THE AMERICAN SOCIETY OF Breast Surgeons

Resource Guide

Accelerated Partial Breast Irradiation

Purpose

To outline the use of accelerated partial breast irradiation (APBI) for the treatment of breast cancer.

Associated ASBrS Guidelines or Quality Measures

1. Prior consensus statement: Accelerate partial breast irradiation

Methods

This is a comprehensive, but not systematic, review of the modern literature on this subject. The ASBrS Research Committee developed a consensus document, which the ASBrS Board of Directors reviewed and approved.

Summary of Data Reviewed

Background

The surgical and adjuvant radiation treatment of breast cancer has evolved dramatically over the past 50 years. In 1976, the National Surgical Adjuvant Breast and Bowel Project (NSABP) initiated the B-06 trial, which randomized patients with invasive breast cancers to receive modified radical mastectomy, lumpectomy, or lumpectomy plus whole breast irradiation (WBI). After 20 years of follow-up, published data from this study and other randomized trials have established that both mastectomy and breast-conserving surgery (BCS) with WBI are appropriate treatment options for Stage I and II breast cancer, with equivalent survival[1-7]. In 1990, the National Institutes of Health issued a consensus statement that supported the use of BCS and WBI as the preferred management for patients with invasive breast cancer[8]. This report was followed by widespread adoption of BCS with WBI. BCS without WBI is associated with a higher rate of recurrence[1, 9-11].

Despite the potential advantages of BCS, which involves less extensive surgical intervention than mastectomy, many eligible women opt to undergo mastectomy instead of BCS because of the long- and short-term side effects of WBI and the burden of treatment, which involves traveling to a radiation treatment facility for daily treatments for 3-6 weeks[12]. In addition, 20% of women who are treated with BCS never receive radiation as part of their treatment[13]. Multiple factors contribute to the lower-than-expected use of BCS and the associated underutilization of adjuvant radiation, including: specific tumor characteristics, cost, patient social and demographic factors, physician/patient bias, distance from the radiation facility,

and lack of social support[12-15]. Furthermore, WBI has other potential downsides, such as deleterious effects upon adjacent tissues including the heart, lung, contralateral breast, adjacent normal breast, and skin[16-18]. Recent data on the use of WBI administered from 1958 to 2001 have demonstrated that its use is associated with a dose-dependent increase in long-term incidence of ischemic heart disease[19]. Theoretically, a safer and more convenient approach to adjuvant radiation therapy could allow more patients to choose BCS, decrease the number of patients treated with BCS who never received adjuvant radiation, and reduce the complications associated with radiation therapy after BCS.

Accelerated Partial Breast Irradiation

Accelerated partial breast irradiation (APBI) has been studied as an alternative to whole breast radiation to make BCS a realistic and palatable option for more women. Numerous studies have shown that a majority of ipsilateral breast tumor recurrences (IBTR), after treatment with BCS and WBI, occur within the index quadrant[20-22]. The concept that irradiation of the immediate vicinity of the primary tumor is adequate to achieve local control of early-stage breast cancer was used to initiate numerous clinical trials involving APBI to show equivalence and non-inferiority of APBI[23-25]. To address long-term efficacy of APBI, the NSABP B-39/RTOG 0413 trial was initiated. This trial is closed, and long-term results are forthcoming. The use of APBI was included in the most recent National Comprehensive Cancer Center Network (NCCN) guidelines, which encourage patients to participate in APBI clinical trials[26].

APBI is delivered via multi-catheter interstitial brachytherapy, balloon-based applicators, external beam radiotherapy, or intraoperative radiation therapy (IORT). All of the APBI modes involve treating a limited and targeted volume of breast tissue in a much shorter course than traditional whole breast radiation. With more than 10 years of follow-up, multiple series have documented excellent clinical outcomes for patients treated with APBI, thus expanding the patient selection criteria. The American Society for Radiation Oncology (ASTRO), the ASBrS, and the American Brachytherapy Society (ABS) have all published consensus statements regarding “suitable” and “cautionary” and “unsuitable” patients for treatment with APBI[23, 27, 28]. ASTRO and ABS have recently updated their guidelines resulting in more open patient selection criteria[29, 30]. The table below lists ABS, ASTRO, and ASBrS guidelines and updates. From the patient perspective, the tangible benefits of APBI may be found primarily in improved access to radiation treatment, less travel[31], reduced out-of-pocket costs, increased patient satisfaction, decreased radiation therapy exposure to normal tissues, and potentially improved cosmetic outcomes[32-34].

