrotic reaction secondary to radiation therapy should theoretically be minimal. The purpose of our study was to examine local recurrence probabilities and rates of chronic tissue fibrosis following IORT for breast cancer patients with prior augmentation mammoplasty.

Methods: A prospectively maintained IORT breast cancer database was reviewed. Among 1415 patients treated with IORT, 133 had prior breast augmentations. The augmented patients were analyzed for all local recurrences of ductal carcinoma in situ (DCIS) or invasive cancer, and by breast quadrant of recurrence (any quadrant or the same quadrant). Local recurrence probabilities were estimated by Kaplan-Meier analysis. For the purpose of this study, fibrosis was considered chronic if it was present at 6 months postoperative and was graded as none, mild, moderate, or severe.

Results: The median age of the cohort was 60 years. Median follow-up was 50 months. Five patients experienced local recurrence, 3 in the same quadrant, 2 in different quadrants. Two local recurrences were invasive, and 3 were DCIS. Only 1 patient was found to have invasive local recurrence in the same quadrant. The probability of any local recurrence in any quadrant at 5 years was 4.89%. The probability of a same quadrant local recurrence was 3.11%, and the probability of a same quadrant invasive local recurrence was 1.25%. There were 2 patients (1.5%) who developed moderate fibrosis secondary to IORT. Seven patients (5.3%) developed mild fibrosis. There were no patients who developed severe fibrosis. The remaining 124 patients (93%) did not develop any fibrosis. When fibrosis occurred, it was limited to 1-2 cm around the IORT site and was not generalized to the entire breast.

Conclusions: To date, this is the largest cohort of breast augmentation patients treated with IORT that we are aware of. The local recurrence probabilities in this study are similar to those reported in international trials studying IORT and are acceptable. Fibrosis induced by IORT occurred in only 6.8% of patients and makes IORT an appealing alternative to whole-breast radiation therapy for augmented patients who meet all IORT criteria.

Figure. Probability of local recurrence



84 - Measuring Distress in Newly Diagnosed Breast Cancer Patients During the COVID-19 Pandemic

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Background/Objective: A new breast cancer diagnosis affects more than just a patient’s physical health; it also impacts their emotional and financial health. Due to the SARS-CoV-2 (COVID-19) pandemic and the resulting economic instability, many patients are experiencing insecurity and financial distress. We seek to determine if patient-reported financial insecurity and distress are increased in our newly diagnosed breast cancer patients in the initial months of the COVID-19 pandemic.

Methods: We conducted a retrospective chart review using Cancer Registrar data of all newly diagnosed breast cancer patients during the COVID-19 period designated March 1- June 30, 2020 in our community cancer center. We compared them with patients diagnosed in the same time period the prior year (March 1- June 30, 2019). We evaluated demographics, stage of cancer at diagnosis, type of first cancer treatment, referrals to social work, behavioral health, and financial counseling, as well as initial NCCN Distress Thermometer™ and self-reported depression scores. We used Student’s *t*-test or the Mann-Whitney *U*-test for continuous data and the Pearson chi-square or Fisher’s Exact test for categorical data as appropriate.

Results: Fewer patients were diagnosed with breast cancer during the pandemic period (135 vs 181). There was no difference in age, race, marital status, cancer stage, or use of neoadjuvant chemotherapy between the 2019 and 2020 groups. Self-reported depression scores were similar between the 2 groups [median(IQR) 3(1,6) both years], while the recorded Distress Thermometer™ score actually decreased,

albeit not significantly [median(IQR) 5(3,8) in 2019 vs 4(2,8) in 2020]. Referrals to financial counseling increased significantly in 2020 compared to 2019 (50.4% vs 40.3%, $p=0.048$).

Conclusions: We did not find a statistically significant increase in NCCN Distress Thermometer™ scores in patients diagnosed with breast cancer during the pandemic period. However, referrals to financial counseling services increased significantly at our institution, although this may be due to increased awareness of the EPIC™ referral process. We hypothesize that a similar study in a community with higher rates of COVID-19 infection may find different results.

Table. Demographics and Distress Newly Diagnosed Breast Cancer Patients, March through June 2019 vs March through June 2020

		2019	2020	p value
	N	181	135	n/a
Age		63.5 yrs	65.3 yrs	0.77
Stage of Cancer at Diagnosis	0	23 (12.7%)	12 (8.9%)	0.82
	1	103 (56.9%)	85 (63.0%)	
	2	26 (14.4%)	20 (14.8%)	
	3	16 (8.8%)	9 (6.7%)	
	4	11 (6.1%)	7 (5.2%)	
	unk	2 (1.1%)	2 (1.1%)	
Marital Status	Married	60.2%	50.4%	0.06
Race	White	87.8%	84.4%	0.35
	Black	7.7%	14.1%	
	Other	4.5%	1.5%	
Depression Score	Median (IQR)	3.0 (1,6)	3.0 (1,6)	0.89
NCCN Distress Thermometer™ Score	Median (IQR)	5.0 (3,8)	4.0 (2,8)	0.41
Use of Neoadjuvant Chemotherapy		17 (9.4%)	9 (5.9%)	0.18
Consult: Social Work		89 (49.2%)	62 (45.9%)	0.32
Consult: Behavioral Health		33 (18.2%)	24 (17.8%)	0.52
Consult: Financial Counseling		73 (40.3%)	68 (50.4%)	0.048

85 - The New Normal? Patient Satisfaction and Usability of Telemedicine in Breast Cancer Care

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Background/Objective: Because of the coronavirus disease 2019 (COVID-19) pandemic, physicians and health care providers transitioned to telemedicine-based care delivery where possible to minimize COVID-19 exposure risks for patients and staff. We aimed to measure patient satisfaction (primary endpoint) and usability (secondary endpoint) of telemedicine among breast cancer patients to better understand its potential role in post-pandemic breast cancer care.

Methods: An anonymous survey was distributed to adult breast cancer patients who have undergone a telemedicine visit at a single academic institution (including surgical, radiation, and medical oncology) over a 12-week period from June 15 to September 4, 2020. The survey collected patient demographics, cancer history, cancer treatment to-date, and assessed satisfaction and usability using a modified Telehealth Usability Questionnaire (Parmanto *et al.* 2016). Patients were asked to rate statements regarding telemedicine using a 7-point Likert scale, with 1 reflecting dissatisfaction or poor usability, and 7 reflecting high satisfaction or usability. Summary satisfaction and usability scores were characterized using descriptive statistics. Associations between satisfaction, usability, and other patient characteristics were analyzed with the non-parametric Spearman correlation coefficient and Wilcoxon rank-sum and Kruskal-Wallis tests.

Results: Of 310 screened breast cancer patients, 203 consented to receive the survey, and 75 responded, yielding a response rate of 37%. The median age of respondents was 63 (range 25-83). The majority of respondents lived in an urban area (61%), were white (91%), and were seeing a medical oncologist (62%). Nearly half (49%) of the patients were not planning to receive chemotherapy, while 32% had completed and 18% were actively receiving chemotherapy. The overall median patient satisfaction score was 5.5 out of 7 with an interquartile range (IQR) of 4.25-6.25. The overall median usability score was 5.6 out of 7 with an IQR of 4.4-6.2. Fitting satisfaction by usability yielded a Spearman correlation coefficient (ρ) of 0.80 ($p < 0.001$), indicating a strong positive correlation between satisfaction and usability. However, we found no correlation for patient age with satisfaction ($\rho = -0.09$, $p = 0.476$) or usability ($\rho = -0.12$, $p = 0.345$), nor for in-person visit commute time with satisfaction ($\rho = 0.06$, $p = 0.626$) or usability ($\rho = 0.06$, $p = 0.616$). Satisfaction and usability scores did not vary significantly according to patient race, location of residence, insurance status, oncology specialty seen, number or type of prior telemedicine visits, or whether patients were actively receiving cancer treatment (Table).

Conclusions: Overall, breast cancer patients were satisfied with telemedicine and found it usable, with respective scores greater than 5 out of 7. This supports the hypothesis that patient satisfaction and usability should not limit the utility of telemedicine in future breast cancer care.

Table 1. Telemedicine Satisfaction and Usability Scores by Patient and Visit Characteristics

Patient or Visit Characteristic (N=75) ¹	Median Satisfaction Score ² (IQR ³)	P-value	Median Usability Score ² (IQR)	P-value
Race				
White (n=64)	5.42 (4.0-6.0)	0.112	5.6 (4.4-6.1)	0.065
Black (n=0)	NA		NA	
Asian (n=3)	6.25 (6.0-6.5)		6.6 (6.0-6.75)	
Other (n=3)	6.0 (5.25-7.0)		6.0 (6.0-7.0)	
Location of Residence (by population size)				
Urban: >50,000 (n=43)	5.25 (4.0-6.25)	0.421	5.6 (4.4-6.2)	0.500
Urban cluster: 2,500 to 50,000 (n=22)	5.75 (5.0-6.25)		5.8 (5.4-6.6)	
Rural: <2,500 (n=6)	5.13 (2.0-6.0)		5.4 (3.2-5.8)	
Medical Insurance Coverage				
Private health insurance (n=33)	5.5 (4.75-6.0)	0.748	5.8 (5.0-6.0)	0.264
Medicare (n=9)	5.75 (4.0-6.25)		5.6 (5.0-6.0)	
Private and Medicare (n=16)	5.25 (3.75-6.25)		5.0 (3.6-6.4)	
Medigap (n=6)	5.63 (5.0-6.25)		6.0 (5.6-7.0)	
Other (n=4)	4.88 (3.88-5.5)		5.1 (3.9-5.4)	
Oncology Specialty of Telemedicine Visit				

Surgical (n=15)	4.75 (3.75-5.75)	0.129	5.4 (3.2-5.8)	0.219
Medical (n=44)	5.75 (5.0-6.25)		5.8 (5.0-6.6)	
Radiation (n=12)	5.75 (5.0-6.13)		5.4 (4.6-6.2)	
Chemotherapy		0.962		0.471
Completed (n=23)	5.5 (4.75-6.25)		5.8 (5.0-6.6)	
Currently receiving (n=13)	5.25 (4.75-6.0)		5.8 (4.4-6.0)	
Planned, not yet started (n=0)	N/A		N/A	
Not planned/unknown (n=35)	5.5 (4.0-6.25)		5.4 (4.0-6.2)	
Radiation Therapy		0.077		0.327
Completed (n=45)	5.25 (4.75-6.0)		5.6 (4.0-6.2)	
Currently receiving (n=2)	5.46 (4.25-6.67)		4.8 (4.4-5.2)	
Planned, not yet started (n=5)	6.5 (6.0-7.0)		6.6 (5.2-6.8)	
Not planned/unknown (n=20)	5.75 (4.0-6.25)		5.8 (5.0-6.0)	
Number of Prior Telemedicine Visits		0.295		0.834
1 (n=26)	5.25 (4.75-5.75)		5.6 (5.0-6.0)	
2 (n=16)	5.63 (3.88-6.25)		5.7 (3.1-6.8)	
3+ (n=29)	5.75 (4.75-6.25)		5.6 (5.0-6.2)	
Type of Visit(s) in the Past 4 Weeks		0.497		0.622
Video only (n=25)	5.5 (4.75-6.25)		5.8 (5.0-6.6)	
Phone only (n=28)	5.75 (5.0-6.13)		5.9 (4.7-6.4)	
Video and phone only (n=7)	5.5 (5.0-6.5)		5.2 (4.4-5.8)	
Other, including In-person (n=11)	4.75 (3.5-5.75)		5.6 (4.4-6.0)	

¹The sum of responses of each characteristic may be <75 and is due to missing survey data.

²Maximum score is 7.

³IQR = Interquartile range

88 - Institutions Treating Breast Cancer Patients of a Low Socioeconomic Status Achieve Multidisciplinary Quality Standards at Lower Rates

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Background/Objective: In 2005, the National Accreditation Program of Breast Centers (NAPBC) began developing a set of standards by which the organization accredits breast centers nationwide. Accreditation signifies to patients that the center delivers quality, multidisciplinary breast cancer care from diagnosis through survivorship. While low socioeconomic status (SES) and low patient volume have been demonstrated to have negative impacts on patient outcomes, it is unknown whether there is an association of an institution's patient SES mix with meeting NAPBC standards for quality care.

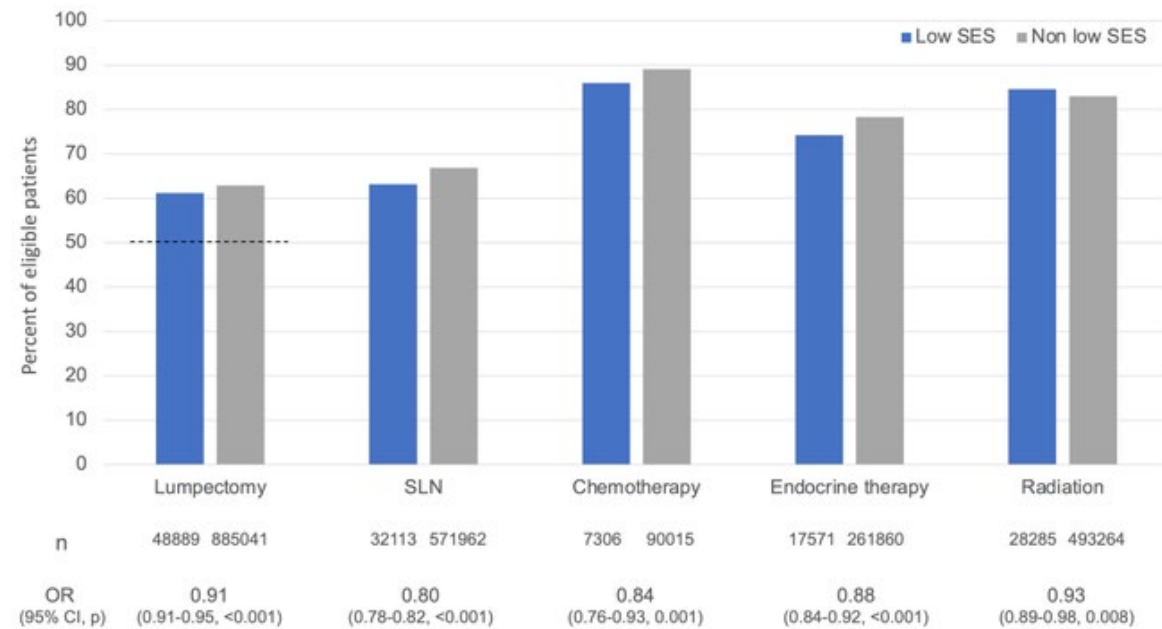
Methods: All Commission on Cancer institutions submitting breast cancer patients to the National Cancer Database (2006-2017) were ranked based on the proportion of uninsured patients and patients in the lowest quartiles for income and educational attainment they treat. After elimination of any institution reporting fewer than 100 patients, we defined low SES institutions as those in the top 10% treating the largest proportion of low SES patients. We then identified women with *in situ* or invasive breast cancer who had all their care at the reporting institution. Cohorts were created from this main group based on age and tumor characteristics based on the 2018 NAPBC standards for lumpectomy (the

only quantitative standard, which is set at a rate of 50%), sentinel lymphadenectomy, and adjuvant chemotherapy, endocrine therapy, and radiation. Univariate and multivariate comparisons of patient, tumor, and treatment factors were made to calculate adjusted odds of meeting each standard between low SES and non-low SES institutions.

Results: A total of 1319 institutions were included in the analysis. A larger proportion of low SES institutions were community cancer centers compared to comprehensive or academic centers for non-low SES ($p < 0.001$). Both low SES and non-low SES institutions reached the benchmark of 50% lumpectomy (61.2 v. 62.9%, $p < 0.001$), but unadjusted and adjusted rates of lumpectomy were lower in low SES (Figure). The rate of sentinel lymphadenectomy was lower for low SES institutions ($p < 0.001$). A subset analysis demonstrated that the difference was due to differences among clinically node-negative patients (OR 0.78, 95% C.I. 0.76-0.80, $p < 0.001$) with no difference in the adjusted odds of sentinel lymphadenectomy for clinical N1 patients (OR 0.94, 95% C.I. 0.89-1.01, $p = 0.08$). Similarly, unadjusted and adjusted rates of chemotherapy and endocrine therapy for appropriate patients were lower at low SES institutions. While the unadjusted rate of adjuvant radiation was higher at low SES institutions, adjusted odds demonstrated that patients treated at low SES institutions were less likely to undergo adjuvant radiation when appropriate.

Conclusions: We found small but significant differences in achieving multidisciplinary standards for quality breast cancer care between low SES and non-low SES institutions. Given that these differences persisted on multivariate analysis, these findings suggest that institutional differences in breast cancer treatment may exacerbate disparities already faced by patients of low SES. Further work to assess breast cancer-specific outcomes and to elucidate the underlying causes of these treatment differences are warranted.

Figure. Percent of eligible patients meeting multidisciplinary quality standards stratified by the proportion of low socioeconomic status (SES) patients the institution treats along with multivariate odds ratio demonstrating the likelihood of low SES institutions meet the standard compared to non-low SES institutions.



The dotted line represents the quantitative 50% lumpectomy standard. [OR - odds ratio, CI - confidence interval]

92 - Longitudinal Trajectories of Patient-Reported Outcomes in Breast Cancer Patients Undergoing Lumpectomy Versus Mastectomy

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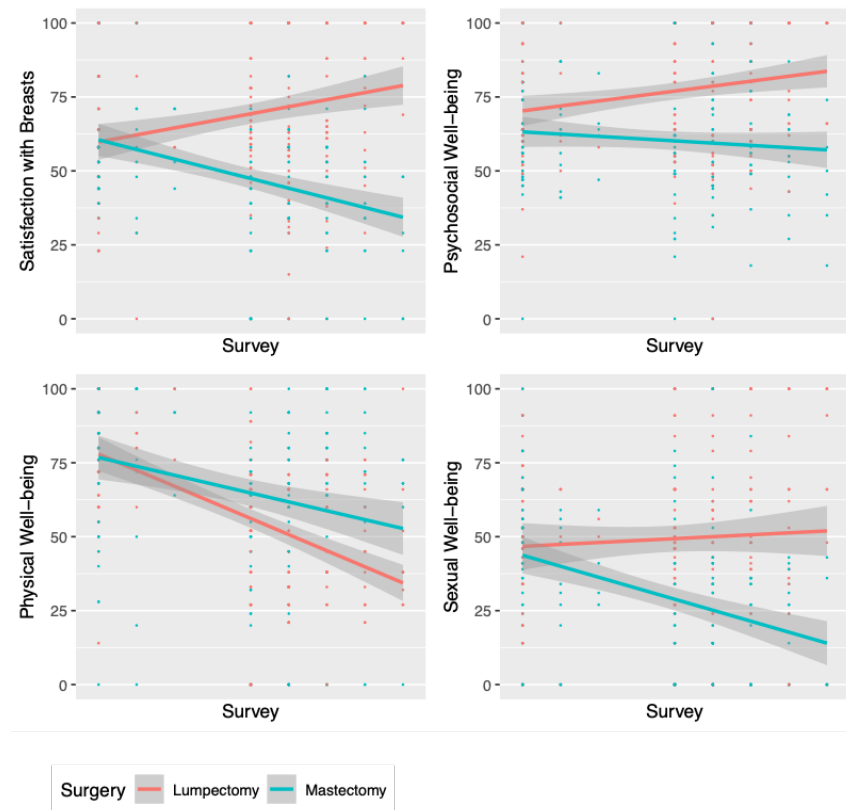
Background/Objective: With greater emphasis being placed on value-based care, patient reported outcome measures (PROMs) are increasingly used to evaluate the effect of treatment on outcomes important to patients. Prior studies have collected PROM data at a single point in time or both pre- and post-operatively. In the present study, we aim to 1) compare PROMs longitudinally between breast cancer patients undergoing lumpectomy versus mastectomy and 2) compare return to baseline between each surgical approach.

Methods: Newly diagnosed breast cancer patients seen in a multidisciplinary clinic at an academic breast center between 6/2019-9/2020 were invited to participate in longitudinal PROM surveys during their treatment course. If willing to participate, patients were emailed the validated BREAST-Q questionnaire, which assesses PROMs specific to patients undergoing breast surgery (psychosocial, physical, and sexual well-being, and satisfaction with breasts). Surveys were delivered at the initial clinic visit, every 3 months until surgery, 2 weeks after surgery, then every 3 months for the first year. Scores for each domain were reported on a scale from 0 (worst) to 100 (best). Patients with at least 1 follow-up after baseline were included. We used linear mixed models to estimate the differences in slopes over time between lumpectomy versus mastectomy patients for each PROM. We also used chi-square tests of association to compare the proportion of patients who returned to their baseline PROM scores by 6 months post-surgery.

Results: Of the 191 patients willing to participate, 40 patients either proceeded with treatment at another institution, did not meet criteria, or elected to withdraw and were thus excluded from analysis. Of those remaining, 102 patients completed at least 2 PROM surveys and therefore could be included in the mixed effects models; 58 of these patients underwent lumpectomy and 44 mastectomy. The Figure illustrates the long-term trajectories of PROMs in patients undergoing lumpectomy versus mastectomy. Mastectomy patients had significantly greater decreases in breast satisfaction ($p < .001$), psychosocial ($p = .003$), and sexual well-being ($p = .01$) over time compared to lumpectomy patients. Both groups of surgical patients reported a decrease in physical well-being, and this was more significant in lumpectomy patients ($p < .001$). At 6 months post-surgery, 65% of lumpectomy patients returned to their baseline breast satisfaction compared to 20% of mastectomy patients ($p = 0.01$). There was no difference in the proportion returning to baseline for the other PROMs between the 2 surgical patients.

Conclusions: We find that patients undergoing mastectomy have significantly decreased breast satisfaction, psychosocial and sexual well-being, and slower return to physical baseline when compared to their lumpectomy counterparts. This likely reflects the longer psychological and physical recovery associated with a more invasive procedure. Understanding how outcomes important to patients change over the care continuum in response to various therapies can help identify timepoints of care where supportive resources may improve outcomes. Not only does this ensure a patient-centered approach to clinical management but will also be important in guiding informed, shared decision-making with prospective patients.

Figure. Longitudinal Changes in PROMs during Treatment



95 – COVID-19 Strategy - Extrapolating a Second Brain to Enhance Surgical Axillary Staging in Breast Cancer From Two Decades of Evidence

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Background/Objective: Staging the axilla in early breast cancer is pertinent to make decisions at tumour board and multidisciplinary meetings for further systemic or surgical treatments. Multiple techniques to localise the true sentinel node are available. This review aims at extrapolating 20 years of evidence to arrive at a streamlined approach during the COVID-19 pandemic.

Methods: MC, Medline, EMBASE, PubMed, and Cochrane library were searched for clinical trials, randomised trials, systematic reviews, and meta-analysis on techniques of axillary sentinel node biopsy in early breast cancer in the last 20 years.

Results: Single agent, preferably radioisotope, is recommended in palpable and good biology tumours. Use of single agent blue dye can be standardised in axillary tail tumours. It is also recommended when isotope mapping is logistically not feasible or during pandemics like COVID-19 where looming infrastructure challenges are prevalent. Dual-agent technique should be considered in previously treated breast and axilla, neoadjuvant chemotherapy cohort, bad tumour biology, high BMI, and

macromastia groups for true nodal retrieval. Optimal number of nodes taken out should not be more than 3 (n=3). Lower axillary sampling of not more than 3 nodes is recommended for troubleshooting with any localising agent technique. Triple-site injection at peri-tumoural, subcutaneous, and sub areolar regions and larger volume of blue dye agent injection of up to 8mls increases the localisation success in the dual technique group for lymphatic mapping. Magnetic tracing can be used as an adjunct to either single-agent (RI/BD) technique when there is failure to localise the sentinel node.

Conclusions: Many units in the UK are now utilising blue dye and magtrace injection to retrieve the true sentinel lymph node to stage the axilla in early breast cancer. And enhancing the technique to locate true SN reduces the burden on health care even more during the COVID-19 pandemic.

Table. Recommendation for surgical axillary staging during COVID-19 pandemic to retrieve the true sentinel node

1. Use of single agent blue dye can be standardised in axillary tail tumours.
2. It is also recommended when isotope mapping is logistically not feasible or during pandemics like COVID-19 where looming infrastructure challenges are prevalent.
3. Dual-agent technique should be considered in previously treated breast and axilla, neoadjuvant chemotherapy cohort, bad tumour biology, high BMI, and macromastia for true nodal retrieval.
4. Optimal number of nodes taken out should not be more than 3 (n=3).
5. Lower axillary sampling of not more than 3 nodes is recommended for troubleshooting with any localising agent technique.
6. Triple-site injection at peri-tumoural, subcutaneous, and sub areolar regions and larger volume of blue dye agent injection of up to 8mls increases the localisation success in the dual technique group for lymphatic mapping.
7. Magnetic tracing can be used as an adjunct to either single-agent (RI/BD) technique when there is failure to localise the sentinel node.

96 - Radar Reflector-Guided Axillary Surgery in Node-Positive Breast Cancer Patients

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Background/Objective: There are currently concerted efforts to refine axillary node surgery in patients with node-positive breast cancer, particularly for patients undergoing neoadjuvant therapy (NAT) and with a low burden of axillary disease. The availability of wireless localization techniques provides an opportunity to accurately identify biopsy-proven positive lymph nodes, and subsequently ensure their removal at the time of surgery. The current study is intended to evaluate the feasibility and effectiveness of radar reflector-guided axillary surgery in patients with node-positive breast cancer.

Methods: Our IRB-approved Breast Cancer Database was queried for patients diagnosed with node-positive breast cancer, between 5/2012 and 10/2020, who underwent preoperative placement of a radar reflector into a biopsy-proven lymph node. Clinicopathologic as well as surgical data were collected and reported using descriptive statistics.

Results: Thirteen patients were identified who underwent axillary placement of a radar reflector preoperatively. Clinicopathologic data are displayed in the Table. At the time of axillary lymph node biopsy, a clip was placed in all patients, and radar reflectors were subsequently placed into the lymph node. Seven patients (54%) were treated with NAT. Intraoperatively, the clip and radar reflector were successfully removed in all 13 patients. Pathology of the lymph node containing the reflector was positive for malignancy in 9 (69%) patients. Among the remaining 4 patients, there were treatment-related changes in 3 patients who received NAT, and biopsy changes in 1 patient who had not undergone NAT. Complete axillary lymph node dissection was performed in 8 (62%) patients, while targeted axillary lymph node dissection was performed in the remaining 5 (38%) patients.

Conclusions: Axillary surgery in patients with node-positive breast cancer guided by preoperative placement of a wireless radar reflector is feasible. The technique ensures excision of biopsy-proven positive axillary lymph nodes and may allow for more a targeted approach to assessing the axilla, particularly in patients who have been treated with NAT.

Table. Clinicopathologic and Operative Data

Variables	Total (N=13)	%
Median Age (years)	58 (28-76)	
Mean BMI (kg/m²)	26.2 (17.8-38.6)	
Histology		
Invasive ductal carcinoma	13	100
Clinical N Stage at Diagnosis		
1	12	92.3
2	1	7.7
Tumor Receptor Status		
Hormone receptor + / HER2/ <i>neu</i> -	7	53.8
Hormone receptor + / HER2/ <i>neu</i> +	3	23.1
Hormone receptor - / HER2/ <i>neu</i> +	1	7.7
Triple-negative	1	7.7
N/a (final path - lymphoma)	1	7.7
Neoadjuvant Therapy (NAT) Regimen		
	(N=7)	
Anthracycline based	7	100
Anti HER2/ <i>neu</i>	4	57
Type of Axillary Lymph Node Biopsy		
Core needle biopsy	7	53.8
Fine needle aspiration	6	46.2
Timing of Reflector Placement		
Pre-Neoadjuvant Therapy	2	15.3

During or Post-Neoadjuvant Therapy	5	38.5
Post Biopsy, preoperative	6	46.2
Mean Number of Lymph Nodes Removed		
Targeted Axillary Surgery	5 (3 – 10)	
Complete Axillary Lymph Node Dissection	14 (7 – 26)	
Mean Number of Positive Lymph Nodes		
Targeted Axillary Surgery	1.6 (0 – 3)	
Complete Axillary Lymph Node Dissection	5 (0 – 23)	

97 - Assessment of the Impact of Surgical Delay on the Rate of Upgrade to Malignancy During Excisional Biopsy for Atypical Ductal Hyperplasia, Flap Epithelial Atypia, Intraductal Papilloma, and Radial Scar

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Background/Objective: When core needle biopsy (CNB) demonstrates atypical ductal hyperplasia (ADH), flat epithelial atypia (FEA), intraductal papilloma (IDP) or radial scar (RS), a surgical biopsy is often offered. Excisional biopsy (EB) provides a more representative tissue sample to rule out an associated malignancy not detected during CNB. The rate of upgrade, or chance of detecting malignancy, ranges from 1-20%. Although these lesions are not considered to be precancerous, they occupy a controversial position in the sequence between benign disease and malignancy. Some studies suggest that ADH, for example, is a precursor to DCIS. With COVID-19-related delays of “elective” procedures affecting many centers across the country, our objective is to identify whether a delay in EB, or certain risk factors (family history, past history of breast cancer, imaging characteristics) are associated with a higher risk of upgrade. We hypothesize that surgical delay is not associated with an increased for upgrade and will be a safe option for select patients.

Methods: An IRB-approved retrospective cohort study of a prospectively collected database from January 1, 2017 - March 31, 2020 at a tertiary care center was performed. Eligible patients included those who were found to have ADH, FEA, IDP, RS, or other atypical lesions on CNB and subsequently underwent EB. The electronic medical record was used to provide supplemental data. ANOVA was used to compare outcomes. Final statistical interpretations are pending.

Results: A total of 405 patients underwent EB for ADH, FEA, IPD, RS, or other atypical findings on CNB. Of those the qualifying diagnosis for EB was ADH for 157, FEA for 45, IDP for 105, and 82 for RS. Eight (%) underwent EN for ALH/LCIS. Fifty-one patients (12.6%) were ungraded to invasive or in-situ carcinoma with EB. Patients were stratified by number of days between surgical consultation (SC) and EB. Sixty-nine patients (17%) had >60 days elapse between SC and EB and were considered as having a delay. In the no-delay (ND) group (patients who underwent EB within 60 days of SC), the upgrade rate was 12.2% (n=41). In the delay group, the rate was 14.5% (n=10). This did not reach significance (p=0.60).

Conclusions: Surgical delay for borderline lesions including ADH, FEA, IPD, and RS was not associated with higher rate of upgrade.

Table. Patient and clinical characteristics of those patients who underwent core needle biopsy at BMC stratified by time from consult to surgery, n=405

Columns by: Surgical consult to surgery (in days)	<=60 days	>60 days	Total	P-value	Missing / N (%)
n (%)	336 (83.0)	69 (17.0)	405 (100.0)		0 / 405 (0.00)
*** Patient Characteristics	***	***	***	***	***
Age, mean (sd)	55.1 (10.9)	55.8 (12.4)	55.2 (11.1)	0.61	0 / 405 (0.00)
Race/Ethnicity, n (%)					
Caucasian, n (%)	44 (13.1)	8 (11.9)	52 (12.9)		
African American, n (%)	25 (7.5)	2 (3.0)	27 (6.7)		
Hispanic/Latino, n (%)	39 (11.6)	8 (11.9)	47 (11.7)		
Middle Eastern, n (%)	6 (1.8)	0 (0.0)	6 (1.5)		
Russian/Ukrainian/Eastern European, n (%)	25 (7.5)	5 (7.5)	30 (7.5)		
Western/Northern European, n (%)	114 (34.0)	28 (41.8)	142 (35.3)		
Ashkenazi, n (%)	3 (0.9)	2 (3.0)	5 (1.2)		
Pacific Islander/Asian, n (%)	4 (1.2)	1 (1.5)	5 (1.2)		
French Canadian, n (%)	33 (9.9)	4 (6.0)	37 (9.2)		
Not recorded, n (%)	36 (10.7)	5 (7.5)	41 (10.2)		
Caribbean, n (%)	2 (0.6)	0 (0.0)	2 (0.5)		
Central/South American, n (%)	1 (0.3)	2 (3.0)	3 (0.7)		
African, n (%)	2 (0.6)	0 (0.0)	2 (0.5)		
North American Indian, n (%)	0 (0.0)	1 (1.5)	1 (0.2)		
non-Ashkenazi Jewish, n (%)	1 (0.3)	1 (1.5)	2 (0.5)	0.12	3 / 405 (0.74)
*** Clinical characteristics	***	***	***	***	***
Atypia Category, n (%)					
ADH NOS, n (%)	128 (71.5)	29 (74.4)	157 (72.0)		
ALH/LCIS, n (%)	8 (4.5)	0 (0.0)	8 (3.7)		
FEA, n (%)	37 (20.7)	8 (20.5)	45 (20.6)		
Other Atypia, n (%)	6 (3.4)	2 (5.1)	8 (3.7)	0.56	187 / 405 (46.17)
Diagnosis, n (%)					
Benign, n (%)	157 (46.7)	30 (43.5)	187 (46.2)		
Atypia, n (%)	179 (53.3)	39 (56.5)	218 (53.8)	0.62	0 / 405 (0.00)
Benign Categories, n (%)					
Intraductal papilloma, n (%)	88 (56.1)	17 (56.7)	105 (56.1)		
Radial scar/CSL, n (%)	69 (43.9)	13 (43.3)	82 (43.9)	0.95	218 / 405 (53.83)
Days from Biopsy to Surgery Appointment, mean (sd)	28.7 (53.1)	52.3 (152.0)	32.8 (79.4)	0.02	0 / 405 (0.00)
Days from surgical consult to surgical treatment (in days), mean (sd)	31.4 (13.7)	114.7 (71.1)	45.2 (44.2)	0.00	2 / 405 (0.49)
Time between core needle biopsy and surgical excisional biopsy (in days), mean (sd)	59.9 (56.1)	165.7 (195.5)	77.5 (102.2)	0.00	2 / 405 (0.49)

Treatment Type, n (%)					
EXC-exc, n (%)	336 (100.0)	69 (100.0)	405 (100.0)	.	0 / 405 (0.00)
Year of Presentation, n (%)					
2017, n (%)	91 (27.1)	20 (29.0)	111 (27.4)		
2018, n (%)	98 (29.2)	17 (24.6)	115 (28.4)		
2019, n (%)	117 (34.8)	17 (24.6)	134 (33.1)		
2020, n (%)	30 (8.9)	15 (21.7)	45 (11.1)	0.01	0 / 405 (0.00)
*** Cancer characteristics	***	***	***	***	***
Type of Cancer, n (%)					
DCIS-ductal carcinoma in situ, n (%)	2 (100.0)	0 (0.0)	2 (100.0)	.	403 / 405 (99.51)
Prior personal history of breast cancer, n (%)					
No, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	.	404 / 405 (99.75)
Diagnosed later with Breast cancer , n (%)					
No, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	.	405 / 405 (100.00)
Diagnosed later with Breast cancer , n (%)					
0, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	.	405 / 405 (100.00)
Personal history of high-risk gene mutation, n (%)					
No, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	.	405 / 405 (100.00)
Family history of breast and ovarian cancer, n (%)					
No, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	.	405 / 405 (100.00)
*** Outcomes	***	***	***	***	***
Imaging characteristics prompting needle biopsy, n (%)					
0, n (%)	0 (0.0)	1 (100.0)	1 (100.0)	.	405 / 405 (100.00)
Was the patient upstaged to cancer from benign needle biopsy? n (%)					
No, n (%)	295 (87.8)	59 (85.5)	354 (87.4)		
Yes, n (%)	41 (12.2)	10 (14.5)	51 (12.6)	0.60	0 / 405 (0.00)

98 - Patient Perception of Changes in Breast Cancer Care During the COVID-19 Pandemic

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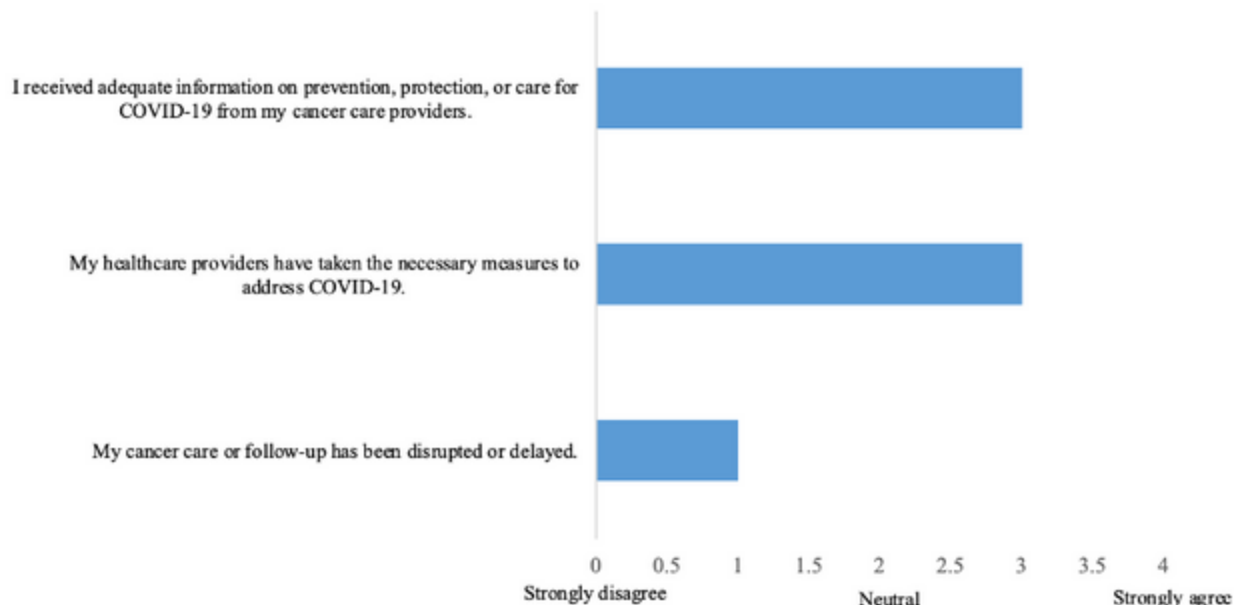
Background/Objective: Due to the COVID-19 pandemic, widespread health care restructuring has occurred. For many breast cancer patients, the changes in the health care system not only led to modifications in the timing and initiation of local and systemic therapies, but also led to adaptations in its delivery. Many patients, for example, were seen for follow-up care primarily through telemedicine. In this study, we explore patient concerns relating to COVID-19, breast cancer, and changes to breast cancer care, hypothesizing that the anxiety associated with in-person care may impact patients' satisfaction with their care and their psychological well-being.

Methods: Breast cancer patients who presented for surgical consultation at an academic, multi-disciplinary clinic between June 2019 and September 2020 completed the electronically distributed, validated COVID-19 Impact and Healthcare Related Quality of Life (COVID-19 IHRQL) questionnaire. This questionnaire assesses COVID-specific concerns within the domains of distress, health care and daily life disruptions, financial hardship, perceived benefits, functional social support, and perceived stress management using Likert-score responses, ranging from 0 (strongly disagree) to 4 (strongly agree). Scale scores were determined by averaging individual items within each domain, with a score >2 indicating greater disruption in that domain.

Results: Of 276 patients recruited, 84 patients completed the COVID-19 IHRQL questionnaire. Sixty-five percent of survey participants reported attending a telemedicine appointment for their cancer care, with the majority (69%) reporting that they were somewhat or very satisfied with their telemedicine experience. Just over half of the survey participants (52%) reported that they fear how the COVID-19 pandemic will impact their cancer care or recovery. Concerns about COVID-19 were prevalent, with 67% of participants reporting anxiety about contracting COVID-19. The median score for distress was 2.3 (IQR = 1.7-2.8). The median disruption composite score was 1.6 (IQR = 1.3-2.5) and evaluated health care and daily life disruptions. Twenty-four of participants reported decreased income due to COVID-19.

Conclusions: Breast cancer patients are impacted by the COVID-19 pandemic, and specifically report anxiety about infection and potential care modifications that may result from the pandemic. Our study identifies ways in which patients' care and quality of life have been impacted. Ongoing research includes semi-structured interviews to assess patient perceptions of changes to their breast cancer care. Further investigation will inform appropriate interventions to improve cancer care during health care crises.

Figure. Median Scores for Select Items in the Health Care Disruptions and Concerns Domain in the COVID-19 IHRQL Questionnaire



Patients read each of the statements and rated them on a Likert-Scale. A score of 0 indicates strongly disagree and a score of 4 indicates strongly agree. Median scores for the 3 statements listed from top to bottom were 3, 3, and 1, respectively.

99 - Atypical Lobular Hyperplasia and Classic Lobular Carcinoma In Situ Can Be Safely Managed Without Surgical Excision

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Background/Objective: The multi-institutional prospective TBCRC 020 study demonstrated an acceptably low upgrade rate of 1% (95%CI 0.01-7%) for pure lobular neoplasia (LN) on core needle biopsy (CNB) with concordant imaging. Based on these results, routine excision for LN with pathologic-radiographic concordance is no longer recommended at our institution. This study sought to describe outcomes in LN patients managed without excision.

Methods: We identified consecutive patients evaluated in our high-risk breast clinic from 2015-2019 for a diagnosis of pure LN, defined as atypical lobular hyperplasia (ALH) and/or classic lobular carcinoma in situ (LCIS), on CNB. We excluded patients with non-classic LCIS, LN accompanied by other atypical lesions requiring excision and those with <6 months of follow-up, defined by most recent date of ipsilateral mammogram or breast MRI. The primary outcome was failure of conservative (non-surgical) management, defined as development of ipsilateral same-quadrant DCIS or invasive breast cancer within 2 years of CNB, or need for ipsilateral same-quadrant excisional biopsy at any time point. The secondary outcome was need for ipsilateral same-quadrant CNB. Outcomes were evaluated using Kaplan-Meier methods and log rank tests.

Results: Of 112 patients with pure LN on CNB, 11 (10%) had <6 months of follow-up (n=5 treated without excision). The study population thus included 101 patients with 102 lesions (1 bilateral LN), 76 (75%) with ALH and 26 (25%) with LCIS +/- ALH. Twelve lesions underwent excision at an outside institution prior to consultation in our clinic. Of the remaining 90 lesions, surgical excision was recommended in 8 (9%) for pathologic-radiographic discordance, and 5 (6%) were excised for patient preference, leaving 77 lesions for evaluation. Clinical features of the 77 lesions managed with observation are presented in the Table. Median follow-up was 27 months (IQR: 16-38). Subsequent screening breast MRI was used in 34%, and chemoprevention in 30%. One patient with LCIS on CNB developed an ipsilateral DCIS in a different quadrant than the LN, >2 years (41 months) after the LN diagnosis. Four patients required subsequent excision between 9-23 months of follow-up due to progressive imaging abnormalities: 2 with mammographic architectural distortion, 1 with mammographic calcifications, and 1 with non-mass enhancement on MRI. All excisions yielded benign pathology. The 3-year risk of conservative management failure was 6.2% (95%CI 2.4-16.0%), all ipsilateral excisions. The failure risk for lesions that initially presented as calcifications (n=50, 65%) vs. other imaging abnormalities (n=27, 35%) was 2.1% vs. 13.4% respectively (p=0.10). There was no difference in failure risk between ALH and LCIS (both 6.2%, p=0.87). The 3-year risk of ipsilateral CNB was 9.3% (95%CI 3.8-21.7%).

Conclusions: Since 2015, 85% of patients with pure LN on CNB were managed without surgical excision at our institution. No ipsilateral same-quadrant cancers occurred over 2 years of follow-up. The risk of requiring a subsequent surgical excision was low (6.2%), especially in patients with calcifications prompting the initial CNB. These data provide reassurance that routine excision of imaging-concordant ALH and classic LCIS is not required.

Table. Clinical features of 77 pure LN lesions managed with observation

Imaging abnormality	
Calcifications	50 (64.9%)
Mass	13 (16.9%)
Asymmetry	1 (1.3%)
Architectural distortion	6 (7.8%)
Non-mass enhancement on MRI	7 (9.1%)
CNB imaging guidance	
Stereotactic	57 (74.0%)
Ultrasound	9 (11.7%)
MRI	11 (14.3%)
CNB gauge*	
≤10	52 (85.2%)
11-14	9 (14.8%)
CNB vacuum-assisted†	
Yes	57 (90.5%)
No	6 (9.5%)
LN type	
ALH	61 (79.2%)
LCIS +/- ALH	16 (20.8%)

*Among n=61 (79%) with known CNB gauge

†Among n=63 (82%) with known use of vacuum-assist

103 - Chemoprevention Initiation in Patients with High-Risk Breast Lesions - The Effect of Low-Dose Tamoxifen

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Background/Objective: Recent data suggest that tamoxifen 5mg/day for 3 years results in similar breast cancer risk reduction in women with high-risk lesions (HRL) compared to the standard 20mg/day for 5 years, with an improved side-effect profile. Our institution began offering low-dose tamoxifen (5 mg/day) in January 2019. We sought to investigate whether chemoprevention (CP) uptake among women with HRL increased following availability of this regimen.

Methods: We identified all patients evaluated in our high-risk breast clinic between 2017-2019 with a HRL, defined as atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), or lobular carcinoma in situ (LCIS). We evaluated rates of CP initiation and clinical factors associated with uptake of CP using univariable and multivariable logistic regression. Among patients initiating CP within 6 months of initial consultation, we compared CP uptake rates pre- and post-Jan 2019. Patients who initiated CP >6 months after their initial visit were evaluated separately, to minimize crossover into the post-Jan 2019 timeframe.

Results: We included 791 patients with HRL; median age was 55, 71% were post-menopausal, and 82% were white. One hundred seven (14%) patients had already completed or were on CP at time of consultation. CP was initiated in 142 of 684 (21%) eligible patients at a median of 1 month (IQR: 0-6 months) from the initial visit; 112 of 142 (79%) initiated CP within 6 months. CP regimens by menopausal status are shown in the Table. The regimen changed during follow-up in 7 (5%) patients, most of whom (86%) switched to low-dose tamoxifen. Of the 41 patients who initiated CP post-Jan 2019, low-dose tamoxifen was used in 20 (49%). In unadjusted analysis, patients who initiated CP were more likely to be age 41-50 or 51-60 (vs. 61-70, both $p < 0.01$) and have dense breasts ($p = 0.03$), with a trend seen for pre-menopausal status ($p = 0.08$). Only age 41-50 (HR 2.52, $p = 0.03$) and 51-60 (HR 2.04, $p = 0.01$) remained significant on multivariable analysis. Among the 112 patients who initiated CP within 6 months, 71 (63%) were evaluated pre-Jan 2019 and 41 (37%) post-Jan 2019. Overall uptake pre- and post-Jan 2019 was 16% (71/450) and 20% (41/204), respectively (OR for post-Jan 2019: 1.34, $p = 0.18$). In pre/peri-menopausal patients, CP uptake was 15% (19/128) pre-Jan 2019 versus 27% (17/64) post-Jan 2019 (OR 2.08, $p = 0.05$). The remaining 30 (21%) patients initiated CP after >6 months, at a median of 11 months from initial visit; most (93%) ultimately initiated a regimen other than low-dose tamoxifen.

