ELSEVIER

CrossMark

BRACHYTHERAPY

Brachytherapy 13 (2014) 488–492

Long-term followup of breast preservation by re-excision and balloon brachytherapy after ipsilateral breast tumor recurrence

Mark Trombetta[1,2,*], Michael Hall[1], Thomas B. Julian[3,4]

[1]*Department of Radiation Oncology, Allegheny General Hospital, Pittsburgh, PA*
[2]*Department of Radiation Oncology, Temple University School of Medicine, Pittsburgh Campus, Pittsburgh, PA*
[3]*Department of Surgery, Allegheny General Hospital, Pittsburgh, PA*
[4]*Department of Surgery, Temple University School of Medicine, Pittsburgh Campus, Pittsburgh, PA*

ABSTRACT

PURPOSE: To report our long-term experience with balloon brachytherapy in retreatment of the breast after ipsilateral breast tumor recurrence.

METHODS AND MATERIALS: Between March 2004 and June 2012, 18 patients previously treated with external beam radiotherapy were retreated using either the MammoSite (Hologic Corporation, Marlborough, MA), MammoSite ML (Hologic Corporation), or the Contura (Bard Peripheral Vascular, Inc., Tempe, AZ) brachytherapy devices. Sixteen patients were treated for an ipsilateral breast tumor recurrence after breast conservation surgery and postoperative irradiation (11 with infiltrating ductal carcinoma [IDC] and 6 with ductal carcinoma in situ [DCIS]), whereas 2 patients developed an in-field breast cancer likely associated with Hodgkin disease mantle irradiation (27 and 17 years prior, respectively). The recurrent histology of seven was IDC, with seven others recurring as DCIS, three as a combination of IDC/DCIS, and one as infiltrating lobular carcinoma. All patients received a twice-daily tumor dose of 3400 cGy at 340 cGy per fraction. Acute and chronic side effects were graded by the Common Terminology Criteria for Adverse Events, version 4.0. Cosmesis was graded by both the Harvard Cosmesis Scale and the Allegheny General Modification of the Harvard Scale.

RESULTS: With a mean of followup of 39.6 months, only 2 patients developed a local recurrence. One patient developed an inflammatory recurrence from what was identified as a moderately differentiated T1N0M0 estrogen receptor–positive recurrence, and the second developed a recurrence immediately adjacent to the implant site. Both patients were treated locally by salvage mastectomy. The patient who developed an inflammatory recurrence rapidly developed visceral metastases including brain lesions and succumbed to her progressive disease. The second patient was successfully salvaged with uncomplicated mastectomy, and she survives to this date. One patient developed a chronic abscess in the sinus tract of the balloon, which required mastectomy, and one developed a post-treatment infection in the catheter tract, which was successfully treated with oral antibiotics. Cosmesis as graded by the Harvard cosmesis criteria and the Allegheny General Modification Score diminished one grade in only 2 patients. All other patients had stable cosmetic scores.

CONCLUSIONS: Use of balloon brachytherapy devices in the treatment of the previously irradiated breast is feasible and may provide adequate local control and acceptable cosmesis in carefully selected patients. Further study and refinement of this therapy is required for more definitive results.

Keywords: Brachytherapy; Retreatment; Breast cancer; Radiation; HDR; Balloon

Introduction

Ipsilateral breast tumor recurrence (IBTR) manifesting in a previously irradiated breast presents a therapeutic challenge. The accepted standard of care continues to be salvage mastectomy to obtain local control while avoiding the potential consequences of reirradiation (1–4); however, newer evidence may signify a trend toward repeat

Received 22 April 2014; received in revised form 14 May 2014; accepted 15 May 2014.

Conflict of interest: None to report.

* Corresponding author. Department of Radiation Oncology, Allegheny General Hospital, 320 East North Avenue, Pittsburgh, PA 15212. Tel.: +412-359-3400; fax: +412-359-3981.

E-mail address: mtrombet@wpahs.org (M. Trombetta).

1538-4721/$ - see front matter
http://dx.doi.org/10.1016/j.brachy.2014.05.017

conservative management and breast preservation (5–9). High-dose-rate brachytherapy using a balloon applicator has been used in partial breast irradiation for the treatment of early stage breast cancer since Food and Drug Administration approval in 2002 when the reproducibility and feasibility were demonstrated (10). Clinical outcome results from balloon brachytherapy studies have shown comparable local control to whole-breast irradiation with better normal-tissue sparing (10–12).

