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Four-year clinical update from the American Society of Breast Surgeons MammoSite brachytherapy trial

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Brachytherapy;
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Partial breast irradiation;
MammoSite

Abstract

BACKGROUND: We present a 4-year update on the efficacy, cosmetic results, and complications of MammoSite breast brachytherapy in patients enrolled in the American Society of Breast Surgeons registry trial.

METHODS: A total of 1,449 breasts in 1,440 patients with early stage breast cancer undergoing breast-conserving therapy were treated with adjuvant, accelerated partial breast irradiation (APBI) (34 Gy in 3.4-Gy fractions) delivered with the MammoSite device. The median follow-up period for the entire group was 36.1 months.

RESULTS: The 3-year actuarial rate of ipsilateral breast tumor recurrence was 2.15%. The 3-year actuarial rate of axillary recurrence was .36%. Complication rates were as follows: infection, 9.5%; seroma, 26.8% (symptomatic seroma, 12.7%); and fat necrosis, 2.0%. The percentages of breasts with good or excellent cosmetic results were as follows: 12 months, 95%; 24 months, 94%; 36 months, 94%; and 48 months, 91%.

CONCLUSIONS: Locoregional control, complications, and cosmetic outcomes from MammoSite APBI at the 4-year update are acceptable and similar to results seen with other forms of APBI.

Breast-conserving surgery followed by radiation therapy has been shown in multiple trials to yield survival rates and recurrence rates that are equivalent to those seen with total mastectomy for early stage breast cancer.[1] Whole-breast radiation therapy is delivered 5 days a week over the course of 5 to 6 weeks. Although the benefit of whole-breast radiation therapy in terms of reducing local recurrences is well documented, whole-breast irradiation also is associated

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with many burdens for the patient. Daily trips to the hospital are not feasible for some patients. Other patients may not have reasonable access to a radiation facility. Furthermore, some patients refuse radiation treatment, and some physicians may have a bias against radiation therapy after breast-conserving surgery. All of these factors contribute to a 19% rate of patients not receiving radiation therapy after breast-conserving surgery[2,3] and have led to increased interest in accelerated partial breast irradiation (APBI).

The rationale for APBI is that 90% of breast recurrences occur at or adjacent to the original tumor bed.[4] This suggests that treatment of the whole breast may expose breast tissue that is not at risk for recurrence. APBI, in which only the part of the breast at greatest risk for recurrence is treated, may be a more efficient and effective treatment. The shorter duration of APBI—5 days—alleviates many of the burdens of standard whole-breast radiation therapy and may make radiation therapy more palatable to many patients.

There are multiple methods for delivering APBI. Among these is delivery of APBI using the MammoSite breast brachytherapy catheter. After approval of the MammoSite device by the Food and Drug Administration (FDA) for clinical use in May 2002, a registry trial was initiated by the manufacturer. In November 2003, the American Society of Breast Surgeons (ASBS) assumed control of the trial. We present here the 4-year update on the efficacy, cosmetic results, and complications.

Materials and Methods

Between May 4, 2002, and July 30, 2004, there were 97 institutions that participated in a registry trial designed to collect data on the clinical use of the MammoSite device for the delivery of APBI. The trial was initiated after the FDA approved the MammoSite device for clinical use in May 2002. The goals and objectives of the trial were to collect data on the technical reproducibility of use of the MammoSite device on a large scale, acute complications, cosmetic results, and efficacy. A previous trial that included 43 patients was performed to establish the safety of the device as a breast brachytherapy catheter and to obtain FDA approval was reported previously.[5] On November 17, 2003, the ASBS assumed primary management of the trial.

Independent full-service contract research organizations (CROs) not affiliated with the ASBS, the manufacturer, or any of the institutions participating in this trial were hired to collect, manage, and analyze data for the ASBS. These CROs ensured regulatory compliance and provided clinical-trial management, monitoring, data management, and statistical analysis services. BioStat International, Inc. assumed control of the data registry in June 2006 and currently serves as the CRO. BioStat verified that all paper records were entered into a central database, verified information on sites of recurrence, and reviewed adverse event records for terminology and missing descriptive information such as grade and time of onset.

Patient enrollment

All centers trained in and using the MammoSite device clinically were encouraged to participate in the registry trial. Information about the trial was incorporated into the regional training programs for the device, with the goal of recruiting as many institutions as feasible to provide a large database of patients in various clinical settings. No site with adequate resources to complete the required data forms was denied participation in the study. Patients could be enrolled in the trial at any time in their treatment once the trial was initiated.

Because data entry and processing for the registry trial are ongoing, a data cut-off date of February 8, 2008, was chosen for this update to allow for auditing and analysis. By that date, 1,449 breasts in 1,440 patients had been treated with MammoSite APBI at 97 participating institutions.

Eligibility criteria

Patient eligibility criteria for the trial were based on a previous publication on the use of APBI from the American Brachytherapy Society.[6] In addition to these patient eligibility criteria, there were technical eligibility criteria designed to exclude patients with inadequate balloon-to-skin distances (<5 mm), excessive cavity size (>6 cm), poor balloon-cavity conformance, or asymmetry of the center catheter shaft.

Data collection and quality assurance

Information on patient demographics, cosmetic results, complications, and efficacy were collected on forms supplied to investigators. After the ASBS assumed management of the trial, additional data were collected on cosmetic results, adverse events, disease recurrence, and patient survival. All data forms were reviewed by the CRO for inaccuracies, omissions, and conflicting information. This was followed by a random audit of 10% of the charts by the CRO to further verify the accuracy of the data, and the current CRO systematically has reviewed 100% of the data on which this update is based.

Institutional review board approval was not required for participation in the registry trial but was recommended. Eighty percent of the clinical sites were affiliated with an institutional review board and obtained its approval to participate in the study. All patients enrolled in the study were required to provide written informed consent, and patients who were treated on or after April 14, 2003, were required to sign a Notice of Privacy Practices in accordance with the Health Insurance Portability and Accountability Act of 1996 (HIPAA agreement) allowing the release of their data. All clinical sites were provided with a sample informed consent form and HIPAA agreement that contained all of the elements necessary for informed consent. Patient data submitted without an informed consent form and/or HIPAA agree-