Conclusions: Overall, rates of CP initiation in patients with HRL have not significantly increased since we began offering low-dose tamoxifen. However, this regimen is now frequently selected, particularly in pre/peri-menopausal patients, with a marginally significant increase in CP use seen in this sub-population. Further study is needed to evaluate the impact of low-dose tamoxifen on CP adherence. Our findings also highlight that longitudinal follow-up likely improves CP uptake, as 1 in 5 women on CP in our cohort did not initiate this treatment until >6 months from their initial visit.

Table. Chemoprevention regimen by menopausal status

	Pre/Peri-menopausal (n=49)		Post-menopausal (n=93)	
	Initial Regimen	Final Regimen	Initial Regimen	Final Regimen
Tamoxifen 5mg	16 (33%)	18 (37%)	10 (11%)	14 (15%)
Tamoxifen 20mg	31 (63%)	29 (59%)	29 (31%)	27 (29%)
Raloxifene	2* (4%)	2* (4%)	41 (44%)	39 (42%)
Aromatase inhibitor	--	--	13 (14%)	13 (14%)

*Peri-menopausal at presentation, >6-month delay to CP initiation during which time became post-menopausal

105 - The Use of Hemostatic Agents to Decrease Bleeding Complications in Oncologic Breast Surgery: A Surgeon's Consecutive Experience

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Background/Objective: Following oncologic breast surgery, such as oncoplastic surgery or mastectomy with or without expander/implant reconstruction, most patients require prompt adjuvant radiation and chemotherapy for locoregional and systemic disease control. Due to undermining of the soft tissue envelope, these procedures may result in post-operative complications such as hematomas or seromas, which may delay adjuvant therapy. To decrease these complications and achieve more controlled hemostasis, hemostatic agents may be employed as an adjunct to traditional methods (e.g., suture ligation and electrocautery). This study evaluated the rate of post-operative bleeding complications and duration of JP drain use in oncologic breast surgery with and without hemostatic agents.

Methods: After obtaining institutional review board approval, a retrospective chart review was performed from a single surgeon's case database from 01/2015 to 09/2020. Patients included were those who underwent surgery for breast cancer, including oncoplastic breast surgery, mastectomy with or without expander/implant-based reconstruction, and subsequent reconstruction with expander to implant exchange. Data collected included indication for surgery, type of operation, use of hemostatic agent, specifically fibrin sealant (FS, Evicel[®]) or combination powder (CP, Hemoblast[®]), length of follow-up, duration of time to JP drain removal, and post-operative complications (seroma, hematoma, or operating room (OR) takeback). This was a consecutive experience where initially no hemostatic agent was used, followed by use of FS, and then CP. JP drains were removed in clinic when drain output was less than 30cc for 2 consecutive days. JP drain output was compared between groups using Welch's t-test. Post-operative complications were compared using Fisher's exact test. Statistical significance was defined as p<0.05.

Results: The use of a hemostatic agent was associated with decreased bleeding complications and significantly decreased time until JP drain removal (Table). Subgroup analysis demonstrated that the CP group experienced no hematomas, seromas, or return to OR for the oncoplastic (n=29) and expander exchange (n=7) procedures as compared to the FS group with a 5.5% seroma rate in oncoplastic (n=73) and 20% seroma rate in expander exchange operations (n=5). The seroma rate after mastectomy was 8.7% with CP (n=23) compared to 14.3% with FS (n=28). The OR takeback rate after mastectomy was 0%

with CP (n=23) compared to 8.7% (n=28) with FS. Lastly, JP drain duration was decreased among oncoplastic (4.8 versus 7.4 days with p=0.0000001), mastectomy (12.7 versus 17.6 days with p=0.1377), and expander exchange (2 versus 17.3 days with p=0.1236) for CP as compared to FS.

Conclusions: The use of hemostatic agents in oncologic breast surgery is associated with a decreased rate of post-operative complications, including seroma, hematoma, and OR takeback. Subgroup analysis demonstrated a more pronounced effect in the CP group, which also saw a statistically significant decreased duration of time prior to JP drain removal in the oncoplastic group compared to FS. This decrease in post-operative complications and significantly decreased JP drain time may help prevent delays to adjuvant radiation and chemotherapy.

Table. Rates of post-operative complications and time to JP drain removal within oncologic breast surgery using no hemostatic agent versus FS and CP.

	No Hemostatic Agent			Hemoblast (CP)		
	Oncoplastic	Mastectomy	Expander Exchange	Oncoplastic	Mastectomy	Expander Exchange
N	87	23	40	29	23	7
Average Follow-up (weeks)	7.9	15.3		6	4.8	6.3
Average Time with JP (days)	11.4	30.4	14.8	5	12.7	2
Standard Deviation	4.5	16.5	12.6	4.1	7.2	3.4
Seroma (%)	2 (2.3)	4 (17.4)	2 (5)	0 (0)	2 (8.7)	0 (0)
Hematoma (%)	3 (3.4)	1 (4.3)	0 (0)	0 (0)	1 (4.3)	0 (0)
OR Takeback (%)	1 (1.1)	3 (13)	1 (2.5)	0 (0)	0 (0)	0 (0)

	Evicel (FS)			Hemoblast (CP)		
	Oncoplastic	Mastectomy	Expander Exchange	Oncoplastic	Mastectomy	Expander Exchange
N	73	28	5	29	23	7
Average Follow-up (weeks)	7.4	8.5	5.4	4.8	6.3	3.9
Average Time with JP (days)	11	17.6	17.3	5	12.7	2
Standard Deviation	5.3	14.4	10.7	4.1	7.2	3.4
Seroma (%)	4 (5.5)	4 (14.3)	1 (20)	0 (0)	2 (8.7)	0 (0)
Hematoma (%)	0 (0)	1 (3.6)	0 (0)	0 (0)	1 (4.3)	0 (0)
OR Takeback (%)	0 (0)	2 (8.7)	0 (0)	0 (0)	0 (0)	0 (0)

106 - Trends in the Surgical Approach to Male Ductal Carcinoma In Situ

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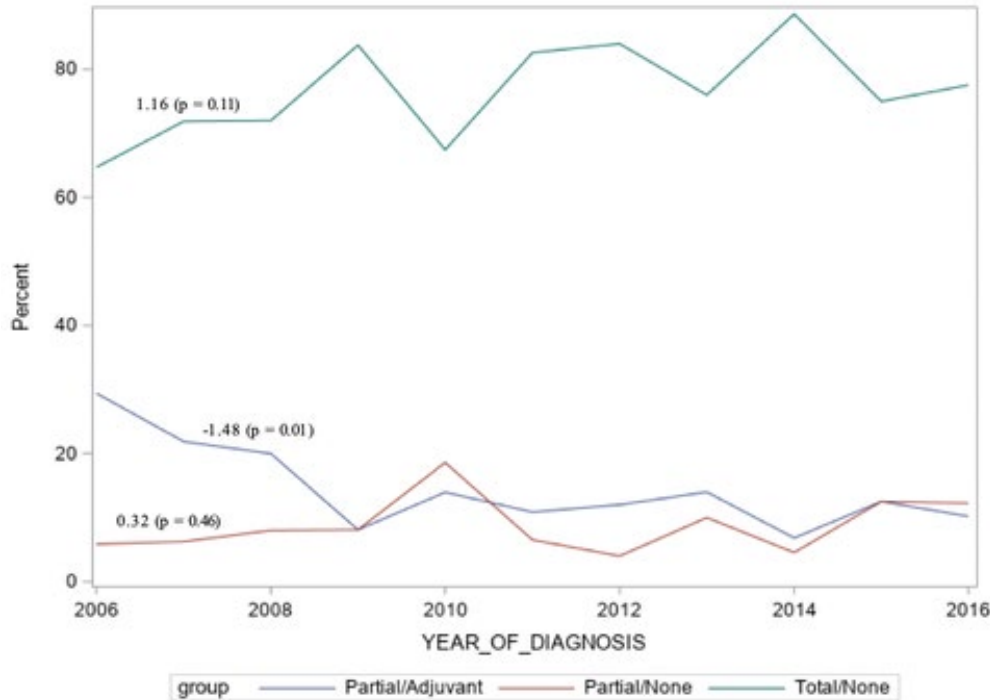
Background/Objective: Surgical management for women diagnosed with ductal carcinoma in situ (DCIS) is well established. Conversely, limited high-quality data exists regarding the optimal surgical approach for male patients with DCIS; therefore, we sought to examine trends in management and effects on survival for male patients with DCIS.

Methods: The National Cancer Database (NCDB) was queried for males diagnosed with DCIS from 2006 to 2016. Patients were categorized by management strategy—partial mastectomy with adjuvant radiation, partial mastectomy without adjuvant radiation, total mastectomy with adjuvant radiation, and total mastectomy without adjuvant radiation. Patients who received total mastectomy and adjuvant radiation were excluded due to small cohort size (5 patients). Continuous variables were evaluated using the Kruskal-Wallis test. The chi-square method was used for analysis of categorical variables. Univariate logistic regression evaluated for associations with the use of partial mastectomy with adjuvant radiation. Kaplan-Meier was employed to analyze survival outcomes.

Results: Between 2006-2016, 556 males were diagnosed with DCIS, with a final cohort size of 551 after exclusions. The majority received total mastectomy without radiation (81.7%), followed by partial mastectomy with adjuvant radiation (11.1%) and partial mastectomy without adjuvant radiation (7.2%). The use of partial mastectomy with radiation trended downward from 2006 to 2016 (-1.48, p=0.01) while use of total mastectomy without radiation did not change (1.16, p=0.11) (Figure). There was no difference in age, race, facility type, Charlson/Deyo score or tumor size between cohorts. There was a significantly larger proportion with poorly or undifferentiated tumor grade in the partial mastectomy with radiation group (56.0%) relative to partial mastectomy alone (35.7%) and total mastectomy alone (33.1%) (p<0.01). Patients who received partial mastectomy with radiation were less likely to be estrogen receptor-positive (83.9%) relative to partial mastectomy without radiation (93.6%) and total mastectomy without radiation (93.8%) (p=0.04). On univariate analysis, there was a negative association between estrogen receptor-positive status and receiving partial mastectomy with radiation [OR=0.35 (0.15-0.81)]. There was no difference in progesterone receptor or HER2 status. A significant difference was observed in the time from diagnosis to definitive surgical procedure for patients who received total mastectomy [31d (21-49)] vs partial mastectomy with radiation [22d (15-31)] and partial mastectomy alone [27d (12-44)] (p<0.01). There was no significant difference in overall survival among the 3 treatment modalities (p=0.85).

Conclusions: For males with DCIS, the use of partial mastectomy with radiation has decreased from 2006 to 2016 based on NCDB data. There was no difference in survival among the 3 treatment modalities. This suggests that clinicopathologic features may influence local regional treatments but not overall survival. Further studies are needed to establish the optimal treatment for males diagnosed with DCIS.

Figure. Trends in the use of partial mastectomy with adjuvant radiation, partial mastectomy without adjuvant radiation and total mastectomy without adjuvant radiation for DCIS in males based on NCDB data, 2006-2016



109 - How Protective Are Nipple-Sparing Prophylactic Mastectomies in BRCA1 and BRCA2 Mutation Carriers?

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Background/Objective: Women with BRCA1 or BRCA2 mutations have a 2-3% annual risk of developing breast cancer with observation alone. Prophylactic nipple-sparing mastectomy (NSM) is now routinely offered to BRCA mutation carriers for risk reduction. Current NSM techniques include thorough removal of breast tissue, but there are little data on subsequent risk of new ipsilateral cancer after these modern NSM. We assessed rates of ipsilateral cancer events after prophylactic and therapeutic NSM in BRCA1 and BRCA2 mutation carriers.

Methods: BRCA1 and BRCA2 mutation carriers undergoing NSM from 10/2007-6/2019 were identified in a single institution prospective database of consecutive NSM. Patient, tumor, and outcomes data were collected. Follow up analysis was by cumulative breast years (aggregate follow up of each breast) and woman-years (aggregate follow up of each woman). All patients had known deleterious mutations; variants of unknown significance (VUS) were excluded.

Results: Three hundred seven BRCA1 and BRCA2 mutation carriers underwent 607 NSM, including 160 BRCA1 mutation carriers, mean age 41.4 (range 21-65) years and 147 BRCA2 mutation carriers, mean age 43.8 (range 23-65) years. Two hundred fifty BRCA1 prophylactic NSM had 1009 cumulative breast-years of follow-up. No new ipsilateral cancers were observed (<0.0010 ipsilateral cancers per breast-year). Sixty-seven BRCA1 therapeutic NSM had 318 cumulative breast-years of follow-up with 1 new ipsilateral cancer (0.0031 ipsilateral cancers per breast-year). The single cancer event after therapeutic NSM did not directly involve the nipple or areola. Two hundred thirty-seven BRCA2 prophylactic NSM had 882 cumulative breast-years of follow-up. There were no new ipsilateral cancers (<0.0011 ipsilateral cancers per breast-year). Fifty-three BRCA2 therapeutic NSM had 234 cumulative breast-years of follow-up with 2 new ipsilateral cancers (0.0085 ipsilateral cancers per breast-year). Neither of the cancer events after therapeutic NSM directly involved the nipple areola complex; 1 patient underwent nipple excision for a chest wall recurrence in the subareolar region with no tumor identified in the resected nipple or areola. There were no new ipsilateral breast cancer events after any prophylactic NSM in a BRCA1 or BRCA2 carrier. In patients undergoing bilateral prophylactic NSM there were no new cancers in 710 woman-years of follow-up (risk less than <0.0014 /woman-year). Risk of ipsilateral cancer was similarly low after a unilateral prophylactic NSM with a contralateral cancer, with no new cancers on the prophylactic side in 471 woman-years of follow-up (risk <0.0021 / woman-year).

Conclusions: Risk of new ipsilateral breast cancer is extremely low after NSM in BRCA1 and BRCA2 mutation carriers. Rates of new/recurrent ipsilateral cancer after therapeutic NSM are also very low. NSM is an effective risk-reducing strategy for BRCA gene mutations.

Table. New ipsilateral cancer events in BRCA1 and BRCA2 mutation carriers after prophylactic or therapeutic nipple-sparing mastectomy (NSM)

	BRCA1 Carriers (N = 160)	BRCA2 Carriers (N = 147)	All BRCA1 and BRCA2 (N= 307)
Patient age [years, mean (range)]	41.4 (21-65)	43.8 (23-65)	42.6 (21-65)
Patient race: Caucasian	149 (93.%)	140 (95%)	289 (94%)
Asian	3 (1.9%)	3 (2.0%)	6 (2.0%)
Black	4 (2.5%)	1 (0.7%)	5 (1.6)
Not reported/Other	4 (2.5%)	3 (2.0%)	7 (2.3%)
Total NSM (breasts)	317	290	607
Prophylactic NSM (total breasts)	250	237	487
Bilateral NSM (# breasts)	196	191	387
Unilateral NSM, contralateral cancer (# breasts)	54	46	100
Cumulative breast-years follow up (prophylactic)	1009	882	1891
Ipsilateral cancers after prophylactic NSM	0	0	0
Annual rate new cancers (prophylactic, per breast)	<0.0010/yr	<0.0011/yr	<0.0005/yr
Therapeutic NSM (total breasts)	67	53	120
Cumulative breast-years follow up (therapeutic)	318	234	552
Ipsilateral cancers after therapeutic NSM	1 (1.5%)	2 (3.8%)	3 (2.5%)
Annual rate new cancers (therapeutic, per breast)	0.0031/yr	0.0085/yr	0.0054/yr

110 - Management of Early-Stage HER2+ Breast Cancer and the Potential Role for Axillary Imaging to Improve Identification of Nodal Metastasis

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Background/Objective: Despite improvements in the treatment for HER2+ breast cancer, many patients will sustain disease progression, including patients diagnosed with early-stage disease. Given the significant benefit of novel therapies for HER2+ disease, including neoadjuvant chemotherapy (NAC) regimens with targeted anti-HER2 therapies and adjuvant therapeutics such as Ado- Trastuzumab Emtansine (T-DM1), it is critical to identify HER2+ patients that reach clinical eligibility for these treatments. Accordingly, we sought to investigate clinically node-negative T1 HER2+ patients to determine the rate of post-surgical nodal positivity, and to identify pre-surgical factors associated with nodal positivity. We hypothesized that there is currently a subset of underdiagnosed T1 N1 HER2+ breast cancer patients who would benefit from axillary imaging evaluation and treatment with neoadjuvant therapy.

Methods: We performed a 10-year (2009-2020) retrospective analysis of T1 HER2+ breast cancer patients after institutional review board approval. Patients were excluded for clinically node-positive

disease, inflammatory breast cancer, pre-operative axillary imaging, or neoadjuvant chemotherapy. We evaluated tumor size, nodal status, number of positive nodes, size of nodal metastasis, tumor grade, presence of lymphovascular invasion (LVI) on final pathology, and hormone receptor (HR) status. Associations between patients with lymph node-positive and lymph node-negative disease were determined using the Chi-square test.

Results: Two hundred forty-five cases were reviewed. After exclusion, 65 patients were found to be clinically node-negative with T1 HER2+ disease. Of these patients, 16 were lymph node-positive on final pathology (25% of T1 patients). The mean age in the study was 52 years (range 17-76). Twelve patients had T1c lesions and 4 patients had T1b size tumors. Eleven patients had ER+ tumors, and within this cohort, 6 were ER+/PR+. The average number of nodes removed in the study was 3. For the lymph node-positive patients, an average of 2 lymph nodes contained disease. Seventy-five percent of patients had macrometastatic disease, and the average size of the nodal metastatic focus was 7.6 mm (range 0.5-36 mm). Eight patients underwent ALND, with 3 patients having additional positive nodes after dissection (range 1-5). Comparing T1 lymph node-negative and positive groups, tumor grade ($p=0.004$) on core needle biopsy and LVI ($p<0.0001$) from final pathology were associated with an increased likelihood of lymph node positivity.

Conclusions: We identified a 25% nodal positivity rate in clinically node negative T1 HER2+ breast cancer patients. In particular, HER2+ patients with larger T1 and high-grade cancers may benefit from diagnostic axillary imaging evaluation to provide additional patients with the potential benefit from NAC. The ongoing translation of novel targeted anti-HER2 therapies indicates the concomitant need for re-evaluation of clinical practice patterns, including the expanded use of pre-operative axillary ultrasound, to ensure patients eligible for NAC are identified, and can obtain maximal benefit from treatment advances.

111 – Triple-Negative Breast Cancer Versus Quadruple-Negative Breast Cancer: Does Androgen Receptor Status Make a Difference?

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Background/Objective: Triple-negative breast cancer accounts for roughly 10-15% of newly diagnosed breast cancers. Triple-negative breast cancer continues to pose a dilemma to the medical community secondary to the aggressive nature of the disease, higher rate of recurrence, and worst overall prognosis. This study aims to assess the androgen receptor (AR) status within triple-negative breast cancer specimens and compare overall characteristics in triple-negative breast cancer in relation to androgen receptor status.

Methods: A retrospective review of triple-negative breast cancer specimens, deemed negative for estrogen receptor (ER-), progesterone receptor (PR-), and human epidermal growth factor receptor (HER2 -) were collected from 2017-2020. These specimens were subsequently immunostained to assess androgen receptor status. We assessed characteristics of triple-negative breast cancer with (AR+) status compared this to triple-negative breast cancer with (AR-) status. Key characteristics such as patient

demographics, tumor biology, immunopositivity for p53 and CK5/6, and response to chemotherapy were assessed.

Results: A total of 50 specimens were attained and underwent immunostaining for AR. Roughly 25% of triple-negative breast cancer specimens stained positive for AR. A subset of AR+ triple-negative breast cancers showed expression of p53 & CK5/6. The majority of AR+ triple-negative breast cancers showed response to chemotherapy as the vast majority of AR+ triple-negative breast cancers underwent neoadjuvant chemotherapy.

Conclusions: Androgen receptor status implements an additional prognostic factor and treatment target for patients with triple-negative breast cancer. Androgen receptor-positive triple-negative breast cancer does seem to be slightly more aggressive overall and have slightly less of a response to chemotherapy than AR- triple-negative breast cancer. Further prospective research and trials are needed to further assess, understand, and maximize treatment therapy to AR triple-negative breast cancer.

112 - The Decreasing Utility of Sentinel Lymph Node Biopsy in Low-Risk Breast Cancer Patients

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Background/Objective: Since the Z0011 and AMAROS trials have changed the criteria for axillary dissection and the use of molecular profiling increasingly determines the need for chemotherapy, the utility of sentinel lymph node biopsy has become more limited. The purpose of this study was to determine how frequently the results of sentinel lymph node biopsy change management decisions in a population at low risk for nodal metastasis, receiving breast conservation therapy compared to other early-stage breast cancer patients.

Methods: A prospective data registry of 1152 patients with early-stage, invasive breast cancer, planning to undergo intraoperative radiation therapy (IORT), was divided into 2 groups: low-risk and higher-risk. Low-risk patients met the following criteria: ≥ 65 years old, tumor size ≤ 20 mm, hormone receptor-positive and HER2-negative status. Those who did not meet all low-risk criteria were assigned to the higher-risk group. Per IORT protocol, all patients had a negative clinical exam of the axilla, negative MRI, mammography, and axillary ultrasound. Every patient had a sentinel node biopsy and frozen section. Axillary status was determined on final pathology, and the 2 cohorts were compared.

Results: A total of 475 women met all criteria and were assigned to the low-risk group. The remaining 677 were assigned to the higher-risk group. The 2 groups are compared by TNM node category. The axillary status of the low-risk group was significantly different from the higher-risk cohort with respect to N0(i-), N1a status, and those patients who had only 1-2 positive nodes. In the low-risk group, 14 (2.9%) were positive on frozen section and 12 (2.5%) of patients were upstaged by final histopathology. In the higher-risk group, 38 (5.6%) were positive on frozen section and 32 (5.2%) were upgraded on final histopathology.

Conclusions: The value of routine sentinel lymph node biopsy may be minimal in a population of breast cancer patients at low risk for nodal metastasis (≥ 65 years old, tumor size ≤ 20 mm, hormone receptor-positive and HER2-negative). This study found that less than 1% of our patients in the low-risk group would have definitive management changes, including additional radiation fields or adjuvant chemotherapy, as a result of their sentinel lymph node biopsy based on NCCN guidelines. A significantly larger percentage of patients in the higher-risk group had evidence of nodal metastasis versus low-risk patients, 12.7% versus 7.8%, $p < 0.01$. While the percentages of patients with 3 or more positive nodes were not significantly different between groups, the higher-risk patients were younger, and any node positivity may affect chemotherapy decisions. The survival benefit of axillary node dissection for breast cancer patients is now in question, especially for older women with low-risk tumors. Our study offers an argument for selective axillary staging based on the low rate of axillary disease found by SLNB in these low-risk patients. In this highly select population, rigorous preoperative clinical staging by physical exam and imaging may be adequate.

Axillary Status on Final Pathology	N % (Low-Risk)	N % (Higher-Risk)	P Value
N0(i-)	438 (92.2%)	591 (87.3%)	<0.01
N0(i+)	11 (2.3%)	16 (2.4%)	NS
N1mi	10 (2.1%)	20 (3.0%)	NS
N1a (1-2 + nodes)	13 (2.7%)	45 (6.6%)	<0.01
N1a (3 + nodes)	1 (0.2%)	4 (0.6%)	NS
All N1a	14 (2.9%)	49 (7.2%)	<0.01
N2a	2 (0.4%)	1 (0.1%)	NS
TOTAL	475 (100%)	677 (100%)	

113 - COVID-19 and Changing Paradigms in Palliative Care for Inoperable Breast Cancer in the UK

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Background/Objective: Association of Breast Surgery in the UK decided to suspend essential cancer services in certain pathways leading to de-escalation of various treatments and supportive care during the COVID-19 pandemic. This greatly impacted the palliative care cohort who depended on social support services and health care support in the community.

Methods: Eight modules extrapolated from the UK Macmillan Cancer services were used to lead telephonic consults with 20 patients with inoperable breast cancers during the period August 2020 to November 2020 for linear interviews with patients and their families.

Results: Mostly unfavourable impact was reported in terms of social, emotional, treatment, carers, new normal adjustment, and lost opportunities due to the current COVID-19 pandemic. Patients seemed happy with the support provided through virtual media by surgeons for their follow-up and by the specialist breast care nursing team.

Conclusions: COVID-19 has had a huge impact in this vulnerable cohort of inoperable breast cancer. Our attempt was to highlight these points and appreciate the challenges faced. There is a need to create better pathways to support them. At the same time, it is commendable that the current provision of virtual media to enhance communication with this group has dampened the effect slightly.

Table. Key findings of telephonic consultations based on the ENABLE study modules in patients with inoperable breast cancer

1. Lost opportunities impact	COVID-19 pandemic had a negative impact on the lives of patients with treatable but not curable cancer.
2. Social impact	As the government imposed restrictions, they couldn't form bubbles with their loved ones who were their main source of near normalcy and comfort during the ongoing pandemic.
3. Psychological impact	More anxiety was noted in this cohort.
4. Emotional impact	Although social distancing and self-isolation had an impact emotionally in this cohort, they reported satisfaction secondary to virtual medium of iPads and tablets delivering them constant contact with their loved ones.
5. Treatments impact	Satisfied with support from specialist breast care nurses and telephonic conversation and support provided during the current pandemic.
6. Shielding impact	Activities of daily living were reportedly hampered by shielding rules as they needed support from carers and loved ones to buy groceries and essential items.
7. Carers impact	Higher burden noted on carers in the cohort that depended on them heavily.
8. New normal impact	Initially experienced difficulty in adjusting to the new normal, but developed streamlined activities during the pandemic to make their lives easier.

118 - Trends Contributing to Disparities in Inflammatory Breast Cancer

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Background/Objective: Breast cancer overall survival rate in Black American (BA) women is lower compared to White American (WA) women. Inflammatory breast cancer (IBC) is a rare but aggressive subtype of breast cancer that is found at higher incidence in the BA patients. The objective of this study was to evaluate trends and identify factors that contribute to racial disparities in outcomes of women with IBC.

Methods: The National Cancer Database (NCDB) was used to evaluate patients with Stage III IBC from 2004 to 2014. Patient demographics, tumor characteristics, treatments and survival trends were stratified by race for comparison.

Results: A total of 10,160 cases were selected with 85% (n=8,591) WA patients and 15% (n=1,569) BA patients. Median follow-up was 58 months. BA patients were significantly younger at diagnosis with mean age of 54 years (SD: 13) compared to WA at mean age of 57 (SD: 13) (p<0.001). BA patients had a statistically higher rate of being uninsured (8% vs 4%), covered by Medicaid (22% vs 11%), live in lower income household (40% vs 14%), and less educated ZIP codes (32% vs 15%) (all p<0.001). BA patients

were more likely to live in a metropolitan county (87% vs 79%, $p < 0.001$) and traveled fewer miles to care compared to WA patients (19 vs 27 miles, $p < 0.001$). In terms of tumor characteristics, BA patients had higher rates of poorly differentiated tumor grade (63% vs 56%, $p < 0.001$). All of the patients selected in the study underwent surgical treatment. WA patients had higher rates of RT compared to BA patients (76% vs 72%, $p < 0.001$). BA patients had higher rates of receiving chemotherapy compared to WA (31% vs 24%, $p < 0.001$). Despite current guidelines for trimodal therapy, both groups (>80%) did not undergo both radiation and chemotherapies. Out of the small group of patients who received chemo and radiation, BA patients had slightly higher rates (17% vs 15%, $p = 0.006$). A significant difference in overall mortality showed that BA patients had 39% greater hazard ratio compared to WA. (95% CI: 1.28, 1.51); $p < 0.001$).

Conclusions: BA women were younger age at diagnosis with higher tumor grades, suggesting more aggressive IBC type compared to WA women. BA patients had lower survival despite having higher rates of trimodal therapy. Disparity in survival may relate to underlying tumor biology and socioeconomic factors, access to insurance, income, and education levels.

TABLE. Inflammatory Breast Cancer Cases Variables Stratified by Race

	White/Caucasian (n = 8,591)	Black/African American (n = 1,569)	P- Value
Age at Diagnosis			
Mean (Standard Deviation)	57.32 (12.96)	53.59 (12.89)	< 0.0001
Primary Payor			
Not Insured	321 (3.74%)	120 (7.65%)	< 0.0001
Private Insurance/Managed Care	4,761 (55.42%)	707 (45.06%)	
Medicaid	955 (11.12%)	350 (22.31%)	
Medicare	2,358 (27.45%)	351 (22.37%)	
Other Government	81 (0.94%)	24 (1.53%)	
Unknown	115 (1.34%)	17 (1.08%)	
Percent of ZIP Code without High School Diploma			
21% or more	1,297 (15.10%)	505 (32.19%)	< 0.0001
13% - 20.9%	2,178 (25.35%)	560 (35.69%)	
7% - 12.9%	2,941 (34.23%)	345 (21.99%)	
Less than 7%	2,040 (23.75%)	133 (8.48%)	
Unknown	135 (1.57%)	26 (1.66%)	
Median Household Income of ZIP Code			
Less than \$38,000	1,204 (14.01%)	628 (40.03%)	< 0.0001
\$38,000 - \$47,999	2,079 (24.20%)	368 (23.45%)	
\$48,000 - \$62,999	2,469 (28.74%)	313 (19.95%)	
\$63,000 or more	2,702 (31.45%)	233 (14.85%)	
Unknown	137 (1.59%)	27 (1.72%)	
County Classification of Patient Residence			
Metropolitan County	6,778 (78.90%)	1,371 (87.38%)	< 0.0001
Urban County	1,324 (15.41%)	136 (8.67%)	
Rural County	175 (2.04%)	14 (0.89%)	

Unknown	314 (3.65%)	48 (3.06%)	
Distance to Facility (Miles)			
Mean (Standard Deviation)	27.31 (110.58)	19.38 (73.22)	0.0004
Tumor Grade			
Well differentiated	220 (2.56%)	23 (1.47%)	< 0.0001
Moderately differentiated	2,277 (26.50%)	318 (20.27%)	
Poorly differentiated	4,775 (55.58%)	986 (62.84%)	
Undifferentiated	112 (1.30%)	14 (0.89%)	
Unknown Grade	1,207 (14.05%)	228 (14.53%)	
Radiation Therapy			
Neoadjuvant	255 (2.97%)	48 (3.06%)	0.0008
Adjuvant	6,269 (72.97%)	1,074 (68.45%)	
None	2,067 (24.06%)	447 (28.49%)	
Chemotherapy			
Neoadjuvant	1,733 (20.17%)	407 (25.94%)	< 0.0001
Adjuvant	366 (4.26%)	78 (4.97%)	
None	6,492 (75.57%)	1,084 (69.09%)	
Radiation and Chemotherapy			
Yes	1,268 (14.76%)	274 (17.46%)	0.0061
No	7,323 (85.24%)	1,295 (82.54%)	

119 - Choosing Between Mastectomy and Breast-Conserving Therapy: Is Patient Distress an Influencing Factor?

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Background/Objective: Breast-conserving therapy (BCT) offers similar oncologic outcomes when compared to mastectomy. Additionally, patients undergoing BCT have reported improved postoperative satisfaction and cosmetic outcomes. Yet, when presented with BCT or mastectomy, many patients will still opt to undergo mastectomy. Distress at the time of diagnosis has broad impacts – including quality of life and treatment adherence – and may be related to patients’ surgical decision-making. We sought (1) to evaluate the relationship between patient-reported distress at the time of diagnosis and surgical treatment pursued in those who were eligible for BCT and (2) to determine sociodemographic and clinicopathologic factors predictive of choosing BCT versus mastectomy.

Methods: Newly diagnosed breast cancer patients who completed a distress screening tool at their initial clinic visit at an academic institution and were deemed candidates for BCT were retrospectively evaluated between 2016 and 2019. The screening tool captured self-reported distress levels in emotional, social, health, and practical domains on a scale of 0-10, with 10 being high distress. Overall distress was calculated by adding all domains (0-40). Relevant sociodemographic and clinicopathologic details, along with surgery performed, were reviewed. Clinical presentation (palpable lump, nipple

discharge, screen-detected) and consultation as a second opinion were also noted. Distress scores were compared against surgical decisions using nonparametric Wilcoxon rank sums test. Remaining categorical variables were analyzed by either Chi-square or Fisher’s exact tests and continuous variables by Student’s t-test. A 2-sided p-value <0.05 was considered significant.

Results: Of 459 patients who were candidates for BCT, 71 (15.5%) elected to have mastectomy and 388 (84.5%) pursued BCT. There were no significant differences in overall distress or the separate domains of distress in patients undergoing BCT versus mastectomy (Table). Patients who opted to undergo mastectomy were on average significantly younger (50.7 years vs 60.4 years, $p<0.0001$), more likely to have sought a second opinion (19.7% vs 8.6%, $p=0.0032$), and more often presented with a palpable mass (59.2% vs 34.7%, $p<0.0001$). Clinical anatomic stage was also significantly associated with surgical decision, with Stage 0 and II patients more frequently pursued mastectomy, while Stage I, and III favored lumpectomy. There was no association between family history of breast cancer in a first-degree relative and the choice of lumpectomy or mastectomy ($p=0.55$).

Conclusions: Patient-reported distress was not associated with the decision between BCT and mastectomy. Rather, younger age, seeking a second opinion, and having a palpable mass on presentation were associated with more aggressive surgical decision-making. Understanding the factors that influence surgical decision-making is crucial – not only in delineating patient populations that may benefit from more education regarding BCT versus mastectomy, but also in guiding informed, shared treatment decisions between patient and provider.

Table. Relationship Between Distress and Surgical Decision

Distress Domain	Breast-Conserving Therapy Median (IQR)	Mastectomy Median (IQR)	P-value
Emotional	5 (3-7)	5 (3-7)	0.1844
Practical	2 (0-5)	2 (0-5)	0.6666
Social	2 (0-4.5)	2 (0-3)	0.3731
Health	5 (3-7)	5 (2-8)	0.4094
Overall	15 (8-21)	15 (8-19)	0.7986

121 - Comparison of IHC and FISH Results of HER2 Oncogene Status in Breast Cancer

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Background/Objective: HER2 overexpression is an important prognostic factor and behavior predictor in breast cancer and guides treatment decisions, with standard testing including immunohistochemistry (IHC) staining with confirmatory fluorescent in-situ hybridization (FISH). There is a discordance rate between the 2 of about 20% (with some studies showing lower concordance between institutions), and our institution currently performs both tests on all specimens. We sought to determine if FISH could be performed selectively, and therefore decrease health care costs.

Methods: Retrospective database review was performed, which included 2500 potential subjects, narrowed for HER2 testing completion. IRB approval was obtained. Data analysis was performed. Comparisons between HER2 FISH status was assessed by t-test, while association between FISH status and IHC, ER and PR were assessed by Chi-square/Fisher’s exact test. P-value <0.05 was considered statistically significant.

Results: Statistical summary is included in the Table. For IHC values of 0 and +1, there was a respective 99.4% and 98.5% concordance with non-amplified FISH results. Equivocal findings for these were 0.3% and 1.0%, and each was only found to be FISH amplified once. IHC value of 3+ was less concordant with 89.7% amplified FISH results.

Conclusions: Our results reflect a high concordance between negative IHC (0 or 1+ values) and a non-amplified FISH result for HER2neu. Less than 90% were concordant for 3+ IHC, however. Given these findings, it would be reasonable to omit confirmatory FISH testing for the 0 or 1+ IHC values. At our institution, IHC is billed at \$331 per test and FISH \$520. Thousands of health care dollars could be saved by changing the policy.

Table. Summary Statistics by HER2 FISH Results (Row Percent) – All Cases

	Total (N=713)	HER2 FISH		
		Amplified (N=76)	Equivocal (N=6)	Non-amplified (N=631)
HER2_IHC				
0	334	1 (0.3%)	1 (0.3%)	332 (99.4%)
1+	198	1 (0.5%)	2 (1.0%)	195 (98.5%)
2+	113	13 (11.5%)	2 (1.8%)	98 (86.7%)
3+	68	61 (89.7%)	1 (1.5%)	6 (8.8%)
ER				
Negative	128	29 (22.7%)	0 (0.0%)	99 (77.3%)
Positive	584	47 (8.0%)	6 (1.0%)	531 (90.9%)
PR				
Negative	216	44 (20.4%)	1 (0.5%)	171 (79.2%)
Positive	496	32 (6.5%)	5 (1.0%)	459 (92.5%)
MIB1 KI-67 rate				
N	705	74	6	625
Mean (SD)	26.8 (22.1)	34.4 (23.0)	15.8 (8.0)	26.0 (21.9)

122 - From Abstract to Published Manuscript: Results from the 2017 and 2018 American Society of Breast Surgeons Conference

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Background/Objective: Recent Cochran review has shown only 37.3% of conference abstracts lead to full peer-reviewed publication. The scientific rigor of the abstracts presented at the American Society of Breast Surgeons (ASBrS) meeting has not been recently evaluated. In this study, we seek to determine the rate at which abstracts presented at the 2017 and 2018 ASBrS meeting were published in a peer-reviewed journal.

Methods: Abstracts from the 2017 and 2018 ASBrS conference were searching in *PubMed* using the abstract title and/or first or last author. Publication date was determined by the online publication date and impact factor by 2019 number provided on *Web of Science*. Data was analyzed with *t* test, Fisher's exact test, and the Tukey method.

Results: In 2017, 268 abstracts were presented at the ASBrS conference, and of that 58 (21.6%) resulted in a full publication. In comparison, 273 abstracts were presented at the ASBrS conference in 2018 and 100 (36.6%) resulted in a full publication resulting in a significant increase in publication rate from 2017 to 2018 ($p < 0.001$). Out of the 158 published manuscripts from the 2017 and 2018 meetings, 75 (47.8%) were published in the *Annals of Surgical Oncology (ASO)*. Abstracts presented as scientific oral presentations or quick shots were more likely to result in a publication in *ASO* than poster presentations ($p < 0.001$). Publication rate did not significantly vary by study type (basic science vs retrospective review vs randomized controlled trial, $p = 0.34$), country (US only vs non-US International vs mixed, $p = 0.28$) or number of institutions (single vs multiple, $p = 0.42$). There was no association with publication if data was classified as a clinical trial, retrospective data, or basic science research. Abstracts not published in *ASO* were published in journals with a significantly lower impact factor (4.16 vs 3.63, $p = 0.039$) and with a significantly longer time to publication (6.479 months, SD 6.487 vs 14.049 months, SD 8.409, $p < 0.001$). Scientific oral presentations were more likely than quick shots ($p = 0.47$) and poster presentations ($p = 0.001$) to be published in a higher impact factor journal. Study type, country, and number of institutions were not significantly associated with publication in higher impact factor journal.

Conclusions: Approximately 29.2% of the abstracts presented from 2017-2018 at the ASBrS conference resulted in a published manuscript. A higher publication rate in higher impact journals for oral presentations indicate that the abstract review process properly stratifies the research. As virtual conferences become mainstream due to COVID-19 pandemic, the effects of this new format on overall research quality and publication rate is of interest in future studies.

123 - Identification of True Sentinel Lymph Node Following Neoadjuvant Chemotherapy Using Effective and Reliable Localizing Techniques

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Background/Objective: To both reiterate the false-negative rate associated with sentinel lymph node biopsy (SLNB) in patients with persistent lymph node disease post neoadjuvant chemotherapy (NAC) and to highlight a simple node localization technique allowing for both effective and efficient lymph node assessment with minimization of unnecessary axillary dissection.

Methods: We looked at 48 women between 28 and 82 years of age with clinically positive lymph node involvement to assess false-negative SLNB following NAC. We further explored this based on age, stage at diagnosis, and number of lymph nodes removed. All patients had SLNB with dual tracer, and all patients had previously biopsy proven or clinically suspicious lymph node tagged for identification. The primary outcome was concordance of sentinel lymph node with tagged biopsy positive or clinically suspicious lymph node at the time of surgical intervention/SLNB. Data were gathered retrospectively from the EHR. We used a multivariate logistic regression to examine what factors could predict discordance between previously localized axillary lymph node and sentinel lymph node as determined by dual tracer.

Results: Among 48 women (median age, 54 years), 47 (98%) completed the study (29 in the discordant group and 18 in the concordant group). Sixty-two percent of patients had discordance between the localized axillary lymph node and the sentinel lymph node, where the previously localized node was not identified as the sentinel lymph node. Of the 37 patients with complete data, 8.1% of patients (n=3) had a finding of discordance between the sentinel node and localized node, pathology negative for disease in the sentinel node, and pathology positive for disease in the localized node. Multivariate logistic regression yielded non-significant contributions of age at time of surgery (p=0.246) and stage of disease at diagnosis (p=0.657) in prediction of discordance between localized node and sentinel node (n=38), while number of lymph nodes taken at time of surgery was shown to be a contributor with removal of more lymph nodes predicting a higher likelihood of discordance (p=0.003). However, on simple regression, number of lymph nodes taken did not significantly predict discordance (p=0.067, n=40).

Conclusions: As we learn more about the local and systemic treatment of breast cancer and management of the axilla with surgery and radiation to maximize treatment and minimize comorbidities, our ability to accurately identify a positive LN post NAC is made even more evident. What we have found, like others, is that dual trace localization of the SLN especially in the setting of persistent disease post NAC is fraught with FN, 61.7% of patients (n=47). Additionally, in 8.1% of the patients in our sample, we found that the localized lymph node was positive for disease while the sentinel lymph node was negative for disease (n=37). However, by tagging the biopsy positive or clinically suspicious LN in advance to NAC, you can both identify the true sentinel LN with great ease and efficacy allowing for a truer assessment of the axillary stage and response to treat while also allowing for less axillary dissection with its associated morbidities.

125 - Cardiovascular Risk Factors in Development of Nipple Necrosis After Nipple-Sparing Mastectomy

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Background/Objective: Nipple-sparing mastectomy (NSM) is increasingly used for treatment and prevention of breast cancer. In terms of reconstructive aesthetics, preservation of the NSM improves outcomes without increasing the rate of cancer recurrence. Additionally, several studies have shown that NSM leads to a reduced local recurrence risk. Unfortunately, this surgical technique has been associated with complications, the most significant being nipple areolar complex necrosis. To further delineate factors associated with increased risk of nipple necrosis (NN), many studies were done regarding age, past medical or social history and surgical incision technique. Multiple factors have been found to increase risk of NN, including smoking, body mass index, preoperative irradiation, and incision type. However, no studies have delineated possible involvement of cardiovascular risk factors such as atherosclerosis, coronary artery disease (CAD), peripheral vascular disease (PVD), hypertension (HTN), diabetes (DM) and hyperlipidemia (HLD) as predisposing factors for nipple necrosis due to preexisting vascular compromise. Additionally, breast arterial calcification identified on mammography has been associated with CAD/coronary calcification and PVD.

Methods: We have retrospectively collected a single institution's NSM cases from August 2011 to October 2018. This was a total sample value of 213 patients. Patient's demographics and cardiovascular risk factors including atherosclerosis, CAD, PVD, HTN, DM, and HLD as well as smoking and breast arterial calcifications were collected.

Results: Of 213 patients retrospectively analyzed, 37 had partial or total necrosis of the nipple or adjacent skin requiring hyperbaric oxygen therapy, trimming, and/or surgical revision. There were no patients with atherosclerosis or CAD, therefore no further analysis could be made. While all other variables were found to have a positive correlation with NN, only PVD, DM, HLD, and smoking were found to be statistically significant risk factors in development of necrosis. No significant association was found between NN and BAC or HTN. Mean follow up for the patient cohort was 51.4 months (0, 109).

Conclusions: Patients with a history of PVD, DM, HLD, and smoking are possibly at increased risk for development of nipple areolar complex necrosis. This array of cardiovascular risk factors has not been previously analyzed and have potential to affect intraoperative technique. Patients with these risk factors preoperatively could benefit from increased flap thickness, preoperative cardiac optimization, and close post-operative follow-up.

Variables	n=213	
	Nipple Necrosis	No Nipple Necrosis
(p) (X2 computed:X2 critical) (correlation)	n=37	n=176
Diabetes (0.032) (4.6>3.8) (0.15)		
Y	3 (50%)	3 (50%)
N	34 (16.4%)	173 (83.6%)
Hyperlipidemia (0.042) (4.1>3.8) (0.14)		
Y	7 (33.3%)	14 (66.7%)
N	30 (15.6%)	162 (84.4%)
Hypertension (0.79) (0.1<3.8) (0.02)		
Y	5 (19.2%)	21 (80.8%)
N	32 (17.1%)	155 (82.9%)
Peripheral Vascular Disease (0.029) (4.8>3.8) (0.15)		
Y	1 (100%)	0 (0%)
N	36 (17%)	176 (83%)
Smoking (0.038) (4.3>3.8) (0.14)		
Y	11 (28.9%)	27 (71.1%)
N	26 (14.9%)	149 (85.1%)
Breast Arterial Calcifications (0.088) (2.9>3.8) (0.12)		
Y	4 (36.4%)	7 (63.6%)
N	33 (16.3%)	169 (83.7%)

126 - Is Lymph Node Evaluation in Older Women Low-Value Care?

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Background/Objective: Senior adult women are understudied, and recommendations are made with low participation in clinical trials. We sought determine the impact of sentinel lymph node biopsy (SLN Bx) in patients over 70.

Methods: In order to determine the impact of nodal staging on treatment in women over 70, we retrospectively reviewed those clinical Stage 1-3 patients diagnosed with hormone receptor-positive, HER2-negative breast cancer, treated at our institution from January 2004 to December 2012. Those with positive lymph nodes were compared to those with negative lymph nodes. The timeframe was chosen as SLN evaluation was generally recommended during this interval. HR-positive and HER2-negative population was chosen as they were less likely to receive chemotherapy.

Results: From January 2004 to December 2012, 254 patients were available with follow-up and treatment data for study. Mean follow-up was 80 months, and age range was 70 to 95.5 at the time of diagnosis. A total of 188(74%) were node-negative, while 66 (25.9%) were node-positive. Fourteen (21%) of the node-positive were diagnosed by US core biopsy, while 52 (78.8%) were diagnosed with SLN Bx. All had pre-op LN evaluation via US and had a core biopsy if suspicious. Overall, the LN-positive group had chemotherapy 37.8% of the time. When comparing the groups, there was a significantly higher chance of receiving chemotherapy with a positive LN (25/66) 37.8% vs. (17/188) or 9 % than with a negative LN (p=0.00000058). The addition of radiation to mastectomy occurred in 35.7% (10/28) of the node-positive vs. 4/50 or 8% of the node-negative patients (p=0.00222). Three of the LN-positive patients chose only surgical treatment similar to the LN-negative (4.5 vs. 5.2%). Most, but not all, patients in both groups chose endocrine therapy. A total of 8/66 12% of the LN-positive did not take

endocrine therapy, while 12.7% of those in the LN-negative group chose no endocrine therapy. In both groups, most were T1 tumors (See Table). Eighteen percent (12/66) of the LN-positive patients died with disease vs 6% (11/188) of the LN-negative patients but there was no evidence that a positive lymph node affected survival, p=0.06.