Criterion	ABS Updates	ASTRO update	ASBrS Updates
Age	≥45 years	≥50 years 40-49 years if all other criteria met	≥45 years for all tumor types
Histology	All invasive subtypes and DCIS	All invasive subtypes Pure DCIS	All invasive subtypes DCIS
Tumor Size	≤3cm	≤3cm	≤3cm
T Stage	Tis, T1, T2	Tis, T1, T2	Tis, T1, T2 (≤ 3cm)
Margins	No tumor on ink for invasive, ≥2mm for DCIS	Close margins ok	No tumor on ink for invasive tumors or tumors involved with DCIS ≥2mm for DCIS
Nodal status	Negative	Negative	Negative
Other factors	Unifocal only No LVI ER+ or ER-	Limited LVI ER+ or ER- EIC ≤3 cm	Multifocal ok if total span of tumors is ≤3cm ER+ or ER- Focal LVI No genetic mutations

Recommendations

Recommendations are limited by the data available at the time this document was written. At this time, the long-term results from the NSABP B-39 study are not published.

Patients should be carefully selected for APBI and properly informed of the current benefits and risks when considering APBI, WBI, and no radiation. There are several APBI options that exist. There are risks and benefits to each of these approaches concerning effectiveness, side effect profile, patient access, and patient preference. These relevant techniques include:

1. External beam radiation therapy (EBRT) with 3-D conformal radiation, intensity modulated radiation therapy (IMRT) or protons

2. Brachytherapy with intercavitary or interstitial techniques

3. IORT

The American Society of Breast Surgeons recommends the following selection criteria when considering patients for treatment with APBI:

Age: Minimum of 45 years

1. **Histology**: All invasive subtypes
   Ductal carcinoma in situ (DCIS)

2. **Total tumor size (invasive and DCIS):** less than or equal to 3 cm in size

3. **T Size:** Tis, T1, T2 ($\leq 3\ cm$)

4. **Margins:** No tumor on ink for invasive tumors and invasive tumors with associated DCIS
   ≥ 2mm for DCIS
   Note for patients treated with IORT with unknown margins status: If margins are found to be positive after IORT treatment, patient should be recommended to undergo re-excision. If re-excision margin is acceptable, WBI should be considered and discussed with multidisciplinary tram and the patient. If WBI is administered after IORT, the IORT dose can be substituted for the boost dose.

5. **Nodal Status:** Negative
   Note for patients treated with IORT and subsequently found to have a positive SLN: WBI should be considered. If WBI is administered, the IORT dose can be substituted for the boost dose.

6. **Other Factors:** Multifocal disease is allowed as long as the combined area of tumor is ≤3cm
   Tumor may be estrogen receptor positive or estrogen receptor negative
   Lymphovascular invasion is allowed as long as it is focal
   Patients should not be treated with APBI if they have a BRCA genetic mutation or other genetic mutation that confers an increased risk of breast cancer
   There is no evidence to support use of APBI in male patients
   Patients with a history of ipsilateral breast cancer treated with radiation should only be treated with APBI as part of specific clinical trial
   No contraindication to APBI in patients with history of contralateral breast cancer

7. Patient selection and counseling should be performed in a multidisciplinary fashion with collaboration between the treating surgeon and the treating radiation oncologist

8. It is preferred that all patients treated are part of a clinical trial or registry. All patients should be monitored regularly to identify adverse events as well as local recurrences.

9. The published data for APBI supports the recommendations summarized above. Continuous, long-term, outcomes-based monitoring of APBI is desirable. The American Society of Breast Surgeons maintains an ongoing MammosSite® Registry (registration completed in 2004), collecting data on 1440 patients treated via the MammosSite® balloon catheter technique.

10. These recommendations are intended as a guide to treat patients. Individual treatment decisions could allow treatment outside of the parameters listed above with appropriate discussion with the patient.

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