Surveys of women who are affected with breast cancer have consistently shown a desire for breast preservation both in the immediate postdiagnosis period and the long term (13–15). We and others have previously reported our results related to repeated attempts with breast preservation using low-dose-rate interstitial brachytherapy (INBT) (7–9) and have published preliminary data on the feasibility of balloon brachytherapy as a part of a retreatment after local recurrence in IBTR using the MammoSite (Hologic Corporation, Marlborough, MA) brachytherapy applicator after lumpectomy (16). We now present our long-term followup data.

To the best of our knowledge, these are the first reported long-term data using balloon brachytherapy devices in the retreatment of the previously irradiated breast.

Methods and materials

Between March 2004 and March 2012, 18 patients previously treated with external beam radiotherapy after breast conservation surgery were retreated using either the MammoSite, MammoSite ML (Hologic Corporation), or the Contura (Bard Peripheral Vascular, Inc., Tempe, AZ) brachytherapy devices for early stage carcinoma of the breast in an institutional review board–approved study. Sixteen patients were treated for an IBTR after breast conservation surgery and postoperative irradiation, whereas 2 patients developed an in-field breast cancer in the upper outer aspect of the breast likely associated with mantle irradiation and chemotherapy for Hodgkin disease treated 27 and 17 years prior, respectively. The initial course of therapy in the first patient was delivered in 1976 and consisted of five cycles of nitrogen mustard, vincristine, procarbazine, and prednisone chemotherapy followed by full mantle field irradiation, which delivered 4500 cGy at 180 cGy per fraction to the axillae and upper outer quadrants of the bilateral breasts. The second patient received multicycle nitrogen mustard, vincristine, procarbazine, and prednisone chemotherapy as well (likely three cycles over 2–3 months by history) followed by 4140 cGy at 180 cGy per fraction to a standard mantle field similar to the first patient. Tattoo marks and portal films from the previous Hodgkin disease treatment verified inclusion of the site of breast tumor development as in field for both patients.

Of the IBTR patients, 11 originally presented with infiltrating ductal carcinoma (IDC) and 6 with ductal carcinoma in situ (DCIS). The recurrent histology of seven was IDC, with seven others recurring as DCIS, three as a combination of IDC/DCIS, and one as infiltrating lobular carcinoma (Table 1). Seventeen patients received a twice-daily tumor dose of 3400 cGy at 340 cGy per fraction. In a single patient, the dose was reduced to 3000 cGy in 300 cGy twice-daily fractions because of concerns over skin frailty. Acute and chronic side effects were graded by the Common Terminology Criteria for Adverse Events, version 4.0 (17). Cosmesis was graded by both the Harvard Cosmesis Scale referenced in the National Surgical Adjuvant Breast and Bowel Project (NSABP) B-39/Radiation Therapy Oncology Group (RTOG) 0413 protocol guidelines (Table 2; (18)) and the Allegheny General Hospital (AGH) Modification of the Harvard Scale (Table 3; (19)). The AGH modification was developed by us to better evaluate the cosmetic changes related to retreatment alone and to better compare retreatment and *de novo* therapeutic affects. The AGH Retreatment Scale modification assigns two Harvard Score numbers for cosmesis; one before the repeat breast conservation therapy and one afterward. This allows baseline scoring as the first number, whereas the second number records more accurately changes in cosmesis related solely to the retreatment.

Table 1
Patient histologic data

Original/recurrent histology	
IDC → IDC	$n = 5$
IDC → DCIS	$n = 2$
DCIS → DCIS	$n = 5$
IDC → IDC/DCIS	$n = 3$
HD → IDC	$n = 1$
HD → IDC/DCIS	$n = 1$
IDC → ILC	$n = 1$

IDC = infiltrating ductal carcinoma; DCIS = ductal carcinoma in situ; HD = Hodgkin disease; ILC = infiltrating lobular carcinoma.

All patients were advised that salvage mastectomy was the standard of care. Brachytherapy was delivered in accordance with the NSABP B-39/RTOG 0413 protocol guidelines for application of balloon brachytherapy (18). All patients received a tumor dose of 3400 cGy at 340 cGy per fraction with each fraction delivered twice daily separated by a minimum 6 h interval and calculated at 1.0 cm

Table 2
Harvard breast cosmesis grading scale

I. *Excellent*: When compared with the untreated breast, there is minimal or no difference in the size or shape of the treated breast. The way the breasts feels (its texture) is the same or slightly different. There may be thickening, scar tissue, or fluid accumulation within the breast but not enough to change the appearance

II. *Good*: There is a slight difference in the size or shape of the treated breast as compared with the opposite breast or the original appearance of the treated breast. There may be some mild reddening or darkening of the breast. The thickening or scar tissue within the breast causes only a mild change in the shape or size

III. *Fair*: Obvious difference in the size and shape of the treated breast. This change involves one-quarter or less of the breast. There can be moderate thickening or scar tissue of the skin and the breast, and there may be obvious color changes