Conclusions: While it is generally accepted that LN evaluation and removing negative lymph nodes does *not* influence survival, it is also recognized that the status of lymph nodes is imperative in making important treatment decisions. In our study this was proven, in that the addition of LN information was significant in treatment selection. LN-positive did not affect survival, perhaps as the information was used to treat the patient optimally. De-adoption of SLN Bx in women over 70 has been recommended. However, with our aging population and major improvements in patients' health and medical care, we should re-evaluate this proposition. Our study illustrates that patients will choose adjuvant treatment when given the recommendation. Omission of LN evaluation risks ageism and treatment discrimination in women over 70 and should not be considered low-value care.

Table. Tumor characteristics and treatment noted by LN status

	LN + 66	Lumpectomy	Mastectomy	BX only no surgery	LN - 188	Lumpectomy	Mastectomy
Chemo only	2	2	0		1	0	1
Chemo + endocrine	6	4	2		5	0	5
Chemo + RT	3	1	2		3	3	0
All 3	14	8	6		8	8	0
Endocrine Only	19	2	15	2	51	19	30
Endocrine and RT	19	16	2	1	100	98	2
None	3	1	2		10	4	6
RT only					10	8	4
T1	44				165		
T2	18				22		
T3	4				1		

127 - How Significant Is Dermal Lymphatic Invasion for Breast Cancer Outcome?

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Background/Objective: Breast tissue lymphovascular invasion (LVI) is a negative prognostic factor of breast cancer and associated worse outcomes in these patients. Dermal lymphatic invasion (DLI) is associated with inflammatory breast cancer or could be an incidental finding. DLI seems to have worse prognosis, but its clinical significance was not compared to tissue LVI yet. The goal of this study is an assessment of influence of DLI on oncologic outcome of breast cancer in comparison to tissue LVI.

Methods: A retrospective analysis of all the patients with reported LVI in breast tissue between October 2014 and August 2020 was performed. Presence of DLI was recorded separately. Surgical and pathologic

outcomes as well as survival and recurrence data were recorded. The effect of DLI on those parameters was then analyzed.

Results: A total of 168 patients with LVI and DLI were included in the analysis. There were 143 (85%) patients who had only tissue LVI, 20 patients (12%) had tissue LVI+DLI, and 5 (3%) patients had only DLI. Median follow-up after surgery was 26 (1-69) months. Mortality of patients with DLI alone was significantly higher than DLI+LVI or LVI alone (40% vs 25% vs 10%, $p=0.026$). LVI+DLI was associated with significantly higher rates of distant recurrence in comparison to DLI or LVI alone (50% vs 40% vs 14%, $p=0.001$) and locoregional recurrence (65% vs 25% vs 12%, $p<0.001$). In addition, when compared to LVI alone, patients with DLI+LVI had higher rates of clinical node positivity (80% vs 50%, $p=0.012$) and positive skin margins on frozen section (33% vs 0%, $p=0.047$) (Table). Negative skin margins on frozen section were highly predictive (93.8%) of margins status on final pathology.

Conclusions: Presence of DLI in breast cancer is an important prognostic factor associated with significantly higher rates of locoregional and distant recurrence as well as a marked decreased survival. Negative skin margins by frozen section accurately predict the final margin status.

		Survival		Total
		Dead	Alive	
LVI	Tissue	14 (10%)	129 (90%)	143
	Tissue/Dermal	5 (25%)	15 (75%)	20
	Dermal	2 (40%)	3 (60%)	5
Total		21	147	168
p=0.026				
		Distant Recurrence		Total
		No	Yes	
LVI	Tissue	117 (86%)	19 (14%)	136
	Tissue/Dermal	10 (50%)	10 (50%)	20
	Dermal	3 (60%)	2 (40%)	5
Total		130	31	161
p=0.001				
		Locoregional Recurrence		Total
		No	Yes	
LVI	Tissue	120 (88%)	16 (12%)	136
	Tissue/Dermal	7 (35%)	13 (65%)	20
	Dermal	3 (75%)	1 (25%)	4
Total		130	30	160
p<0.001				
		Clinical node positivity		Total
		Negative	Positive	
LVI	Tissue	70 (50%)	70 (50%)	140
	Tissue/Dermal	4 (20%)	16 (80%)	20

Total		74	86	160
p=0.012				
		Frozen Section (Margins)		
		Negative	Positive	Total
LVI	Tissue	10 (100%)	0 (0%)	10
	Tissue/Dermal	6 (67%)	3 (33%)	9
Total		16	3	19
p=0.047				

128 – Second-Opinion Review of Outside Breast Imaging: An Analysis of the Frequency That Additional Testing Is Recommended and Radiology/Pathology Outcomes

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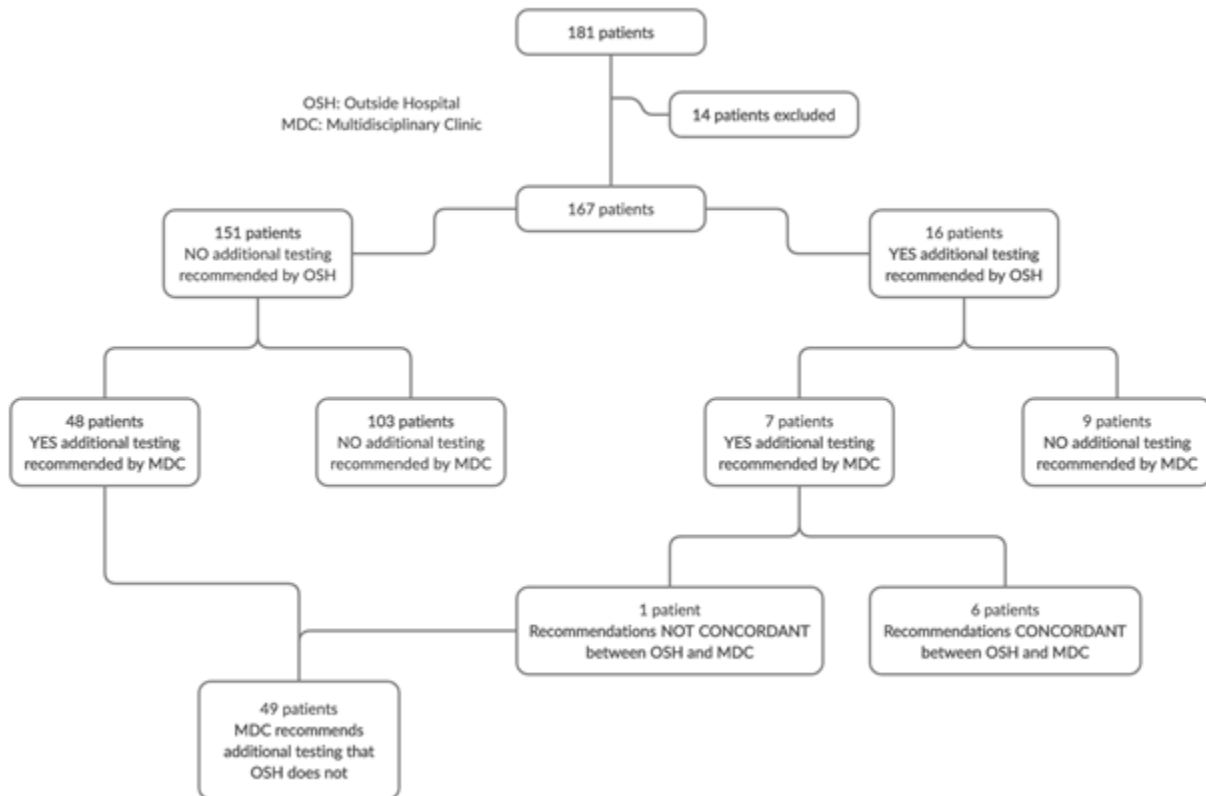
Background/Objective: Second-opinion review of outside imaging for breast cancer patients is a common practice performed at many institutions across the United States. However, it is unknown whether the additional imaging and biopsies ordered as a result of second opinion review leads to actionable change in the patient’s treatment plan. The purpose of this study is 1) to evaluate the frequency that additional imaging and/or biopsies are recommended based on second-opinion review and 2) to determine how frequently these additional interventions yield new or malignant results.

Methods: Breast cancer patients who had diagnostic imaging and biopsies performed at an outside facility and presented to our multidisciplinary clinic at an academic breast center between 2018 and 2020 were retrospectively reviewed. Patients who pursued follow-up care at another institution were excluded. Recommendations for additional diagnostic evaluation were compared between outside facility and our multidisciplinary team. Additional imaging or biopsies were performed, and their results were recorded. Frequency of additional testing and new or malignant results were summarized with descriptive statistics.

Results: A total of 181 patients were seen in our clinic during this time period, 14 of which received follow-up care elsewhere and were excluded. Thus, 167 patients were included in the final analysis. The Figure summarizes a breakdown of additional testing recommendations. Of the 151 patients in which additional testing was not recommended by the outside facility, we recommended additional testing in 48 (32%). Of the 16 patients in which additional testing was recommended by the outside facility, we also recommended additional testing in 7 (44%). Only 1 of these 7 patients were provided recommendations that differed from the outside facility. Overall, based on second-opinion review, our multidisciplinary team provided recommendations for additional testing that differed from the outside facility in 49 of 167 (29%) patients. Sixty imaging procedures (11 mammograms, 23 ultrasounds, 24 magnetic resonance imaging, 2 other) and 25 biopsies (12 ipsilateral breast, 7 contralateral breast, and 6 axillary biopsies) were performed among these 49 patients. From these 60 additional imaging orders, additional lesions were found in 22 (37%), lesions larger than originally described in 4 (7%), and no

additional findings in 23 (38%). From these 25 additional biopsies, 17 (68%) were found to be malignant on pathology and 8 (32%) benign.

Conclusions: Overall, second-opinion review was valuable in identifying 17 additional malignant lesions that were not noted at the primary consultation. Future analysis includes determining the frequency with which the results of additional intervention lead to changes in treatment. Examining how often our recommendations for additional testing actually yield actionable outcomes will help inform the utility and impact of second-opinion review in the patient’s diagnostic work-up.



131 - Assessing Cosmetic Outcome in Breast Cancer Patients: Interobserver Variability

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Background/Objective: Cosmetic outcome is an important consideration after breast cancer surgery, and is often an endpoint in trials. We sought to determine the interrater reliability between breast surgical oncologists and reconstructive surgeons using the Harvard/NSABP/RTOG Cosmesis Grading scale, and the correlation between their observations and patients’ own subjective assessments.

Methods: As part of a prospective trial, patients who underwent breast-conserving surgery were asked to rate their cosmetic outcome on a Likkert scale (poor-fair-good-excellent) at the postoperative and 1 year time point. Photographs were also taken at these timepoints. Three breast surgical oncologists (who were not involved in these cases) and 2 reconstructive surgeons were asked to rate these deidentified photographs given the Harvard/NSABP/RTOG scale, independently of each other.

Results: A total of 55 patients had both photographs and self-Likkert evaluations at the postoperative timepoint, at which time, 36.4% and 49.1% of patients rated their cosmetic outcome as “excellent” and “good”, respectively. At this time point, surgeons generally rated the cosmetic result more favorably than patients (see Table). The 3 breast surgical oncologists (kappa -0.087; 95% CI: -0.091 to -0.082, p=0.223) and the 2 reconstructive surgeons (kappa -0.150; 95% CI: -0.157 to -0.144, p=0.150) had poor interobserver agreement among raters of the same specialty postoperatively. There was also generally poor-slight agreement between surgeon and patient ratings at this time point (kappas -0.042 (p=0.659), 0.069 (p=0.226) and 0.076 (p=0.090) for breast surgical oncologists 1 to 3, respectively, and 0.018 (p=0.689) and 0.112 (p=0.145) for reconstructive surgeons 1 and 2, respectively). Seventeen patients also had photographs and self-Likkert evaluations at the 1-year timepoint, at which time, 41.2% and 58.8% rated their cosmetic outcome as “excellent” and “good”, respectively. At this time point, breast surgical oncologists found the cosmetic result to be more varied (see Table). There was generally poor to fair agreement between surgeon and patient ratings (kappas -0.115 (p=0.477), 0.177 (p=0.245), and 0.101 (p=0.475), for breast surgical oncologists 1 to 3, respectively, and 0.335 (p=0.037) and -0.118 (p=0.221) for reconstructive surgeons 1 and 2, respectively) at the 1-year timepoint. The interobserver agreement between breast surgical oncologists was better at the 1-year timepoint (kappa 0.507; 95% CI: 0.501 to 0.512, p<0.001) than it had been postoperatively; however, there was still poor correlation between the 2 reconstructive surgeons (kappa -0.040; 95% CI: -0.049 to -0.031, p=0.772).

Conclusions: Despite objective scales for measuring cosmesis after breast-conserving surgery, high levels of agreement between surgeons assessing cosmesis is lacking. This does not appear to be specialty specific. Further, surgeons’ ratings using the Harvard/NSABP/RTOG scale often do not reflect patients’ own subjective assessment of their cosmetic outcomes.

	Patient	Breast Surgical Oncologist			Reconstructive Surgeon	
		1 ^a	2	3	1	2 ^b
Postoperative Timepoint (n=55)						
Excellent	20 (36.4%)	34 (61.8%)	50 (90.9%)	52 (94.5%)	52 (94.5%)	39 (70.9%)
Good	37 (49.1%)	18 (32.7%)	5 (9.1%)	3 (5.5%)	3 (5.5%)	8 (14.5%)
Fair	6 (10.9%)	2 (3.6%)	--	--	--	8 (14.5%)
Poor	2 (3.6%)	--	--	--	--	--
One Year Timepoint (n=17)						
Excellent	7 (41.2%)	8 (47.1%)	9 (52.9%)	10 (58.8%)	10 (58.8%)	3 (17.6%)
Good	10 (58.8%)	5 (29.4%)	4 (23.5%)	3 (17.6%)	4 (23.5%)	4 (23.5%)
Fair	--	3 (17.6%)	2 (11.8%)	2 (11.8%)	1 (5.9%)	5 (29.4%)
Poor	--	1 (5.9%)	2 (11.8%)	2 (11.8%)	2 (11.8%)	4 (23.5%)

^a Missing 1 rating at the postoperative timepoint; ^b Missing 1 rating at the 1-year timepoint

132 - Adherence to Guideline-Concordant Neoadjuvant Chemotherapy Delivery for HER2-Positive Breast Cancer Patients in the Community Setting: An Institutional Analysis

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Background/Objective: Institutional adherence to National Comprehensive Cancer Network (NCCN) Guidelines in the neoadjuvant treatment of breast cancer is a potential measure of the quality of breast cancer care. The aim of this study is to evaluate adherence to guideline-concordant neoadjuvant chemotherapy (NACT) including anti-HER2 antibodies for HER2-positive breast cancer patients.

Methods: We performed a retrospective investigation of HER2-positive breast cancer patients treated from 2015-2020 at a large community oncology practice that used a weekly multidisciplinary tumor board. We included those who met NCCN guidelines for receipt of NACT based on tumor size ($\geq T2$) and/or nodal status ($\geq N1$). Variation in guideline-concordant care was assessed over time and according to patient and physician characteristics. Additionally, we assessed institutional adoption of trastuzumab emtansine (TDM1) as adjuvant therapy based on the results of the KATHERINE trial (Minckwitz et al. 2019). Data were derived from medical oncology electronic health record and billing data.

Results: A total of 260 patients met inclusion criteria, of which 213 (82%) received NACT. Of the 47 (18%) who did not receive NACT, only 4 had a documented medical oncology consultation prior to definitive treatment. Guideline concordance increased over time from 78% during the period 2015-2018 to 91% during the period 2019-2020 ($p=0.02$) (Table). Rates of NCCN-recommended neoadjuvant treatment for eligible patients were not statistically different for age at diagnosis (<70 years: 84% vs. ≥ 70 years: 73%; $p=0.17$), race (Black: 81% vs. White: 82% vs. Other: 89%; $p=0.68$), payer type (Commercial: 87% vs. Medicare: 78% vs. Medicaid: 89% vs. other: 100%; $p=0.33$), or median income by ZIP code ($< \$50,000$: 79% vs. $\$50,000 - \$99,999$: 88% vs. $> \$100,000$: 81%; $p=0.24$). Rates of adjuvant TDM-1 use increased significantly after FDA approval in January 2019 ($p<0.001$). Rates of pathologic complete response by regimen will be presented at the meeting.

Conclusions: Our study shows an increase in the percentage of guideline-concordant NACT delivery over a 5-year period in addition to early adoption of TDM1 in the adjuvant setting in this large community oncology practice. These results suggest an elevated awareness over time among community surgeons that multidisciplinary evaluation of all HER2+ breast cancer patients should be the standard of care. Guideline compliance is increasingly useful as a measure of the quality of breast cancer care in a value-based health care environment. Further analyses focusing on physician and operational related factors contributing to disparities in guideline-concordant delivery of breast cancer care are warranted.

Year of Diagnosis	Total Patients	NACT Patients	Percent NACT
2015	41	32	78%
2016	56	44	79%
2017	48	37	77%
2018	38	30	79%
2019	49	43	88%
2020	28	27	96%
Total	260	213	82%

133 - Are We Over-Imaging the Axilla in Patients Undergoing Neoadjuvant Chemotherapy?

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Background/Objective: The role of axillary imaging in patients undergoing neoadjuvant chemotherapy (NAC) and the eventual surgical management of the axilla is controversial. Current NCCN guidelines recommend nodal biopsies in clinically node-positive (N+) patients receiving NAC with marking of the biopsied node for later targeted removal. This has greatly increased the number of imaging exams patients undergo. The purpose of this study is to determine the difference in utilization of pretreatment axillary imaging in clinically N+ compared to N- patients and the ability of the imaging studies to estimate residual nodal disease in post NAC patients and the likelihood for completion axillary dissection (CALND).

Methods: Patients who underwent axillary node biopsy prior to NAC were identified and the rate of imaging utilization was compared in ypN+ patients to ypN0, as well as the rate of nodal staging change and CALND. Fisher's exact test was used to calculate significance.

Results: From January to October 2019, 46 patients (median age 55 years, range 34-82) underwent neoadjuvant chemotherapy (NAC), of which 32 (70%) underwent nodal biopsy at time of diagnosis, with 26 positive (81.2%) and 6 negative results (18.8%). After NAC, 9 (34.6%) patients were downstaged to N- (ypN0) on sentinel lymph node biopsy (SLNBx), of which 66% had targeted nodal retrieval. Seventeen (65%) patients remained N+ (ypN+) (3 ypN1mi, 10 ypN1, and 4 ypN2). The rate of nodal staging change was significantly greater in the pre-treatment N+ group compared to the N- group, where 34.6% were downstaged to ypN0 compared to 5% who upstaged from N- to ypN+, p=0.001. In examination of use of CALND, a significant proportion of the N+ patients underwent completion dissection with 46.2% compared to 0% of the N- group, p=0.004. All patients had pre-treatment axillary imaging. Of the 46 patients who underwent NAC, 42 (91.3%) had pre-treatment MRIs performed. There was no statistical difference in the utilization of pre-therapy MRI between clinically N+ and N- patients [24 (92.3%) vs 17 (85%), p=0.64]. However, there was significantly greater usage of axillary ultrasound in the N+ group compared to the N- groups (100% vs 65%, p=0.001). A total of 80 preoperative imaging studies were performed for all 46 patients, of which 30 (37.5%) did not change clinical management of the axilla, as the patients remained N- after SLNBx.

Conclusions: Only 1/3 of the patients who were N+ prior to NAC downstaged to N- ypN0 and benefitted from extensive axillary imaging and biopsy in an attempt to avoid CALND. This represents only 21.3% of the imaging studies performed. For the remainder of the patients, pre-NAC imaging and biopsies also did not change clinical management, as 70% remained N+ and 46.2% went onto receive CALND and none of N- patients did. Thus, a more selective use of imaging and biopsy may be more predictive or effective in altering clinical management.

Table. Results

	cN+	cN-	p
n	26	20	
Pre NAC MRI	24 (92.3%)	17 (85%)	0.64
Pre NAC US	26 (100%)	13 (65%)	0.001

Change in ypN stage	9 (34.6%)	1 (5%)	0.001
Completion ALND	12 (46.2%)	0 (0%)	0.004

136 - A Class of Their Own: Borderline Phyllodes Tumors

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Background/Objective: Phyllodes tumors are rare fibroepithelial neoplasms that account for 0.3-1% of all breast tumors. In 2012, the World Health Organization (WHO) established grading criteria for benign, borderline, or malignant tumors based on distinct histopathologic features. However, earlier versions of the International Classification of Diseases, 10th revision (ICD-10) recognizes only benign and malignant grades for coding, despite different local and distant recurrence rates with borderline phyllodes tumors. The objective of this study was to accurately classify and describe treatment and survival for benign, borderline, and malignant phyllodes tumors to improve surveillance and clinical outcomes.

Methods: All patients diagnosed with benign or malignant phyllodes tumors based on diagnosis code within our integrated health delivery system from 2016-2020 were identified across 21 medical centers. The pathology was reviewed, and patients were restaged as benign, borderline, or malignant phyllodes tumors. Data regarding demographics, method of diagnosis, pathologic features, grade, margin status, treatment, surveillance, and recurrence were collected and analyzed.

Results: In total, 307 patients were included in the analysis. Within this cohort, 225 patients had benign phyllodes tumors, 52 patients had borderline phyllodes and 30 had malignant phyllodes tumors. Of the 52 patients with borderline phyllodes tumors, 47 (90.4%) patients were initially classified as benign and five patients were initially classified as malignant based on diagnosis code. The average age among all patients was 43 years old, 100% of patients were female, and most patients were white (35.5%), followed by Asian (31.9%). The average age for benign tumors was 40.3 years, versus 49.4 years for borderline and 51.5 years for malignant phyllodes ($p < 0.001$). The incidence of borderline and malignant tumors did not differ significantly by race ($p = 0.58$). Most patients with benign and borderline phyllodes tumors were treated with lumpectomy (93% and 83%, respectively). In contrast, 47% of patients with malignant phyllodes underwent mastectomy. With respect to overall survival, 13% of patients with malignant phyllodes have died versus 0.9% of patients with benign disease ($p < 0.001$).

Conclusions: With over 300 phyllodes patients, our contemporary cohort represents the largest series of these tumors from the United States available in the literature to date. We demonstrate that borderline tumors comprise a significant subset of all phyllodes patients. How patients are treated varies significantly by grade. These data emphasize the importance of appropriate ICD-10 coding (D48.6) of

borderline phyllodes tumor for tracking grade-specific outcomes in order to determine the appropriate treatment and surveillance recommendations.

144 - Local Recurrence of Breast Cancer in Upfront Breast-Conserving Therapy in a Modern Cohort of Breast Cancer Patients

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Background/Objective: Breast-conserving surgery (BCS) followed by a course of radiotherapy has become the standard treatment for patients with early-stage breast cancer. The greatest concern of breast-conserving therapy (BCT) remains in-breast local recurrence. We aim to provide new data about the rate of local recurrence of breast cancer after BCT in a large group of patients. We also aim to highlight the predictors of local recurrence to be considered for the appropriate selection of patients who are candidates for BCT.

Methods: This is a retrospective study that includes 320 patients with primary early-stage breast cancer who were diagnosed between January 2010 and December 2016 and treated with upfront BCS at our institution. Data regarding clinic-demographic characteristics of the patients' pre-operative imaging, cancer characteristics, and oncologic outcomes were obtained from the patients' charts.

Results: Median age of the patients was 52 years (range 29-88). Median tumor size was 1.5 cm with T1 (71.2%) and T2 (22.6%) tumors. The majority of patients had unifocal disease (n = 273; 85.6%). Regarding classification by molecular subtypes of breast cancer, 155 cases (48.6%) had Luminal A subtype, 118 cases (37%) had luminal B subtype, whereas a minority belonged to HER-2 and triple-negative subtypes (11 cases (3.4%) and 30 cases (9.4%), respectively). Wire-localization of the tumor(s) was done in almost half the cases (n=148; 50.9%). Two-thirds of the patients received adjuvant chemotherapy (n=208; 65.2%) and the majority received adjuvant radiotherapy (n=298; 95.5%). The time between surgery and adjuvant radiotherapy was reviewed revealing a median of 116 days between both. With a median follow-up period of 54 months, local recurrence is (1.6%). Multivariate analysis showed a significant correlation between the number of positive nodes and overall recurrence, and between margin status and overall recurrence (p-value<0.05).

Conclusions: Local recurrence after breast-conserving surgery is becoming an uncommon event. Predictors of cancer recurrence should be considered for the appropriate selection of patients for BCT.

147 - Breast Cancer Treatment and Bankruptcy

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Background/Objective: The cost of cancer treatment has a significant emotional and economic impact. The objective of this study was to identify characteristics of breast cancer patients who filed for bankruptcy within a single state registry. We sought to compare patients who filed for bankruptcy before and after their diagnosis and identify breast cancer specific factors that might increase a risk of filing for bankruptcy.

Methods: We identified breast cancer patients between age 18-90 years with Stages 0-3 who underwent surgery between 1/1/2007-12/31/2014 from our state registry. We then linked these patients to individuals who had filed for chapter 7 bankruptcy (liquidation of assets to pay off debts) or chapter 13 bankruptcy (pay debts with a payment plan over a defined time period) per the Public Access to Courts Electronic Records. The cohort of patients were divided into 2 groups – bankruptcy filed less than 2 years **before** diagnosis and bankruptcy filed **after** diagnosis. Bivariate intergroup analysis and multivariate logistic regression was used to identify risk factors of filing for bankruptcy before or after diagnosis. Disease-specific risk of filing for bankruptcy after surgery was evaluated using Cox proportional hazard model.

Results: Of the 23,012 surgical breast cancer patients identified, 450 (1.96%) had filed for bankruptcy, with 232 less than 2 years before diagnosis and 218 after diagnosis. The median age of both groups was 55 years (47-62). Approximately 1/3 of the patients were between 50-59 years (31.8%). More than half the patients had private insurance (54.4%), and 23.1% had Medicare. The 2 groups had similar socio-economic demographics in terms of race, median income, education, and metro status. The majority of patients were Caucasian (80.7%) with a third of patients considered “high poverty range” (29.8%). Patients filing for bankruptcy after diagnosis were more likely to have undergone mastectomy (58.3% vs 47.4%, p=0.03). On multivariate analysis, patients filing for bankruptcy after diagnosis were less likely to undergo chemotherapy (OR 0.16, p=0.034).

Conclusions: In this cohort of patients, rates of bankruptcy amongst breast cancer patients was low. While patients filing for bankruptcy after diagnosis were more likely to have undergone mastectomy, this was not significant on multivariate analysis. While overall cost of breast cancer care can be high, this study did not identify a specific area of breast cancer treatment that increased the risk of filing for bankruptcy.

	Total	Bankruptcy <=2yrs before Diagnosis	Bankruptcy After Diagnosis	p-value
Total Population	450	232(51.6)	218(48.4)	
Age in years				
Median (IQR)	55(62-47)	56(64.5-48)	53(61-46)	0.0198
Age range				
<40	36(8.0)	15(6.5)	21(9.6)	
40-49	116(25.8)	55(23.7)	61(28.0)	
50-59	143(31.8)	76(32.7)	67(30.7)	
60-65	67(14.9)	32(13.8)	35(16.1)	0.190

>65	88(19.5)	54(23.3)	34(15.6)	
Insurance				
Medicaid	26(5.8)	17(7.3)	9(4.1)	0.112
Medicare	104(23.1)	61(26.3)	43(19.7)	
Private	245(54.4)	122(52.6)	123(56.4)	
Others	3(0.7)	2(0.9)	1(0.5)	
Unknown	72(16.0)	30(12.9)	42(19.3)	
Race				
White	363(80.7)	193(83.2)	170(78.0)	0.165
Non-white	85(18.9)	39(16.8)	46(21.1)	
Unknown	2(0.4)	0(0.0)	2(0.9)	
Poverty Level				
Low	155(35.1)	86(37.5)	69(32.4)	0.516
Moderate	155(35.1)	78(34.1)	77(36.1)	
High	132(29.8)	65(28.4)	67(31.5)	
Unknown	8(1.78)	3(1.29)	5(2.29)	
Income				
Median	\$49281.5	\$48558	\$49681	0.5283
IQR	\$60128-\$38811	\$59762-36972	\$60458-\$39911	
Education				
High School	89(92.4-	88.3(92-84.1)	89.6(92.7-85.5)	0.1919
Median % (IQR %)	84.4)			
Unknown	8(1.78)	3(1.29)	5(2.29)	0.4392
College				
Median % (IQR %)	18.1(27.8-13.1)	17.8(26-12.7)	19.1(29.3-13.5)	
Unknown	8(1.78)	3(1.29)	5(2.29)	
Metro status				
Urban	393(87.3)	197(84.9)	196(89.9)	0.111
Rural	57(12.7)	35(15.1)	22(10.1)	
Clinical Stage				
0	113(25.1)	68(29.3)	45(20.6)	0.138
1	200(44.4)	100(43.1)	100(45.9)	
2	107(23.8)	48(20.7)	59(27.1)	
3	30(6.7)	16(6.9)	14(6.4)	
Surgery				
BCS	212(47.1)	122(52.6)	90(41.3)	0.037
Mastectomy	237(52.7)	110(47.4)	127(58.3)	
Unknown	1(0.2)	0(0.0)	1(0.4)	
Chemotherapy				
No	360(80.0)	187(80.6)	173(79.4)	0.662
Yes	84(18.7)	41(17.7)	43(19.7)	
Unknown	6(1.3)	4(1.7)	2(0.9)	
Radiation				
No	313(69.6)	160(69.0)	153(70.2)	0.611
Yes	136(30.2)	71(30.6)	65(29.8)	
Unknown	1(0.2)	1(0.4)	0(0.0)	
Hormone Therapy				

No	200(44.4)	96(41.4)	104(47.7)	0.273
Yes	233(51.8)	125(53.9)	108(49.5)	
Unknown	17(3.8)	11(4.7)	6(2.8)	
Triple-negative cancer				0.164
No	422(93.8)	214(92.2)	208(95.4)	
Yes	28(6.2)	18(7.8)	10(4.6)	

148 - Patterns of Response of Breast Cancer After Neoadjuvant Chemotherapy According to Molecular Subtype: A Retrospective Cohort

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Background/Objective: Breast cancer remains one the most commonly diagnosed cancer in the world and in our region. In patients with large primary tumor, or clinically positive axillary lymph nodes (ALN), neoadjuvant chemotherapy (NCT) was proven equivalent in terms of disease-free survival (DFS) and overall survival (OS) to adjuvant chemotherapy. Neoadjuvant chemotherapy is being more widely used to decrease the size of breast cancer prior to surgical resection. This study evaluates residual disease present in the breast and ALN in patients who received neoadjuvant chemotherapy followed by surgery.

Methods: We did a retrospective medical chart review at our institution for Lebanese women with a diagnosis of invasive breast cancer and who were ≥ 18 years of age. We selected patients who were initially diagnosed with T1-4 N1 M0 breast cancer, received NCT followed by either breast-conserving surgery or total mastectomy with sentinel lymph node biopsy and/or ALN dissection. Data regarding demographics, medical histories, clinical variables, pre-operative imaging, cancer characteristics, neoadjuvant chemotherapy regimen, chemotherapeutic response of the primary tumor and sentinel lymph nodes, clinicopathologic features, post-surgery treatments, recurrence rates, and survival status were recorded from randomly chosen eligible charts of patients diagnosed between January 2010 and December 2016.

Results: We included 187 patients who received NCT and surgical management. Median age of this cohort was 45 years (range 25-84), and all patients were female. Median tumor size was 3.0 cm. All had invasive carcinoma; 89.3% had invasive ductal carcinoma, 7.5% had invasive lobular carcinoma, 0.5% had a combination of the 2, while 2.7% had other types of carcinomas. Among the 187 cases, the most frequent tumors were T2 tumors (n=113, 60.4%), and had axillary lymph node involvement (n=128, 68.4%). Regarding classification by molecular subtypes of breast cancer, luminal B tumors were the most frequent (n=85, 45.5%), followed by Luminal A (n=54, 28.9%), then triple-negative (= 26, 13.9%), and HER2-positive (n=22, 11.8%). The overall rate of pathological complete response (pCR) ypT0/ypN0 was 12.8% (n=24). Tumors that presented the highest rate of pCR were HER2-positive, at 45.5% (n=10). Multivariate analysis showed age and nodal status as independent risk factors for pCR. Younger age, defined as below 40 years, and nodal positivity at initial presentation showed higher rate of pCR with statistical significance for both factors (p-value<0.05).

Conclusions: The results will help us better understand the complete pathologic response in different molecular subtypes, with all its implications on management options. This will allow us to better select those patients for breast conservation and sentinel LN biopsy.

150 - Temporal Associations Between Screening Mammography and the Incidence of Early- Versus Late-Stage Breast Cancer in Eastern North Carolina

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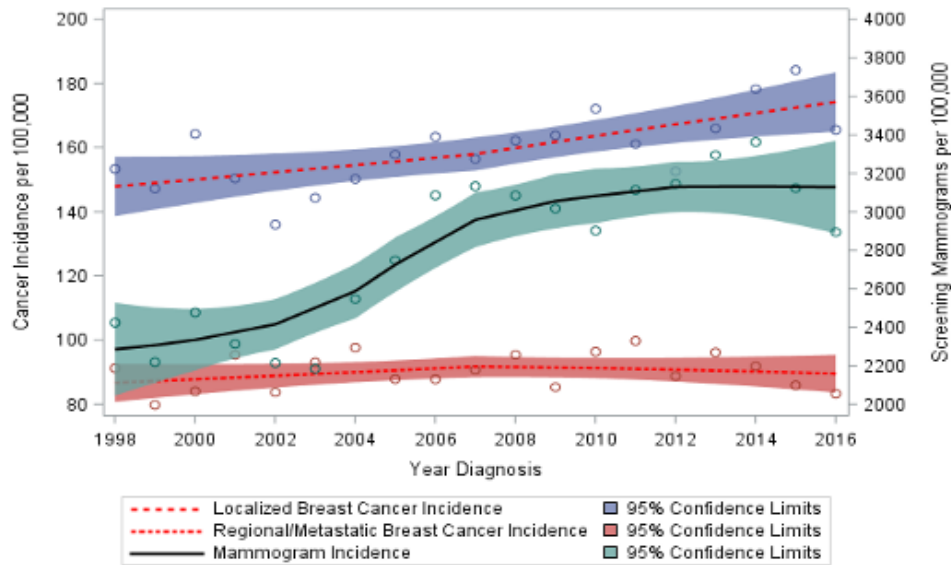
Background/Objective: Women with breast cancer in our region, Eastern North Carolina (ENC), face multiple barriers in access to care and suffer poorer oncologic outcomes relative to the rest of the state. Screening mammography has been promoted to facilitate earlier detection of breast cancer. A previous analysis demonstrated that the rate of mammographic screening in ENC increased significantly from 1998 to 2008, and then plateaued. We sought to examine temporal associations between screening mammography rates and the incidence of early- versus late-stage breast cancer in ENC.

Methods: ENC population estimates for women aged 40 and older were derived from US census data. Screening rates were estimated from the annual number of screening mammograms performed between 1998 and 2016 in the region. Breast cancer incidence data were obtained from the North Carolina Central Cancer Registry. Rates were modeled using a negative binomial with population size included as an offset that assumed a stable underlying risk of breast cancer.

Results: From 1998 to 2007, mammographic screening rates significantly increased by 3.4% per year (95% CI 2.2 to 4.7%), whereas from 2008-2016, the rate was relatively stable (0.5% increase per year, 95% CI -0.2 to 3.2%, $p>0.05$) (Figure). From 1998-2007, overall breast cancer incidence increased by 0.7% per year (95% CI 0.0 to 1.5%), with no significant change in the rate of early-stage disease (0% change per year, 95% CI -1.6 to 1.6%) and an increase in late-stage disease incidence of 0.9% per year (95% CI 0.0 to 1.9%). From 2008-2016, overall breast cancer incidence was relatively stable (0.2% increase per year, 95% CI -0.1 to 1.8%, $p>0.05$), with a nonsignificant increase of 1.2% per year (95% CI -0.1 to 3.2%) for early-stage disease and a nonsignificant decrease of -0.1% per year (95% CI -0.3 to 1.5%) in the rate of late-stage disease.

Conclusions: Results demonstrate a temporal association between increased mammographic screening and increased incidence of breast cancer in ENC, with stable rates of breast cancer following the stabilization of the rate of mammographic screening in 2008. We did not observe a migration from late- to early-stage disease following more widespread utilization of screening mammography, which calls into question whether screening facilitates earlier detection in this population. Further analyses are needed to clarify the reason for the increased incidence of late-stage disease observed prior to 2008; one possible explanation is that receipt of screening mammography is a surrogate for increased access to/utilization of medical care in this population.

**Figure. Breast cancer diagnosis and screening mammograms
Women 40 years of age or older
29 Counties of Eastern North Carolina**



151 - Sentinel Lymph Node Biopsy in Prophylactic Mastectomy - Doing Less Is More

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Background/Objective: National trends show rising rates of contralateral prophylactic mastectomy (CPM), despite lack of evidence for improved overall survival in patients with concurrent or a prior history of breast cancer. The detection rate of occult carcinoma in prophylactic mastectomy is statistically low, thus routine sentinel lymph node biopsy (SLNB) in the prophylactic side is questionable and carries associated risks. This study aims to examine the rate of occult carcinoma in prophylactic mastectomies, the role of preoperative breast magnetic resonance imaging (MRI) to detect mammographically occult malignancy in the prophylactic side, the rate of metastasis to prophylactic sentinel nodes, and complications of SLNB procedure on the prophylactic side.

Methods: Retrospective analysis of 300 women who underwent CPM or bilateral prophylactic mastectomy (BPM) between 2011 and 2014 were identified from an institutional pathology database. Demographics, indications for prophylactic mastectomy, availability of preoperative MRI, pathologic results for the prophylactic breast and sentinel lymph nodes, and postoperative axillary complications were analyzed.

Results: A total of 333 prophylactic mastectomies was performed in 300 women with a median age of 49 years. CPM was performed in 267 patients (89%) and BPM in 33 patients (11%). Only 10% of all patients had a known BRCA1 or BRCA2 mutation. All patients who underwent BPM had genetic mutations or significantly elevated lifetime risks for breast cancer. Majority of prophylactic mastectomy (PM) specimens (76%) revealed benign findings. Occult carcinoma was identified in only 5% (n=15) of the PM

specimens: 7 were invasive carcinoma, 8 were ductal carcinoma in situ. Preoperative MRI detected focally suspicious lesions in only 2 of the 15 patients who were found to have occult carcinoma. Prophylactic SLNB was performed in 270 (90%) of PM. Intraoperative pathologic evaluation was performed in 62% (n=187) of cases, none of which were positive. This correlated with final permanent section in all except 1 case where prophylactic SLNB contained cross metastatic carcinoma from the index cancer. None of the remaining patients, including patients with occult carcinoma had metastasis to prophylactic sentinel nodes. Prophylactic SLNB related complications developed in 7% of patients (n=22), ranging from post-operative axillary hematoma or seroma, neuralgia/paresthesia, upper extremity weakness/decreased range of motion, to lymphedema. The lymphedema rate was 4% (n=11), constituting 50% of total reported complications.

Conclusions: Avoiding unnecessary surgery leads to lower health care costs, better resource utilization, decreased operative time and complications. Appropriate counseling of patients by surgeons regarding the low probability of occult malignancy in the PM and the potential complications of SLNB is paramount in reducing the number of women who undergo SLNB with PM.

Table. Histopathologic findings in prophylactic mastectomy and sentinel lymph nodes

Prophylactic Mastectomy (n=333)	Number (%)	Prophylactic Sentinel Lymph Node Biopsy (n=270)	Number (%)
Benign	254 (76)	Benign	269 (99.6)
High Risk Lesions	64 (19)		
Atypical Ductal Hyperplasia	22 (6)		
Atypical Lobular Hyperplasia	21 (6)		
Flat Epithelial Hyperplasia	6 (2)		
Lobular Carcinoma In Situ	15 (5)		
Occult Carcinoma	15 (5)	Metastatic carcinoma	
Invasive Ductal	3 (1)	Invasive Ductal	1* (0.4)
Invasive Lobular	3 (1)		
Tubular Carcinoma	1 (0.3)		
Ductal carcinoma in situ	8 (2.7)		

*Cross metastasis from index cancer (prophylactic breast did not contain an invasive carcinoma)

152 - Early-Stage Estrogen Receptor-Low Positive Breast Cancer – A Unique Entity?

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Background/Objective: In 2010, the American Society of Clinical Oncology and the College of American Pathologists guidelines for immunohistochemical (IHC) evaluation of estrogen receptor (ER) staining were modified to include "ER-low positive" cases with a score of 1-10% positivity, thus increasing the number of patients eligible for endocrine therapy. Although limited, available data suggest that outcomes for ER-low positive patients may differ from those with ER positivity >10%, and management

strategies are not well defined. Here we describe the clinical management and outcomes for ER-low positive patients treated at a comprehensive cancer center.

Methods: Natural language processing was used to screen institutional pathology databases to identify patients with ER-low positive breast cancer diagnosed on core needle biopsy or surgical excision from 2010-2019. Patients with T1-3, N0-1 invasive breast cancer with confirmed ER-low positive, HER2-negative breast cancer treated at our institution were included. Clinical characteristics and outcomes were compared between those treated with upfront surgery and those who received neoadjuvant chemotherapy (NAC).

Results: A total of 53 patients met the inclusion criteria; 45 (85%) underwent upfront surgery, and 8 (15%) received NAC (Table). The median age was 54 years (range 31-94 years). The majority of patients, 37 (69.8%), presented with cT1N0 disease. Patients who received NAC had higher cT stage and trended towards increased receipt of mastectomy when compared to patients who received upfront surgery (62.5% vs. 31.1%; p=0.09). Axillary management was similar in both groups with SLNB being performed in 6 (75.0%) patients in the NAC group and 34 (75.6%) patients in the upfront surgery group. Among patients treated with breast conservation, 97.1% received post-operative whole-breast irradiation (WBRT), while 26.3% of mastectomy patients received post-mastectomy radiation therapy (PMRT). In the NAC cohort, only 1 (12.5%) patient experienced a pathologic complete response (pCR), 4 (50.0%) patients received adjuvant chemotherapy, and 2 (25.0%) received adjuvant endocrine therapy; of whom only 1 (12.5%) received both. The upfront surgery cohort had high rates of adjuvant chemotherapy use, 32 (71.1%) patients, and only modest use of endocrine therapy, 17 (37.8%) patients; overall only 12 (26.7%) upfront surgery patients received both. At a median follow-up of 35.0 months (range 1.5-107.9), 4 (7.5%) patients have experienced a recurrence, including 2 (3.8%) local-regional and 3 (3.8%) distant recurrences. Recurrence rates were similar between NAC and upfront surgery patients (p=0.36). Overall, 3 year local-regional recurrence-free survival was 95.1% (95% CI 88.4-100%) and disease-free survival was 92.4% (95% CI 84.2-100%). There have been 3 deaths (5.7%), 2 of which were breast cancer related.

Conclusions: The majority of patients with ER-low positive, HER2-negative breast cancer presented with cT1N0 disease and received upfront surgery and adjuvant chemotherapy. Use of endocrine therapy was modest in both upfront surgery and NAC cohorts. Although limited by sample size and short-term follow-up, the event rate in this study suggests an opportunity to better refine systemic therapy strategies.

Table: Clinical and Management Characteristics and Outcomes of Low ER-Positive Patients by Cohort

	NAC n=8	Upfront Surgery n=45	P-value
Median age (years)	53 (33-66)	55 (31-94)	0.16
Clinical T stage			
-T1	1 (12.5)	36 (80.0)	<0.01
-T2	7 (87.5)	7 (15.6)	
-T3	0 (0)	2 (4.4)	
Clinical N Stage			
-N0	7 (87.5)	44 (97.8)	0.16
-N1	1 (12.5)	1 (2.2)	
Surgical Management			
-Breast Conservation	3 (37.5)	31 (68.9)	0.09
-Mastectomy	5 (62.5)	14 (31.1)	

Axillary Management			
-SLNB	6 (75.0)	34 (75.6)	0.25
-ALND	2 (25.0)	4 (8.9)	
-None	0 (0)	7 (15.5)	
Histology			
-DCIS with Microinvasion	0 (0)	2 (4.4)	0.95
-IDC	8 (100)	40 (88.9)	
-ILC	0 (0)	2 (4.4)	
-Mixed	0 (0)	1 (2.2)	
Adjuvant Therapy			
-Chemotherapy	4 (50.0)	32 (71.1)	0.24
-Endocrine therapy	2 (25.0)	17 (37.8)	0.49
Radiation			
-WBRT n=34	3 (100)	30 (96.8)	0.75
-PMRT n=19	3 (60.0)	2 (14.3)	0.05
Median Follow-up (months)	43.5 (15.8-102.1)	30.8 (1.5-1.6.5)	0.27
Recurrence Events	1 (12.5)	3 (6.7)	0.57
-Local-Regional Recurrence	0 (0)	2 (4.4)	0.54
-Distant Recurrence	1 (12.5)	2 (4.4)	0.36
Breast Cancer Related Deaths	1 (12.5)	1 (2.2)	0.36

155 - Surgical Axillary Staging Before Neoadjuvant Chemotherapy: Who Gets It and Why We Should Avoid It

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Background/Objective: Sentinel lymph node biopsy (SLNB) and/or axillary lymph node dissection (ALND) remain part of the standard of care for staging most patients with breast cancer. The use of neoadjuvant chemotherapy (NAC) is effective in downstaging the axilla and limiting the extent of axillary surgery. Prospective studies have demonstrated that a repeat sentinel node biopsy after NAC is inaccurate, owing to a high false-negative rate, and therefore not indicated. Surgical axillary staging demonstrating a positive axillary node before NAC therefore necessitates axillary lymph node dissection post-NAC. We hypothesized that there is persistent use of surgical axillary staging pre-NAC and its use is associated with aggressive clinicopathologic features and a higher rate of ALND.

Methods: The study cohort consisted of all adult women with Stage I-III breast cancer who underwent axillary lymph node staging surgery (either SLNB and/or ALND) and received NAC between 2013-2017 in the National Cancer Database. We evaluated the sequence of lymph node surgery and administration of chemotherapy and classified patients as receiving NAC first or surgical axillary staging first. Using multivariable regression, we estimated the association between patient and clinical characteristics with the probability of undergoing surgical axillary staging prior to NAC. We also calculated the rate of ALND

among those who had surgical axillary staging prior to NAC and compared to those who had surgical axillary staging after NAC.

Results: A total of 120,538 women met inclusion criteria. Of these women, 82,226 (68%) women received NAC first, and 38,312 (32%) underwent surgical axillary staging prior to NAC. On multivariable regression, surgical axillary staging prior to NAC was more likely in with younger women (HR 1.11 for age <30) and decreased with older age (HR 0.87 for ages 70-79 and 0.74 for 80+), compared to women 40-49 years old. Additionally, advancing clinical T stage, lobular histologic subtype, higher grade, and hormone receptor (HR)-positive/HER2-negative subtype were associated with increased use of surgical axillary staging prior to NAC (Table). As expected, women who underwent surgical axillary staging prior to NAC were more likely to undergo ALND as their final axillary procedure: 72.1% vs 63.2% of HR+/HER2- patients; 62.3% vs 46.5% of HR+/HER2+ patients; 63.6% vs 49.3% of HR-/HER2+ patients; 60.1% vs 47.2% of triple-negative patients.

Conclusions: While certain features suggestive of aggressive behavior (grade and T stage) were associated with use of pre-NAC surgical axillary staging, women with more aggressive tumor subtypes were less likely to undergo pre-NAC surgical axillary staging. More than 30% of women treated with NAC between 2013-2017 underwent surgical axillary staging prior to initiation of NAC, resulting in significantly higher rates of ALND in this group. Pre-NAC surgical axillary staging should be performed only in rare circumstances to avoid the risk of unnecessary ALND.

Table. Adjusted associations between patient and clinical characteristics with the probability of undergoing lymph node staging surgery first, compared to NAC first

	RR (95% CI)	p-value
Age category		
18-29	1.11 (1.04, 1.18)	0.001
30-39	1.04 (1.00, 1.07)	0.04
40-49	1.00 (ref)	-
50-59	0.97 (0.94, 0.99)	0.02
60-69	0.93 (0.90, 0.96)	<0.0001
70-79	0.87 (0.83, 0.91)	<0.0001
80+	0.74 (0.66, 0.82)	<0.0001
Clinical stage		
1A	1.00 (ref)	-
1B	1.37 (1.09, 1.72)	0.007
2A	0.79 (0.76, 0.82)	<0.0001
2B	1.25 (1.21, 1.29)	<0.0001
3A	1.27 (1.22, 1.32)	<0.0001
3B	0.86 (0.82, 0.91)	<0.0001
3C	1.20 (1.14, 1.27)	<0.0001
Histology		
Ductal	1.00 (ref)	-
Lobular	1.10 (1.06, 1.13)	<0.0001
Other	0.98 (0.93, 1.04)	0.53
Receptor status		
HER2+/HR+	0.88 (0.86, 0.91)	<0.0001
HER2+/HR-	0.88 (0.85, 0.91)	<0.0001
HER2-/HR+	1.00 (ref)	-
Triple negative	0.83 (0.81, 0.85)	<0.0001
Grade		
1	1.00 (ref)	-
2	1.15 (1.09, 1.21)	<0.0001
3	1.22 (1.15, 1.28)	<0.0001
4	1.09 (0.85, 1.40)	0.50

Abbreviations: RR, risk ratio; CI, confidence interval

156 - A 4-Year Breast Surgeon Experience in Patients Undergoing LYMPHA at the Time of Axillary Lymph Node Dissection for the Treatment of Clinical T1-4N1-2M0 Breast Cancer

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Background/Objective: Breast cancer related lymphedema (BCRL) affects 1 in 5 breast cancer survivors. With an estimated 3.2 million breast cancer survivors, lymphedema has the potential to affect up to 640,000 women. The greatest risks for BCRL continue to remain axillary lymph node dissection (ALND), adjuvant radiotherapy, and body mass index (BMI). BCRL may result in functional disability, chronic pain, and decreased quality of life. Over the years, research has focused on minimizing extent of axillary surgery, minimizing the need for both radiotherapy and ALND, as well as surgical techniques to minimize BCRL risk. Lymphatic microsurgical healing approach (LYMPHA) is a surgical technique that may be used at the time of ALND to prevent the development of lymphedema. LYMPHA has historically been performed by plastic surgeons, requiring operative coordination to perform LYMPHA at the time of breast cancer resection. In our study, we report the 4-year experience of a breast surgeon trained in LYMPHA. We investigate the outcomes in our patients undergoing LYMPHA at the time of ALND for the treatment of cT1-4N1-2M0 breast cancer.

Methods: A retrospective review of breast cancer patients with cT1-4N0-2M0 disease who underwent ALND with LYMPHA was performed over a 4-year period (May 2016- July 2020). Patients were identified through the University Hospital cancer registry. Demographic, pathologic, oncologic, and operative data were collected. Follow-up data on BCRL were collected through our lymphedema surveillance program. Feasibility of LYMPHA and incidence of BCRL was evaluated.

Results: Over a 50-month time period, 92 patients with cT1-4N0-2M0 disease underwent ALND and attempted LYMPHA. Successful lymphatic-venous anastomosis was completed in 86 patients. LYMPHA was unable to be completed due to lack of suitable vein (n=5) and suitable lymphatic channels (n=1). Mean patient age was 56.5 years old (29-81) and mean BMI was 28.8kg/m² (17.7-56.2). Mean patient physical therapy follow-up was 14.1 months. Rate of BCRL following ALND with LYMPHA was 11.6% when compared to our institution's previously reported lymphedema rate of 34% following ALND alone. An increased BMI was demonstrated in the BCRL patients as compared to those without BCRL (36.6 vs. 27.8 kg/m²).

Conclusions: LYMPHA may be successfully employed by breast surgeons at the time of ALND to reduce BCRL. Patients that underwent ALND and LYMPHA had approximately a two-thirds reduction in BCRL incidence. Further studies are needed to assess long-term outcomes in patients undergoing LYMPHA. Research efforts should continue to focus on the prevention of BCRL through minimizing the extent of axillary surgery and radiotherapy while ensuring patient safety and oncologic outcomes. However, LYMPHA currently remains an option for patients undergoing ALND.

161 - Metastasis to Ipsilateral Supraclavicular and Cervical Lymph Nodes in Breast Cancer: A Single Center 15-Year Experience

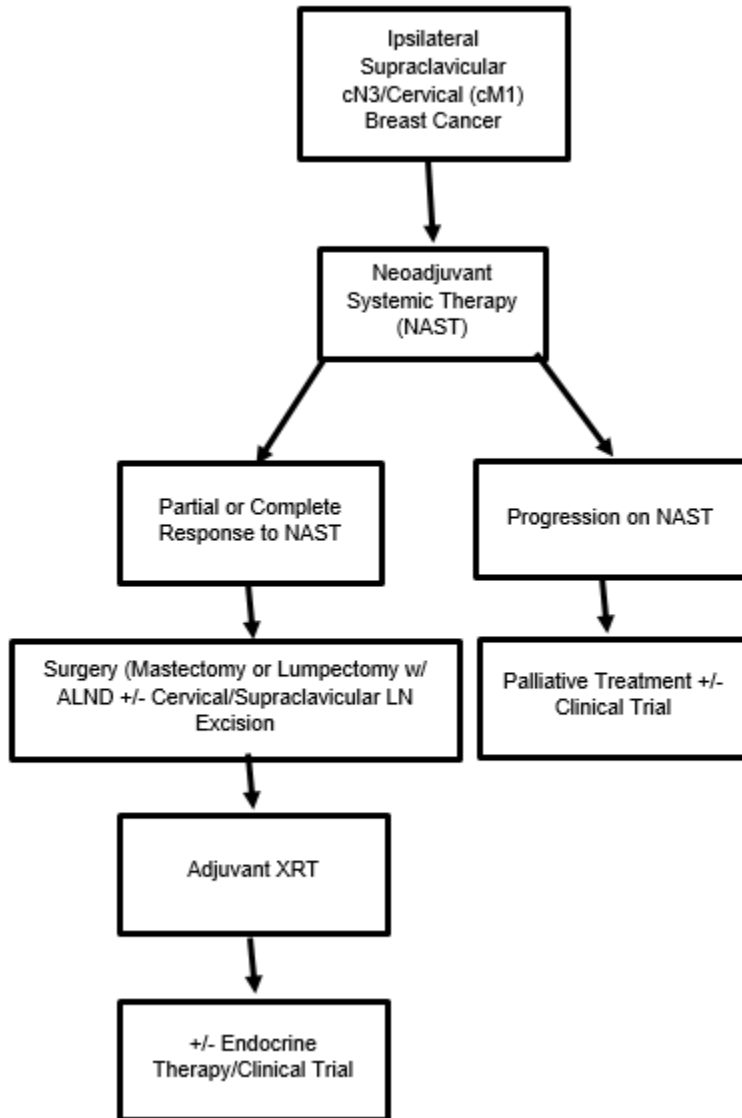
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Background/Objective: Ipsilateral supraclavicular and cervical lymph node metastases from primary breast cancer are staged as cN3 and cM1 disease, respectively, and are associated with poor prognosis. However, modern era systemic therapy is associated with high clinical responses rates, creating uncertainty around the optimal management strategy for these patients. Our objective was to evaluate our institutional experience with the management of ipsilateral supraclavicular and/or cervical lymph node metastases in patients with a primary breast cancer.

Methods: We queried our cancer registry from 2005-2020 to identify patients with primary breast cancer found to have ipsilateral cervical and/or supraclavicular lymph nodes at time of presentation (n=19). Prior to 2010, patients were treated with surgery first (n=7); these patients are excluded from this analysis as they do not reflect our current institutional approach. Records were reviewed retrospectively for clinical management. We generated a summary of descriptive statistics utilizing Statistical Package for Social Sciences (SPSS) Version 26.

Results: Twelve patients who were treated with neoadjuvant systemic therapy were included in this review. Of these patients, 6 had supraclavicular only, 3 had cervical only, and 3 had combined cervical and supraclavicular disease. Median patient age was 52 years (range 27-58). Seven were hormone receptor and HER-2/neu-negative, and 3 were HER-2/neu-positive breast cancers. Three patients progressed on NAST and were deemed unresectable; these patients died at 7, 7, and 8 months after completing NAST. Nine patients underwent surgical resection (1 with progressing disease and 8 with partial responses to NAST). Most received a mastectomy (n=7), with 2 patients undergoing breast conservation. All patients received an axillary lymph node dissection. There were 3/9 patients who underwent resection of bulky, residual disease in the supraclavicular and/or cervical lymph nodes. Patients received standard post-mastectomy chest wall radiation or whole-breast radiation. In addition, all patients received definitive radiation to the supraclavicular and/or cervical nodes. Median follow-up time was 19 months (range 6-122). Three out of 9 surgical patients experienced a recurrence (1 local recurrence, 2 distant) at a median time of 17 months (10-48). One patient died during the follow-up period. Of note, this patient had ER/PR-negative, HER2/neu-positive breast cancer and was noted to have progression of disease after NAST.

Conclusions: With improvements in systemic therapy leading to distant control, surgeons are asked to consider resection of advanced nodal disease for local disease control in breast cancer. This limited study highlights the importance of using NAST to define the tumor biology. Based on our institutional experience, it is reasonable to consider an aggressive approach to local-regional control for patients with a good response to NAST.



162 - Increasing Incidence of Triple-Negative Breast Cancer Among Young African-American Women in Delaware

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Background/Objective: Breast cancer rates overall in the United States have remained relatively stable for the past 15 years, and mortality rates have steadily declined. Delaware, on the other hand, currently ranks 6th overall in incidence of breast cancer, and 20th overall in mortality, despite being ranked third nationally in mammogram screening. This is thought to be attributed to a higher rate of triple-negative breast cancer (TNBC), specifically in the African American population, than is seen nationally. This study

seeks to determine if incidence of TNBC is increasing in younger African American patients, to better direct community outreach.

Methods: A retrospective chart review was used to identify first breast cancers in patients diagnosed in Delaware from 2010 through 2019, with 8775 total patients identified. Demographic data and receptor status were collected for each patient, and patients without invasive disease or with incomplete information about receptor status were excluded. Age-adjusted incidence was calculated, and subgroup analysis was performed based on receptor status and race using heat maps and t-test to test for an increase in incidence in the later 5 years over the first 5 years.

Results: There was no statistically significant increase in overall invasive cancer or TNBC in combined group or subgroup analyses. Heat map analysis and Simulation Modeling Analysis of the data points show an overall decrease in TNBC in all groups, and an upward trend identified in the 25-29-year-old and 75-79-year-old subgroups of African American women. These 2 groups reached significance in the t-test comparing the years 2010-2014 with 2015-2019, $p=0.0039$ and 0.0474 respectively.

Conclusions: Not only did the data fail to meet the threshold of significance, the heat map display shows an overall downward trend in the rate of TNBC over the study period, contrary to expectations. However, on subgroup analysis, 2 groups of younger and older African American women showed increasing rates of TNBC, indicating a need for additional outreach specific to these groups.

Table. TNBC as percent of all cancer in African American women

TNBC as percent of all cancer in African American women										
Age Range	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5 to 9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10 to 14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15 to 19	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20 to 24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25 to 29	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.0%	0.0%
30 to 34	0.0%	0.0%	0.0%	50.0%	0.0%	33.3%	0.0%	0.0%	25.0%	100.0%
35 to 39	66.7%	0.0%	33.3%	0.0%	12.5%	50.0%	100.0%	0.0%	25.0%	33.3%
40 to 44	36.4%	33.3%	20.0%	0.0%	20.0%	27.3%	40.0%	37.5%	25.0%	33.3%
45 to 49	50.0%	83.3%	30.0%	27.3%	18.2%	41.2%	0.0%	33.3%	20.0%	20.0%
50 to 54	45.5%	14.3%	30.8%	22.7%	45.5%	33.3%	21.1%	26.7%	15.4%	28.6%
55 to 59	14.3%	21.4%	25.0%	20.0%	33.3%	26.1%	25.0%	21.1%	35.0%	9.5%
60 to 64	10.0%	21.4%	41.7%	22.2%	11.1%	11.1%	14.3%	25.0%	9.5%	30.0%
65 to 69	14.3%	37.5%	18.2%	23.5%	13.3%	7.7%	28.6%	28.6%	8.3%	5.0%
70 to 74	6.7%	33.3%	25.0%	11.1%	22.2%	11.1%	37.5%	10.0%	7.1%	25.0%
75 to 79	20.0%	0.0%	0.0%	14.3%	20.0%	20.0%	25.0%	28.6%	40.0%	14.3%
80 to 84	50.0%	14.3%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	0.0%
>85	0.0%	33.3%	0.0%	0.0%	50.0%	100.0%	33.3%	50.0%	0.0%	20.0%
TOTAL	27.6%	26.5%	25.6%	18.5%	22.3%	24.6%	27.1%	25.5%	17.1%	17.9%

163 - De-Escalation of Axillary Surgery for Node-Positive Breast Cancer Patients Following Neoadjuvant Endocrine Therapy

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Background/Objective: Axillary management in patients with positive lymph nodes following neoadjuvant endocrine therapy (NET) is controversial.

Methods: Patient data were collected from a prospectively maintained cancer database from 2011-2017 for all stage 1-3 ER+, HER2- patients with breast cancer. Patients with positive lymph nodes following NET who underwent sentinel lymph node biopsy (SLNB) alone were compared to those who underwent completion axillary dissection (AD).

Results: In the study period, there were 2905 stage 1-3 ER+ HER2- breast cancer patients, and 515 of these patients had NET for ≥ 30 days. Patients were followed for a mean of 46 months. In the NET cohort, 41 (8%) were clinically node-positive at diagnosis, and 474 (92%) were clinically node-negative. Ultimately, 110 (23%) of the clinically node-negative group were found to have positive lymph nodes (+LN) at the time of surgery with 11 (2%) having >3 LN+. Most of NET patients, 386 (75%), underwent SLNB, with 96 (19%) undergoing AD or evaluation of >5 lymph nodes (including 11 patients who underwent completion AD after identification of positive lymph nodes on SLNB). There was no nodal evaluation in 33 (6%) patients. Of node positive patients, 81 (54%) had SLNB alone while 68 (46%) underwent AD (Table). Eleven (1%) of NET patients had a local recurrence with 10 (2%) distant recurrences. In LN+ patients managed with SLNB only following NET, the local recurrence rate was (2/81) 2%. One (1%) patient had an axillary recurrence. LN+ patients who underwent AD had a local recurrence rate of 3/68 (4%). In the AD group, 2 (3%) patients had an axillary recurrence, and 1 patient (1%) had an in-breast recurrence.

Conclusions: In clinically node-negative patients selected for NET, very few patients had >3 lymph positive lymph nodes upon surgical evaluation. Early axillary recurrence is rare in patients with 1-3 positive lymph nodes following SLNB, allowing for de-escalation of axillary surgery in appropriately selected patients.

Table. Patients who had positive lymph nodes (LN+) after sentinel lymph node biopsy (SLNB) alone compared to those who had completion axillary dissection (AD) following neoadjuvant endocrine therapy

	SLNB + LN N=81	ALND + LN N=68	P-Value
Age	62yo (28-84)	58yo (39-83)	0.63
Duration NET Mean (SD)	90 days (60)	134 days (83)	<0.001
Pathologic Tumor Size Mean (SD)	2.5cm (0.9)	3.2cm(1.2)	0.02
Clinically Node Positive (%)	8 (10)	31 (46)	<0.001
Multigene Signature			1.00
Intermediate or Low Risk (%)	44 (54)	28 (41)	
High Risk (%)	6 (7)	3 (4)	
Follow-up (months) Mean (SD)	55(21)	58(23)	0.42
Adjuvant Chemotherapy (%)	31 (38)	42 (62)	0.005
BCS (%)	47 (58)	20 (29)	0.005
Mastectomy (%)	33 (40)	48 (71)	0.005

WBRT (% of BCS)	42 (89)	18 (90)	1.00
PMRT (% of Mastectomy)	11 (33)	25 (52)	0.11
Chest Wall or In Breast Recurrence (%)	2 (3)	1 (2)	1.00
Axillary Recurrence (%)	1 (1)	2 (3)	0.59
Distant Recurrence (%)	2 (3)	5 (7)	0.41

164 - Impact of Choosing Wisely Recommendations on Sentinel Lymph Node Biopsy and Postoperative Radiation Rates in Hormone-Positive Breast Cancer Patients Age 70 Years or Older

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Background/Objective: In 2016, Society of Surgical Oncology in conjunction with the Choosing Wisely campaign released recommendation advocating for the omission of sentinel lymph node biopsy (SLNB) in females over the age of 70 with early-stage, hormone-positive, clinically node-negative invasive breast cancer. The guideline has been somewhat controversial, and there has been speculation that overall rates of SLNB have been increasing. Furthermore, concerns have been raised that omission of SLNB will result in higher rates of whole-breast radiation following breast conservation therapy despite level I evidence demonstrating a lack of survival benefit with use of adjuvant radiation in this demographic. The current study sought to investigate the impact of the Choosing Wisely campaign guidelines on performance of SLNB and practice patterns related to adjuvant radiation in this population.

Methods: A single-center retrospective review was performed of women over the age of 70 years who underwent partial mastectomy between January 2009 and December 2018 for newly diagnosed breast cancer. Inclusion criteria included clinical T1 tumors, clinical node-negative status, and estrogen receptor-positive/HER2-negative phenotypes. The primary outcome measure was the rate of adjuvant radiotherapy based on performance of SLNB. Subjects were divided into groups based on whether SLNB was performed. We hypothesized that omission of SLNB would correlate with higher rates of whole-breast radiation. A multivariate logistic regression model was used to predict radiation therapy receipt using key variables that included: age, clinical T stage, lymphovascular invasion, and ASA physical status classification. Secondary study objectives included temporal trends in SLNB rates based on the Choosing Wisely guideline publication in 2016, in addition to factors associated with locoregional and distant recurrence.

Results: A total of 487 female patients were included, 274 (56%) of whom received radiation therapy. There were 413 patients who underwent SLNB (85%) with nodal positivity rate of 11%. Patients who underwent SLNB had higher rates of radiation therapy (63.5% vs. 15.1%, $p < 0.001$). Age younger than 80 was an independent predictor of radiation therapy receipt (OR 3.0; 95% CI, 0.22-0.52). Factors associated with increased likelihood of SLNB included age younger than 80 (OR 4.1; 95%CI, 0.14-0.41), higher clinical T stage (OR 2; 95%CI, 1.1-4.6), and ASA score of ≤ 2 (OR 1.9; 95%CI, 0.30-0.87). Performance of SLNB decreased after the Choosing Wisely campaign (88.4% vs 78.4%, $p = 0.003$). Median follow-up was 4.8 years with 19 (3.9%) documented recurrences; 14 local, 2 regional, and 3 distant recurrences, respectively. Performance of SLNB was not associated with recurrence (2.9% vs

5.5%, $p=0.279$), whereas adjuvant radiotherapy resulted in reduced recurrence (1.1% vs 6.1%, $p=0.002$). Five-year overall survival was 84.6% (95% CI 80.5-87.9%), and 1 patient (0.2%) died from disease.

Conclusions: In our study population, SLNB performance decreased after the Choosing Wisely campaign. Patients who underwent SLNB had significantly higher rates of adjuvant radiotherapy. Recurrence rates remain low in this demographic regardless of treatment rendered and omission of SLNB and radiotherapy should remain a consideration.

165 - Patient Selection for Neoadjuvant Chemotherapy in cT1-T2/N0 HER2-Amplified Breast Cancer in the National Cancer Database

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Background/Objective: The optimal sequencing of treatment for small node-negative HER2+ breast cancers is controversial. Neoadjuvant chemotherapy (NAC) with anthracycline- or platinum-based regimens risk overtreatment of patients who might have excellent survival with adjuvant taxol and anti-HER2, whereas surgery first fails to identify patients with residual disease in need of additional systemic therapy. We investigated patient and tumor characteristics associated with receipt of NAC.

Methods: Our study included adult women diagnosed with clinical T1-2/N0, HER2+ breast cancer between 2013-2015 in the National Cancer Database who underwent surgery. We identified treatment initiated within 8 months of diagnosis (NAC, neoadjuvant anti-HER2 therapy, surgery, adjuvant chemotherapy). Our primary study outcome included receipt of NAC vs. surgery first. Secondary outcomes included type of chemotherapy (multi- vs. single-agent), type of breast surgery (mastectomy vs. lumpectomy), and type of nodal surgery (axillary lymph node dissection [ALND] vs. sentinel lymph node biopsy [SLNB] or no surgery). Demographic (age, race, insurance status, county, region), comorbidities, and tumor characteristics (stage, grade, hormone receptor status) associated with each outcome were identified using multivariable log-binomial regression models.

Results: We identified 40,980 women, of which 8,375 (21%) received NAC (with or without adjuvant chemotherapy), 22,085 (55%) received adjuvant chemotherapy only, 9,477 (24%) received no chemotherapy, and 1,043 were missing information on chemotherapy timing. Eighty-five percent of women treated with NAC received neoadjuvant anti-HER2, and 81% of patients treated with adjuvant chemotherapy received anti-HER2. After adjustment, cT2 stage was the strongest predictor of NAC, compared to surgery first (Table). Younger age and later year of diagnosis were also positively associated with receipt of NAC, while hormone receptor status, older age, Black race, rural county, and government-funded health insurance or no insurance were inversely associated with receipt of NAC. Ninety-one percent of women who received NAC were treated with multi-agent NAC, whereas 79% of women who received adjuvant chemotherapy received multi-agent chemotherapy. After adjustment, women with cT2 stage were more likely to receive multi-agent chemotherapy, and older women were less likely. Forty-four percent of women received mastectomy, and 56% received lumpectomy. Mastectomy was more common in patients treated with NAC vs. adjuvant chemotherapy (50% vs. 43%), however after adjustment, NAC was negatively associated with mastectomy. After adjustment,

predictors of mastectomy included cT2 stage, lobular histology, higher grade, younger age, White race, Southern region, and higher comorbidity index. Sixty-six percent of women received SLNB, 29% received ALND without SLNB, and 5% had no lymph node surgery. After adjustment, cT2 stage, higher grade, younger age, and Medicaid insurance or no insurance were associated with ALND; NAC was negatively associated with ALND.

Conclusions: In early HER2-amplified breast cancer, clinical stage is the strongest predictor of NAC. Demographic factors, such as county of residence, race, and insurance status are also highly predictive of therapy sequencing. Future study of the optimal sequence of treatment for early HER2+ breast cancer to balance the risk of undertreatment and of morbid therapies should consider how patients are selected for treatment including tumor features, patient features, and aim to eliminate health disparities.

Table. Adjusted associations between demographic and clinical factors and neoadjuvant chemotherapy, compared to surgery first

	Neoadjuvant chemotherapy*	
	RR	(95% CI)
cT2 stage (ref=cT1)	3.95	(3.77, 4.14)
HR+ (ref=HR-)	0.82	(0.79, 0.85)
Histology (ref=ductal)		
Lobular	0.85	(0.79, 0.91)
Other	0.85	(0.74, 0.96)
Grade (ref=1)		
2	1.03	(0.94, 1.13)
3-4	0.88	(0.80, 0.97)
Age category (ref=50-69)		
18-49	1.24	(1.20, 1.29)
70+	0.51	(0.47, 0.55)
Race (ref=White)		
Black	0.91	(0.86, 0.97)
Other	0.94	(0.87, 1.02)
Year of diagnosis (ref=2013)		
2014	1.59	(1.50, 1.69)
2015	1.90	(1.80, 2.01)
Region (ref=South)		
Northeast	0.82	(0.78, 0.87)
Midwest	1.02	(0.98, 1.06)
West	0.94	(0.89, 0.99)
County (ref=metro)		
Urban	0.84	(0.79, 0.90)
Rural	0.86	(0.73, 1.00)
Insurance status (ref=Private)		
Not insured	0.81	(0.70, 0.93)
Medicaid	0.88	(0.81, 0.94)
Medicare	0.75	(0.71, 0.80)
Other government	0.98	(0.85, 1.14)

Charlson Comorbidity Index (ref=0)		
1	0.81	(0.76, 0.87)
2	0.86	(0.74, 1.00)
≥3	0.99	(0.79, 1.24)

*Bold Relative risk (RR) indicates statistically significant result at significance level of 0.05. CI: Confidence interval. Ref: Reference value

166 - Surgical Delay During the COVID-19 Pandemic: Observations of Early Pathologic Changes in Response to Short-Term Neoadjuvant Endocrine Therapy

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Background/Objective: Surgical societies released recommendations for triage of elective surgery to minimize hospital burden in the face of the COVID-19 pandemic from March 2020 to July 2020. During this time, hormonal therapy was advised for our clinically node-negative patients with T1-2 tumors that were hormone receptor-positive. This recommendation was based on evidence supporting the safety and efficacy of 6-12 months of primary endocrine therapy before surgery in women with Stage 1 or limited Stage 2 disease. The purpose of this observational series was to examine the impact of delayed surgery during the COVID epidemic, specifically the pathologic response to a shorter course of neoadjuvant endocrine therapy.

Methods: This was a retrospective review of breast cancer patients placed on neoadjuvant endocrine therapy due to COVID-related surgical delays from March 2020 to July 2020. Patients were grouped by duration of neoadjuvant endocrine therapy prior to surgery: <30 days, 30-60 days, 60-90 days, and >90 days. Pathologic response after definitive surgery was evaluated in a blinded fashion by a single pathologist. The analyzed pathologic response variables included: size, tumor grade (nuclear grade, cellularity, mitoses/10hpf), and inflammatory changes (lymphocytes/10hpf). Size after definitive surgery was compared with size from original diagnostic imaging. Tumor grade and inflammatory changes were evaluated relative to the initial core biopsy specimen.

Results: During the study period, a total of 21 patients received neoadjuvant endocrine therapy due to delay in surgery. Preoperative tumor size ranged from 0.3cm to 3.2cm. The 21-Gene Recurrence Scores (RS) ranged from 7-26. 48% of patients (n=10) had an increase in tumor inflammation; all of these received 90 days or less of endocrine therapy, and RS was 7-17. 7 patients (33%) had an increase in tumor size. For those 7 patients, the average RS was 19, and 2 were invasive lobular carcinoma. Of the 7 that increased in size, 5 (71%) showed no change in inflammation.

Conclusions: While the number of patients receiving short-term neoadjuvant endocrine therapy, due to delay in surgery, was not enough to establish a significant difference in tumor size or grade, there was a trend towards increased tumor inflammation in the 30-60- and 60-90-days treatment groups, especially in the group of patients with low RS. Patients with a less robust inflammatory response and a higher RS tended to have an increased tumor size on final pathology. A larger prospective study will be needed to further investigate the relationship between RS and tumor inflammatory biology in the setting of neoadjuvant endocrine therapy. In patients for whom neoadjuvant endocrine therapy is being

considered while awaiting definitive surgery, trends favor obtaining a RS on core biopsy that may further guide therapy.

	<30 days NET (n=4)	30-60 days NET (n=7)	60-90 days NET (n=5)	>90 days NET (n=5)	P value
Tumor Size					0.98
No Residual Tumor	0	1	0	2	
Decreased or Unchanged	2	3	3	3	
Increased	2	3	2	0	
Tumor Grade					0.99
Decreased	0	1	1	0	
Unchanged	0	3	1	1	
Increased	4	2	3	2	
No Residual Tumor	0	1	0	2	
Tumor Inflammation					0.99
Decreased	0	0	0	2	
Unchanged	3	1	1	1	
Increased	1	5	4	0	
No Residual Tumor	0	1	0	2	

168 - Outcomes of Margin Re-Excision After Oncoplastic Breast Reduction

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Background/Objective: Lumpectomy with oncoplastic breast reduction/mastopexy is increasingly offered to select patients who desire breast conservation. This approach may yield lower rates of positive margins, improve cosmetic results, and facilitate breast conservation for a larger tumor. However, positive margins still occur, and the tissue rearrangement can make margin re-excision more challenging. Little is known about outcomes of re-operation for positive margins in this setting.

Methods: This is a single institution, retrospective analysis of outcomes of margin re-excisions after lumpectomy with oncoplastic Wise-pattern reduction from 2015-2020. Outcomes assessed were the rate of successful margin re-excision while maintaining breast conservation therapy, in-breast recurrence, wound healing, maintenance of cosmesis, and delay to radiation. To assess maintenance of cosmesis, 3 blinded breast cancer providers, without knowledge of the study aims or photograph sequence, reviewed photographs from after oncoplastic reduction, and after re-excision, and compared cosmesis between the 2 images.

Results: From 2015-2020, 649 patients underwent lumpectomy with oncoplastic Wise-pattern reduction. Forty-eight patients (7.4%) had ≥ 1 positive margin(s); of these, 28 went directly to mastectomy, and 20 underwent margin re-excision. In the margin re-excision group, the average age and BMI were 56 ± 11 y and 32 ± 6 . Tumor types were invasive ductal (70%), invasive lobular (5%), mucinous carcinoma (5%), and pure DCIS (20%); all invasive carcinomas had a DCIS component. T category distribution was as follows: 4 were Tis (20%), 12 were T1 (60%), and 4 were T2 (20%). Four patients (20%) received neoadjuvant chemotherapy. Multifocal disease was present in 8 patients (40%); 6 patients (30%) had 2 needle localizations for their original operation. Ninety percent of the positive margins involved DCIS. Residual disease was found in 8 patients (40%) at re-excision. One patient

required a second margin re-excision for persistently positive margin involved with DCIS and did achieve clear margins on the third operation. Radiation was given to 19 patients (95%), and boost doses were given to 4 patients (20%). Two patients (10%) had delay of radiation past 6 weeks due to wound complications. Six patients (30%) developed non-healing incisional wounds, which healed with wound care. Of the 15 patients with photographs available, 12/15 patients (80%) were blindly judged to have the same or better cosmesis after margin re-excision. There was 1 in-breast recurrence of IDC occurring 2.5 years after the original operation. This patient's index cancer was IDC, ER 10%, HER2-. During treatment of the index cancer, this patient had final negative margins of >5mm, and she was treated with radiation (5 months after margin re-excision due to non-healing wound) and endocrine therapy. In summary, the recurrence rate was 5%, and the rate of successful breast-conserving therapy was 100% (average follow-up 22 ±13 months).

Conclusions: Margin re-excision after oncoplastic breast reduction is often technically feasible. All patients in this cohort were successfully managed with margin re-excision while maintaining breast conserving therapy. There was only 1 recurrence. Longer follow-up will be important to confirm the oncologic safety of this approach.

	N = 20 (%)	Average ± SD
Age		56 ±10.5
BMI		32 ±6.0
Sternal Notch to Nipple Distance		30 ±3.6
Non-invasive Tumor Size on Pathology (mm)		32 ±22.8
Invasive Tumor Size on Pathology (mm)		15 ±6.8
Days between lumpectomy and re-excision		19 (Median)
Follow Up (months)		22 ±13
Tumor type on Final Path		
Pure DCIS	4 (20%)	
IDC	14 (70%)	
ILC	1 (5%)	
Mucinous	1 (5%)	
ER Positive Tumors	19 (95%)	
Her2Neu+ Tumors	5 (25%)	
Multifocal Tumors	8 (40%)	
Number of Radiology placed Wire Localizations		
0	3 (15%)	
1	11 (55%)	
2	6 (30%)	
Quadrant of Disease		
UIQ	8 (40%)	
UOQ	9 (45%)	
LIQ	2 (10%)	
LOQ	1 (5%)	
Received Neoadjuvant Chemotherapy	4 (20%)	
Tumor type on Positive Margin		
DCIS	16 (80%)	
DCIS & Invasive (IDC)	2 (10%)	
Invasive (IDC & ILC)	2 (10%)	
Residual Disease found on Re-excision	8/20 (40%)	
DCIS	6 (30%)	
DCIS & IDC	1 (5%)	
Mucinous	1 (5%)	

169 - Evaluation of Factors Predictive of Breast Cancer Incidence in Pittsburgh Area by ZIP Code

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Background/Objective: The influence of bias, race, insurance status, and poverty on outcomes in medicine has repeatedly been demonstrated in well-designed studies. Local factors affecting specific communities beyond known risk factors for poor outcomes are less likely to be investigated. Knowledge on specific factors affecting local communities allows for better distribution of resources with the potential to improve breast cancer-related mortality.

Methods: We combined data from our electronic health record (EHR) and the US Census database. Data from our EHR included stage of breast cancer and ZIP code of patients within our health care system, which covers a large portion of Southwestern Pennsylvania including Pittsburgh, Pennsylvania. The Census data allowed us to investigate the influence of occupation, poverty, median income, education, renting vs owning a residence, disability, insurance status, pollution, and race. Data from 3075 patients diagnosed with breast cancer in Western Pennsylvania from 2016-2018 were collected via query of the EHR and matched by ZIP code to the American Community Survey (ACS) from the United States Census. Pearson correlation coefficients were created to determine the independent associations between independent / predictor variables and the number of cases in the ZIP code. Pearson correlation coefficients greater than 0.5 were considered significant in this study.

Results: Strong Pearson correlation coefficients were noted for total cases and those with insurance. This was the case for insured adults with a disability (0.6056) and insured adults without a disability with private health insurance (0.6555). There was also a correlation between breast cancer incidence and white race (0.6171). Two occupational categories also correlated with breast cancer incidence namely wholesale trade (0.6370) and “transportation and warehousing and utilities” (0.5822).

Conclusions: Multiple external factors impact breast cancer incidence in the population. Incidence appears to strongly correlate with having insurance, regardless of disability status. ZIP codes with a higher percentage of people who responded white to the census survey also strongly correlates to the number of cases. Correlation with white race may be associated with increased access to insurance in this demographic. The occupations associated with breast cancer cases may be due to increased access to insurance among those patients and their families. These results suggest the importance of analyzing demographic factors to institute targeted breast cancer community interventions in Southwestern Pennsylvania.

171 - Opioids Are Not Required for Pain Control Following Oncoplastic Breast-Conserving Surgery

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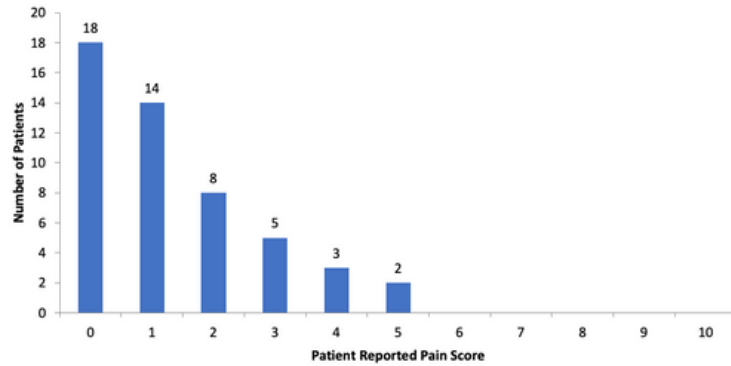
Background/Objective: Overprescribing opioid pain medication after surgical intervention contributes to the opioid abuse health crisis. Current guidelines regarding opioid-based postoperative pain control after breast surgery do not fully address oncoplastic breast-conserving surgery (OBCS). The complexity associated with these procedures suggests a higher level of post-operative pain, and routine prescription of opioids has become standard practice. However, we propose that nonsteroidal anti-inflammatory drugs (NSAIDs) are an effective alternative for pain management following OBCS. This study evaluated pain levels associated with OBCS and the effectiveness of NSAIDs for perioperative pain control.

Methods: This was a single-center prospective study of consecutive breast cancer patients who underwent OBCS. Clinical data on patient demographics, surgical procedure, and perioperative complications were collected on all patients. Prior to surgery, patients were surveyed to obtain baseline pain levels and preoperative use of pain medications. Following OBCS, opioid pain prescriptions were not given as standard practice. All patients were instructed to use NSAIDs as needed for pain control and to contact providers if pain was not adequately controlled. Pain levels and medications used were recorded in the post-anesthesia care unit, postoperative day 1 and at the postoperative follow-up appointment 1-2 weeks after surgery. The Pain, Enjoyment of Life and General Activity (PEG) 1-10 scale was used at the postoperative evaluation to allow for patient-reported pain assessment.

Results: From October 2019 to October 2020, 50 patients undergoing OBCS were enrolled in this study. At the pre-operative visit, 28% of patients reported chronic pain, with 1 patient reporting intermittent opioid use. Mastopexy was the most commonly used oncoplastic technique (50% of patients) followed by therapeutic reduction mammoplasty (44%), while 6% underwent other oncoplastic approach. Seventy percent of patients underwent a contralateral procedure for symmetry. After OBCS, the mean pain score was 1.3 out of 10 (SD 1.4), with 90% of patients reporting scores ≤ 3 at the postoperative visit. On the PEG scale describing pain in the week after surgery, the mean scores for the average pain, enjoyment of life, and general activity scales were 3.1 (SD 2.5), 2.6 (SD 2.1), and 2.6 (SD 2.7), respectively. Ultimately, 98% of patients did not report using any opioids postoperatively, with 1 patient requiring opioid usage. No patients requested an opioid prescription after surgery. Furthermore, 84% of patients were able to effectively manage their pain with NSAIDs, and 16% of patients did not need any form of pain medication following discharge.

Conclusions: The majority of patients reported minimal pain and found non-opioid regimens adequate to control their pain following OBCS. This study demonstrates that routine opioid prescriptions are not necessary as standard care for patients undergoing OBCS. Perioperative pain as a result of OBCS was appropriately managed without the use of opioid treatment.

Figure. Patient-reported pain scores at first post-operative visit



172 - A Single Institution Experience: Comparing Wire Localization to Magseed Localization in Non-Palpable Breast Lesions

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Background/Objective: Traditionally, nonpalpable breast lesions are localized preoperatively using wire localization (WL) on the day of surgery but are subject to displacement and can delay operative schedules. Magseed localization (ML) utilizes a metallic magnetic marker to localize nonpalpable breast lesions under ultrasound or mammography at any time prior to breast-conserving surgery (BCS), including prior to neoadjuvant therapy. The purpose of this study is to assess the accuracy of surgical excision by comparing the margin status and re-excision rates of ML compared to WL for nonpalpable, cancerous breast lesions. We hypothesize that ML will be noninferior to WL when comparing margin status and re-excision rates.

Methods: We conducted an IRB-approved retrospective review of 197 consecutive women undergoing WL excision (9/2017-10/2018) and prospective data collection on 114 women undergoing ML excision (2/2019-2/2020) for cancerous breast lesions. Of note, 2 women in each cohort had bilateral breast lesions. WL occurred on the day of BCS, while ML occurred a median of 7 days prior to BCS. Demographic, operative, and clinicopathological data were collected. The primary outcome was margin status. Secondary outcomes were re-excision rates, operative time, specimen volume, and tumor size. Mann-Whitney U-Test was performed for continuous variables, and Chi-square test was performed for categorical variables.

Results: The cohorts were similar in regard to age, laterality, pathological diagnosis, tumor grade, and hormonal receptor status. Women undergoing ML excision were more frequently White (91.4% vs 75.9%; $p=0.0014$), had a shorter time from biopsy to BCS (median 41.5 vs 49 days; $p=0.0091$), and more frequently underwent sentinel lymph node biopsy (87.1% vs 73.4%; $p=0.004$). When comparing ML to WL, ML had a much higher rate of negative margins and a lower rate of positive margins (93.1% and 5.2% vs 83.4% and 11.6%, respectively; $p=0.047$). Those who underwent ML had lower rates of re-excision compared to WL (6.9% vs 16.1%; $p=0.018$). Of note, operative time for those undergoing ML

was 10 minutes shorter than those undergoing WL (71.5 vs 82 minutes; $p < 0.0001$), but there was no difference in tumor size or specimen volume on final pathology.

Conclusions: In this single institution experience in excision of nonpalpable, cancerous breast lesions, we have shown that ML achieves higher negative margin and lower re-excision rates when compared to patients who underwent WL. ML may also improve preoperative workflow by uncoupling the localization from the day of surgery and also resulted in an operative time that was marginally, though statistically significantly, shorter.

Table: Demographic, Clinicopathologic, and Operative Details

	Needle Localization (N=199)	Magseed Localization (N=116)	p-value
Age, mean (SD)	60.1 (10.5)	61.8 (10.8)	0.15
Race			0.0014
White	151 (75.9%)	106 (91.4%)	
Black	39 (19.6%)	10 (8.6%)	
Other	9 (4.5%)	0	
Path			0.07
Invasive	153 (76.9%)	99 (85.3%)	
DCIS	46 (23.1%)	17 (14.7%)	
Grade			0.43
1	53 (26.6%)	37 (31.9%)	
2	84 (42.2%)	50 (43.1%)	
3	62 (31.2%)	29 (25.0%)	
Hormonal Status			
ER/PR-Positive	168 (84.8%)	103 (88.8%)	0.28
HER2-Positive*	15 (9.8%)	10 (10.1%)	0.94
Laterality**			0.90
Right	101 (50.8%)	58 (50.0%)	
Left	98 (49.2%)	58 (50.0%)	
Time From Biopsy to Surgery, median (IQR)	49 (38-69)	41.5 (31.5-60.5)	0.0091
Operative Time, median (IQR)	82 (69-101)	71.5 (60-88.5)	<0.0001
Procedure Type			0.004
PM	53 (26.6%)	15 (12.9%)	
PM + SLNB	146 (73.4%)	101 (87.1%)	
Specimen Volume (cm³), median (IQR)	72.9 (45.5-112.3)	78.9 (51.8-111.5)	0.56
Tumor size (mm), median (IQR)	11 (6-17)	10.5 (6-15)	0.054
Margins			0.047
Negative	166 (83.4%)	108(93.1%)	
Close***	10 (5.0%)	2 (1.7%)	
Positive	23 (11.6%)	6 (5.2%)	
Re-Excision	32 (16.1%)	8 (6.9%)	0.018

DCIS: ductal carcinoma in situ; ER/PR: estrogen/progesterone receptor; IQR: interquartile range; PM: partial mastectomy; SD: standard deviation; SLNB: sentinel lymph node biopsy; *Only patients with Invasive Disease; **Two patients per cohort had bilateral lesions; ***DCIS only

173 - Post-Mastectomy Reconstruction Rates After Medicaid Expansion

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Background/Objective: The Women’s Health and Cancer Rights Act (WHCRA) of 1998 established federal guidelines to ensure insurance coverage for reconstruction after mastectomy. Since its adoption, trends suggest increased rates of reconstruction for breast cancer patients. However, there have been limitations secondary to regional differences, race, income, and education. The Affordable Care Act sought to close gaps in health coverage among low-income Americans. The purpose of this study was to assess if there was a causal relationship between Medicaid expansion and increased rates of post-mastectomy reconstruction (PMR).

Methods: This National Cancer Database retrospective study looked at women over 39 years of age who had Medicaid or no insurance and who underwent PMR between 2011-2017. States were categorized based on Medicaid expansion status, and the years 2011-2013 were designated as pre-expansion, while 2015-2017 were designated as post-expansion. Women living in states that previously expanded Medicaid before the ACA’s expansion in 2014 were excluded from the analysis (WA, CA, NJ, MN, DC, CT). Trends in use of PMR after passage of Medicaid expansion in 2014 were evaluated.

Results: A total of 33,106 women met the eligibility requirements for the study, 17,117 in expansion states and 15,989 in non-expansion states. The percent of women with Medicaid compared to no insurance increased in expansion states, but not in non-expansion states (81% to 89%, $p<0.01$; vs. 65% to 66%, $p=0.84$). The percent undergoing PMR increased for all payment categories, 21.1% to 27.8% for no insurance ($p<0.001$), 27.4% to 35.3% for Medicaid ($p<0.001$), and 53.6% to 60.2% for private insurance ($p<0.001$). However, among the non-insured/Medicaid population, the increase was similar in non-expansion and expansion states, (21.9% to 29.5%, $p<0.001$, vs. 29.6% to 37.3%, $p<0.001$, respectively). There were differences in pre-existing characteristics between expansion and non-expansion states; expansion states had higher percentages of Asian/Pacific Islanders, lower percentages of black patients, lower-staged cancers, higher income and education, and very different geographic distribution ($p<0.001$ for all). Each of these factors was also associated with increased rates of PMR. In multivariate logistic regression, when adjusted for race, age, cancer stage, income, education, and geographic region, there was no difference in the rate of PMR between expansion and non-expansion states (See table).

Conclusions: Rates of PMR in patients with no insurance or Medicaid are low but are increasing. However, this increase seems to be unrelated to Medicaid expansion. There are still large disparities in PMR based on race, income, education, insurance coverage, and geographic region.

	2011-2013	2015-2017
	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Race		
White	Reference	Reference
Black	0.87 (0.79-0.96)	0.84 (0.76-0.93)
Asian/Pacific Islander	0.49 (0.41-0.59)	0.49 (0.41-0.58)
Age		

40-49	Reference	Reference
50-59	0.59 (0.54-0.64)	0.54 (0.50-0.59)
60-69	0.35 (0.32-0.40)	0.29 (0.26-0.33)
70-79	0.14 (0.10-0.20)	0.11 (0.08-0.15)
80-89	0.40 (0.02-0.10)	0.04 (0.02-0.10)
90+	0	0.13 (0.03-0.54)
Stage		
0	Reference	Reference
I	0.77 (0.70-0.87)	0.83 (0.75-0.95)
II	0.50 (0.44-0.56)	0.55 (0.50-0.62)
III	0.26 (0.23-0.30)	0.29 (0.25-0.33)
IV	0.21 (0.16-0.28)	0.14 (0.10-0.20)
Median Household Income		
Less than \$38,000	Reference	Reference
\$38,000-47,999	1.00 (0.88-1.12)	1.07 (0.95-1.20)
\$48,000-62,999	1.23 (1.08-1.40)	1.20 (1.05-1.36)
\$63,000 or more	1.72 (1.50-2.00)	1.61 (1.37-1.90)
Percent No High School Degree		
21.0% or more	Reference	Reference
13.0%-20.9%	1.02 (0.91-1.14)	1.06 (0.94-1.19)
7.0%-12.9%	1.11 (1.00-1.26)	1.18 (1.03-1.35)
Less than 7.0%	1.18 (1.00-1.40)	1.38 (1.16-1.65)
Geographical Location		
New England	Reference	Reference
Middle Atlantic	1.14 (0.92-1.41)	0.99 (0.80-1.23)
South Atlantic	0.63 (0.50-0.78)	0.61 (0.49-0.77)
East North Central	0.71 (0.58-0.88)	0.64 (0.52-0.79)
East South Central	0.38 (0.29-0.49)	0.38 (0.29-0.49)
West North Central	0.70 (0.54-0.90)	0.72 (0.55-0.94)
West South Central	0.38 (0.30-0.48)	0.33 (0.26-0.42)
Mountain	0.62 (0.48-0.80)	0.62 (0.50-0.80)
Pacific	0.71 (0.52-0.96)	0.55 (0.40-0.76)
Expansion Status		
Nonexpansion	Reference	Reference
Expansion	1.05 (0.93-1.20)	0.99 (0.87-1.12)

174 - Mortality Risk in Older Patients with Breast Cancer Undergoing Breast Surgery: How Low Is “Low Risk?”

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Background/Objective: Breast surgery is generally considered a low-risk operation having a low risk of post-operative mortality. However, for older patients with breast cancer and multiple co-morbidities, even low-risk procedures may carry some increased level of risk. As such, we sought to analyze factors that may influence post-operative mortality in elderly patients with breast cancer undergoing breast surgery to help guide clinical decision-making.

Methods: Patients diagnosed with non-metastatic invasive breast cancer (2010-2016) were selected from the National Cancer Database. Patients were categorized by age (<70y vs ≥70y), receipt of surgery (no surgery vs surgery), and type of surgery (breast+axilla, breast only, vs no surgery). Patient characteristics were compared. Overall survival (OS) was defined as time from surgery to death or last follow-up for all analyses that included only surgery patients, and as time from diagnosis to death for analyses that included surgery and no surgery patients. Unadjusted OS was estimated using the Kaplan-Meier method. Mortality rates at 3, 6, and 12 months were reported. An adjusted logistic regression model was used to estimate the association of age and surgery with 1-year mortality after adjustment for known covariates.

Results: Of patients age ≥70y, 275,671 (92%) underwent surgery and 23,962 (8%) did not. In this age group (≥70y), patients who did not undergo surgery (vs those who did) tended to be older (median age: no surgery 83y, breast only 82y, breast+axilla 76y; p<0.001) and have higher comorbidity scores (score ≥2: no surgery 8.8%, breast only 8.1%, breast+axilla 6%; p<0.001). Median follow-up from diagnosis for all patients was 55.2mo (95% CI 55.2-55.3), and median follow-up from surgery among surgery patients was 53.9mo (95% CI 53.8-54). For those who had surgery, unadjusted mortality rates at 3 months post-op were higher in older patients: (1) age ≥85: 1.6%; (2) age 80-84: 0.8%; (3) age 75-79: 0.5%; (4) age 70-74: 0.4%. They were also higher in patients with higher comorbidity scores: (1) score ≥2: 1.9%; (2) score 1: 0.9%; (3) score 0: 0.5%. Mortality rates were similar regardless of whether patients underwent lumpectomy or mastectomy (without radiation: both 1.2% at 3mo postop; with radiation: lumpectomy 0.1% and mastectomy 0.2% at 3mo postop). After adjustment, death at 1 year post-surgery was associated with older age (≥85y, OR 2.17, 95% CI 1.99-2.35; ref 70-74y), higher comorbidity scores (≥2 vs. 0, OR 2.64, 95% CI 2.44-2.85), and higher stage disease (Stage III vs. I, OR=5.38, 95% CI 4.97-5.83, all p<0.001), while type of breast surgery was not associated with risk of death (p=0.10). Other significant factors associated with increased risk of death at 1y post-surgery included: shorter distance traveled to treating facility, longer time from diagnosis to surgery, no axillary surgery, no radiation receipt, and no endocrine therapy receipt.

Conclusions: Breast surgery remains a relatively low-risk procedure for older patients with breast cancer, but select factors can be used to estimate the risk of post-operative mortality to guide surgical decision-making among older women. Aside from the direct peri-operative risks, breast surgery may also play a role in select patients' subsequent overall medical decline.

175 - Margin Re-Excision and Complications Rates in Patients Undergoing Breast-Conserving Surgery Using Shave Margin Protocol Following Neoadjuvant Chemotherapy

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Background/Objective: Neoadjuvant chemotherapy (NAC) shares equivalent oncologic outcomes with adjuvant therapy but carries the added benefit of potentially reducing tumor volume and improving chances of breast-conserving surgery (BCS). There have, however, been mixed rates of positive margins reported after BCS in patients who have undergone NAC. Additional intervention carries risk of poor cosmetic outcomes, delayed adjuvant care, higher cost burden, and increased rates of postoperative complications. We thus aim to (1) assess the rate of positive margins and need for margin re-excision with our current shave margin protocol and (2) determine whether there is increased risk of positive margins in patients who have undergone NAC. Secondary objectives include evaluation of complication rates in those with NAC.

Methods: Adult female patients who underwent BCS for invasive breast cancer or ductal carcinoma in situ at an academic breast center between April 2018 and September 2019 were included. Demographic and clinicopathologic details, receipt of NAC, postoperative margin status and need for re-excision, as well as postoperative complications were retrospectively reviewed. Only those with invasive breast cancer were included in the analysis of the relationship between NAC and margin status. Rates of positive margins, re-excision, and complications were summarized with descriptive statistics. Categorical variables were compared using Chi square analyses with $p < 0.05$ considered significant.

Results: A total of 285 patients were identified who met inclusion criteria. Overall, 17.2% of patients had positive margins and required further intervention. Of those that underwent re-excision, 32% had persistent positive margins necessitating a third surgery. Two out of 3 patients who underwent a third re-excision surgery remained positive and ultimately underwent mastectomy. There were 230 identified patients who had invasive breast cancer, 56 of which underwent NAC. Patients who underwent NAC were not more likely to have positive margins than those who did not (16% vs 14.4%, $p=0.75$) (Table). However, there was a trend toward increased positive margins after re-excision in the NAC group, with 55.6% having persistent positive margins compared to 23.8% of those without NAC ($p=0.09$). The NAC group had a significantly higher overall complication rate after BCS (26.8% vs 14.8%, $p=0.034$). Specifically, there were higher rates of hematoma (7.1% vs 1.7%, $p=0.028$) and re-admission (5% vs <1%, $p=0.005$).

Conclusions: Previous studies have shown conflicting results of positive margins after BCS in patients who underwent NAC. However, these studies were not conducted on patients undergoing BCS with intraoperative shave margin protocol. Our study shows that when using the shave margin protocol, there is no difference in positive margin rates in those who did or did not receive NAC, but there were higher rates of complications between these groups. Future directions include determination sociodemographic and clinicopathologic factors predictive of positive margins in patients undergoing NAC.

Table. Positive margins and complications in patients with and without neoadjuvant chemotherapy

Positive Margin Following BCS			
	No NAC (174)	NAC (56)	p
Negative Margin	149	47	
Positive Margin	25 (14.4%)	9 (16%)	0.75
Complications			
	No NAC (229)	NAC (56)	p
SSI	4 (1.7%)	2 (3.5%)	0.39
Seroma	25 (10.9%)	6 (10.7%)	0.96
Hematoma	4 (1.7%)	4 (7.1%)	0.028*
Re-admission	1 (0.44%)	3 (5.4%)	0.005*
All Complications	34 (14.8%)	15 (26.8%)	0.034*

Abbreviations: BCS, breast conserving surgery. NAC, neoadjuvant chemotherapy. SSI, surgical site infection. *Statistically significant with $p < 0.05$.

176 - Inflammatory Breast Cancer at Extremes of Age

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Background/Objective: Inflammatory breast cancer (IBC) is a rare breast malignancy characterized by its aggressive clinical presentation with worse clinical outcomes when compared to non-IBC. Differences in tumor biology and treatment patterns between older and younger patients with non-IBC have been described. This study evaluates tumor characteristics, treatments received, and clinical outcomes in IBC patients at extremes of age.

Methods: Using an institutional prospective clinical database, we identified IBC patients diagnosed between 2010-2019. Patients were stratified by age at diagnosis (40 years and 65 years). Demographics and clinico-pathologic features were compared. Receipt of neoadjuvant chemotherapy, modified radical mastectomy, and adjuvant radiation was analyzed among patients with known treatment information. Recurrence and survival outcomes were analyzed by stage at presentation (III or IV) using Kaplan Meier log-rank tests.

Results: Of 523 women identified, 21.6% (n=113) were diagnosed at 40 years of age and 13.8% (n=72) diagnosed at 65 years. There was no statistical difference between groups with respect to race/ethnicity, nodal stage, *de novo* Stage IV status, and tumor subtype (Table). However, there were trends toward younger patients having a higher proportion of Asian and Hispanic patients, higher likelihood of clinical N2/N3 disease, triple-negative (TNBC) and HER2-positive subtypes compared to the older cohort. Among Stage III patients with known treatment information, there was no statistical difference between the younger and older group with respect to the receipt of neoadjuvant chemotherapy (95.7% vs 95.3%, $p=0.93$), modified radical mastectomy (100% vs 97.4%, $p=0.38$), and adjuvant radiation (100% vs 94.9%, $p=0.06$). Pathologic complete response rates were also similar between the groups (26.2% vs 30.6%, $p=0.65$). After a median follow-up of 37 months, 19.6% (n=19) of Stage III patients who received trimodality therapy developed local recurrence, while 44.9% (n=44) had

distant recurrence. Between age groups, there was no statistical difference in 3-year recurrence-free survival (42.6% vs 54.0%; $p=0.34$) or 3-year overall survival (75.6% vs 64.4%; $p=0.25$). For patients with *de novo* Stage IV disease, treatment was similar between the groups with most patients receiving systemic therapy (100% vs 92.6%, $p=0.19$) and similar rates of comprehensive local-regional therapy 69.2% ($n=18$) of younger and 73.3% ($n=11$) of older patients. There was no difference in 3-year overall survival among younger or older patients with Stage IV disease (48.5% vs 53.2%, $p=0.41$).

Conclusions: No significant differences were observed in tumor characteristics, treatment patterns and clinical outcomes among IBC patients diagnosed at 40 years compared to 65 years. Younger patients tended to have more aggressive subtypes (TNBC, HER2-positive) and older patients had lower N-stage at presentation. When comprehensive, multidisciplinary care was delivered, younger and older IBC patients had similar recurrence and survival outcomes.

Table. Clinico-pathologic factors and treatment patterns among patients with inflammatory breast cancer diagnosed at 40 years old compared to 65 years old.

	40 years old (n=113)		65 years old (n=72)		
Race/ethnicity					P=0.21
Asian	6	5.3%	1	1.4%	
Black	8	7.1%	8	11.1%	
Native American	1	0.9%	0	0.0%	
Hispanic	18	15.9%	5	6.9%	
White	77	68.1%	57	79.2%	
Other	3	2.7%	1	1.4%	
Histology					P=0.11
Invasive ductal carcinoma	104	92.0%	58	80.6%	
Invasive lobular carcinoma	3	2.7%	6	8.3%	
Micropapillary	5	4.4%	4	5.6%	
Mixed invasive ductal and lobular carcinoma	1	0.9%	3	4.2%	
Metaplastic	0	0.0%	1	1.4%	
Tumor subtype					P=0.25
TNBC	35	31.0%	18	25.0%	
HR+ HER2-	34	30.1%	32	44.4%	
HR+ HER2+	16	14.2%	7	9.7%	
HR- HER2+	28	24.8%	15	20.8%	
Clinical node status					P=0.09
0	9	8.0%	1	1.4%	
1	44	38.9%	39	54.2%	
2	10	8.8%	3	4.2%	
3	46	40.7%	25	34.7%	
Unknown	4	3.5%	4	5.6%	
Distant metastasis at presentation					P=0.94
No	70	61.9%	45	62.5%	
Yes	43	38.1%	27	37.5%	
Stage III	40 years old (n=70)		65 years old (n=45)		
Neoadjuvant chemotherapy					P=0.93*
No	3	4.3%	2	4.4%	

Yes	67	95.7%	41	91.2%	
Unknown	0	0.0%	2	4.4%	
Surgery					P=0.38*
MRM	65	92.8%	38	84.4%	
BCS	0	0	1	2.3%	
Unknown	5	7.1%	6	13.3%	
Adjuvant radiation					P=0.06*
No	0	0.0%	2	4.4%	
Yes	69	98.6%	37	82.2%	
Unknown	1	1.4%	6	13.4%	
Stage IV (de novo)	40 years old (n=43)		65 years old (n=27)		
Neoadjuvant chemotherapy					P=0.19*
No	0	0.0%	1	3.7%	
Yes	43	100%	25	92.6%	
Unknown	0	0.0%	1	3.7%	
Surgery					P=0.81*
None	21	48.8%	14	51.9%	
MRM	22	51.2%	13	48.1%	
Radiation					P=0.97*
No	3	7.0%	2	7.4%	
Yes	23	53.5%	13	48.1%	
Unknown	17	39.5%	12	44.4%	

*Only patients with known treatment information were included in this analysis
MRM Modified Radical Mastectomy, BCS Breast Conserving Surgery

177 - Outcomes After Nipple-Sparing Mastectomy for Positive Margin(s) Following Recent Oncoplastic Wise-Pattern Reduction

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Background/Objective: For patients with large and/or ptotic breasts, a pre-planned two-staged approach to nipple-sparing mastectomy (NSM) has been described. Less is known about subsequent NSM after an initial Wise pattern oncoplastic reduction. We present our experience in patients who underwent NSM for positive margin(s) after an oncoplastic breast reduction.

Methods: This is a single institution, retrospective review of NSM for positive margin(s) after oncoplastic Wise-pattern breast reduction (2015-2020). The primary endpoint was nipple loss. Secondary outcomes were operative re-intervention and wound complications not requiring re-operation.

Results: From 2015-2020, 649 patients underwent lumpectomy with oncoplastic Wise-pattern breast reduction/mastopexy. Forty-eight patients (7.4%) had ≥ 1 positive margin(s); of these, 28 went directly to

mastectomy, and 20 underwent successful margin re-excision. Nine patients (15 breasts) underwent NSM. Of these, 6 patients had contralateral prophylactic NSM after Wise-pattern reduction. Mean age was 51 years, and mean BMI was 32. All patients presented with grade II or III breast ptosis. Average sternal notch-to-nipple distance (recorded in 6 patients) was 33cm. Average interval between oncoplastic reduction and NSM was 98 days (range 21-205 days). Three patients received systemic chemotherapy between oncoplastic reduction and NSM. Three patients [6 breasts, 40%) underwent reconstruction with sub-pectoral tissue expanders. Five patients [7 breasts, 47%) underwent direct-to-implant pre-pectoral reconstruction. One patient (2 breasts, 13%) underwent immediate DIEP flap autologous reconstruction. Three patients [3 breasts, 20%) required unplanned reoperation: 1 for postoperative hematoma, 1 for expander removal for cellulitis, and 1 for nipple removal due to necrosis. Thus, the rate of total nipple loss was 7% (1 of 15 breasts). In the patient who experienced total nipple loss, 56 days elapsed between oncoplastic reduction and NSM procedure. Of those requiring re-operation, all had sub pectoral tissue expanders placed at the initial NSM procedure. Two patients (2 breasts, 13 %) had superficial wounds that healed by conservative measures. No patient underwent radiation therapy. Average length of follow-up was 24 months (range 2-48 months).

Conclusions: Our experience demonstrates that NSM is safe and feasible when required for positive margin(s) after oncoplastic reduction. The rate of nipple loss observed is comparable to what has been reported after NSM in the un-operated breast. In most prior reports of NSM after oncoplastic reduction, the staged approach to NSM was pre-planned, whereas in our series patients all had an initial attempt at breast-conserving therapy, with NSM as a definitive procedure for positive margin(s). As such, the interval from reduction to NSM is shorter than in many previous series. Furthermore, this is the largest reported series of NSM with pre-pectoral direct-to-implant reconstruction after prior oncoplastic reduction and is remarkable for no nipple loss or necrosis in that subset.

178 - Early Outcomes with Intraoperative Radiation Therapy for Breast Cancer

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Background/Objective: For selected patients with early-stage breast cancer, intraoperative radiation therapy (IORT) has emerged as a convenient alternative to standard whole-breast irradiation (WBI). We report a single institution 3-year experience with IORT in terms of oncologic outcomes, toxicities, and cosmesis.

Methods: Clinicopathological and perioperative outcomes of all patients who underwent IORT for early-stage breast cancer at a large, public hospital from 2017-2020 were retrospectively retrieved. Toxicity was categorized to acute or chronic based on 6 months post-IORT cutoff.

Results: A total of 85 patients underwent IORT and had complete data, aged 49-85 years (mean 62). IORT added a mean of 23 minutes to the total operative time. Mean applicator size was 3.55 cm, and the mean distance from the applicator to the skin was 1.63cm (range, 0.70-3.9). Final staging was 0, 1 and 2 in 34 (40%), 50 (58.9%) and 1 (1.1%) patients, respectively. Mean tumor size was 0.8cm (range 0.1-2.1), with ductal histology encompasses 80 (94.1%) of cases. Surgical margins were positive in 2 patients and

less than 2mm from tumor in 9 patients. Adjuvant WBI was required in 5 patients following IORT, while adjuvant chemotherapy and endocrine therapy was given to 2 and 75 patients, respectively. Early wound complications (n=18, 21.2%) required antibiotics and/or drainage in 8 (9%) patients, and re-operation with loss of nipple-areola complex in 1 patient, due to skin necrosis. Chronic toxicities were reported in 12 (14.1%) patients and included firmness (n=4), pain (n=6), breast or arm lymphedema (n=3), and hyperpigmentation (n=3). Fair or poor cosmetic outcome was reported in 7 (8.2%) patients, 3 of them underwent an additional reconstructive procedure by plastic surgery. After a mean follow-up of 17 months (range 2.8-40.6), none of the patients had local recurrence, and no mortality was recorded.

Conclusions: Utilizing IORT among patients with low-risk early breast cancer may be a safe and more convenient alternative to traditional WBI, with low toxicity rate, acceptable cosmetic results, and good oncologic outcomes at 17 months. Longer follow-up and further prospective controlled studies are needed to confirm the findings presented.

Table. Demographic and clinicopathological characteristics of IORT patients

Characteristic		N=85 (%)
Age mean (range)	61.9 (49 – 85)	-
Ethnicity / Race	White-Hispanic	41 (48.2)
	White non-Hispanic	3 (3.5)
	Black Hispanic	22 (25.9)
	Black non-Hispanic	14 (16.5)
	Other	5 (5.9)
BMI mean(range)	30.2 (20.9- 47.9)	-
≥30	-	36 (42.3)
Comorbidities	Diabetes	22 (25.9)
	Heart Disease	9 (10.5)
	Lung Disease	13 (15.3)
	Rheumatologic Disease	12 (14.1)
	Smoking (active / former)	21 (32.8)
Tumor Location	UOQ	33 (38.8)
	UIQ	14 (16.5)
	LOQ	6 (7.1)
	LIQ	6 (7.1)
	Sub-areolar	3 (3.5)
	3:00	5 (5.9)
	6:00	5 (5.9)
	9:00	4 (4.7)
	12:00	9 (10.5)
	pT	0
1mi ^a		2 (2.4)
1a		13 (15.3)
1b		16 (18.8)
1c		19 (22.4)
	2	1 (1.1)
pN	x	25 (29.4)

	0	59 (69.5)
	1mi ^b	1 (1.1)
Tumor Histology	DCIS	34 (40.0)
	IDC	16 (18.8)
	IDC & DCIS	30 (35.3)
	ILC	3 (3.5)
	Other	2 (2.4)
DCIS Grade	Grade 1	21 (32.8)
(n=64)	Grade 2	41 (64.1)
	Grade 3	2 (3.1)
IDC/ILC Grade	Grade 1	19 (37.3)
(n=51)	Grade 2	32 (62.7)
Receptor Status	ER+/PR+	74 (87.1)
	ER+/PR-	10 (11.7)
	ER-/PR-	1 (1.1)

^a micro-invasion (≤ 1 mm), ^b Micro-metastases (> 0.2 mm, ≤ 2.0 mm), IORT; Intraoperative radiation therapy, BMI; Body mass index, UOQ; Upper outer quadrant, UIQ; Upper inner quadrant, LOQ; Lower outer quadrant, LIQ; Lower inner quadrant, , DCIS; Ductal carcinoma in-situ, IDC; Invasive ductal carcinoma, ILC; Invasive lobular carcinoma, ER; estrogen receptor, PR; progesterone receptor.

180 - Travel Distance and Insurance Status Predictive of the Receipt of Mastectomy in Early-Stage Breast Cancer

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Background/Objective: Recent retrospective studies have demonstrated the survival advantage of breast-conserving therapy with radiation (BCS) over mastectomy for early-stage breast cancer. The aim of our study was to evaluate the impact of travel distance and insurance status on patients' decisions to receive BCS or mastectomy without reconstruction (TM) for early-stage breast cancer. We hypothesized that patients who were noninsured and traveled >20 miles to a treatment facility would be more likely to receive TM compared to BCS.

Methods: Using the National Cancer Database from 2010 to 2017, we examined the surgical choices of women with Stage I or II breast cancer. All patients were treated at 1 facility, had known hormone receptor status, HER2 status, and travel distance from home ZIP code to treatment facility. Chi-square tests were used to examine subgroup differences stratified by operative treatment (BCS or TM). Multivariate logistic regression was used to examine patient, facility, and pathologic factors associated with the receipt of TM compared to BCS.

Results: Of the 284,202 patients in our cohort, 70.1% received BCS while 29.9% received TM. Regardless of procedure, the majority of patients were white non-Hispanic, had none/few comorbidities, traveled <20 miles, and were ER+, PR+ and HER2-. Pathologic factors predictive of the receipt of TM compared to BCS included having stage II disease, more aggressive disease ER-, PR- or HER2+ or having a large tumor size >5 cm when compared to stage I disease, ER+, PR+ and HER2- or tumor size <2 cm (all p values

<.001). Patients that were noninsured or traveled >20 miles to a treatment facility were significantly more likely to receive TM, when compared to patients with private insurance and those who traveled <20 miles (all p values <.05).

Conclusions: Despite previous literature illustrating the survival advantage of BCS over TM for patients with early-stage breast cancer, this study demonstrates that travel distance and insurance status are predictive factors in the receipt of TM compared to BCS when all care is received at the same facility. Future studies to identify targeted interventions to address these barriers may lead to improved uptake of BCS in noninsured patients and patients required to travel long distances to receive care.

Table. Factors predictive of TM compared to BCS (n=284,202)

	OR	Lower CI	Upper CI	P Value
Analytic Stage				
Stage I	Reference			
Stage II	1.921	1.880	1.963	<.0001
ER Assay				
Positive	Reference			
Negative	1.157	1.123	1.193	<.0001
PR Assay				
Positive	Reference			
Negative	1.237	1.204	1.270	<.0001
HER2 Assay				
Negative	Reference			
Positive	1.393	1.360	1.426	<.0001
Tumor Size				
<2 cm	Reference			
2-5cm	1.389	1.352	1.426	<.0001
>5cm	4.026	3.780	4.288	<.0001
Unknown	1.803	1.685	1.930	0.6568
Insurance Status				
Private	Reference			
Not Insured	1.680	1.578	1.787	<.0001
Public	1.336	1.306	1.366	0.1027
Distance Traveled From Home Zip Code				
<20 Miles	Reference			
20-39 Miles	1.220	1.189	1.251	0.0001
40-59 Miles	1.348	1.293	1.405	0.0074
60-79 Miles	1.481	1.391	1.576	<.0001
>80 Miles	1.427	1.354	1.505	<.0001

181 - Locoregional Recurrence Is Low Regardless of Extent of Axillary Surgery After Neoadjuvant Chemotherapy

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Background/Objective: There has been increasing momentum for de-escalation of axillary surgery in patients after neoadjuvant chemotherapy (NAC). While studies have deemed sentinel lymph node (SLN) surgery after NAC feasible, there is a paucity of data on the clinical outcomes using this technique compared with complete axillary lymph node dissection (ALND) in patients with clinically node-positive (cN+) disease prior to NAC.

Methods: Patients with biopsy-proven axillary nodal disease from clinical Stage II-III breast cancer prior to NAC at a single institution between 1/2007 and 3/2017 were identified. Patients were divided into 2 groups based on extent of regional lymph node surgery: SLN surgery alone (SLNB) and ALND with or without SLN surgery. Clinicopathologic variables and outcomes were compared. Patients were also compared based on locoregional recurrence (LRR), and multivariate regression was used to identify predictors of LRR.

Results: A total of 190 patients met inclusion criteria, of whom 35 (18%) had SLNB alone; of the 155 (82%) who had ALND, 133 (70%) had ALND only and 22 (12%) had SLN surgery followed by completion ALND. There was no significant difference in age, biomarker profile, clinical T and N stage, clinical response after NAC, and receipt of adjuvant chemotherapy, endocrine therapy or radiotherapy between patients who underwent SLNB alone and ALND. Patients who underwent SLNB alone were more likely to have achieved nodal pathologic complete response (pCR) (60% vs 37%, $p=0.038$), have ypN0 disease (69% vs 41%, $p=0.009$), and have isolated tumor cells or micrometastatic burden of disease (21% vs 6.6%, $p<0.01$) than those who underwent ALND. There was no significant difference in LRR (2.9% vs 9.0%, $p=0.221$) or axillary recurrence (2.9% vs 1.3%, $p=0.459$). There were 15 cases of LRR; 9 of whom had a breast only recurrence, 3 had an axillary recurrence, 1 had both a breast and an axillary recurrence, and 2 had a supraclavicular nodal recurrence. Patients with LRR had lower rates of nodal pCR (6.7% vs 44%, $p=0.011$) and higher pathologic N stage (ypN0 6.7% vs 49%; ypN1 47% vs 33%; ypN2 20% vs 13%; ypN3 27% vs 4.6%, $p=0.01$); they were also more likely to have nodal macrometastasis (93% vs 44%, $p=0.004$) and receive adjuvant chemotherapy post NAC (60% vs 18%, $p<0.01$), though they had similar rates of adjuvant radiotherapy (93% vs 88%, $p=1.0$) when compared to patients without LRR. On multivariate analysis, while positive pathologic nodal status (OR 14.2, 95%CI 1.19-171, $p=0.036$) was predictive of LRR, receipt of adjuvant radiotherapy (OR 2.36, 95%CI 0.17-33.7, $p=0.528$) and type of axillary surgery (SLNB alone vs ALND; OR 4.30, 95%CI 0.37-50.1, $p=0.245$) were not.

Conclusions: Patients with higher residual burden of nodal disease after NAC were more likely to undergo ALND. However, LRR did not differ significantly and specifically, axillary recurrence remained exceedingly low, whether patients underwent SLNB alone or ALND. The extent of axillary surgery did not predict for LRR.

182 - Implementation of Intraoperative Ultrasound Localization for Breast-Conserving Surgery in a Large, Integrated Health Care System Is Feasible and Safe

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Background/Objective: Intraoperative ultrasound localization for breast-conserving surgery is an effective technique with low rates of re-excision but has not been widely adopted. An intraoperative ultrasound program was implemented in 2015 in a large, integrated, health care system to improve the patient care experience and increase operational efficiency for women undergoing breast-conserving surgery. This program was one of the first launched by the Breast Surgery Group, established in 2015 to optimize practice consistency and outcomes for more than 4000 women diagnosed with breast cancer each year. The implementation coincided with the consolidation of breast surgical care to high-volume surgeons who performed >50 breast operations a year.

Methods: All breast cancer patients who underwent breast-conserving surgery in our health system were reviewed retrospectively. Patient characteristics and outcomes at the start of the program in from January to October 2015 were compared to the same 10-month period in 2019.

Results: Patient characteristics were similar in 2015 compared to 2019; however, the volume of lumpectomies increased (1,696 in 2015 vs 2,057 in 2019), as did the use of neoadjuvant chemotherapy (4.4% vs. 5.9%, $p=0.037$), (Table). During the period of program implementation, intraoperative ultrasound localization increased from 4.1% of all lumpectomies in 2015 to 29.8% in 2019, while utilization of other methods decreased (palpation 28.2% vs 18.2%, wire/non-radioactive seed 67.7% vs 51.5%, $p < 0.001$). Patient selection by tumor T stage was significantly different when comparing localization methods as intraoperative ultrasound localization had the highest proportion of T1 tumors (palpation 44.7%, wire/seed 57.3%, US 64%, $p < 0.001$) and wire or seed localization had the highest proportion of DCIS (palpation 10.1%, Wire/Seed 25.6%, US 7.3%, $p < 0.001$). The adoption of ultrasound localization increased in parallel with the consolidation of breast surgeons from 88 to 59 surgeons, while the percentage of surgeons using ultrasound localization increased significantly (17% to 82%, $p < 0.001$). Furthermore, surgeons who use ultrasound localization use it frequently, as currently half of surgeons perform more than 25% of their lumpectomies using this method. Over the study period, the re-excision rate decreased overall (24.0% vs. 19.2%, $p < 0.001$) and the rate of re-excision was lowest for lumpectomies using ultrasound localization when compared to other methods of localization (US 12.7%, Palp 19.5%, Wire/seed 24.6%, $p < 0.001$).

Conclusions: Integration of intraoperative ultrasound localization for breast-conserving surgery into a high-volume integrated health-system is feasible, safe, and did not increase re-excision rates.

	2015 (n=1696)	2019 (n=2057)	p
Age (95% CI)	63 (62-64)	63 (62-64)	0.926
History of breast cancer	103 (6.1%)	158 (7.7%)	0.054
Neoadjuvant Chemotherapy	74 (4.4%)	121 (5.9%)	0.037
Surgeons (more than 5 operations per year)	88	59	
Localization type			
Palpation	479 (28.2%)	384 (18.7%)	<0.001
Wire	1148 (67.7%)	744 (36.1%)	
Non-radioactive Seed	0	315 (15.3%)	
US	69 (4.1%)	614 (29.8%)	
Re-excision	407 (24.0%)	394 (19.2%)	<0.001
T stage			
DCIS	338 (19.9%)	365 (17.7%)	0.007
T1	962 (56.7%)	1125 (54.7%)	
T2	356 (21.0%)	504 (24.5%)	
T3	26 (1.5%)	34 (1.7%)	
T4	4 (0.2%)	1 (0.01%)	
Missing	10 (0.6%)	28 (1.4%)	
ER+	1452 (87.4%)	1750 (85.8%)	0.043
PR+	1151 (69.3%)	1501 (73.6%)	<0.001
HER2 +	141 (8.5%)	202 (9.9%)	0.299

183 - Predictors of Positive Lumpectomy and Cavity Shave Margins and Effect of Margin Status on Recurrence and Survival in Breast Conservation Therapy

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Background/Objective: Cavity shave margins (CSM) following lumpectomy have been shown to decrease the rate of positive margins and need for re-excision. Survival and recurrence outcomes data remain sparse.

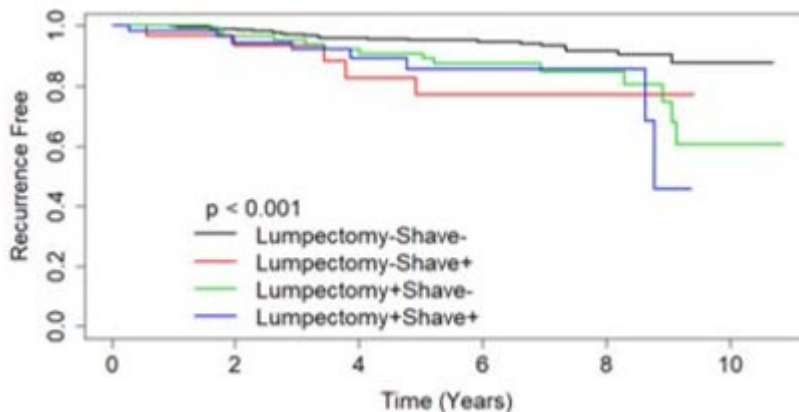
Methods: A retrospective review of all breast cancer patients who underwent breast-conserving surgery (BCS) for invasive ductal (IDC), lobular (ILC) and ductal carcinoma in situ (DCIS) from 2009-2018 at a single academic institution was completed. Cases were performed by multiple surgeons; however, CSM technique was standard. Kaplan-Meier method was used to estimate survival. Cox proportional hazard analyses were used to obtain hazard ratios with 95% confidence intervals (CI). Chi-square test was used to calculate p-values for all categorical variables, and Wilcoxon signed rank test for continuous variables. Subgroup analysis was used to compare breast cancer-specific survival (BCSS) and recurrence by stratifying groups by lumpectomy and shave margin status: L-S-, L-S+, L+S- and L+S+.

Results: Eight-hundred thirty-nine patients undergoing lumpectomy with CSM were identified. Average age was (mean \pm SD: 61.6 \pm 11.3, years), body mass index (31.0 \pm 7.2), excised tumor size (1.5 \pm 1.1, cm) and

total CSM volume (30 ± 219 , cm³). Tumor histology included n (%): 325 (38.7) IDC, 73 (8.7) ILC, 193 (23.0) IDC+DCIS and 197 (23.5) DCIS. Length of follow-up was (4.7 ± 2.6 , years). The majority of tumors were estrogen receptor (ER)-positive 664 (87.9), PR-positive 555 (73.5), and HER2-negative 522 (85.4). CSM saved subsequent reoperation for positive margins in 195 (23.6%) patients. CSMs detected occult multifocal disease that would otherwise have not been detected by lumpectomy alone in 11% of cases. Positive margin rate by tumor histology was highest for ILC 22 (30.1) > IDC+DCIS 50 (25.9) > DCIS 35 (17.8) and lowest for IDC 21 (6.5). The overall rate of recurrence was 6.8%. Recurrence rate was significantly higher in L-S+ (15%) > L+S+ (14%) > L+S- (13%) > L-S- (5%), ($p=0.0008$) (Figure). Only nodal disease (OR= 2, $p=0.02$), tumor histology (OR= 2, $p < 0.01$), tumor grade (OR 4, $p < 0.05$), and excised tumor size ($p < 0.01$) were statistically significantly associated with both positive lumpectomy margin and CSM. There was no difference in 5-year BCSS between the 4 subgroups: 97.6% for L-S-, 93.6% L-S+, 96.5% L+S+ and 95.1% L+S- ($P=0.094$).

Conclusions: CSM can detect occult multifocal disease in patients undergoing BCS and save reoperation when primary lumpectomy margins are positive. Predictors for margin positivity including nodal disease, tumor histology and grade, and tumor size may influence long-term recurrence rates. Randomized control trials comparing lumpectomy vs. lumpectomy with routine CSM are needed to confirm the significance of CSM on outcomes.

Figure. Time to recurrence stratified by subgroups



184 - Diagnostic Accuracy of Nipple Discharge Fluid Cytology: A Meta-Analysis and Systematic Review of the Literature

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Background/Objective: Nipple discharge accounts for 15-45,000 presentations to the Rapid Diagnostic Breast Clinics in the UK each year and is the third most common presentation after mastalgia and mass in the USA. Symptomatic patients undergo triple assessment in the form of history and examination; imaging (mammogram and ultrasound) and cytopathological assessment of nipple discharge if elicited.

Cytological analysis has been performed on nipple smears for several decades but is thought to be limited by low sensitivity and negative predictive value. This systematic review and meta-analysis determined the diagnostic potential of nipple cytology, when compared to histology, alongside the diagnostic accuracy of allied clinical and imaging modalities.

Methods: Studies were identified by performing electronic searches on MEDLINE, EMBASE and SCOPUS up to April 2020. Search terms included 'Nipple Discharge Fluid' and 'Cytology' in all its forms. Only clinical studies with primary data on the diagnostic accuracy of nipple discharge fluid as compared with biopsy or surgical histology were included. All studies also underwent Quality Scoring using QUADAS-II evaluation metrics. Both hierarchical and bivariate models for diagnostic meta-analysis were utilised to attain overall pooled sensitivity and specificity. Further analysis of the diagnostic potential of blood in discharge fluid, as well as imaging modalities including mammogram, ultrasound and MRI was conducted.

Results: Of 837 studies retrieved after de-duplication, 45 studies fulfilled the criteria for review and meta-analysis. Pooled sensitivity, specificity and an area under the receiver operating characteristic (SROC) values were calculated for both benign and malignant diagnoses. Results from a total of 59,991 patients were examined, with cytology samples included from 8,648 breasts (mean age 48.7±4.66 years). Papers ranging from 1956-2019 were included. The diagnostic accuracy meta-analysis of nipple aspirate fluid revealed a sensitivity of 0.78 [0.64-0.93] and specificity of 0.43 [0.25-0.61] for a benign diagnosis, and a sensitivity of 0.46 [0.30-0.62] and a specificity 0.74 [0.59-0.88] of for a malignant one. Furthermore, patients presenting with blood-stained discharge yielded an overall malignancy rate of 0.58 [0.54-0.60] with a positive predictive value (PPV) of 0.27 [0.17-0.36]. Pooled ultrasound sensitivity and specificity was 0.70 [0.60-0.80] and 0.58 [0.24-0.91]; mammography sensitivity and specificity was 0.38 [0.23-0.52] and 0.79 [0.69-0.90] and MRI sensitivity and specificity was 0.70 [0.61-0.70] and 0.45 [0.20-0.70]. The PPV for all diagnostic modalities were benign cytology: 0.78[0.56-1.01]; malignant cytology: 0.58 [0.46-0.71]; ultrasound: 0.78 [0.56-0.99]; mammogram: 0.49 [0.24-0.75]; MRI: 0.67 [0.55-0.79].

Conclusions: Pooled data from all studies encompassing nipple discharge fluid assessment suggest that the diagnostic accuracy of nipple smear cytology is limited and questions its value altogether, at a cost of \$75 per smear. No single imaging modality has a high enough diagnostic accuracy to be utilised alone, which justifies a surgical approach to obtain a definitive diagnosis in the context of persistent, blood-stained, single-duct discharge, particularly in the midst these changing times. In the quest to discover superior diagnostic techniques for nipple fluid analysis, emerging technologies must have a diagnostic accuracy which is greater than cytology, and offer advantages in terms of cost, reproducibility, user dependency, and turnaround time.

185 - A Novel 5-gene Score to Predict Complete Pathological Response to Neoadjuvant Chemotherapy in ER-Positive/HER2-Negative Breast Cancer

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Background/Objective: Estrogen receptor (ER)-positive/HER2-negative is the most abundant breast cancer subtype, accounting for approximately 70% of all tumors. ER-positive/HER-2 negative tumors are generally less aggressive compared to the other subtypes. However, the likelihood of patients with this subtype achieving complete pathological response (pCR) after neoadjuvant chemotherapy (NAC) is less than 10%. Given that there is no predictive biomarker for response to NAC, surgeons hesitate to consult medical oncology for this less aggressive subtype that result in extensive operation. In this study, we developed a tumor gene expression-based score to predict pCR after NAC in ER-positive/HER2-negative breast cancer.

Methods: Data of 280 ER-positive/HER2-negative patients of the multicenter study of Hatzis et al. (Gene Expression Omnibus identifier GSE25066) was used to identify genes whose pre-treatment tumor expression was predictive of NAC response. The score consists of 5 of these genes chosen from Hallmark E2F pathway gene set that we previously found to associate with NAC response. TCGA ($n = 579$) and METABRIC ($n = 1355$) cohorts were used to associate the score with clinical and molecular features. The GSE20181 cohort ($n = 52$) was used to test the score's predictive value for hormonal therapy, and GSE20194 ($n = 129$) and Hess et al. ($n = 67$) cohorts were used to validate the NAC response-predictive biomarker value of the score.

Results: Gene expressions of *CDCA8*, *MCM2*, *MCM6*, *MELK*, and *DEK* were elevated the most in ER-positive/HER2-negative breast cancer patients who achieved pCR compared to those who did not (false discovery rate [FDR] < 0.0001 with \log_2 fold-change > 0.67) in GSE25066 cohort. The 5-gene score of tumors was calculated using these 5 genes. In receiver operating characteristics analysis using the score, area under curve was significantly higher than that for the E2F pathway score (respectively 0.81 and 0.76, $p=0.0002$). Among various breast cancer subtypes, the score was lowest for ER-positive/HER2-negative ($p<0.001$). In ER-positive/HER2-negative tumors of the GSE25066 as well as TCGA and METABRIC cohorts, the score was associated with higher Nottingham pathological grade (all $p<0.001$), AJCC pathological stage ($p<0.001$, 0.025, and <0.001, respectively), and *MKI67* expression (Spearman's correlation = 0.72, 0.88, and 0.71, respectively). In each of these cohorts, high-score (top 1/3rd) ER-positive/HER2-negative tumors had increased expression of 5 different cell proliferation-related gene sets compared to other tumors (E2F targets, G2M checkpoint, MYC targets v1 and v2, and Mitotic spindle; all normalized enrichment scores > 1.8 and FDR<0.005). The high-score tumors also had greater intratumor heterogeneity, homologous recombination defects, mutation burden, neoantigen load, and immune-related gene set scores compared to low-score tumors. They also had more abundance of anti-cancer immune cells, including CD4⁺ memory T cells, T helper type 1 cells, M1 macrophages, and B cells, and less abundance of stromal cells. Although the score was not associated with response to hormonal therapy, it was significantly associated with high pCR rate after NAC in the GSE20194 ($p=0.006$) and Hess et al. ($p=0.037$) cohorts.

Conclusions: The 5-gene score reflects cell proliferation and has the potential to predict pCR after NAC in ER-positive/HER2-negative breast cancer.

186 - Intratumoral Neutrophil Lymphocyte Ratio (NLR) as a Prognostic Biomarker in Triple-Negative (TN) Breast Cancer Patients

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Background/Objective: Numerous studies reported that the elevation of neutrophil lymphocyte ratio (NLR) in the blood associate with poor prognosis in breast cancer based on the notion that neutrophil represents pro-cancer, and lymphocytes represent anti-cancer immune cells. Recently tumor immune microenvironment has been demonstrated to play critical roles in the outcome of breast cancer patients. However, there is scarce evidence on the clinical relevance of intratumoral NLR in breast cancer patients. In the current study, we hypothesized that intratumoral NLR high tumors are associated with worse survival particularly in TNBC that is known to have high immune cell infiltration.

Methods: A total of 1904 breast cancer patients' data were obtained from METABRIC (Molecular Taxonomy of Breast Cancer International Consortium) and analyzed. NLR was calculated by the gene expressions of CD66b (*CEACAM8*) and CD8 (*CD8A*). NLR high and low were divided by the median. Overall survival (OS) and disease-free survival (DFS) were calculated utilizing Kaplan Meier method between intratumoral NLR high and low groups. xCell algorithm was used to analyze the infiltrated immune cells within the tumor immune microenvironment as we have previously published.

Results: Intratumoral NLR high group was associated with worse OS in whole, ER-positive/HER2-negative, and triple-negative (TN) subtypes, in agreement with the previous studies. TN subtype alone demonstrated worse DFS of NLR high group. Surprisingly, gene set enrichment analysis (GSEA) demonstrated no gene set enrichment to NLR high group, which indicates that there is no distinctive mechanism that associate with worse survival. Whereas, immune response-related gene sets, such as IL6-JAK-Stat3 signaling, Inflammatory response, Allograft rejection, Complement, and Interferon gamma response, significantly enriched to NLR low group in TN subtype (FDR=0.001, FDR=0.003, FDR=0.002, FDR=0.002, and FDR=0.002 respectively). This enrichment was consistent in ER-positive/HER2-negative subtype (FDR < 0.001 for all gene sets). Compared with ER-positive/HER2-negative subtype, anti-cancer immune cells such as CD4+ T cells, CD8+ T cells, M1 macrophage, and helper T helper type 1 cells were significantly infiltrated in TN patients ($p < 0.001$ for all genes), where M2 macrophages and neutrophils were less and regulatory T cells and T helper type 2 cells were more infiltrated in TN subtype. Furthermore, intratumoral NLR was significantly lower in TN compared with ER-positive/HER2-negative subtype ($p < 0.001$). These results suggest that intratumoral NLR low group is associated with better survival due to favorable tumor immune microenvironment in TN subtype rather than NLR high group has worse survival.

Conclusions: In conclusion, our results implied that intratumoral NLR low tumor was associated with improved OS in whole, ER-positive/HER2-negative, and TN breast cancer patients and better DFS in only TN patients. Also, higher infiltration of anti-cancer immune cells was observed in TN subtype compared to ER-positive/HER2-negative which may contribute to the favorable outcome of TN breast cancer.

187 - Early Results from a Multi-Center Trial for the Treatment of Early-Stage Breast Cancer Using Intra-Operative Electronic Brachytherapy

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Background/Objective: To report on local control after a single 20 Gy fraction of intra-operative electronic brachytherapy (IORT) at the time of partial mastectomy in a non-randomized multi-center trial.

Methods: This Phase 4, single arm prospective non-randomized trial enrolled 1200 patients from May 2012 through July 2018 at twenty-seven national and international institutions. Of the 1200 subjects, 917 had early-stage invasive ductal carcinoma, 208 had ductal carcinoma in situ, 15 had invasive lobular carcinoma, 24 had mixed or other carcinomas, and 36 were unknown/not reported. All were treated with a single 20 Gy fraction of IORT using the Xofigo Electronic Brachytherapy System. The most recent follow-up visits in the analysis were in December 2019 due to more limited recent patient access from COVID-19 restrictions. Median patient age at time of treatment was 66 years with a range of 41 to 93 years. Median lesion size reported was 11mm. Median follow-up for all 1200 subjects treated is 3.1 years with a range up to 7 years.

Results: There were 34 ipsilateral recurrences reported. By type of primary cancer, there were 24 recurrences in 917 IDC patients, 9 recurrences among 208 DCIS patients and 1 recurrence in a patient with unknown/not reported type. Sorting by ASTRO category, there were 26 recurrences among 928 Suitable patients, 5 recurrences among 218 Cautionary patients, and 3 recurrences out of 49 Unsuitable patients. 5 patients without ASTRO classification had no recurrences. Kaplan-Meier analysis was performed on 1102 patients with follow-up times of 6 months or more.

Kaplan-Meier Estimated probabilities of ipsilateral recurrence at 3 years

1102 patients: 1.7% (95% CI 0.7%,2.7%)

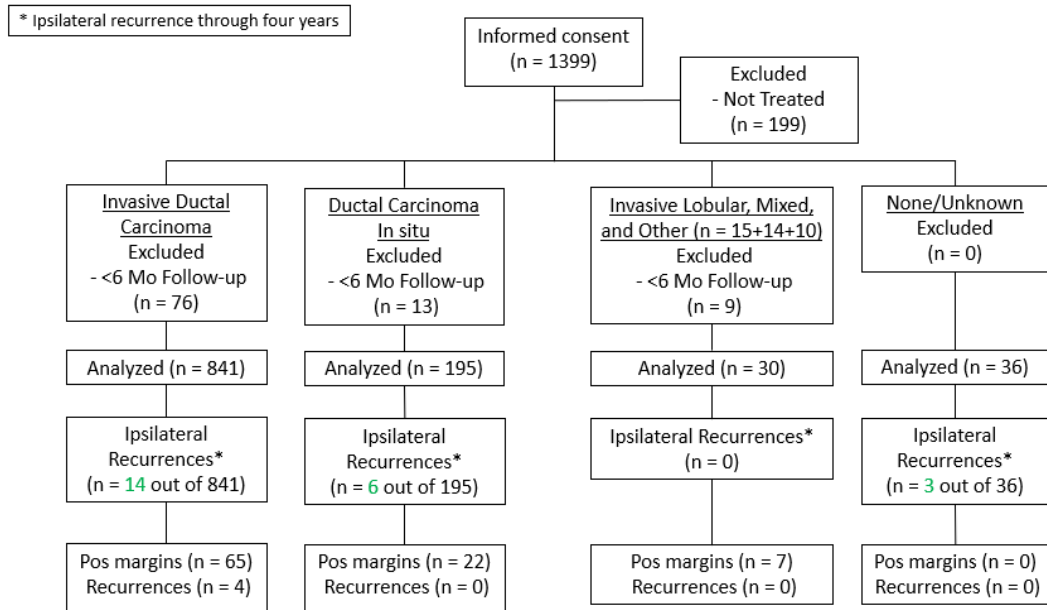
841 IDC patients: 1.7% (95% CI 0.7%,2.7%)

Kaplan-Meier Estimated probabilities of ipsilateral recurrence at 4 years

1102 patients: 2.9% (95% CI 1.5%,4.3%)

841 IDC patients: 2.6% (95% CI 1.2%,4.0%)

Conclusions: With a median follow-up of 3.1 years, 1200 early-stage breast cancer patients were treated with a single 20 Gy fraction of IORT to the lumpectomy cavity at the time of partial mastectomy using the Xofigo Axxent Electronic Brachytherapy System with an acceptable local recurrence rate.



188 - Utility of MRI for Surgical Planning in Patients with In-Breast Tumor Recurrence

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Background/Objective: Magnetic resonance imaging (MRI) for newly diagnosed breast cancer patients has been associated with changes to surgical management. However, the role of MRI in surgical planning for patients with in-breast tumor recurrence (IBTR) diagnosed by mammography, ultrasound, or clinical exam has not been defined. We aimed to determine whether MRI performed after IBTR diagnosis alters surgical planning.

Methods: A retrospective chart review of patients diagnosed with IBTR at a single institution from 1/2007-12/2019 was performed. Patients were excluded if their IBTR surgery was performed elsewhere, if they did not undergo surgery, or if IBTR was initially detected with MRI. Clinicopathologic information, MRI results, details of IBTR and initial and final surgical plan were collected. IBTR operative plan was defined as mastectomy (if prior lumpectomy for original BC); wide local excision (WLE, if prior mastectomy for original BC); or lumpectomy (if prior lumpectomy for original BC and lumpectomy also for IBTR). Chi squared and unpaired T-tests were used to compare those who did and did not undergo MRI in terms of clinicopathologic factors, multidisciplinary treatment, and change in surgical plan.

Results: Seventy-one of the 298 patients with IBTR met inclusion criteria and make up the study cohort. The mean age at IBTR was 58 years (range 32-90). A majority were ER+ (70.4%) and HER2- (85.9%) with invasive ductal histology (86.0%) and previously underwent lumpectomy for their original cancer diagnosis (62.0%). IBTR was diagnosed on average 3.5 years after original BC diagnosis. After pathological confirmation of IBTR, 33 patients (46%) underwent MRI. Patients who underwent MRI had a lower BMI ($p=0.01$) but were otherwise similar with respect to clinicopathologic factors including age

(p=0.09), race, histology (p=0.20), receptor status (p=0.28-1), and tumor size (p=0.37). Only 3 patients (9.1%) who had MRI required alteration of their surgical plans: identification of a contralateral BC; candidate for lumpectomy rather than requiring mastectomy; and identification of thick mastectomy flaps requiring completion mastectomy rather than WLE. No patients required change in their reconstructive plans as a result of MRI. MRI did not discover extensive local disease, chest wall involvement, or previously unknown additional sites of IBTR on MRI. The final IBTR breast operation was the same for patients who did and did not have MRI as part of their pre-operative work-up (p=0.17). Patients who underwent MRI trended toward longer time between diagnosis and surgery (129 versus 97 days, p=0.10). MRI was not associated with differences in neoadjuvant chemotherapy (p=0.44) or adjuvant radiation (p=0.34).

Conclusions: MRI ordered for additional assessment of patients with known IBTR does not impact the final surgical management in >90% of individuals. Prior data on the clinical utility of MRI after IBTR diagnosis is lacking, although MRI is often used in practice. Based on our results, routine breast MRI is not recommended for all IBTR diagnoses as it rarely alters surgical management and did not impact the order of treatment or multidisciplinary recommendations. MRI should be used selectively to further evaluate patient specific findings of clinical concern.

	All Patients (n=71)	Yes MRI (n=33)	No MRI (n=38)	p-value (y/n MRI)
Age (years)	58.0 ± 11.9	55.4 ± 10.3	60.2 ± 12.8	0.09
Race				
Asian	1 (1.4%)	1 (3.0%)	0 (0%)	N/A
African American	12 (16.9%)	6 (18.2%)	6 (15.8%)	
Caucasian	57 (80.3%)	26 (78.8%)	31 (81.6%)	
Hispanic	1 (1.4%)	0 (0%)	1 (2.6%)	
BMI	31.5 ± 9.3	28.8 ± 7.4	34.0 ± 10.2	0.01*
Histology				0.20
Ductal	61 (86.0%)	29 (87.9%)	32 (84.2%)	
Lobular	5 (7.0%)	2 (6.0%)	3 (7.9%)	
Other	5 (7.0%)	2 (6.0%)	3 (7.9%)	
Receptor status				
ER positive	50 (70.4%)	25 (75.8%)	25 (65.8%)	0.44
PR positive	35 (49.2%)	18 (54.5%)	17 (44.7%)	0.48
HER2 positive	10 (14.1%)	5 (15.2%)	5 (13.2%)	1
Triple-negative	18 (25.4%)	6 (18.2%)	12 (42.9%)	0.28
Size (cm), Pathological	2.03 ± 1.33	1.88 ± 1.43	2.17 ± 1.25	0.37
Original Breast Cancer Operation				1
BCT	44 (62.0%)	20 (60.6%)	24 (63.2%)	
Mastectomy	27 (38.0%)	13 (39.4%)	14 (36.8%)	
IBTR Operation				0.17
WLE	19 (26.8%)	12 (36.4%)	7 (18.4%)	
Lumpectomy	13 (18.3%)	4 (12.1%)	9 (23.7%)	
Mastectomy	39 (54.9%)	17 (51.5%)	22 (57.9%)	

189 - Favorable Tumor Immune Microenvironment and Better Survival Are Seen in Breast Cancer Patients with High Apoptosis

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Background/Objective: Tumor immune microenvironment plays a vital role in tumor biology, response to treatment and survival in breast cancer, although it is known to have less tumor infiltrating lymphocytes than other cancers. Apoptosis is a programmed cell death that releases immunogenic molecules and siphon immune cells. Our hypothesis is that breast cancer with high apoptosis is associated with favorable tumor immune microenvironment and hence better survival.

Methods: Clinico-pathological, tumor gene expression profile and survival data from the Molecular Taxonomy of breast cancer International Consortium (METABRIC) cohort (n=1904) and The Cancer Genome Atlas (TCGA) (n=1065) as a validation cohort was used and molecular subtype, Nottingham grade, AJCC stage, MKI67 expression, stromal cells, immune cell fraction, mutation related score of the tumor with high and low apoptotic pathways, was abstracted. Apoptosis score was determined by Gene Set Variation Analysis of Molecular Signatures Database Hallmark gene set and median cut-off was used to divide into high and low apoptosis groups. Standard analysis of overall survival (OS), disease-specific survival (DSS) and disease-free survival (DFS) were performed comparing high and low groups, using log-rank test.

Results: Breast cancer with high apoptosis was significantly associated with better DFS and OS, however, did not correlate with tumor subtype, pathological grade or stage. High apoptosis score was associated with low MKI67 expression that implies less cell proliferation; and high infiltration of fibroblasts, endothelial cells and adipocytes, and high lymphocyte infiltration and IFN- γ scores. High apoptosis significantly enriched signaling, and immune response-related gene sets, such as Inflammatory response, Allograft rejection, IFN- γ response and Complement, K-RAS, TNF A, TGF B signaling, consistently in both cohorts. It was also associated with high rate of silent and non-silent mutation as well as SNV neoantigens. In agreement, immune cells such as CD8, CD4 memory, dendritic cells, M1 and M2 macrophages were uniformly infiltrated in high apoptosis tumors consistently in both cohorts. Overall, cytolytic activity (CYT) was significantly elevated in high apoptosis group in both cohorts. There was no difference in apoptosis by response to neoadjuvant chemotherapy in both hormone positive and triple-negative breast cancer. All of 9 immune checkpoint molecules studied (PD-1, PD-L1, PDL-2, IDO1 and 2, CTLA 4, LAG3, BTLA, TIGIT) were uniformly elevated in high apoptosis breast cancer in both cohorts ($p < 0.001$). High apoptosis significantly correlated with high TIDE prediction score and Checkpoint Index ($p < 0.001$).

Conclusions: These results support our hypothesis that breast cancer with high apoptosis is associated with signaling- and immune response-related gene sets, high mutation and neoantigen, and immune cell infiltration with global cytolytic activity, which possibly explains that high apoptosis cancers have better DFS and OS.

190 - Extreme Oncoplasty: Outcomes From Breast Conservation Surgery in Women with Large, Multi-Focal, and Multi-Centric Tumors

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Background/Objective: Extreme oncoplasty is a breast-conserving operation using oncologic principles and plastic surgery techniques in a patient who, in most physicians' opinions, requires a mastectomy. Although breast surgeons are starting to add oncoplastic techniques to their armamentarium, oncoplastic breast surgery has not yet become a mainstream option available to all women diagnosed with breast cancer. The majority of literature for breast conservation is reported on lesions that are ≤ 50 mm. Women with lesions >50 mm, or those with multi-centric, or multi-focal disease are usually recommended to go straight to mastectomy. Our group has reported on a subset of patients who sought breast conservation despite recommendation for mastectomy. We propose that for selected patients, extreme oncoplasty can allow for successful resection of larger lesions (>50 mm), with clear surgical margins, without compromising recurrence or survival.

Methods: A total of 223 patients in a prospectively collected database with multi-focal, multi-centric, or locally advanced tumors that spanned >50 mm, treated with an oncoplastic breast-conserving surgery, were reviewed and considered the extreme oncoplasty group. These patients were compared to 668 patients in the standard oncoplasty group, which consists of patients with a unifocal lesions ≤ 50 mm treated with oncoplastic breast-conserving therapy. All patients underwent surgical resection with oncoplastic reconstruction using a standard or split wise pattern reduction and immediate contralateral mastopexy for symmetry, followed by whole-breast radiation therapy. Diagnostic work-up included digital mammography, ultrasound, and MRI in every patient. Average length of follow-up was 43 months. Extreme patients were offered a mastectomy as part of the informed consent discussion, but declined mastectomy and sought a breast-conserving alternative option. The patients were reviewed for tumor size, margin status, and local recurrence rate.

Results: The table details and compares the characteristics, recurrences, and breast cancer deaths with standard and extreme groups. Of note, the local and axillary recurrence rates are statistically similar in both groups. Because of the smaller span of the tumors in standard group, clear margins using "no ink on tumor" or 1mm as the definition were more frequently obtained in the standard group.

Conclusions: Historically, limited data are available for women with T3 lesions treated with breast-conserving surgery. Extreme oncoplasty is a promising concept. It allows successful breast conservation in selected patients with multifocal and/or multicentric tumors greater than 5 cm who might not be offered breast conservation. From a quality-of-life standpoint, extreme oncoplasty is a better option than the combination of mastectomy, reconstruction, and radiation therapy. The benefits include fewer operations, shorter hospital stays, and better self-image. As oncoplastic surgery becomes more popular nationally, extreme oncoplasty can be offered to select patients who otherwise would be undergoing mastectomy.

	Standard	Extreme	P Value
N	668	223	-
Ave Tumor Size	21.2 mm	74.0 mm	< 0.01
Ave Specimen Weight	117 gm	200 gm	< 0.01
No Ink on Tumor	97.9%	92.4%	< 0.01
Margin \geq 1 mm	91.2%	74.4%	< 0.01
No. Local Recurrences	17	5	See below
No Axillary Recurrences	4	1	See below
No Distant Recurrences	10	9	See below
Breast Cancer Deaths	3	1	See below
5-Year Probability Local Recurrence	2.26%	3.64%	0.80
5-Year Probability Axillary Recurrence	0.61%	0.46%	0.94
5-Year Probability Distant Recurrence	1.66%	7.81%	< 0.01
5-Year Probability Breast Cancer Death	0.85%	2.09%	0.79

192 - Virtual Multidisciplinary Tumor Boards: A Forced Innovation in Breast Cancer Care from the COVID-19 Pandemic

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Background/Objective: The COVID-19 pandemic necessitated drastic changes in health care. While some of these changes were detrimental, the pandemic has also provided increased learning opportunities. One such change at our institution was the transition from in-person to virtual multidisciplinary tumor board (MTB).

Methods: Our institution holds a weekly breast cancer MTB. This meeting of all relevant disciplines facilitates discussion of optimal disease management. At each meeting, attendance is tracked by profession. Before the COVID-19 pandemic, MTB was held in person. At the start of the COVID-19 pandemic, we changed our MTB to a virtual format via Zoom. We compared attendance in 2019 and pre-COVID at in-person MTB to post-COVID virtual MTB held via Zoom.

Results: Pre-COVID in-person MTB had a mean attendance of 11.67. Post-COVID, virtual tumor board attendance increased, with a mean of 18.1, $p < 0.0001$. Attendance by surgeons, radiologists, and radiation oncologists did not show a statistically significant change. There was a statistically significant increase in attendance by pathologists, mean 1 vs. 1.61, $p < 0.0001$, medical oncologists, mean 1.24 vs. 2.1, $p < 0.0001$, and non-physician participants, mean 4.47 vs. 9.65, $p < 0.0001$.

Conclusions: The change to virtual MTB format at our institution has improved weekly conference attendance. The most significant increase in participation was seen among non-physician participants. Further research is needed to evaluate the effect of a virtual MTB format on patient outcomes.

194 - Ozone Therapy as a Novel Potential Approach in Patients with Severe Granulomatous Mastitis Is Associated with an Improved T-helper-1 Response

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Background/Objective: Idiopathic granulomatous mastitis (IGM) is known as a chronic benign disorder that can mimic breast cancer. In recent studies, immunological dysfunction has been suggested to play a major role in pathogenesis of IGM. Furthermore, the therapeutic potential of ozone therapy has been previously shown in autoimmune rheumatic diseases and has recently been reported as a potential novel approach to treat COVID-19 patients. We recently have demonstrated that ozone therapy was effective, tolerable and safe especially in patients with steroid-resistant granulomatous mastitis. In this study, we aimed to assess the differential intracellular cytokine expressions in different T-lymphocyte subsets in regard to clinical efficacy of ozone therapy in severe idiopathic granulomatous mastitis.

Methods: Between November 2019 and June 2019, 10 patients with biopsy-verified granulomatous mastitis having negative microbiological cultures or RT-PCR for tuberculosis and who do not desire a steroid therapy were included into the study. Ozon therapy included oxygen-ozone immunocutaneous therapy by major ozone Autohemotherapy (AHT) (n=7) and/or rectal ozone insufflation (n=3) sessions depending on patient's response and therapy compliance. Clinical response was evaluated by physical exam and/or radiology including ultrasound or magnetic resonance imaging before and after the therapy. Peripheral blood T lymphocyte subsets (CD8+, CD4+, CD127-CD25+CD4+) were analyzed for intracellular cytokine expressions IFN- γ , TNF- α , IL-10 and TGF- β by flow-cytometry before and after 4 to 5 months following ozone therapy.

Results: Median age was 35 (range, 27-45). Significant clinical remissions were obtained in 6 patients following ozone therapy such as softening of inflamed breast tissue and total disappearance of discharge from cutaneous fistulas demonstrated by imaging work-up. However, 4 patients did not show any clinical remission to therapy (n=2) or developed recurrence in 2 months following remission. Ozone therapy induced elevated intracellular cytokine expressions of IFN- γ , and TNF- α , and decreased IL-10 expressions in CD4+ T-lymphocytes and decreased TGF- β expression in CD127-CD25+CD4+ and CD8+ cells ($p < 0.05$). Furthermore, patients responding to ozone therapy were more likely to have increased CD4 and CD8+ cells showing high levels of intracellular IFN- γ , and TNF- α expressions, and decreased TGF- β expression in CD127-CD25+CD4+ cells ($p < 0.05$).

Conclusions: Our results suggest that response to ozone therapy was associated with an improved T-helper-1 response inducing IFN- γ production and decreasing levels of TGF- β expression in CD127-CD25+CD4+ cells. Further studies are required to understand the immunological mechanisms underlying IGM and the therapeutic effect of ozone therapy as a promising potential novel therapeutic approach in severe IGM.

197 - Fluoroscopic Intra-Operative Neoplasm and Node Detection (FIND): A Comparative Trial with Needle Localization

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Background/Objective: Patients with non-palpable breast lesions opting for breast-conserving surgery are in need for image-guided pre-operative localization. Wire localization remains the standard to which novel non-wire devices are compared. It is a painful procedure accompanied by vasovagal events, risk of wire malposition and complex scheduling issues. The novel non-wire devices are not without disadvantages: the need for a second procedure, malpositioning of the device compared to the original clip, and high costs. Furthermore, in low-income communities and countries these devices are simply not available. In this paper, we present our institute's experience with fluoroscopy-guided intraoperative localization, a low-cost procedure that obviates the need for a preoperative procedure, hypothesizing its equivalence with wire-guided localization in terms of re-excision rate.

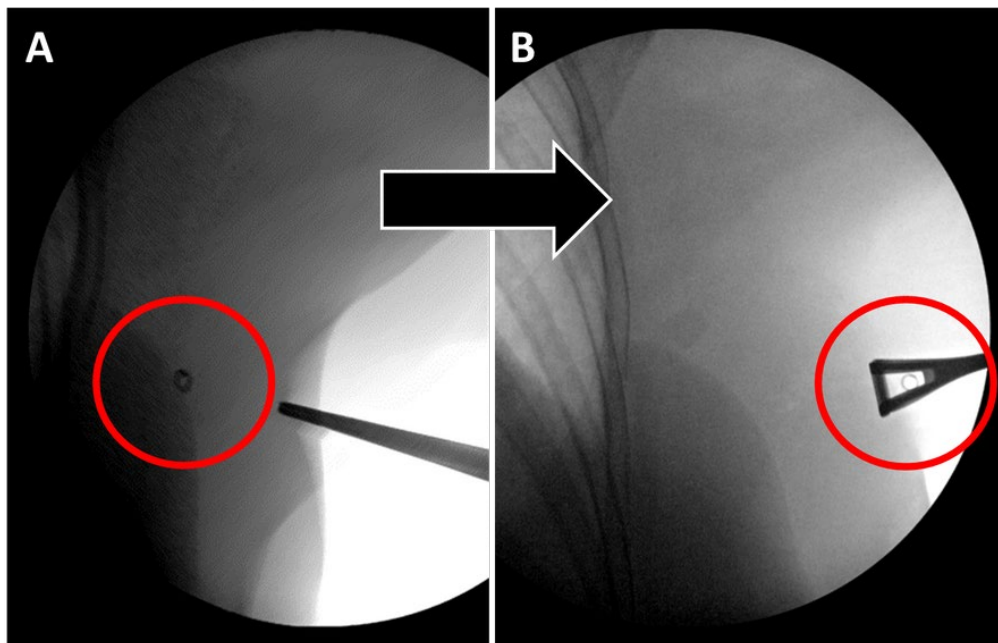
Methods: This is a single institute retrospective study from September 2016 to May 2020. Electronic chart review identified lumpectomy and axillary procedures necessitating lesion localization. We limited our search to patients with a single lesion for localization. All excisions were guided either by preoperative needle localization or intraoperative fluoroscopy (Figure). Patient, lesion histology, procedure, and outcome data were collected and compared between techniques. Statistics for categorical variables were done using chi-square test.

Results: We identified 125 patients, 31.2% of which underwent fluoroscopy-guided lumpectomy and 68.8% underwent wire-guided lumpectomy. The fluoroscopy group had a mean age of 64 (± 13.6) years and the wire-guided group 62.5 (± 11.8) years. Mean surgery time for the fluoroscopy group was shorter than for the wire-guided group (115 \pm 47 versus 132 \pm 56 minutes, respectively). Specimen weight was also lower in the fluoroscopy group. Out of the 82 patients who underwent lumpectomy for a malignant lesion, final positive margins were found in 9.1% (2 of 22) of the fluoroscopy group and 20% (12 of 60) in the wire-guided group ($p=0.3$), and re-excision was performed in 2 fluoroscopy patients (9.1%) and 7 wire-guided patients (11.7%). Of the cohort, there were 9 patients who underwent axillary lymph node localization, 4 using fluoroscopy and 5 using wire-guidance. All cases had a successful retrieval of the clipped node.

Conclusions: Fluoroscopy is a feasible, affordable and available technique for intra-operative localization of breast and axillary lesions. Compared to the standard of care needle localization it has a tendency towards improved OR time, margin negativity, and is equal in re-excision rate. It offers surgeons an additional skill, especially needed when the use of novel localization devices is cost-prohibitive, and offer patients a painless and effortless experience, especially for those requiring multiple lesions localized.

Figure. Fluoroscopy-guided localization of a ring clip (marked by red circle) in a left axillary lymph node.

A. Clamp pointing and localizing clip; B. Babcock grasping the clipped node



200 - Short-Term Impact of the COVID-19 Pandemic on Management of Estrogen Receptor-Positive Breast Cancer Patients in a Midwestern Rural State

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Background/Objective: The COVID-19 pandemic led multiple national organizations to endorse triage guidelines for breast cancer patients based on local COVID-19 disease burden and hospital resources. We studied the short-term impact of the pandemic on the presentation and treatment of patients with ER+ cancers in a rural state with a low COVID disease burden during the study period.

Methods: All patients with newly diagnosed ER+, Stage 0-III breast cancer first seen or diagnosed between February 15 and August 21, 2020 at 1 community and 1 academic institution were identified by retrospective chart review. A total of 76 patients were identified. The early cohort (February – May; N=40) were seen during the period of state mandated cessation of elective surgery, while surgery schedules had normalized for the late cohort (June - August, N=36). Patient and tumor characteristics, type and timing of surgical treatment, chemotherapy, and endocrine treatment were compared between the cohorts. Chi-squared or Fisher's exact tests were used to compare categorical variables and Wilcoxon rank sum tests were used to compare continuous variable between the time periods.

Results: There was no significant difference between cohorts in age, clinical T stage, and HER2 receptor status. The early cohort had more cN1, cN2 disease (15% vs 0% and 3% vs 0% respectively, $p=0.02$)

clinical Stage II patients (45% vs 14%, $p=0.01$) and fewer patients eligible for breast conservation (BCT) (32% vs. 9%, $p<0.01$). Fewer patients chose BCT (48% v 17% $p<0.01$). Treatment choice was affected by the pandemic for 50% of the early and 0% of the late cohort ($p<0.01$). Patients in the early cohort were more likely to receive neoadjuvant endocrine (22% vs 0%, $p<0.01$) and chemotherapy (17% vs 0%, $p=0.01$), more likely to undergo mastectomy (53% vs 17%, $p<0.01$), and had a longer time to surgery (mean, 10.8 weeks vs 4.8 weeks, $p<0.01$). Rates of reconstruction were similar (57% vs 67%, $p=1.0$), but fewer patients in the early cohort had bilateral mastectomy (14% vs 67% of mastectomy patients, $p=0.02$). There was no difference in use of genomic testing (25% vs 22%) or adjuvant chemotherapy (28% vs 17%, $p=0.26$).

Conclusions: Lack of access to surgery during the early pandemic likely contributed to increased use of neoadjuvant treatment, longer time to surgery, and decrease in bilateral mastectomy. Higher clinical stage at presentation for early pandemic patients is concerning for a delay in diagnosis or treatment in patients with early-stage disease. Overall, we found that there were significant differences among patients with ER+ breast cancer treated early versus later in the COVID-19 pandemic, even in a state with low COVID rates.

201 - Presentation, Management, and Outcomes of Very Young Women with Breast Cancer (Age <30) Compared to Other Pre-Menopausal Women

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Background/Objective: Previous studies have shown that premenopausal women present more often with aggressive breast cancer and have a higher risk of recurrence than their older counterparts. However, little is known about very young women (<30 years) with breast cancer and whether their risk factors, presentation and outcomes vary from other premenopausal women. Using our institutional experience, we compared very young women with breast cancer (<30 years) with older premenopausal women (30-46 years) to identify differences in patient and disease characteristics, treatment and outcomes.

Methods: Retrospective chart review of premenopausal women between ages 18 to 46 with Stage 0-4 breast cancer were evaluated at a single academic institution between 1998-2020 was performed. Patient and tumor characteristics, treatment, and time to recurrence were examined with univariate analysis. Time to recurrence and death was analyzed for patients who presented with Stage 0-3 breast cancer using stepwise Cox regression analysis.

Results: Thirty-seven very young women (<30 years) and 442 young premenopausal women (30-46 years) were included. Very young women were more likely to be Black (18.9% vs 4.5%, $p=0.003$), present with a mass (75.7% vs 55.2%, $p=0.016$) and have tumors that were ER-negative (62.2% vs 38.8%, $p<0.0001$), HER2-positive (32.6% vs 21.7%, $p=0.001$), and advanced stage (Stage 3: 13.5% vs 8.6%, Stage 4 10.8% vs 3.8%, $p=0.008$). They were also more likely to have a history of pregnancy at or within 1 year of diagnosis (28.6% vs 5.6%, $p=0.001$) and less likely to have a family history of breast cancer (30% vs 50%, $p=0.03$). The rate of genetic testing and deleterious mutation was similar in the 2 groups, with negative testing in 60.7% and 72.6%, respectively ($p=0.212$). There was no significant difference in

mastectomy rate (56.8% vs 53.7%, $p=0.902$) or receipt of radiation (67.7% vs 65.1%, $p=0.567$). Very young women were more likely to receive chemotherapy (85.3% vs 67.9%, $p=0.034$) and less likely to receive antiestrogen therapy (43.2% vs 59.3%, $p=0.082$). At 4 years average follow-up, very young women had a higher rate of all-site breast cancer recurrence (42.3% vs 21.7%; $p=0.027$). Cox regression analysis controlling for patient, tumor, and treatment factors found that younger women had a shorter time to first recurrence than older premenopausal women (OR = 2.37 [1.07-5.25]; $p=0.034$). No association between age group and mortality was observed.

Conclusions: Very young women with breast cancer were not more likely to have genetic mutations or familial breast cancer than older premenopausal women, but did have other significant differences in demographics, risk factors, and disease characteristics. They presented more often with late stage, high-risk disease, and had worse outcomes even after correcting for differences at presentation.

203 - Anatomic Location of Tissue Expander Placement Does Not Delay Adjuvant Therapy in Women with Breast Cancer

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Background/Objective: Two-stage breast reconstruction with initial placement of tissue expanders and subsequent placement of permanent implants is a common breast reconstruction technique. Locations for tissue expander placement include pre-pectoral (anterior to the pectoralis muscle) and retro-pectoral (posterior to the pectoralis muscle). Historically, tissue expanders were placed retro-pectoral. Recently, there has been a national increase in the proportion of patients undergoing pre-pectoral implant-based breast reconstruction. The impact of location of tissue expander placement on delay to initiation of adjuvant treatment is unknown.

Methods: Retrospective review of women undergoing mastectomy followed by adjuvant radiation or chemotherapy at a single institution between January, 2014 through July, 2020. Women were divided into 3 groups: (1) pre-pectoral tissue expander (TE), (2) retro-pectoral TE, and (3) no immediate reconstruction. Patients who underwent immediate autologous reconstruction were excluded from this analysis. A treatment delay was defined as a greater than 8-week interval between TE placement and initiation of adjuvant therapy. Multivariable logistic regression was used to assess differences in the proportion of women who had time delays to start of adjuvant therapy for the 2 TE placement locations.

Results: A total of 639 women met inclusion criteria. The median age was 51.2 years (IQR 43.7-64.0). There were 207 (32%) women who underwent TE placement, and 432 (68%) had no immediate reconstruction. Of the 207 women who underwent TE placement, 84 (41%) had pre-pectoral placement, and 122 (59%) had retro-pectoral placement. Ninety-nine percent received adjuvant radiation therapy; 80% received adjuvant chemotherapy. The median time to adjuvant therapy was 49.5 days (IQR 40-64); no reconstruction 47 days (IQR 38-60); pre-pectoral 57 days (IQR 46-7), retro-pectoral 55 days (IQR 43-74). Time delays longer than 8 weeks between initial TE placement and start of adjuvant therapy was observed in 35% of women: no reconstruction 28.5%; pre-pectoral 51.2%; retro-pectoral 45.9%.

Self-reported smoking status: 14% current smokers; 24% former smokers; 62% never smoked. Current smokers were more likely to have a delay to adjuvant therapy than never smokers (OR 2.63, 95%CI 1.49-4.64, p<.001). Surgical site infection occurred in 12% of patients and 5% experienced mastectomy skin flap necrosis. Five women had an infection during radiation. Four women had nipple necrosis. Of 207 women with TE placement, 43 (21%) required premature TE removal. TE placement was associated with a delay to adjuvant therapy when compared to no reconstruction (OR 2.83, 95%CI 1.98-4.13, p<.001). Location of TE did not impact the odds of having a delay to treatment. On multivariable analysis, having reconstruction and being a current smoker were the only variables found to cause a delay to adjuvant therapy.

Conclusions: Immediate TE placement for staged implant-based breast reconstruction was associated with a delay in adjuvant therapy; however, anatomic location of TE placement was not associated with this time delay. Current smoker status was predictive of a time delay to adjuvant therapy. The functional and aesthetic technique of pre-pectoral placement of a tissue expander does not correlate with a delay in therapy as compared to retro-pectoral placement. Future studies are recommended to further delineate impact on therapy.

Table. Clinical characteristics and delay to adjuvant treatment

	Delayed (N=222)	Not delayed (N=417)	Total (N=639)	p value
Race				0.164
Unknown	1 (0.4%)	3 (0.7%)	4 (0.6%)	
African American	70 (31.7%)	96 (23.2%)	166 (26.1%)	
American Indigenous	1 (0.5%)	0 (0.0%)	1 (0.2%)	
Asian	3 (1.4%)	8 (1.9%)	11 (1.7%)	
Native Hawaii	1 (0.5%)	2 (0.5%)	3 (0.5%)	
Other	1 (0.5%)	4 (1.0%)	5 (0.8%)	
White	145 (65.6%)	304 (73.4%)	449 (70.7%)	
Tobacco History				<0.001
Unknown	8 (3.6%)	9 (2.2%)	17 (2.7%)	
Current cigarette smoker	46 (21.5%)	41 (10.0%)	87 (14.0%)	
Previous use	50 (23.4%)	98 (24.0%)	148 (23.8%)	
Never smoked	118 (55.1%)	269 (65.9%)	387 (62.2%)	
BMI				0.992
N	221	414	635	
Mean (SD)	29.6 (6.5)	29.6 (6.7)	29.6 (6.6)	
Median	28.7	28.8	28.8	
Q1, Q3	24.3, 33.5	25.0, 33.4	24.9, 33.5	
Range	(17.0-57.3)	(16.3-63.4)	(16.3-63.4)	
Diabetes				0.269
Unknown	4 (1.8%)	5 (1.2%)	9 (1.4%)	
No	196 (89.9%)	358 (86.9%)	554 (87.9%)	
Yes	22 (10.1%)	54 (13.1%)	76 (12.1%)	
Clinical Stage				0.568
Unknown	29 (13.1%)	54 (12.9%)	83 (13.0%)	
Not applicable	0 (0.0%)	2 (0.4%)	2 (0.3%)	
0	8 (4.1%)	11 (3.0%)	19 (3.4%)	

IA	22 (11.4%)	45 (12.5%)	67 (12.1%)	
IB	2 (1.0%)	5 (1.4%)	7 (1.3%)	
IIA	54 (28.0%)	90 (24.9%)	144 (26.0%)	
IIB	56 (29.0%)	118 (32.7%)	174 (31.4%)	
IIIA	30 (15.5%)	49 (13.6%)	79 (14.3%)	
IIIB	14 (7.3%)	29 (8.0%)	43 (7.8%)	
IIIC	6 (3.1%)	5 (1.4%)	11 (2.0%)	
IV	1 (0.5%)	9 (2.5%)	10 (1.8%)	
Pathologic stage				0.338
Unknown	8 (3.6%)	2 (0.5%)	10 (1.6%)	
0	23 (10.7%)	34 (8.2%)	57 (9.1%)	
IA	22 (10.3%)	33 (8.0%)	55 (8.7%)	
IB	6 (2.8%)	16 (3.9%)	22 (3.5%)	
IIA	42 (19.6%)	79 (19.0%)	121 (19.2%)	
IIB	44 (20.6%)	116 (28.0%)	160 (25.4%)	
IIIA	59 (27.6%)	97 (23.4%)	156 (24.8%)	
IIIB	7 (3.3%)	12 (2.9%)	19 (3.0%)	
IIIC	10 (4.7%)	19 (4.6%)	29 (4.6%)	
IV	1 (0.5%)	9 (2.2%)	10 (1.6%)	
Reconstruction				<0.001
None	123 (55.4%)	309 (74.1%)	432 (67.6%)	
Tissue Expander	99 (44.6%)	108 (25.9%)	207 (32.4%)	
Infection during course of radiation				0.479
Unknown	6 (2.7%)	15 (3.6%)	21 (3.3%)	
Not applicable	0 (0.0%)	1 (0.2%)	1 (0.1%)	
No	215 (99.5%)	397 (99.0%)	612 (99.2%)	
Yes	1 (0.5%)	4 (1.0%)	5 (0.8%)	
Was there mastectomy skin flap necrosis				<0.001
Unknown	7 (3.2%)	17 (4.1%)	24 (3.8%)	
No	194 (90.2%)	390 (97.5%)	584 (95.0%)	
Yes	21 (9.8%)	10 (2.5%)	31 (5.0%)	
Was there nipple necrosis				0.728
Unknown	12 (5.4%)	12 (2.9%)	24 (3.8%)	
Not applicable	35 (15.8%)	52 (12.5%)	87 (13.6%)	
No	174 (99.4%)	350 (99.2%)	524 (99.2%)	
Yes	1 (0.6%)	3 (0.8%)	4 (0.8%)	
Tissue Expander Variables and Delay to Adjuvant Treatment				
	Delayed (N=99)	Not Delayed (N=108)	Total (N=207)	p value
Placement of tissue expander				0.418
Pre-pectoral	43 (43.9%)	41 (38.3%)	84 (41.0%)	
Retro-pectoral	55 (56.1%)	66 (61.7%)	121 (59.0%)	
SPY used intraoperatively				0.965
No	65 (66.3%)	70 (66.0%)	135 (66.2%)	
Yes	33 (33.7%)	36 (34.0%)	69 (33.8%)	

Single or bilateral tissue expanders				0.860
Single	47 (48.0%)	50 (46.7%)	97 (47.3%)	
Bilateral	51 (52.0%)	57 (53.3%)	108 (52.7%)	
Infection to the surgical site				0.009
No	68 (69.4%)	88 (84.6%)	156 (77.2%)	
Yes	30 (30.6%)	16 (15.4%)	46 (22.8%)	
Did the tissue expander need to be deflated				0.113
No	89 (94.7%)	91 (88.3%)	180 (91.4%)	
Yes	5 (5.3%)	12 (11.7%)	17 (8.6%)	
Premature removal of the tissue expander				0.058
No	68 (72.3%)	86 (83.5%)	154 (78.2%)	
Yes	26 (27.7%)	17 (16.5%)	43 (21.8%)	

205 - Post-Treatment Ultrasound vs MRI Use in Invasive Lobular Breast Cancer Patients Treated with Neoadjuvant Therapy

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Background/Objective: Invasive lobular carcinoma (ILC) has distinct clinical and histologic characteristics. Its larger size at diagnosis and diffuse, infiltrative growth pattern result in high re-excision rates ranging from 29-67%. This pattern also makes accurately estimating tumor size with imaging difficult. Neoadjuvant therapy (NAT) has been increasingly used to decrease tumor burden and reduce the frequency of incomplete surgery. For the surgeon, an accurate estimation of tumor size prior to surgery is important in determining the appropriate extent of surgical resection. However, the use of post-treatment ultrasound (US) versus magnetic resonance imaging (MRI) in these ILC patients treated with NAT remains unclear. Here, we evaluated the use of post-treatment US versus MRI and the accuracy of these modalities in measuring tumor size in ILC patients treated with NAT.

Methods: We queried a database of ILC patients treated at our institution from 1999-2020 and identified 173 patients who received NAT. This group was characterized according to their tumor receptor and biomarkers, histologic grade, stage of disease, NAT (chemotherapy versus endocrine therapy) received, post-treatment tumor size measured by US and MRI, and tumor size measured on surgical pathology. Data were analyzed with chi-squared tests, t tests, and Pearson's correlation using Strata 14.2.

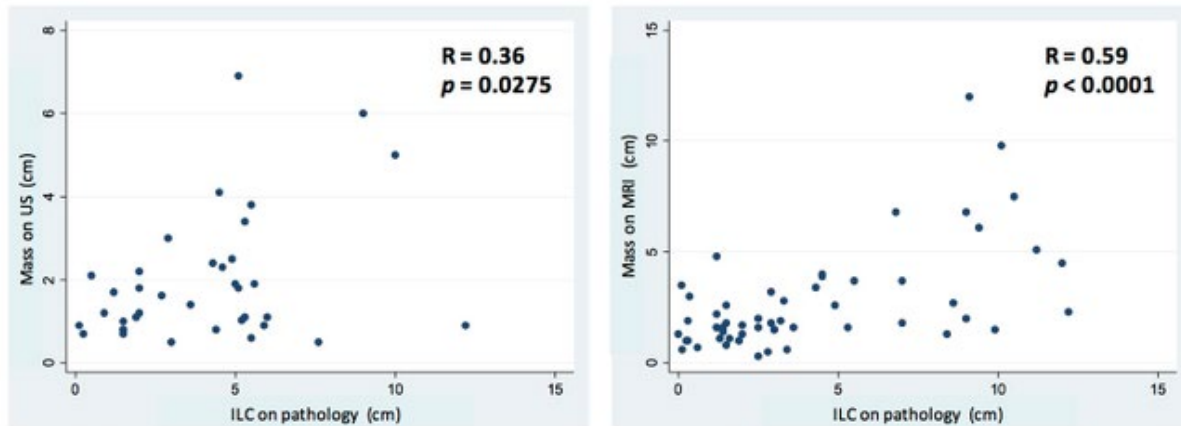
Results: In our study, 88.3% of patients were hormone-positive (58.3% ER+/PR+ and 30% ER+/PR-), 8.6% were HER2-positive, and 3.1% were triple-negative in receptor and biomarker expression. Node-positive patients comprised 49.4% of ILC NAT patients. The mean age of neoadjuvant chemotherapy patients was lower than neo-endocrine patients (53 years old vs 62 years old, $p < 0.001$). Significantly more patients received neoadjuvant chemotherapy (54.3% $n=94$, $p < 0.0001$) though a notable number of ILC patients received endocrine therapy as their primary NAT (45.1%, $n=78$). Endocrine therapy was favored in grade 1 ILC and Stage 1 disease, whereas neoadjuvant chemotherapy was more commonly used in grade 3 ILC and Stage 2 disease. Breast surgeons were more likely to obtain post-treatment MRIs in neoadjuvant chemotherapy patients as opposed to neo-endocrine patients (73.9% vs. 59.3%, $p=0.041$).

Conversely, providers were more likely to obtain post-treatment US in neo-endocrine patients compared to neoadjuvant chemotherapy patients (37.5% vs. 19.6%, $p=0.009$). The use of US remained low with only 48 of 173 (27.7%) patients completing a post-treatment US. Post-treatment MRI mass measurements significantly correlated with pathology tumor sizes ($R=0.59$, $p<0.0001$) and performed better than US measurements ($R=0.36$, $p=0.0275$). Despite the high frequency of MRI use, 62 of 173 (35.8%) patients had a positive margin at time of first surgical resection.

Conclusions: At our institution, ILC patients treated with neoadjuvant chemotherapy were younger, possessed intermediate or high-grade tumors, and presented at more advanced stages of disease than those treated with neo-endocrine therapy. Our breast surgeons most commonly ordered MRIs for post-treatment imaging, particularly in the neoadjuvant chemotherapy group. MRI was more accurate in estimating tumor size than US but still underestimated the extent of the tumor. This underestimation prior to surgery may contribute to a higher rate of positive margins.

Figure. Post-treatment MRI measurements more closely correlate with final surgical pathology of ILC compared to US measurements.

A. Tumor size measured by US compared to surgical pathology measurements; B. Tumor size measures by MRI compared to surgical pathology measurements



207 - Improving the Patient Experience for Women Undergoing Breast Surgery: Yes, There's an App for That, Too!

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Background/Objective: Many breast surgeries today are performed as outpatient procedures. While this improves efficiency for the health system, it also limits the opportunities for patients to communicate with their team during their peri-operative course. We developed ManageMySurgery-Breast (MMS-B, Higgs Boson, Inc, Durham, NC), a smartphone-based application that serves as a virtual patient navigator through all phases of the surgical journey, where patients can access educational resources about their

procedure and submit patient-reported outcomes (PROs) to track their symptoms and functioning. Here, we present initial results from the PRO survey administered to women undergoing breast surgery.

Methods: Patients from a single academic medical center were invited to the MMS platform from December 2018 to September 2020. PRO measures included the validated Patient-Reported Outcomes Measurement Information System[®] (PROMIS[®])-29 survey, which assesses 7 domains (physical function, anxiety, depression, fatigue, sleep disturbance, ability to participate in social roles/activities, and pain interference) with 4 questions per domain, and pain intensity with a single question. The response options use a 5-point Likert Scale, and there is one 11-point rating scale for pain intensity. Baseline and postop surveys (1 week, 1 month, and 3 months) were electronically pushed to patients via scheduled in-app notifications. Descriptive statistics for the surveys were calculated. Categorical variables were reported as numbers and percentages. Continuous variables were reported as means, standard deviation, and 95% confidence intervals. One-sample t tests were used to determine if significant changes from baseline occurred at the postop follow-ups.

Results: Of the 50 baseline surveys, 26 patients (52%) underwent lumpectomy, and 24 (48%) underwent mastectomy. For the 53 unique patients who completed at least 1 survey, survey completion rates decreased over time [baseline: N=50/53 (94.3%); post-op 1wk: N=22/49 (44.9%); 1mo: N=16/46 (34.8%); 3mo: N=12/37 (32.4%)]. Of the 27 patients with both a baseline and at least 1 post-op survey, 21 completed the survey at 1wk (77.8%), 16 at 1mo (59.3%), and 10 at 3mo (37%). Baseline scores for all 7 domains were similar for patients undergoing lumpectomy and mastectomy. At 1wk post-op, patients reported significant worsening in their ability to participate in social roles/activities, anxiety, pain interference, and physical function (all $p < 0.05$); there were no significant changes in depression, fatigue, or sleep disturbance. At 1mo post-op, the only domain that remained significantly altered from baseline was anxiety ($p < 0.01$). As expected, pain intensity scores were highest at 1wk post-op for both lumpectomy (mean score 3.75, 95% CI 2.31-5.19) and mastectomy patients (mean score 2.8, 95% CI 1.3-4.3), which represent significant changes from baseline ($p < 0.01$) that normalized by 1mo post-op ($p = 0.47$).

Conclusions: Tracking PROs via the MMS-B platform is feasible and demonstrates changes in the PROMIS-29 domains that are consistent with other studies. Incorporation of this tool into routine clinical care could help to identify patients who are not recovering as expected and may provide an opportunity to intervene earlier to improve outcomes. Work is ongoing to understand how to motivate sustained patient engagement, so that MMS-B can support patients along the entirety of their cancer journey.

208 - The Big 5 Personality Traits and Breast Cancer Surgery Choice - The WhySurg Study

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Background/Objective: To assess patient personality traits associated with choice for breast-conserving surgery (BCS), unilateral mastectomy (UM) or bilateral mastectomy (BM).

Methods: A cross-sectional survey of patient demographics, tumor factors, and a validated personality trait profile was distributed to the Army of Women volunteers who were aged 18-70 and underwent

breast cancer surgery between 2010 and 2020. The personality profile included the “Big 5” personality categories: extraversion, agreeableness, conscientiousness, negative emotionality, and open-mindedness. Analysis of Variance (ANOVA) with Tukey’s test compared personality traits among patients undergoing BCS, UM and BM. K-means clustering and a chi-square test were performed including patient age, family history, and cancer stage to determine if type of surgery chosen was associated with certain personality traits.

Results: A total of 2,148 women completed the survey, with 1,522 (70.9%) (BCS 676 (44.4%), UM 327 (21.5%), BM 519 (34.1%)) who reported their surgery choice and answered the personality trait profile. The mean age of participants was 50 years old with median year of surgery in 2014. There were significant differences in personality traits between the UM and BM patients, but not between the UM and BCS patients or BCS and BM patients. UM patients were found to be less assertive ($p=0.044$), more open-minded ($p=0.019$), more intellectually curious ($p=0.038$), and have higher aesthetic sensitivity ($p=0.012$) compared to BM patients. A 3-cluster solution was chosen, with each cluster including a mix of patient demographic and tumor factors and personality traits. Demographics and personality traits that defined clusters were age, negative emotionality (anxiety, depression, and emotional volatility), open-mindedness (intellectual curiosity, aesthetic sensitivity, and creative imagination), respectfulness, organization, and responsibility. Surgery type was similar across all 3 clusters (Table, $p=0.322$).

Conclusions: These data demonstrate UM patients are more open-minded and assertive (extraverted) than BM patients, but that personality types do not differ between BCS and BM patients or UM and BCS patients. When separating patients into distinct groups based on personality traits, surgery choice was similar between groups.

Table. Surgery type by cluster

	Cluster1	Cluster2	Cluster3
	N (%)	N (%)	N (%)
All Patients	451	646	425
Lumpectomy	191 (42.4)	295 (45.7)	190 (44.7)
Unilateral Mastectomy	105 (23.3)	143 (22.1)	79 (18.6)
Bilateral Mastectomy	155 (34.4)	208 (32.2)	156 (36.7)

209 - Effect of Complications on Outcomes in Breast Cancer Patients Treated with Mastectomy and Immediate Reconstruction

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 H. Lee Moffitt Cancer Center, Tampa, FL

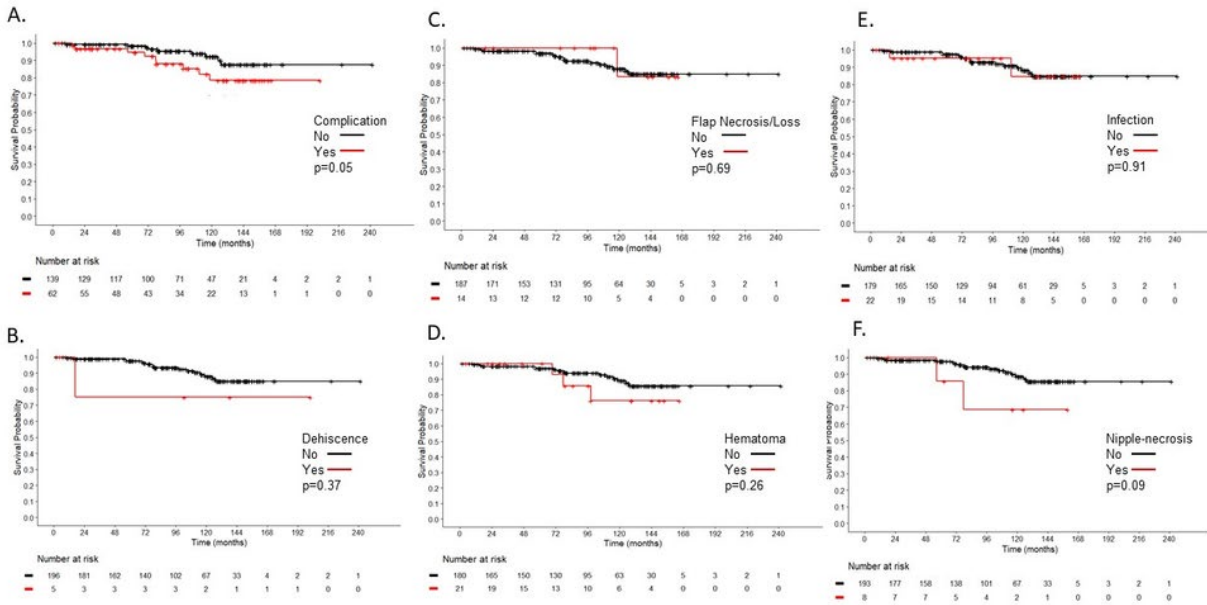
Background/Objective: Recent data for non-breast malignancies show operative complications influence recurrence rates. Rising mastectomy rates coupled with increased postoperative complications associated with reconstruction fuel concerns for poorer outcome. The goal of this study was to determine the effect of complications on recurrence in breast cancer patients.

Methods: A single-institution retrospective review was conducted of consecutive patients with first-time diagnoses of breast cancer and at least 5-year follow-up after mastectomy with immediate reconstruction. Overall survival and recurrence was compared between patients with immediate (<30 days) complications (infection, dehiscence, flap/nipple necrosis, hematoma, implant related) to those without using fisher-exact, chi-squared tests and cox-proportional hazard ratios.

Results: Of 201 patients (2007-2015), 149 had bilateral mastectomy, totaling 350 mastectomies. Sixty-two had nipple sparing, 43 of which were bilateral. Of the total 201 patients, 62 (30.8%) had any surgical complication. Patients with complications were older (52.1 years complication vs 49.4, $p=0.03$), but groups were otherwise similar for type of reconstruction (85.1% implant vs 14.9% tissue-based, $p=0.39$), current tobacco use, estrogen receptor (ER), progesterone receptor (PR), and HER2 positivity, and lymphovascular invasion (all $p>0.05$). Pathologic stage was similar between groups (overall $p=0.37$), with 96% having Stage 0,1, or 2 disease. Recurrence occurred in 18 (8.9%) patients: 4 local, 2 regional, and 12 distant; 13/18 (6.4%) had post-operative complications. Of 62 patients with any complication, 22 (19.3%) were infection, 5 (2.2%) had dehiscence, flap necrosis in 14 (7%), hematoma in 21 (18.4%), and nipple necrosis in 8 (7%). With median follow-up of 8.9 years, patients with complications trended towards having higher recurrence risk (Hazard Ratio (HR) 2.23, 95% confidence interval (CI) 0.88-5.63, log-rank $p=0.08$, cox regression $p=0.05$). This trend held most true for patients with nipple necrosis (HR 3.28, 95% CI 0.75-14.31, log-rank $p=0.09$, cox regression $p=0.06$), though this was not statistically significant. Patients with infections (HR 1.1, 95% CI 0.25-4.76, $p=0.9$), dehiscence (HR 2.45, 95% CI 0.32-18.41, $p=0.37$), hematomas (HR 2.01, 95% CI 0.58-6.94, $p=0.26$), and flap necrosis (HR 0.67, 95% CI 0.09-5.02, $p=0.69$) had similar recurrence-free survival (Figure). Higher-stage patients (HR 13.66, 95% CI 1.4-131.6, log-rank $p=0.03$), and those requiring adjuvant radiation (HR 2.78, 95% CI 0.98-7.9, log-rank $p=0.04$) were more likely to recur. Patients with complications had similar overall survival (HR 1.24, 95% CI 0.21-7.50, $p=0.81$) to those without.

Conclusions: Similar to other solid tumors, breast cancer patients with complications following mastectomy and immediate reconstruction trend towards higher recurrence risk, but unlike other malignancies, do not have lower overall survival. This finding may be due to the overall improved breast cancer prognosis compared to non-breast malignancies such as lung, colorectal or gastric cancer.

Figures. Recurrence-free survival in breast cancer patients undergoing mastectomy with immediate reconstruction and A) any complication, B) dehiscence, C) flap necrosis or loss, D) hematoma, E) infection, or F) nipple-necrosis



210 - Impact of 2012 World Health Organization Pathology Grading Criteria on the Diagnosis of Phyllodes Tumor on Core Needle Biopsy

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Background/Objective: Fibroepithelial (FE) lesions of the breast include fibroadenomas (FA) and phyllodes tumors (PT), which can be difficult to differentiate on core needle biopsy (CNB). In July 2012, the World Health Organization (WHO) issued updated criteria for diagnosis and grading of PT. Prior studies have found that implementation of these criteria is associated with an increase in the proportion of FE lesions diagnosed as PT on surgical excision. However, the impact on CNB assessment is unknown. We reviewed our experience to determine whether the proportion of PT diagnosed on CNB changed after implementation of the guidelines in 2012. We also examined the impact on accuracy of CNB in diagnosing PT on surgical pathology (SP).

Methods: A single-institution retrospective review was conducted on all breast CNB reports from January 2008 to December 2018 containing the words FE, FA, or PT. CNB results, surgical excision rates and final pathology results prior to & after July 2012 were compared. Concordance between CNB results and SP was assessed.

Results: We identified 486 patients with 536 FE lesions on CNB: 443 FA (82.6%), 10 PT (1.9%), 49 FE-favor FA (9.1%) and 34 FE-favor/cannot exclude PT (6.3%). After 2012, the proportion of PTs on CNB remained

constant (1.4% vs. 2.0%, $p=1.00$), however the diagnoses of FE-favor FA and FE-favor/cannot exclude PT on CNB increased significantly (5.8% vs. 18.8%, $p<0.01$). Surgical excision was performed for 12.2% of FA, 14.3% of the FE-favor FA, 85.3% of FE-favor/cannot exclude PT and 90% of PT found on CNB. Rates of surgical excision were similar before and after 2012 (15.9% vs. 19.3%, $p=0.37$). On SP, an additional 19 PTs were diagnosed, in 9.2%, 14.3% and 44.8% of those with CNB of FA, FE-favor FA and FE-favor/cannot exclude PT, respectively. There was no difference in the proportion of PTs diagnosed on excision before or after July 2012 (31.8% vs. 27.3%, $p=0.68$). The overall rate of discordance between CNB results and SP was 19.2% and was not different between the time periods ($p=0.76$). None of the PTs found on CNB were downstaged to FE/FA on SP.

Conclusions: After implementation of the 2012 WHO criteria, the use of FE in CNB diagnoses significantly increased. However, this did not change surgical excision, accuracy of CNB, or PT rates. A significant proportion of PTs cannot be diagnosed definitively on CNB, and surgical excision should be considered for equivocal pathology.

212 - Impact of Re-Excision For Positive Margins Following Partial Mastectomy on Patient-Reported Outcomes

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Background/Objective: Patients with breast cancer may undergo re-excision for positive margins based upon SSO/ASTRO consensus guidelines following breast conserving surgery. With little understanding of how re-excision impacts patient experience, the present study aimed to assess the impact on quality of life and patient satisfaction metrics among patients who undergo re-excision for positive margins following a partial mastectomy.

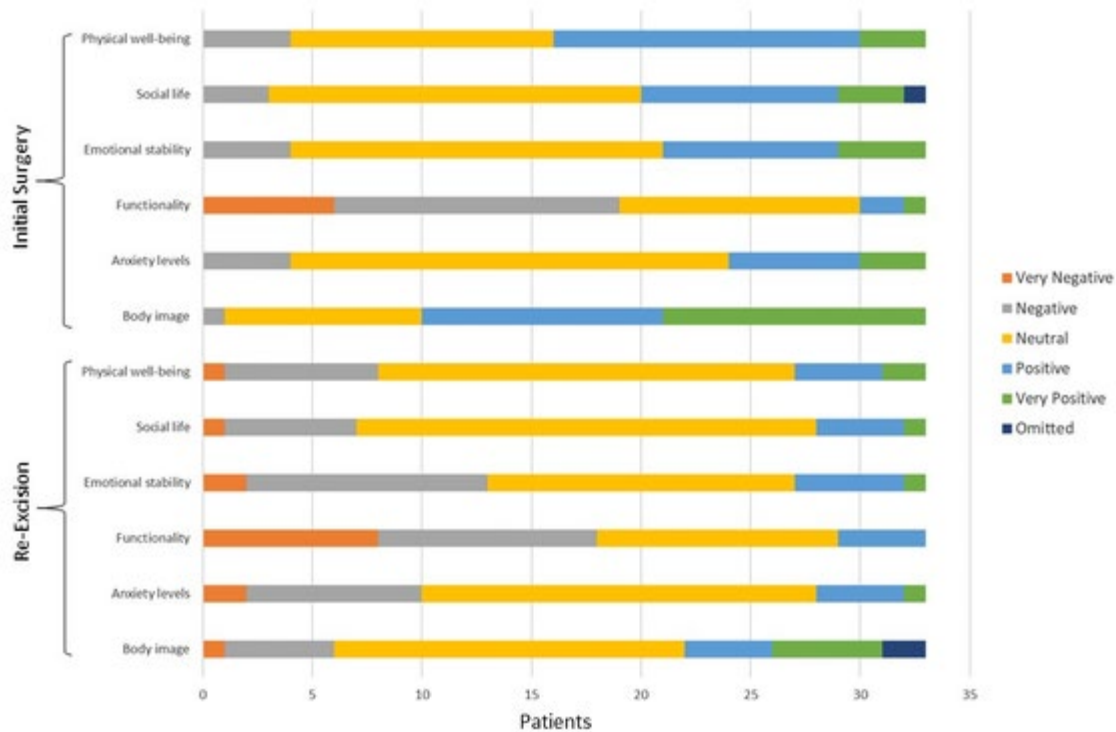
Methods: We retrospectively surveyed patients (≥ 18 years old) who underwent partial mastectomy followed by re-excision for positive margins at a single institution from March 2017 to November 2018. Patients were contacted either via email or phone depending upon available contact information on up to 3 occasions to complete the study. Quality of life and patient satisfaction were assessed using a Likert-scale based survey that queried information related to quality of life, anxiety, body image, and satisfaction with care and surgical decisions. Patient outcomes were assessed for 2 distinct time frames: following surgery and following re-excision.

Results: Of the 87 patients with attempted contacts, 33 patients completed the survey (37.9% response rate). Variation in the quality-of-life measures (grouped by initial surgery and re-excision) is presented in Figure 1. When rating how re-excision impacted their wait time to further treatment (e.g. chemotherapy or radiation), 15.2% indicated a “negative” impact, 63.6% “neutral,” 3.0% “positive,” 3.0% “very positive” impact, and 15.2% reported “not applicable”. Overall, 27.3% reported that they were “dissatisfied” and 3.0% were “very dissatisfied” with their decision to have breast conservation surgery versus mastectomy. 33.3% endorsed a “neutral” response and 36.4% reported feeling “satisfied” with their decision to have breast conservation. When asked how their experience with re-excision impacted their satisfaction with their decision to have a partial mastectomy versus mastectomy, 3.0% reported a

“very negative” impact, 15.2% “negative,” 48.5% “neutral,” 12.1% “positive,” 15.2% “very positive,” and 6% did not respond.

Conclusions: In this study, considerable variation was observed in quality of life and surgical decision metrics following breast conserving surgery and re-excision for positive margins. Notably, fewer positive/very positive outcomes and more negative/very negative outcomes were observed following re-excision, compared to the initial surgery. Further initiatives should address patient experience with second surgeries in an effort to improve patient experience.

Figure. Level of impact of partial mastectomy and subsequent re-excision of positive margins on patient wellbeing



213 - Systematic Review of Patient Decision Aids for Breast Cancer Surgery Decision: How Do Patients Evaluate Tradeoffs Among Objectives?

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Background/Objective: Many breast cancer patients are faced with making a decision among several surgical treatment options. Making an informed decision necessitates that patients receive information on the risks and benefits of their surgical options so they can evaluate tradeoffs among their objectives. However, women frequently report not being completely informed about their treatment options prior to making a decision. There is a recent emphasis on shared decision making; use of decision aiding tools can result in increased dialog between physician and patient and can help inform patients about the

costs and benefits of viable treatments that meet their objectives. Decision aids have demonstrated reduced decisional conflict and improved patient knowledge and satisfaction with their surgery decision. The purpose of this study was to review and synthesize existing breast cancer surgical decision aids with a focus on describing how tradeoffs among objectives are evaluated to arrive at a decision among viable surgical options.

Methods: We conducted a systematic literature review to identify studies reporting patient decision aids designed for evaluating breast cancer surgical treatments. We searched MEDLINE and PubMed databases for titles that included the words, (“breast cancer” and decision and (surgery or surgical)). Inclusion criteria required full text published papers describing a decision aid that provided information about surgical treatment options and their outcomes regarding primary surgery. We reviewed studies reported in 3 decision aid review articles. We extracted and characterized the following elements: surgical treatments evaluated, patient objectives, method for characterizing patients preference for objectives, method for analyzing trade-offs, type of decision tool, mode of delivery, study design, specificity of oncologic data.

Results: We identified 108 articles in PubMed and 232 articles in MEDLINE. After removing duplicate articles, we reviewed 260 abstracts to identify those that report on a patient decision aid or decision-making tool. Full text review resulted in inclusion of 31 articles from the databases and 5 from the decision aid review papers, representing 24 decision-aids (n=3 multi-media, 4 video, 8 paper-based, 9 computer/web-based). Only 1 decision-aid was readily available on-line without requiring special access.

Conclusions: Decision aids increase communication between patient and physician and assist patients in making a surgical decision. One shortcoming of some breast cancer surgery decision aids is that the patient is provided with an abundance of information, but patients may not have the ability to process the information in a way that allows them to adequately evaluate the tradeoffs among objectives. Many decision tools incorporate values clarification exercises that rate the importance of objectives, but few ask patients to rank objectives to understand relative importance. We are aware of decision aids that do not appear in database searches; at least 1 requires society membership and does not explicitly evaluate tradeoffs. A decision analytic framework would provide a quantitative decision-aiding tool where patients weight objectives and explicitly evaluate tradeoffs, providing patients with a decision recommendation based on their values. Few of the published decision aids are readily available to surgeons for use. Increased surgeon access to these tools would facilitate greater shared decision making.

214 - Screening MRI Compliance Factors in Patients at High Risk for Breast Cancer

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Background/Objective: Breast magnetic resonance imaging (MRI) is the most sensitive of the available modalities to evaluate patients with breast cancer. The American Cancer Society currently recommends breast MRI screening as an adjunct to mammography in patients with a lifetime risk of 20% or greater chance of developing breast cancer. Several models are used to assess a patient’s lifetime risk. Patients with BRCA mutations have a lifetime risk of up to 45% to 75% of developing breast cancer. The Gail and

Tyrer-Cuzick (TC) models incorporate various risk factors, and are currently used to determine further imaging and guide risk-reducing interventions. However, the increased risk does not always correlate with patient compliance. The objective of this study is to assess the compliance of high-risk breast cancer patients in obtaining a screening MRI, and identify factors associated with increased or decreased compliance. Once identified, addressing these factors may lead to improved patient outcome.

Methods: A single institutional breast cancer database was used from our institution in this retrospective study. The number of screening MRIs and the number of high-risk patients were evaluated for each year. High risk patients were sub-categorized into patients with BRCA1/BRCA 2 mutations, Gail model with greater than 20% lifetime risk of developing breast cancer, and TC model with greater than 20% lifetime risk of developing breast cancer. Patients with prior history of breast cancer, and duplicate patients were excluded. Patient factors including race, insurance status, family history of cancer, and type of referring physician were taken into account.

Results: For 2017, 47.2% of total high-risk patients, 28.1% of expected patients with BRCA mutation, 25.8% of expected patients with Gail model greater than 20% risk, and 18.2% of expected patients with TC model greater than 20% underwent screening MRI within that year. For 2018, 22.8% of total high-risk patients, 30.0% of expected patients with BRCA mutation, 22.1% of expected patients with Gail model greater than 20% risk, and 12.9% of expected patients with TC model greater than 20% underwent screening MRI within that year. For 2019, 31.2% of total high-risk patients, 33.3.% of expected patients with BRCA mutation, 25.9% of expected patients with Gail model greater than 20% risk, and 15.6% of expected patients with TC model greater than 20% underwent screening MRI within that year. Among patients who were compliant with their screening imaging, a significant proportion of the MRIs ordered were from breast surgeons.

Conclusions: As predicted, compliance with screening MRI in patients determined to have a high risk for developing breast cancer in their lifetime is less than ideal. Factors that affected compliance include being referred for an MRI by a breast surgeon. Primary care physicians must emphasize the importance in adjunctive imaging for patients with high risk. Patients in the high-risk category must also be encouraged early on to follow up with a breast surgeon or breast cancer specialist in order to better guide for improved detection and possible risk-reducing interventions.

215 - A Study Assessing and Comparing African-American College and Medical Students' Knowledge and Attitudes Toward Breast Cancer and Breast Cancer Awareness

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Background/Objective: The purpose of this study is to assess and compare African-American college and medical students' knowledge and interest in breast cancer and breast cancer awareness. The outcome

from this study will allow for the development of population-specific programs in an attempt to combat health disparities through an educational framework.

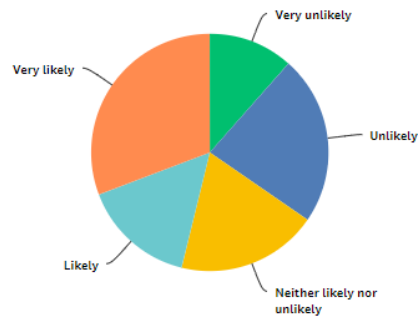
Methods: Participants were made aware of the survey via distribution from members of the Student National Medical Association (SNMA), Minority Association of Pre-medical Students (MAPS) and interpersonal communication. The survey consisted of objective data detailing level of education, ethnicity/race, age and gender. There were 4 knowledge-based questions on incidence, mortality and breast cancer survivorship and 3 questions that addressed attitudes toward breast cancer awareness and screening. There were a total of 55 responses excluding 1 response given by a resident physician. 26 respondents identified as African-American/Black from which the data was analyzed.

Results: Among the 26 African-American participants, 15 were college students and 11 were medical students. The average overall scores for college and medical students were 50% and 59% respectively regarding questions on breast cancer mortality, incidence and cause-specific survivorship. The lowest score within the medical student group was 25% and the highest score 100%. The lowest score within the college student group was 0% with the highest score 75%. Both groups demonstrated a greater knowledge on breast cancer mortality with an average score of 91% and 80%. The college students outperformed the medical students regarding age specific incidence of breast cancer with an average score of 73% to 55%. The results provided by the African-American students showed that 46.1% knew someone with breast cancer. Although 88% strongly agreed that breast cancer awareness is important, 7.69% strongly disagreed. Less than 50% of the African-American participants were very likely or likely to ask a family member if they had been screened for breast cancer.

Conclusions: African-American women have the highest mortality rate of any ethnic group in the United States and the lowest cause-specific 5-year survival from breast cancer. Education has been identified as a contributing factor in health disparities between Non-Hispanic whites and Non-Hispanic blacks. Though education has been identified as a contributing factor in health disparities within breast cancer, there is not a large pool of data assessing the knowledge and attitudes of uneducated or educated African-Americans regarding this subject. Larger studies would serve as a gap analysis to determine topics to be targeted for the development of breast cancer education and awareness programming serving this population. Future directions include determining how earlier, targeted breast cancer awareness and education programs affect mortality and survivorship in African-American women.

How likely are you to ask a family member the following: "Have you been screened for breast cancer?"

Answered: 26 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very unlikely	11.54%	3
Unlikely	23.08%	6
Neither likely nor unlikely	19.23%	5
Likely	15.38%	4
Very likely	30.77%	8
TOTAL		26

216 - Breast Recovery After Surgery: Subgroup Analysis of Pectoral Blocks

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Background/Objective: Enhanced Recovery After Surgery protocols have shown to optimize unpleasant surgical side effects. The majority of breast surgery has become outpatient, but the idea has led to initiatives to decrease the use of opioids. In this institution, a Breast Recovery after Surgery (BRAS) protocol was initiated in February 2017 and observed a decrease in opioid use. The protocol includes pectoral I and II blocks. We aimed to perform a subgroup analysis among BRAS patients with respect to the type of anesthetic used for the pectoral blocks.

Methods: This retrospective chart analysis of all BRAS patients, from February 1, 2017, to June 30, 2019, compared the type of anesthetic used in pectoral blocks performed intraoperatively. All pectoral blocks were either liposomal bupivacaine, ropivacaine, or bupivacaine. The anesthesiologist determined the type of anesthetic used. Patients with chronic pain not associated with chemotherapy were excluded from the analysis. We used Chi-squared and Kruskal-Wallis testing to compare total oral morphine milligram equivalents (MME), length of stay (LOS, hours), and pain score as well as patient, disease, and care characteristics. A Bonferonni correction was used for pairwise comparisons.

Results: A total of 417 BRAS patients received pectoral nerve blocks within the chart review period. There was a significant association between anesthetic used for the pectoral block and LOS ($p < 0.005$, Table), pain score ($p < 0.005$), and Total OMME ($p < 0.05$). Specifically, ropivacaine was associated with a significantly reduced LOS ($p < 0.005$) and Total OMME ($p < 0.005$) compared to bupivacaine. In addition, patients given ropivacaine had significantly lower pain scores than those given liposomal bupivacaine ($p < 0.005$). All other pairwise comparisons were not significant ($p > 0.05$). Concerning patient characteristics, there was a significant association between anesthetic used and age, patients taking antidepressants, malignant cases, and unilateral cases ($p \leq 0.0399$). Specifically, the ropivacaine group

had older patients than those given liposomal bupivacaine ($p < 0.05$) and a lower proportion of patients taking antidepressants ($p < 0.05$). In addition, there were a higher proportion of malignant and unilateral cases for the ropivacaine group compared to the other 2 anesthetics ($p < 0.05$).

Conclusions: The results exhibited that with the implementation of the collective BRAS protocol, a significant association existed between outcomes and anesthetic used for pectoral nerve blocks. Specifically, the use of ropivacaine was associated with the best outcomes, and bupivacaine could be excluded for use in pectoral blocks; however, more research is needed regarding the patient's pain control and opioid consumption while recovering at home.

Table. Outcome comparisons by block type

Variable	Ropivacaine (n=200)	Liposomal Bupivacaine (n=148)	Bupivacaine (n=69)	p-value
Length of Stay (hrs)	2.6 (2.0-12.8)	3.2 (2.3-17.3)	3.3 (2.5-18.8)	0.0015
PACU Pain Score (Highest)	3.0 (0.0-6.0)	5.0 (2.0-7.0)	4.0 (0.0-8.0)	0.0012
TOTAL Oral MME	45.0 (30.0-60.0)	60.0 (30.0-82.5)	45.0 (30.0-103.4)	0.0104
Intra-Op Oral MME	30.0 (15.0-45.0)	30.0 (15.0-60.0)	30.0 (30.0-60.0)	0.2241
PACU Oral MME	0.0 (0.0-15.0)	7.5 (0.0-30.0)	7.5 (0.0-30.0)	0.0078
Post-PACU Oral MME	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.0 (0.0-16.9)	0.0001

Note: Continuous Data presented as median (Q1-Q3); Missing data excluded from analyses on a test-by-test basis;

217 - Impact of COVID-19 Pandemic on Breast Cancer Stage at Diagnosis, Presentation, and Patient Management

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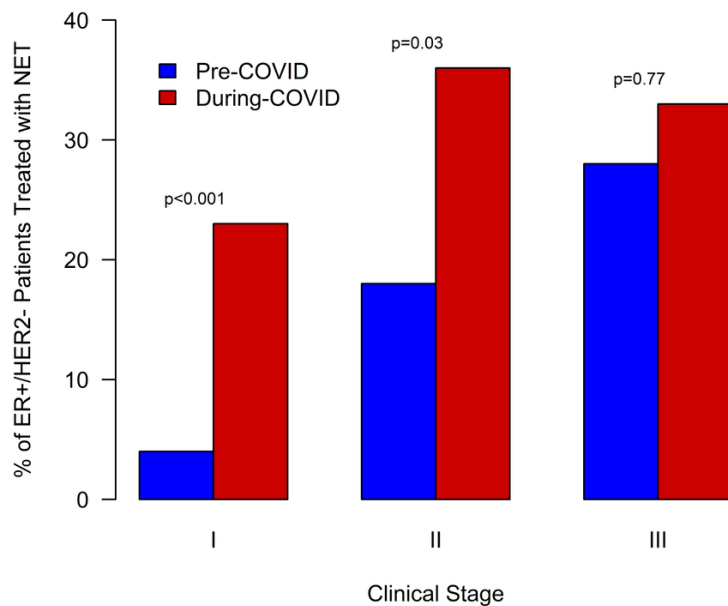
Background/Objective: The COVID-19 pandemic caused temporary suspension of screening programs, halting of elective procedures, and delays in management forcing clinicians to potentially alter treatment recommendations. We hypothesize that due to the COVID-19 pandemic patients are presenting with more advanced breast cancers and that neoadjuvant therapy use increased. This study evaluates breast cancer stage at diagnosis and rates of neoadjuvant therapy among women presenting to our institution prior to and during the COVID-19 pandemic.

Methods: Retrospective chart review of all patients presenting to our institution with a new breast cancer diagnosis from 3/2020-8/2020 were compared to 3/2019-8/2020. Patients presenting with recurrent ipsilateral disease were excluded. We compared breast cancer stage at diagnosis and clinical and demographic features between the during-COVID and pre-COVID time periods and evaluated use of neoadjuvant therapy. Groups were compared using chi-square or Wilcoxon rank-sum tests.

Results: 571 patients were identified, 390 pre-COVID and 181 during-COVID. Sixteen patients (3%) had bilateral breast cancer (3% and 2%, pre- and during-COVID, $p = 0.56$). Patient median age was 61 years for both groups ($p = 0.74$). Method of cancer detection was by imaging in 66% of patients and by physical findings or symptoms in 34% pre-COVID, compared to 65% and 35%, respectively during-COVID, $p = 0.80$. Tumor biology did not vary by period of presentation. Among patients with DCIS, 92% were HR+ pre-COVID and 90% during-COVID ($p = 0.73$). Comparing invasive tumors pre-COVID to during-COVID 77% vs 78% were HR+/HER2-, 10% vs 10% were HR+/HER2+, 3% vs 1% were HR-/HER2+, and 11% vs 10% were HR-/HER2- respectively ($p = 0.80$). Overall clinical stage at diagnosis for pre-COVID compared to during-

COVID, respectively was: 19% vs 16% were Stage 0; 44% vs 42% were Stage I; 27% vs 30% were Stage II; 8% vs 10% were Stage III; 3% vs 2% were Stage IV. The percent presenting with clinical stage II-IV disease was 42% during-COVID compared to 37% pre-COVID ($p=0.27$). Use of neoadjuvant therapy was significantly higher during-COVID (42%) compared to pre-COVID (31%, $p=0.01$) driven by an increased use of neoadjuvant endocrine therapy (NET) from 9% pre-COVID to 19% during-COVID ($p<0.001$), while neoadjuvant chemotherapy (NAC) use remained stable at 22% for each period ($p=0.81$). In the HR+/HER2- patients use of NET increased from 12% pre-COVID to 27% during-COVID ($p<0.001$). Of patients treated with NET, 18% were stage I pre-COVID and increased to 45% during-COVID ($p=0.03$). The percentage of HR+/HER2- patients treated with NET by stage is shown in the figure demonstrating use of NET increased in each stage with most marked increase in NET in stage I disease and significant increase in stage II disease. For patients treated with surgery first, time from first appointment to surgery was 41 days pre-COVID vs 39 days during-COVID ($p=0.59$).

Conclusions: Breast cancer stage at diagnosis, method of cancer detection and tumor biology did not differ significantly during-COVID compared to pre-COVID. During the COVID pandemic more patients were treated with neoadjuvant endocrine therapy use. Neoadjuvant endocrine therapy use increased dramatically in stage I and II HR+/Her2- disease.



218 - Regional Nodal Ultrasound and Its Implications for Staging and Treatment in Early-Stage Breast Cancer

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Background/Objective: The role of regional nodal ultrasound and its implications remain controversial for the management of early-stage breast cancer. Our institution adopted implementation of routine regional nodal ultrasound for all invasive breast cancer patients after a partnership with MD Anderson Cancer Center in 2013. We evaluated the implications pre- and post-implementation of this novel protocol.

Methods: We performed a retrospective data review using our institutional tumor registry data from 2010-2012 and 2016-2018. Patients who were in clinical stage I and II were included in the pre-intervention group. Patients who were in clinical stage I and II and underwent a nodal basin ultrasound and nodal biopsy were included in the post-intervention group. We compared clinical and pathologic staging, rate of chemotherapy, rate of adjuvant radiation therapy as well as full axillary dissection between the 2 groups.

Results: We identified 556 patients in pre-intervention group and 96 patients in post-intervention group. We found a statistically significant difference in the distribution of clinical staging between the 2 groups, stage I and II, respectively (66.0% and 34.0% pre-intervention and 34.4% and 65.6% post intervention, $p < 0.001$). We found a statistically significant difference in the distribution of pathologic staging between the 2 groups (65.7% and 28.5% vs 43.6% and 47.3%, $p < 0.001$). We found a statistically significant difference in the rates of chemotherapy as well as complete axillary dissection between the 2 groups (50.5% vs 72.7%, $p < 0.001$ and 21.0% vs 54.4%, $p < 0.001$ respectively). We did not find a statistically significant difference between the rates of adjuvant radiation therapy (21.0% vs 54.4%, $p = 0.213$).

Conclusions: We found the rates of chemotherapy as well as completion axillary dissection were higher in our patient population after the adoption of a routine regional nodal ultrasound in the management of invasive breast cancer patients. Addition of a regional nodal ultrasound can be a useful tool to identify higher risk patients in the management of early-stage breast cancer.

Table. Characteristics in staging and therapies

	Pre Intervention		Post Intervention		<i>p</i>		
	Total	% Of Total	Total	% Of Total			
AJCC Clinical Stage	556		96				
Stage I	367	66.0%	33	34.4%	<0.001		
Stage II	189	34.0%	63	65.6%			
AJCC Pathologic Stage	453		50				
Stage 0	1	0.2%	2	4.0%	<0.001		
Stage I	316	69.8%	24	48.0%			
Stage II	137	30.2%	26	52.0%			
Chemotherapy	556	281	50.5%	92	67	72.8%	<0.001
Radiation Therapy	556	343	61.7%	92	63	68.5%	0.213
Completion Axillary Dissection	529	111	21.0%	90	49	54.4%	<0.001
Pre Intervention: 2010-2012, Post Intervention 2016-2018							

219 - Decision Regret About Breast Cancer Surgery - The WhySurg Study

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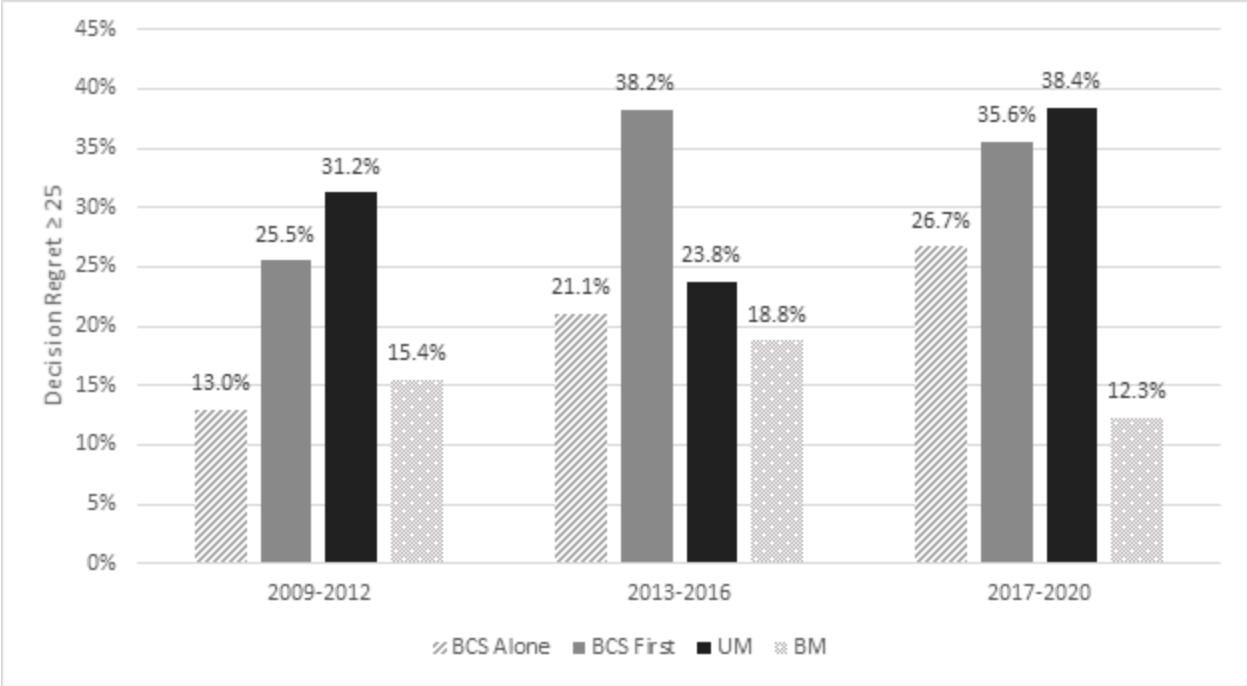
Background/Objective: Women are faced with complex choices about their breast cancer care, but few recent studies have compared decision regret between different breast surgical procedures. The objective of this study was to report decision regret scores across different breast surgeries up to ten years after the procedure.

Methods: An electronic cross-sectional survey including demographic questions and a validated decision regret scale was distributed to Army of Women volunteers age 18-70 who underwent any breast cancer surgery from 2010-2020. Decision regret scores were compared among patients who underwent bilateral mastectomy (BM), unilateral mastectomy (UM), breast conserving surgery (BCS) alone, and BCS first (BCS followed by re-excision or mastectomy). Outcomes were then stratified by physician recommendation for surgery type. Regret between procedures was compared over different time periods. Multivariable logistic regression adjusting for patient and tumor factors was used to determine if surgery type was associated with a regret score in the highest quartile range.

Results: 2,148 women completed the survey with 1,525 (71.0%) (BCS alone 470, BCS first 207, UM 328, BM 520) who reported their surgery choice and answered all questions on the regret scale. Mean age of participants was 50 with median year of surgery in 2014. The median decision regret score for all patients was 5 (IQR 0-20) on a 100-point scale; for BCS alone it was 0 (0-20), for BCS first it was 10 (0-30), for UM it was 6 (0-25) and for BM it was 5 (0-15). 342 (22.4%) participants had a regret score ≥ 25 (BCS alone 20.2%, BCS first 31.9%, UM 30.8%, and BM 15.4% ($p < 0.001$)). Of 958 patients who were recommended BCS, 624 (65%) underwent BCS, 114 (12%) UM and 220 (23%) BM. Decision regret was similar between BCS and BM as well as BCS and UM, but UM patients had more regret than those who underwent a BM (median regret score 5(0-25) vs 0(0-10), $p = 0.040$). Of 849 patients who were recommended a UM, 294 (35%) underwent UM and 308 (36%) underwent BM. UM patients had more regret than BM patients (median regret score 5(0-25) vs 5(0-15), $p = 0.006$). On multivariable analysis, adjusting for patient and tumor factors, time from surgery, and complications, BM was associated with less regret than UM (OR 0.40 (0.27-0.58), $p < 0.001$), BCS alone (OR 0.56 (0.38-0.83), $p = 0.003$), and BCS first (OR 0.32 (0.21-0.49), $p < 0.001$). Over 3 time periods analyzed (2009-2012, 2013-2016, and 2017-2020), BM and BCS alone patients had the lowest regret scores of all surgical types, while UM and BCS first patients had the highest (Figure 1).

Conclusions: Overall, decision regret was low for all 4 procedure types but BM was associated with the lowest regret scores on multivariable modeling. These data should be considered when discussing breast cancer surgery decisions with patients.

Figure. Decision Regret by Year and Type of Surgery



220 - Factors Associated with Margin Re-Excision in Oncoplastic Surgery for Breast Cancer

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Background/Objective: The use of oncoplastic surgery (OS), combining partial mastectomy with plastic surgery techniques aimed at improving cosmetic outcomes, is increasing. Re-excision of margins may be more difficult after OS and a 2-step approach is often applied to allow for margin pathologic assessment prior to reconstructive procedure and improve outcomes. In this study, we compared rates of re-excision between women treated with 1- and 2-step OS, and assessed factors associated with re-excision and need for additional surgery between groups.

Methods: We retrospectively identified all women with invasive and in-situ breast cancer who were treated with 1-step combined OS or 2-step sequential OS (defined as reconstructive procedure within 6 months of partial mastectomy) from our institutional database between January 1st, 2015 and December 31st, 2019. The selected OS approach was at breast surgeon's discretion. Clinicopathologic characteristics, need for additional surgery, and factors associated with re-excision were compared between women treated with 1-step and 2-step OS approaches.

Results: We identified 153 women who underwent OS; 79 (52%) had a 1-step procedure and 74 (48%) had a 2-step approach. Re-excision for close or positive margins was more common in women treated with 2-step vs. 1-step OS (30% vs. 2.5%, $p<0.001$) (Table). Of women in the 2-step group who had a re-excision, 55% ($n=12/22$) underwent the reconstructive procedure at the time of re-excision, and 2 of these women subsequently required another re-excision or mastectomy. The remaining 10 women (45%) had an interval re-excision followed by the reconstructive procedure at a later date. Overall, conversion to mastectomy was low ($n=2$, 1.3%). The presence of mammographic microcalcifications and requirement of multiple radioactive seeds for localization (both $p<0.001$) was more common in women treated with 2-step OS. Clinicopathologic characteristics were otherwise similar between the 2 groups (Table). Mammographic calcifications ($p=0.009$), non-mass enhancement (NME) on magnetic resonance imaging (MRI) ($p=0.01$), presence of DCIS on final pathology ($p=0.04$), and use of multiple seeds for pre-operative localization ($p=0.06$) were independently associated with odds of re-excision. On multivariate analysis, only MRI NME was associated with increased odds of re-excision (OR 7.01, 95% CI 1.79-46.7, $p=0.014$).

Conclusions: Women treated with OS with extensive mammographic microcalcifications, use of multiple seeds for localization, and extensive NME were more likely to need re-excision. Undergoing a 2-step approach was significantly associated with re-excision, thus highlighting apt surgeon selection for the appropriate surgical approach. Factors associated with risk of re-excision should be factored in when deciding on optimal approach for OS.

Table. Clinicopathologic factors and additional surgery associated with 1-step and 2-step oncoplastic procedures

	All n= 153		1-Step n= 79		2-Step n= 74		p-value
Clinicopathologic factors							
Age, median (IQR)	50.4	(45, 57)	51.5	(46, 58)	50	(43, 56.3)	0.34
BMI, median (IQR)	28.6	(25, 33.4)	28	(24.7, 33.9)	29.4	(25.2, 32.7)	0.45
Mammographic density, n (%)							
Predominantly Fatty	11	(7.2%)	6	(8%)	5	(7.0%)	0.46
Scattered fibroglandular	51	(33%)	25	(32%)	26	(35%)	
Heterogeneously dense	72	(47%)	35	(44%)	37	(50%)	
Extremely dense	11	(7.2%)	6	(8%)	5	(7.0%)	
Mammographic calcifications, n (%)	80	(53%)	29	(37%)	51	(69%)	<0.001
NME on MRI, n (%)	51	(54%)	19	(45%)	32	(62%)	0.15
MRI NME size, medial (IQR)	2.7	(1.4, 5.3)	2.6	(1.3, 3.4)	4.65	(1.7, 6.15)	0.12
Neoadjuvant chemotherapy, n (%)	40	(26%)	18	(23%)	22	(30%)	0.36
Clinical T stage, n (%)							0.38
Tis	41	(27%)	19	(24%)	22	(30%)	
T1	41	(27%)	19	(24%)	22	(30%)	
T2	36	(24%)	15	(19%)	21	(28%)	
T3	13	(8.5%)	6	(8.0%)	7	(9.0%)	
T4	1	(0.7%)	1	(1.0%)	0	(0%)	
Clinical N stage, n (%)							0.33
N0	122	(80%)	66	(84%)	56	(76%)	
N1	30	(20%)	13	(16%)	17	(23%)	
N2	1	(0.7%)	0	(0%)	1	(1.0%)	
Presence of DCIS, n (%)	116	(78%)	59	(79%)	57	(77%)	0.85
Histology, n (%)							0.91
Ductal	143	(94%)	74	(94%)	69	(93%)	
Lobular/mixed	10	(6.5%)	5	(6.0%)	5	(7.0%)	
ER positive, n (%)	103	(68%)	57	(72%)	46	(62%)	0.36
Lymphovascular invasion, n (%)	27	(18%)	12	(15%)	15	(20%)	0.73
Histologic grade, n (%)							0.55
Well differentiated	12	(7.9%)	8	(10%)	4	(5.0%)	
Moderately differentiated	22	(15%)	9	(12%)	13	(18%)	
Well differentiated	75	(49%)	39	(50%)	36	(49%)	
Multiple radioactive seeds, n (%)	54	(35%)	17	(22%)	37	(50%)	<0.001
Need for additional surgery*							
Any additional surgery, n (%)	25	(16%)	3	(3.8%)	22	(30%)	<0.001
Re-excision, n (%)	24	(16%)	2	(2.5%)	22	(30%)	<0.001
Conversion to mastectomy, n (%)	2	(1.3%)	1	(1.3%)	1	(1.0%)	1

BMI Body mass index. *MRI* Magnetic resonance imaging. *NME* Non-mass enhancement. *DCIS* Ductal carcinoma in situ. *ER* Estrogen receptor. *Patients underwent reexcision, mastectomy, or both.

221 - Presence of Atypia on Initial Biopsy and Rate of Malignant Upgrade Following Surgical Excision of Radial Scars and Intraductal Papillomas: A Community Hospital Experience

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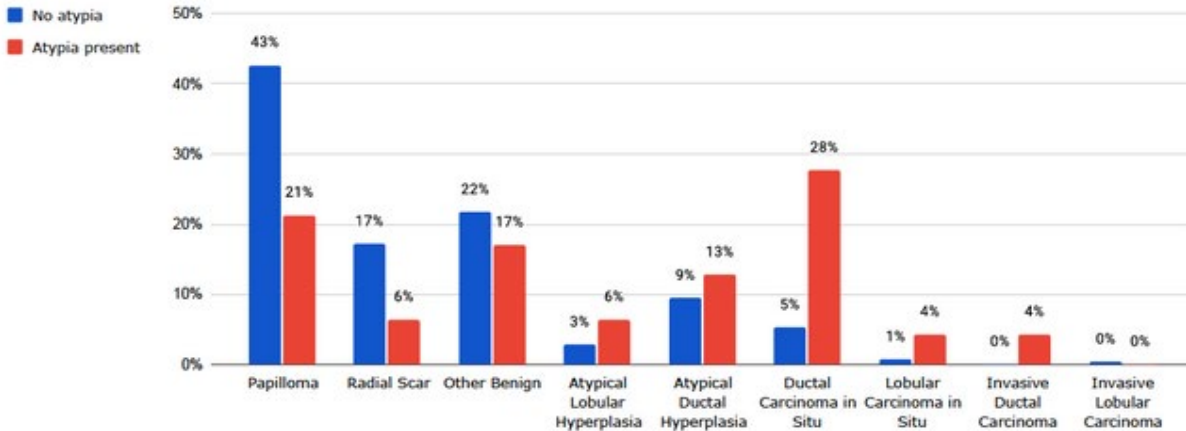
Background/Objective: Management of intraductal papillomas and radial scars has traditionally centered around surgical excision due to a risk of upgrade to malignancy on subsequent surgical excision. The reported rate of upgrade between these lesions is extremely variable and ranges from 2 to 37% among various studies. More recent literature, however, has reported lower rates of malignant upgrade, raising controversy over whether surgical resection is always indicated in these lesions. Certain risk factors, such as size or presence of atypical features on initial biopsy have been proposed as potential variables to predict which of these lesions are more likely to contain cancer at surgical excision, and to guide surgical decision-making. An optimal, standardized management strategy for intraductal papillomas and radial scars does not exist. The purpose of this study is to determine the rate of malignant upgrade in our patient population and determine whether the presence of atypia on initial biopsy is associated with malignant upgrade.

Methods: This was a single-institution retrospective analysis of 333 patients with biopsy-proven radial scar or papilloma who subsequently underwent surgical excision between 2016 and 2019. IRB approval was obtained per institutional protocol. Patient demographic data, symptomatology, personal and/or family history of cancer, lesion characteristics including presence of atypia, mammographic features, and final pathology were all included in our data collection. REDCap® research database and Microsoft Excel® were used for data collection and analysis.

Results: Of the 333 patients included, 78% (259) had intraductal papillomas, 20% (69) radial scars, and 1.5% (5) had features of both on initial biopsy. Most patients (73%) were asymptomatic at the time of diagnosis and the most common symptom reported was nipple discharge followed by palpable mass. Average lesion size was 5.9 mm in maximal diameter and most were located in the upper outer quadrant (47%). Overall, 76% (254) were found to have benign final pathology, 13% (44) were found to have atypia, and 11% (35) were found to have carcinoma in situ or invasive carcinoma on final surgical pathology. There was a statistically significant difference in upgrade rate among patients with and without atypia on their initial biopsy, with 36% (17/47) of biopsies with atypia vs. only 6.3% (18/286) without atypia positive for carcinoma on subsequent surgical excision, respectively ($p < 0.0001$). There were no statistically significant differences in patient demographics, symptomatology, or lesion size between these 2 subgroups.

Conclusions: Though presence of atypia on initial biopsy is significantly associated with a higher rate of malignancy on final surgical pathology, the rate of malignancy in both subgroups remains high enough to warrant surgical intervention regardless of presence of atypia. Our results support the current practice of surgical excision of these lesions at our institution.

Figure. Comparison of final pathology at surgical resection in patients based on presence or absence of atypical features at initial biopsy (*=p<0.05)



222 - Feasibility of Same-Day Discharge for Mastectomy with Immediate Implant-Based Reconstruction

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Background/Objective: This novel study will assess the feasibility and outcomes of same-day discharge (SDD) following nipple-sparing mastectomy (NSM) and skin-sparing mastectomy (SSM) with implant-based pre-pectoral reconstruction (IBR). This contrasts the current standard practice of admitting patients to the hospital as an inpatient for at least 1 night postoperatively. Furthermore, advances in opioid sparing anesthesia, the Enhanced Recovery After Anesthesia (ERAS) protocol, and prepectoral reconstruction, has dramatically reduced pain scores and narcotic requirements after surgery. A recent study from Kaiser Permanente Northern California was recently published regarding their surgical home recovery pilot program for outpatient mastectomy. Implementation not only led to an increase in same-day mastectomy from 23% to 61%, rates of ED visits, reoperation and readmission were non-significant after the substantial increase in outpatient procedures. Therefore, SDD may reduce healthcare costs, decrease the risk of hospital-acquired infections and can increase patient satisfaction which we aim to demonstrate with this study.

Prospective Clinical Trial Design: All patients who meet eligibility criteria are enrolled in the study with the intention of SDD. Before the surgery, on postoperative day (POD 0), standardized pain and Breast-Q surveys are completed. Patients then undergo mastectomy with IBR without any changes to operative technique or standards. Post-operatively, the patients are monitored per post-operative anesthesia care unit (PACU) protocol. If discharge criteria is met, patients will return home without admission and will complete the pain survey POD1 and Breast-Q POD7. If discharge criteria is not met, they will be admitted to the hospital for at least 1 night and complete the pain survey POD1 as inpatients and Breast-Q POD7 at home. All patients will be asked to record drain output and narcotic usage until their post-operative appointment, at which all surveys will be returned. Outcomes for satisfaction and pain

will be determined with validated survey responses and complications will be assessed through retrospective chart review.

Eligibility Criteria: All women without significant comorbidities (smoking, diabetes, heart disease) receiving therapeutic or prophylactic NSM or SSM with immediate IBR (tissue expander or direct-to-implant) who are amenable to same-day discharge.

Specific Aims: The aims of this study are to demonstrate feasibility of SDD for mastectomy patients with IBR. We hypothesize that SDD provides acceptable patient satisfaction, pain control, complication rates with similar opiate equivalent use in comparison with overnight admission. We also believe that this study will demonstrate that patients will recommend it to other women undergoing mastectomy.

Statistical Methods: Descriptive Statistics Exploratory data analysis will be performed through tabulation and graphical analysis. Means and Standard deviations will be calculated for normally distributed data (established with the Shapiro-Wilks test); medians and interquartile ranges(IQRs) will be calculated for non-normally distributed and ordinal data. Frequency counts and column percentage will be established for nominal data.

Historical Multivariate analysis: Complications and pain curves will be plotted to determine maximum sensitivity and specificity and cutoff points will be defined. The cutoff points (and any other significant covariates) will then be used in logistic regression analysis to establish the risk of complications, pain in SDS patients from this cohort in comparison to historical controls in order to ensure randomization would be appropriate in future studies if no significant negative differences are demonstrated.

Present and Planned Accrual: Our present accrual is 34 total (31 SDD and 3 Inpatient). Our planned accrual is 60 total (30 SDD and 30 Inpatient). We plan to conduct another power analysis if there is insufficient enrollment into the inpatient group.

Contact information for clinicians and patients with an interest in the clinical trial
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Idanis Perez-Alvarez- Research Coordinator- imp22@georgetown.edu

223 - Hidden Port-A-Cath Placement: Making the Most Visible Scar Invisible

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Background/Objective: Over the past few decades, breast cancer surgery has evolved to improve oncologic safety and cosmetic outcomes. While there has been an increasing role of oncoplastic surgery and hidden scar techniques for breast cancer patients, the port-a-cath placement has remained unchanged. The traditional port site placement results in patients having a visible scar to the anterior chest wall. In a recent study, 50% of patients made an effort to hide their anterior chest wall scar. We sought to develop a new technique for port-a-cath placement where the port is still positioned in the

anterior chest wall but the incision site is hidden at the anterior axillary fold. We aimed to characterize the outcomes between the standard vs. novel port-a-cath placement techniques.

Methods: This is a retrospective chart review of patients who underwent port-a-cath placement by a single breast surgeon between 01/01/2016 to 10/15/2020. Demographics and outcomes data were collected from the EMR and analyzed. Additionally, patients who underwent the novel port-a-cath placement technique were asked to complete the validated EQ-5D-5L quality of life questionnaire and other qualitative measurements to evaluate their overall quality of life and satisfaction.

Results: A total of 141 patients were included in this study (94 underwent the traditional approach, 47 underwent the novel approach). Results are summarized in Table 1. The average time for the standard procedure was 22.7 ± 5.4 minutes while the average time for the novel procedure was 34.4 ± 6.6 minutes. The complication rate for the standard procedure was similar compared to the novel procedure (2% vs. 6%, $p = 0.27$). For the standard approach, complications included dysfunctional port requiring replacement, pain, and hematoma. Only 1 patient in the novel approach had a complication of dysfunctional port requiring replacement. Among the patients that completed the validated EQ-5D-5L quality of life questionnaire, patients reported improved quality of life. Overall, patients who underwent the novel port-a-cath placement procedure were satisfied with the procedure, satisfied with the location of the scar, and were happy about the appearance of the scar.

Conclusions: The implementation of the novel port-a-cath placement technique led to overall improved quality of life and satisfaction. This study demonstrates that the novel port-a-cath placement technique is a safe and effective alternative compared to the traditional port-a-cath placement technique, especially among patients that are self-conscious about having a visible scar on the anterior chest wall.

	Standard Port-A-Cath Placement (N = 94)	Hidden Port-A-Cath Placement (N = 47)
Age, years, mean \pm STD	61.3 \pm 10.5	48.7 \pm 8.5
Female, N (%)	91 (97%)	47 (100%)
Race, N (%)		
White	88 (94%)	46 (98%)
Black	4 (4%)	1 (2%)
Other	2 (2%)	0
BMI, mean \pm STD	31.3 \pm 7.0	28.9 \pm 6.8
Operative time, minutes, mean \pm STD	22.7 \pm 5.4	34.4 \pm 6.6
Complications		
Dysfunctional Port	3 (3%)	1 (2%)
Pain	2 (2%)	0
Hematoma	1 (1%)	0
Port Status		
In Place	42 (45%)	20 (43%)
Explanted	42 (45%)	26 (55%)
Lost to Follow-up	10 (10%)	1 (2%)

225 - Current Trends in Breast Reconstruction After Prophylactic Mastectomy - A NSQIP Analysis

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Background/Objective: The rate of prophylactic mastectomy has been rising over the past decade, which some have attributed to the “Angelina effect”, relating to Angelina Jolie’s double mastectomy in 2013 that increased public awareness of the procedure and breast cancer-related genetic mutations. The objective of our study is to determine if the rate of prophylactic mastectomy for genetic mutations has increased within the NSQIP population and to assess reconstructive trends, demographic characteristics, and outcomes of patients who undergo prophylactic mastectomy.

Methods: All patients who underwent prophylactic mastectomy between 2007-2018 were identified within the ACS-NSQIP database using ICD-9 or ICD-10 codes correlating with family history of malignant neoplasm of breast, genetic susceptibility to malignant neoplasm of breast, and prophylactic breast or gland removal. Patients with a diagnosis of personal history of malignant neoplasm of breast were excluded. We then selected patients with CPT codes that correlated with mastectomy or breast reconstruction, stratified by implant-based, tissue-based and other, and assessed trends of reconstruction over the study period. Demographic characteristics and clinical outcomes were compared between patients undergoing no immediate reconstruction, implant-based reconstruction, and tissue-based reconstruction.

Results: A total of 7,714 patients met inclusion criteria. Of those, 1,640 patients did not have an associated reconstruction CPT code (21.26%), 4,857 patients underwent implant-base reconstruction (62.96%), 1,145 patients underwent tissue-based reconstruction (14.84%), and 72 patients underwent reconstruction categorized as other (0.94%). The percentage of patients without immediate reconstruction significantly decreased (from 32.22% in 2007 to 20.44% in 2018, $p<0.001$) over the study period, and the rate of both implant- and tissue-based reconstruction significantly increased ($p<0.001$ and $p=0.003$, respectively). The proportion of patients diagnosed with genetic susceptibility for malignant breast neoplasm significantly increased over the study period ($p=0.002$). Patients without immediate reconstruction were significantly older and had significantly higher ASA classifications than those who underwent reconstruction (Table.1). Patients without reconstruction also had a significantly higher rate of superficial wound infection compared to those with implant- and tissue-based reconstruction (3.5% vs. 1.5% and 3.0%, respectively, $p<0.001$). Patients with tissue-based reconstruction had a significantly higher rate of dehiscence compared those with no reconstruction or implant-based reconstruction, (2.7% vs. 0.7% and 0.7% respectively, $p<0.001$), longer postoperative length of stay (3.90 vs. 1.31 and 1.44 days, respectively, $p<0.001$), and higher rates of reoperation (12.5% vs. 5.3% and 7.5%, respectively, $p<0.001$).

Conclusions: Our study demonstrates that there has been an increase in prophylactic mastectomy for genetic predisposition to breast cancer within the 2007 to 2018 NSQIP population. There was also a significant increase in immediate reconstruction after prophylactic mastectomy, with both implant-based and tissue-based reconstruction rates significantly increasing during the study period. The increased public awareness may be a driving factor in patient decision making and the choice to undergo prophylactic mastectomy.

Table. Comparison of characteristics and clinical outcomes in patients without reconstruction vs tissue or implant reconstruction following prophylactic mastectomy

Variable	Reconstruction type				
	None	Tissue	<i>P value</i>	Implant	<i>P value</i>
N, (%)	1,640 (21.3)	4,857 (14.8)	-	1,145 (63.0)	-
Age, mean (year)	51.9	46.6	p<0.001	44.2	p<0.001
ASA classification, mean	2.21	2.0	p<0001	2.0	p<0001
Wound infection, (%)	3.5	1.5	p<0.001	3.0	p<0.001
Wound dehiscence, (%)	2.7	0.7	p<0.001	0.7	p<0.001
LOS, mean (days)	3.90	1.31	p<0.001	1.44	p<0.001
RTOR, (%)	12.5	5.3	p<0.001	7.5	p<0.001

ASA: American Society of Anesthesiologist

LOS: Length of Stay

RTOR: Return to Operating Room

226 - Characteristics of Breast Cancer in Relation to CA 27.29 Prior to Breast Surgery

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Background/Objective: The use of CA 27.29 has emerged as the most common tumor marker to detect recurrence and metastasis in breast cancer, although ASCO discourages the routine use of tumor markers for surveillance of long term, asymptomatic survivors. One key question is to determine the characteristics of breast cancer associated with elevated CA 27.29 prior to breast surgery when the cancer is still in vivo to determine if there is a cohort of breast cancer patients for whom screening with CA 27.29 levels post-operatively would be of value.

Methods: We evaluated a prospective cohort of 597 patients who underwent surgery for breast cancer at a single institution from March 2016 to October 2020. These patients had CA 27.29 levels obtained immediately prior to surgery, and 237 patients also had levels obtained after surgery.

Results: The CA 27.29 upper limit of normal is 38.6 at our institution. The average age of patients with elevated CA 27.29 was 57 (35-81), while patients with normal CA 27.29 was 58 (28-84) ($p = 0.18$). The average CA 27.29 levels for each tumor size were 19.8 for Tis, 19.2 for T1, 25.1 for T2, 32.3 for T3, and 50.6 for T4, respectively. One-way ANOVA revealed that the association between tumor size and CA 27.29 was significant ($p < 0.001$). The average CA 27.29 levels for each nodal status were 21.0 for N0, 29.2 for N1, 25.0 for N2, and 33.4 for N3, respectively. One-way ANOVA revealed that the association between nodal status and CA 27.29 was significant ($p < 0.001$). Histologic type was not associated with CA 27.29; the average CA 27.29 levels were 24.5 for invasive ductal carcinoma, 25.4 for invasive lobular carcinoma, and 22.5 for other types ($p = 0.22$). The proportion of patients who were estrogen receptor-positive was 67.2% among those with elevated CA 27.29, while the proportion was 77.5% among those with normal CA 27.29 ($p = 0.03$). Likewise, the proportion of patients who were progesterone receptor-positive was 58.5% among those with elevated CA 27.29, while the proportion was 73.8% among those with normal CA 27.29 ($p < 0.01$). HER2 receptor was not associated with CA 27.29 (elevated CA 27.29 = 18.4%, normal CA 27.29 = 19.4%; $p = 0.46$). Lastly, CA 27.29 levels dropped an average of 5.5 after surgery and a paired t-test revealed that this difference was significant ($p = <0.001$).

Conclusions: Elevated CA 27.29 immediately prior to surgery was associated with larger tumor size, higher nodal status, and lower proportion of hormone receptor-positive tumors. Further studies are being conducted to determine the relationship between elevated CA27.29 pre-op and the utility of routine CA27.29 screening in long-term, asymptomatic breast cancer survivors.

227 - The iGAP Multi-Center Longitudinal Registry Correlating Genetics, Genomics, Imaging, Clinical and Patient-Reported Outcomes

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Background/Objective: Physicians are increasing using tests and technology, including Germline Genetic, Genomic, and Biomarker Testing, to provide insight into a healthy individual's risk and an affected individual's disease characteristics, in order to provide individualized clinical treatments; however, many barriers to widespread and appropriate testing persist due to complex guidelines for use, varied quality and cost, rapid advances, and adequate understanding of appropriate implementation by medical professionals. The iGAP Registry is a multi-center ongoing database designed to capture information on disease risk assessment, Germline Genetic, Genomic, and Biomarker Testing, and their utilization and impact on treatment practices and outcomes to help determine, over time, the most effective use of testing in varied patient populations and to support the increased use of precision medicine.

Prospective Clinical Trial Design: The iGAP Registry is a multi-center longitudinal, observational research database with an integrated platform of clinically-useful tools designed to address gaps for providers specifically for identifying individuals at elevated risk based on clinical and pathologic factors, guiding them to appropriate genetic, genomic, and biomarker testing and providing clinical insights on actionable results for personalized management and prevention for the individual and their family members over time.

Eligibility Criteria

18 years or older

Presents consecutively to a participating practice and who has previously been screened and tested;

Receives/has received germline, genomic, or other biomarker testing, either through a prior provider or a participating practice;

Consents to be a part of the registry.

All cancer types, elevated risk unaffected patients including family members

Specific Aims: To understand the utilization of Germline Genetic, Genomic, and Biomarker Testing in various clinical settings and to understand individual Risk, Physician Decision Impact, Personalized Treatment Recommendations including Precision Medicine, Clinical and Patient-reported Outcomes.

Statistical Methods: This is an observational study correlating multiple data points over time from all investigators sites. Multi-variate analyses will be performed based on specific goals of the research oversight committee.

Present and Planned Accrual: There are 1,031 subjects currently in the registry. 10,000 subjects are expected in the Registry over 5 years with anticipated 5-year follow-up.

Contact information for clinicians and patients with an interest in the clinical trial
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231 - Comparison of Patient-Reported Outcomes Following Reconstruction After Nipple-Sparing Versus Skin-Sparing Mastectomy

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Background/Objective: Surgical treatment of breast cancer impacts a patient's physical, social, personal, and sexual health. Women who undergo mastectomy can have a negative self-image and experience negative changes in their sexuality. Mastectomy with reconstruction has shown improved body image outcomes when compared to mastectomy alone. The aim of this study was to evaluate patient quality of life after nipple-sparing mastectomy with reconstruction (NSM-R) compared to skin-sparing mastectomy with reconstruction (SSM-R).

Methods: A retrospective review identified patients undergoing mastectomy with reconstruction at our institution, between January 1, 2013 and August 30, 2018, who had also completed the BREAST-Q pre- and post-operatively. The BREAST-Q is a patient-reported outcome tool that was designed to measure the quality of life and satisfaction among breast surgery patients. Individuals in this cohort underwent bilateral or unilateral mastectomy, performed for cancer or prophylactically, followed by implant or tissue-based reconstruction. Patients were divided into NSM-R and SSM-R. Responses scores to 7 specific quality of life questions were compared between the 2 groups. Unpaired t-test was used to evaluate the statistical significance of the findings.

Results: We identified 89 patients who underwent NSM-R and 47 patients who underwent SSM-R with complete BREAST-Q data. Analysis demonstrated that women with NSM-R were significantly more confident sexually ($p=.0162$) and felt more sexually attractive when unclothed ($p=.0022$) compared to women with SSM-R. All other BREAST-Q parameters that were considered – appearance in mirror clothed and unclothed, emotional health, self-confidence, and attractiveness – were not significantly different between the 2 patient groups, post-operatively. Interestingly, SSM-R patients reported lower sexual confidence following surgery compared to before surgery ($p=.028$), all other outcomes for NSM-R and SSM-R had similar or improved scores after surgery compared to pre-operatively.

Conclusions: Our study shows that both NSM-R and SSM-R have similar quality of life outcomes in all areas except for sexuality. Patients undergoing NSM-R felt more sexually confident and more sexually attractive when unclothed. This highlights the complex psychosocial implications of mastectomy and

removal of the nipple areolar complex. The results of this study will help physicians and their patients make informed decisions on their surgical breast care.

	NSM-R		SSM-R		p value
	Pre	Post	Pre	Post	
1. How you look in the mirror clothed?	3.16	3.43	3.06	3.3	0.3881
2. How you look in the mirror unclothed?	2.66	2.89	2.23	2.57	0.0578
3. Emotionally healthy?	4.33	4.47	3.87	4.32	0.3508
4. Self-confident?	4.12	4.37	3.96	4.28	0.5724
5. Attractive?	3.92	4.11	3.72	3.98	0.4726
6. Confident sexually?	3.88	3.91	3.88	3.38	0.0162
7. Sexually attractive when unclothed?	3.18	3.58	3.23	2.87	0.0022

232 - The Positive Predictive Value of Recommended Additional Ipsilateral and Contralateral MRI-Guided Biopsies: Is the Yield Worth the Delay?

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Background/Objective: The routine use of preoperative breast MRI in all women with early-stage breast cancer is not a standardized practice. With previously reported low positive predictive value (PPV), patients recommended for additional MRI biopsies likely experience a delay in time to surgery. By analyzing a contemporary cohort undergoing 3.0-tesla MRI prior to surgery, we sought to identify the likelihood that a recommended additional MRI-guided biopsy would yield a result impacting surgical management.

Methods: Patients diagnosed with cTis-2N0-1 breast cancer who did and did not undergo preoperative MRI in a single institution were included. The positive predictive value of additional ipsilateral and contralateral MRI-guided biopsies recommended were analyzed with respect to breast density and histology. Positive results were defined as histology requiring excision (in-situ or invasive cancer, high-risk lesions). Benign histology not routinely excised was considered a negative result. Surgical management with respect to index cancer diagnosis was recorded, and time from initial diagnostic biopsy to surgery was calculated. Patients receiving neoadjuvant chemotherapy were excluded from the time to surgery analysis. Patients eligible for lumpectomy were defined as having unicentric disease with a tumor ≤ 5 cm.

Results: Between 2015 and 2018, three hundred fifty-one women were diagnosed with early-stage breast cancer and 215 of these underwent preoperative MRI. One hundred thirteen patients (52.5%) of those who underwent a MRI, required an additional ipsilateral or contralateral MRI-guided biopsy. The median primary tumor size was 1.3 cm (0.9 – 2.4) and 9.1% of patients were clinically node-positive. The median age was 60 (52 – 69) and 60.2% of the patients had heterogeneously dense or extremely dense breast tissue. More than half of the additional ipsilateral MRI-guided biopsies were malignant (58.7%) whereas 21.3% of contralateral MRI-guided biopsies were malignant. The overall PPV of MRI was 77.6%.

The PPV of an additional ipsilateral MRI-guided biopsy was 79.5% and that of an additional contralateral biopsy was 59.6% (Table 1). Excluding patients who received neoadjuvant chemotherapy, patients not undergoing preoperative MRI saw a median time to surgery of 33 days (22-56), while those who did undergo an MRI saw a median time to surgery of 46 days (33-69) (p=0.0002). Patients who underwent an MRI and subsequently an MRI-guided biopsy saw a median time to surgery of 64 days (45-99). Of lumpectomy-eligible patients found to have an additional ipsilateral lesion on MRI requiring excision, 48 patients (13.8%) underwent mastectomy.

Conclusions: Our analysis of patients with early-stage breast cancer demonstrated that the ipsilateral PPV of additional MRI-guided biopsies is higher than that of additional contralateral biopsies. However, with 1 in 5 additional contralateral MRI-guided biopsies resulting in in-situ or invasive cancer, this knowledge prior to definitive surgery holds potentially valuable information for adequate surgical planning. While undergoing preoperative MRI does show an increase in days from diagnosis to surgery, the potential oncologic benefit may outweigh the delay. Methodical selection of patients with early-stage breast cancer to undergo preoperative MRI requires determining which criteria would increase the pretest probability of a positive result and should be the subject of future study.

Table. Ipsilateral and Contralateral MRI Biopsy Pathology

	Benign Non-Surgical	Benign High-Risk (Surgical)	Malignancy	PPV
Ipsilateral	15 (20.0%)	16 (21.3%)	44 (58.7%)	79.6%
Contralateral	19 (40.4%)	18 (38.3%)	10 (21.3%)	59.6%

233 - Utilization of Online Resources to Facilitate Virtual Collaboration and Development of an Educational Breast Surgical Oncology App: mEdison

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Background/Objective: Our Breast Surgical Oncology (BSO) Department developed a multidisciplinary, multimedia app for the onboarding and training of new Advanced Practice Providers (APPs) including Nurse Practitioners and surgical Physician Assistants. Current models for training is to supplement in-person clinic experiences with written resources provided in a binder. These materials are time-consuming for supervisors to reproduce, must be updated often, and cannot be carried or indexed easily by the end user. Furthermore, experiential teaching may not be standardized. Our team participated in the National Science Foundation i-Corps program and conducted more than forty interviews with curriculum developers, professors in PA programs at other institutions, and instructors and supervisors in the oil and gas industry and pharmaceutical/device companies. Common themes were the need for new hires to understand how and why tasks are done, and the need to provide resources that can be easily accessed, even beyond the initial training period, to reduce "imposter syndrome." The SARS-CoV-2 pandemic affected our project by accelerating the timeline and by hindering group collaboration. Experiential learning is now impacted by restrictions on the number of people who can enter a patient exam room or to be in other enclosed, shared clinical workspaces. Thus our tool is useful to supplement, in a standardized and customizable fashion, in-person learning. However, COVID-19

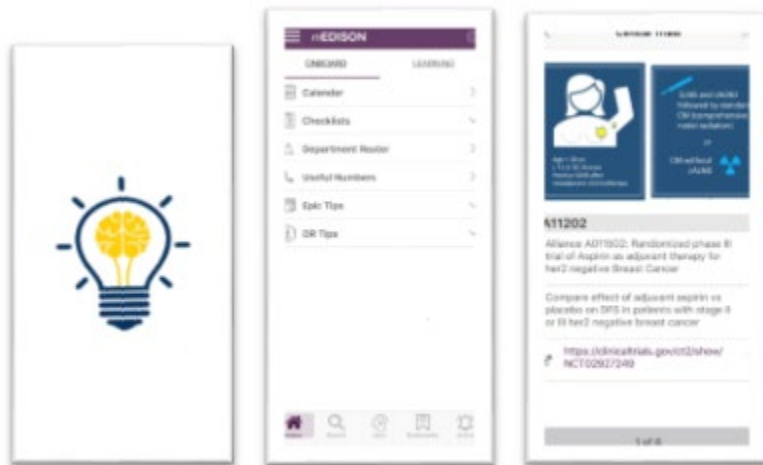
restrictions also impacted our project development by limiting our ability to brainstorm design iterations in person as a group. We hypothesized that by maximizing our use of online tools, we could leverage virtual collaboration to develop a pilot app.

Methods: We used an institutional Box cloud platform to share and edit novel content about major multidisciplinary learning objectives, including benign breast disease, surgical treatment of breast cancer, medical oncology, radiology, radiation oncology, reconstructive surgery options, clinical trials, genetics, and management of high-risk lesions. Real-time visual collaboration was achieved with Miro, a virtual whiteboarding platform, to facilitate brainstorming, ideation and planning. Design tools including Adobe XD were used to facilitate the wireframing and prototyping with our external tech partner. Lastly, we conceptualized and developed the app by using UI/UX (user interface/user experience) principles to generate a clear, intuitive interface.

Results: Our team met 1-2x per week for ten weeks using Zoom and WebEx platforms, including use of mobile phone mirroring to allow for real-time demonstrations as the wire frames were developed. Rules of engagement were established to promote group collaboration. This resulted in a functional v1.0 app which includes voiceovers, short videos, visual abstracts, and multiple-choice questions, to effectively address a variety of learning styles .

Conclusions: Our findings suggest that online tools can effectively mitigate pandemic-imposed, in-person meeting restrictions. Collaborative group projects are possible, reproducible and enhanced by engaging individual strengths. As we add functionality to subsequent versions, we plan to use similar virtual tools to test the effectiveness of our app.

Figure. Select screenshots. (a) mEdison flash screen, (b) wireframe options, (c) visual abstract for a clinical trial.



234 - Prophylactic Mastectomy - Are We Evaluating the Axilla?

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Background/Objective: Routine sentinel lymph node biopsy in patients undergoing prophylactic mastectomy is not recommended. We aimed to evaluate the trends of axillary lymph node assessment in women undergoing prophylactic mastectomy within the ACS-NSQIP database. We hypothesize that the rate of lymph node surgery has decreased over the study period.

Methods: All patients who underwent mastectomy from 2007-2018 were identified in the ACS-NSQIP using CPT codes (19303-19307). Patients who underwent prophylactic mastectomy were identified within this cohort using ICD-9 or ICD-10 codes correlating with family history of malignant neoplasm of breast, genetic susceptibility to malignant neoplasm of breast, and prophylactic breast or gland removal. Patients with a diagnosis of personal history of malignant neoplasm of breast were not included. We then calculated the percentage of mastectomies that were performed prophylactically per year in the NSQIP database for each included year. The percentage of these patients that underwent lymph node surgery was determined using CPT codes and stratified for sentinel lymph node biopsy (38500 and 38525) or axillary lymph node dissection (19305, 19306, 19307, 38740, and 38745). We assessed the overall trend in rates of prophylactic mastectomy, lymph node surgery, sentinel lymph node biopsy and axillary lymph node dissection and assessed patient characteristics between patients who did and did not have axillary lymph node surgery at the time of their prophylactic mastectomy.

Results: A total of 157,338 patients underwent mastectomy from 2007-2018. Of these patients, 7,419 patients (4.72%) met our study's criteria for prophylactic mastectomy. There was a significantly increasing trend in prophylactic mastectomy, from 2.67% in 2007 to 5.51% in 2018, $p=0.002$. Of patients who underwent prophylactic mastectomy, there was a significant decline in lymph node surgery overall, from 21.14% in 2007 to 10.97% in 2018. When stratified by type of lymph node surgery, there was a significant decrease in axillary lymph node dissection (11.86% in 2007 to 2.82% in 2018, $p<0.0001$) but not in sentinel lymph node biopsy ($p=0.61$). Due to limitations of our study, we were unable to assess the indications for axillary lymph node dissection. There was no significant difference in age, race or ASA class of patients who underwent lymph node surgery compared to those who had mastectomy alone.

Conclusions: Previous literature has shown a low rate (2-6%) of occult malignancy in patients undergoing contralateral and bilateral prophylactic mastectomy. These patients have also been shown to have a very low rate of positive sentinel lymph nodes, with the highest incidence in patients with locally advanced disease in the contralateral breast. Our study found that while the incidence of prophylactic mastectomy is increasing within the NSQIP database, the incidence of axillary lymph node surgery at the time of prophylactic mastectomy is significantly decreasing, which is in accordance with current recommendations.

Figure. Rate of axillary lymph node surgery in prophylactic mastectomy

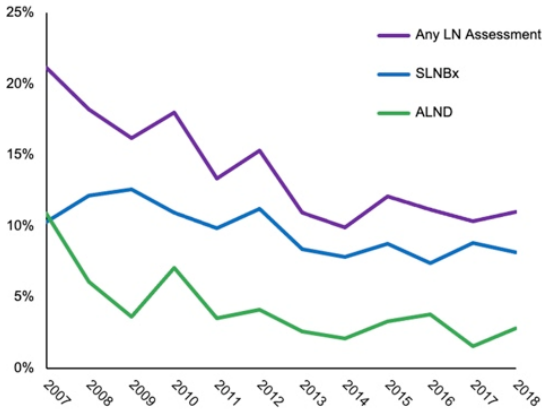


Figure 1. Rate of Axillary Lymph Node Surgery in Prophylactic Mastectomy.

LN: Lymph Node
 SLNBx: Sentinel Lymph Node Biopsy
 ALND: Axially Lymph Node Dissection

236 - Complex Sclerosing Lesions and Radial Scars: Risk of Upgrade and Implications for Management

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Background/Objective: Frequently benign lesions of the breast are identified and management of these lesions can be clinically challenging. Current guidelines recommend consideration of excision or excision of radial scars (RS) and complex sclerosing lesions (CSL) due to the risk of identifying a cancerous lesion.¹ However, inconsistencies in the literature exist and more clarity regarding management would be helpful. The purpose of this single institution retrospective chart review is to assess the frequency of upgrade of RS and CSL to ductal carcinoma in situ (DCIS) or invasive cancer from biopsy to surgical.

Methods: After IRB approval was obtained, patients with a diagnosis or pathologic suspicion of RS and/or CSL at biopsy from January 2012 to January 2020 were selected for this retrospective chart review. Patients with a previous or concurrent diagnosis of breast cancer or DCIS were excluded. Additionally, high risk lesions of lobular carcinoma in situ (LCIS) or atypia including atypical lobular hyperplasia (ALH) and atypical ductal hyperplasia (ADH) on biopsy were excluded. Upgrade rate was defined as identification of invasive carcinoma or DCIS at in the pathology report from lumpectomy. Additionally, data pertaining to risk factors for upgrade of these lesions was collected.

Results: A total of 53 female patients with 56 biopsies met our inclusion criteria. Of the 43 biopsies with subsequent surgical excision, only 1 lesion (RS) progressed to DCIS resulting in an upgrade rate of 2.3%. None of the 28biopsies that contained a CSL upgraded, and all but 2 of these CSLs underwent surgical excision with a lumpectomy to ensure correct diagnosis. Eight (18.6%) of the 43 surgical excisions were found to have atypia or LCIS at excision.

Conclusions: The upgrade rate for RS or CSL to invasive cancer or DCIS was found to be only 2.3% suggesting clinical observation without surgical excision in appropriate cases should be a strong consideration. None of the women with a CSL diagnosis at biopsy experienced upgrade at surgical excision. Previous studies state the association of RS and CSL with cancer ranges from 0-25%.¹ Our findings align with recent publications which report upgrade rates of less than 4%.²⁻³ Additionally, our study identified many lesions containing atypia or LCIS at excision, suggesting these women harbor an increased lifetime risk of cancer and would potentially benefit from additional screening options or chemoprevention.

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	imaging (N=13)	surgery (N=43)	Total (N=56)	p value
Age*				0.237
Nmiss	0	2	2	
Mean (SD)	54.077 (11.913)	49.854 (10.832)	50.870 (11.136)	
Race*				0.614
Nmiss	0	2	2	
Black or African American	4 (30.8%)	9 (22.0%)	13 (24.1%)	
Multiple	0 (0.0%)	2 (4.9%)	2 (3.7%)	
White	9 (69.2%)	30 (73.2%)	39 (72.2%)	
BMI*				0.767
Nmiss	0	2	2	
Mean (SD)	30.513 (6.833)	31.263 (8.197)	31.083 (7.835)	
Symptomatic*				
Nmiss	0	2	2	
N	8 (61.5%)	29 (70.7%)	37 (68.5%)	
unknown	1 (7.7%)	0 (0.0%)	1 (1.9%)	
Y	4 (30.8%)	12 (29.3%)	16 (29.6%)	
Method of biopsy				0.104
MA Stereotactic	6 (46.2%)	18 (41.9%)	24 (42.9%)	
MA US Guided	5 (38.5%)	5 (11.6%)	10 (17.9%)	
MA with Tomographic Guidance	1 (7.7%)	2 (4.7%)	3 (5.4%)	
MR Guided	1 (7.7%)	17 (39.5%)	18 (32.1%)	
US Guided	0 (0.0%)	1 (2.3%)	1 (1.8%)	

Differential Diagnosis at biopsy				0.016
CSL only	0 (0.0%)	3 (7.0%)	3 (5.4%)	
RS & CSL	2 (15.4%)	23 (53.5%)	25 (44.6%)	
RS only	11 (84.6%)	17 (39.5%)	28 (50.0%)	
Apocrine metaplasia at biopsy				0.424
N	10 (76.9%)	28 (65.1%)	38 (67.9%)	
Y	3 (23.1%)	15 (34.9%)	18 (32.1%)	
Radiographic-Histologic concordance				0.857
N	0 (0.0%)	1 (2.3%)	1 (1.8%)	
Unknown/not documented	4 (30.8%)	13 (30.2%)	17 (30.4%)	
Y	9 (69.2%)	29 (67.4%)	38 (67.9%)	
Upgrade				<0.001
N	0 (0.0%)	42 (97.7%)	42 (75.0%)	
NA (imaging follow-up)	13 (100.0%)	0 (0.0%)	13 (23.2%)	
Y	0 (0.0%)	1 (2.3%)	1 (1.8%)	
Family history of breast cancer*				0.623
Nmiss	0	2	2	
N	2 (15.4%)	9 (22.0%)	11 (20.4%)	
Unknown	1 (7.7%)	1 (2.4%)	2 (3.7%)	
Y	10 (76.9%)	31 (75.6%)	41 (75.9%)	
1st degree family history of breast cancer*				0.77
Nmiss	0	2	2	
N	4 (30.8%)	16 (39.0%)	20 (37.0%)	
NA (no family history)	2 (15.4%)	8 (19.5%)	10 (18.5%)	
unknown	1 (7.7%)	1 (2.4%)	2 (3.7%)	
Y	6 (46.2%)	16 (39.0%)	22 (40.7%)	
History of previous biopsy*				0.007
Nmiss	0	2	2	
N	6 (46.2%)	26 (63.4%)	32 (59.3%)	
Unknown/not documented	3 (23.1%)	0 (0.0%)	3 (5.6%)	
Y	4 (30.8%)	15 (36.6%)	19 (35.2%)	

237 - Pre-Operative Genomic Profiling for Risk Stratification of Breast Cancer Patients during the COVID-19 Pandemic

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Background/Objective: Beginning in March, 2020, local, state and Federal governments altered screening for, treatment of and follow-up of patients with breast cancer due to COVID19. In response, physicians from various Societies formed the COVID19 Pandemic Breast Cancer Consortium. One of their suggestions was the use of core biopsies for genomic testing to help triage patients for surgical vs. systemic treatment during the pandemic. We evaluated pre-operative genomic profiling using the 70-gene (MP) and 80-gene (BP) molecular tests for its impact on multi-disciplinary treatment planning for newly diagnosed breast cancer patients.

Methods: From April to September 2020, patients from the iGAP Registry Database with newly diagnosed breast cancer had their diagnostic core biopsies sent for MP risk of recurrence testing and BP molecular subtyping as part of their routine care. The rapid results program (Figure 1) was evaluated to optimize triage of patients to appropriate neo-adjuvant treatment regimes. When genomic results differed from IHC/FISH results or suggested a different treatment plan vs. clinical factors alone, we referred to this as “reclassification.”

The iGAP Registry is a multi-center IRB-approved longitudinal database that includes genomic, pathology, physician decision impact, clinical and patient reported outcomes over time.

<https://clinicaltrials.gov/ct2/show/NCT04419896>

Results: The average time from biopsy to test results was 10.02 days and the average lab TAT was 5.04 days. MP and BP results re-classified patients from conventional IHC/FISH subtyping or traditional clinical factors (e.g., nodal status, tumor size) 29% of the time (Table 1).

Conclusions: Utilization of pre-operative genomic profiling on core biopsy enabled genomic results to be incorporated into triaging patients into appropriate treatment planning and nearly 1/3 of patients had an alteration in their treatment plan. We pursued this program to triage patients during COVID but the impact on treatment planning has highlighted the utility of this approach beyond the pandemic.

<u>Result Efficiencies:</u>	<u>Average Days</u>	<u>Raw #</u>
TAT- Bx to Result:	10 Days	
TAT- Accession to Result:	5 Days	
QNS/Failure Rate via CORE:	7.50%	*9/152
<u>Reclassification Rate:</u>		
ER+ --> Basal:	3.26%	*5/152
TN --> Luminal B	0.66%	*1/152
HER2+ --> Luminal B	0.66%	*1/152
HER2+ --> Basal	0.66%	*1/152
T2+ or LN+ ---> Luminal A	19.08%	*29/152
ULTRA LOW >65	4.61%	*7/152
TOTAL:	28.94%	*44/152

239 - Efficacy of Ozone Therapy as a Novel Potential Therapeutic Approach in Severe Granulomatous Mastitis

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Background/Objective: Idiopathic granulomatous mastitis (IGM) is known as a chronic benign disorder that can mimic breast cancer. Even though the exact etiology of IGM is unknown, autoimmunity may play a major role in pathogenesis. Since the therapeutic potential of ozone therapy has recently been shown in rheumatic diseases and in COVID19 disease, this study aimed to assess the clinical efficacy of ozone therapy in severe idiopathic granulomatous mastitis.

Methods: Two cohorts (cohort A and cohort B, N=43) were included into the study treated by 2 different treatment protocols between August 2017 and April 2019. All patients had biopsy-verified granulomatous mastitis with negative microbiological cultures or RT-PCR for tuberculosis. Patients resistant to steroid therapy or suffering from steroid complications (n=29, 67.4%) or who do not desire a steroid therapy were included into the study. Clinical response was evaluated by physical exam and/or radiology including ultrasound or magnetic resonance imaging before and after the therapy.

Results: Median age was 33 (range, 24-55). Treatment was made by weekly major ozone Autohemotherapy (AHT) alone by using a high dose ozone (70 gamma) in patients in cohort A (n=34). However, cohort B included 9 patients treated with consecutive alternating AHT or ozone rectal insufflation by using lower doses ozone between 15 to 30 gamma for AHT and 25 to 50 gamma for rectal administration twice a week for a month followed by weekly maintenance therapy sessions. Local ozone injections within the affected gland were applied to patients weekly for at least 2 months until full recovery in both cohorts. Significant clinical differences were obtained after ozone therapy such as softening of inflamed breast tissue, reduction and total disappearance of discharge from cutaneous fistulas in all patients. Almost half of the patients (51%, n=22) had magnetic resonance imaging that showed a recovery of findings associated with inflammation in the breast. The complete response rate after 4 month-therapy was estimated as 41% (n=14) in cohort A with high dose ozone therapy, and 55.6% (n=5) in cohort B with low dose ozone therapy, whereas the remaining patients showed a partial response in both groups. Only one patient treated with rectal ozone insufflation in cohort B once had abdominal pain and hypotension that disappeared with a quick recovery at the same day after the session.

Conclusions: Ozone therapy has been shown to be as an effective, tolerable and safe therapy especially for IGM patients with steroid-resistant granulomatous mastitis. Furthermore, treatment by using low dose ozone autohemotransfusion or rectal ozone insufflation seems to be at least as effective as high dose ozone therapy as a promising potential novel therapeutic approach in severe IGM.

240 - Is Sentinel Lymph Node Biopsy with Radiotherapy Alone Safe in Clinically Node-Positive Breast Cancer After Neoadjuvant Chemotherapy?: Turkish Multicentric Neosentitürk-Trial/MF-18-03

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Background/Objective: Omitting axillary lymph node dissection (ALND) following sentinel lymph node biopsy (SLNB) in patients with initially clinically node positive disease after neoadjuvant chemotherapy (NAC) is still controversial. Our aim is to find out whether SLNB alone could be oncologically safe in a subgroup of patients with residual nodal disease in SLNs after NAC.

Prospective Clinical Trial Design: Study protocol: All patients with clinically node positive disease will undergo neoadjuvant chemotherapy. Axillary FNA and PET-CT are strongly recommended, however presence of radiologically and clinically highly suspicious lymph nodes will also be considered as clinically nodal positivity. All patients with clinically node negativity (physical exam, USG, and/or MRI, PET-CT) after neoadjuvant chemotherapy (NAC) will be considered for SLNB with any technique (blue dye alone, radionuclide alone or both combined) and any breast surgery (mastectomy or breast conservation). PET-CT and MRI following NAC are not mandatory. PE and USG and/or MRI are preferred. At least, 2 sentinel lymph nodes will be obtained. Intraoperative evaluation of SLNs is strongly recommended. All patients having SLNB with clinically-negative axilla after NAC will be included into the study:

SLNB (-)/(+) & level 1-3 RT (N=500)

SLNB(-)/(+)&ALND & level 3 RT (+/-level 1-2) (N=500)

Eligibility Criteria

Inclusion Criteria:

Age:18-70

T0-4, N1-3, M0

Exclusion Criteria:

Inflammatory breast cancer,

pregnant patients

Patients with distant metastatic disease

Specific Aims: Primary Endpoint: The primary endpoints are disease free survival defined as time from diagnosis of cancer to any event as local, regional or distant recurrence, and disease specific survival defined as time from diagnosis to death from breast cancer, and overall survival defined as time from diagnosis to death from any cause. **Secondary Endpoint:** The secondary endpoints are patient reported morbidity outcomes such as lymphedema or shoulder function.

Statistical Methods: Kaplan Meier survival test will be used to calculate the disease free and disease specific survival.

Present and Planned Accrual: Between January 2018 and September 2020, over 500 patients were registered into the study. A total of 1000 patients will be registered.

Contact information for clinicians and patients with an interest in the clinical trial
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(<http://clinicaltrials.gov/ct2/show/NCT04250129>)

241 - Is There Any Advantage of Targeted Axillary Dissection After Neoadjuvant Chemotherapy in Patients with Initially Positive Clipped Node?

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Background/Objective: Removal of the clipped lymph node alone or as sentinel lymph node or aloand removal the by targeted interventions with sentinel lymph node biopsy (SLNB) have been shown to improve the false negative rates in patients with initially positive axilla following neoadjuvant chemotherapy (NAC). We aimed to evaluate the surgical advantage of targeted removal of the metastatic clipped node by various radiological methods in our clinic.

Methods: Between June 2017 and September 2020, a prospective study was performed in patients with clinically node-positive breast cancer (T1-3, N1). The metastatic index lymph node was marked with a clip before NAC. Sentinel lymph node biopsy (SLNB) was performed by only blue dye or combined method (radioisotope & blue dye). Based on the surgeon and radiologist preference, the clipped lymph node was marked with radioactive isotope Tc99 or wire on the day of surgery and presence of the clip in the lymph node was demonstrated by specimen radiography.

Results: Fifty-four patients with a clipped lymph node that was radiologically visible (ultrasound or mammogram or CT) were evaluated. The median age of the patients was 46 (24-70). All patients were cN1, whereas the majority (n=48, 88.9%) had cT2 tumors. SLNB was performed with only blue dye in 38 patients (70.4%), and combined method in 18 patients (29.6%). The mapping success was 96.3% except 2 patients with lymphatic mapping using blue dye alone. The median number of SLN was 3 (1-5) (1 SLN in 8 patients, 2 SLNs in 15 patients, and 3≤ SLNs in 29 patients). The clipped lymph node was removed by wire in 47 patients (87%) and by radio-guided occult lesion localisation (ROLL) in 7 patients (13%). The clipped lymph node was detected in 47 patients (87%) in SLNs and in 7 patients (13%) in non-SLNs. The clipped lymph node pathology was found to be regression in 22 (40.7%), metastasis in 2 (3.7%), metastasis& regression in 26 (48.1%) and reactive changes in 4 (7.4%) patients. The majority of patients (n=21) with ypN0 (n=24) underwent SLNB with removal of the clipped lymph node. The nonsentinel lymph node positivity evaluated in those patients with an intraoperative pathological positive node and axillary dissection (n=26) were 50% with SLNB technique alone, 69.2% by removal of the clipped lymph node alone, and 42.3% by using both techniques, respectively.

Conclusions: Our findings suggest that removal of the clipped lymph node by guidance of various radiological methods including ROLL or wire in addition to SLNB reduced the nonsentinel lymph node positivity rates even more compared to each technique alone. However, experienced radiologists and surgical teams are required to perform these techniques successfully.