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Original article

Immediate expander/implant breast reconstruction followed by post-mastectomy radiotherapy for breast cancer: Aesthetic, surgical, satisfaction and quality of life outcomes in women with high-risk breast cancer

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ABSTRACT

Background: Immediate tissue expander/implant-based breast reconstruction (BR) is often avoided when post-mastectomy radiotherapy (PMRT) is planned due to concerns about high complication rates and poor aesthetic outcomes. This study evaluated surgical, aesthetic and quality of life (QoL) outcomes in women undergoing immediate implant-based BR (IIBR) followed by PMRT.

Methods: Participants were recruited at least six months after completing the final stage of BR. They completed validated on-line questionnaires assessing satisfaction, QoL, distress, body image and regret. Aesthetic outcomes were rated by their operating surgeon through clinical examination and assessed by an independent surgeon using photographs.

Results: Forty-seven participants completed questionnaires and reported good outcomes for QoL (FACT-B = 115; TOI = 73), satisfaction (Breast-Q), distress (Impact of Events scale <4.8 all subscales) and body image (Body Image scale), with a low score on the Decisional Regret scale (mean 12.1). Aesthetic outcomes were rated fair-to-good (Kroll scale). The surgical complication rate was low (expander/implant loss rate 6.4%, wound infection 10.6%, seroma 4.1%). At follow-up, 33 (70.2%) participants retained their permanent implant and 12 (25.5%) converted to a TRAM or DIEP flap; there were two LD flaps.

Conclusion: This study demonstrated acceptable cosmetic results, high patient satisfaction and low complication rates. It provides evidence that women are willing to accept the potential risks of IIBR in exchange for its benefits including enhanced body image during chemotherapy and PMRT and the possible avoidance of more complicated and costly delayed autologous BR. The results support the importance of access to BR, even in women with high-risk disease.

Introduction

The majority of women undergoing mastectomy for breast cancer are eligible for immediate breast reconstruction (BR) yet reconstruction rates remain low, at less than 15% in all but the most specialized cancer centers around the world [1].

Women with larger and/or more advanced breast cancers require post-mastectomy radiotherapy (PMRT) as part of their treatment and the indications for PMRT are increasing [2,3]. PMRT is traditionally regarded as a contraindication to immediate implant-based breast reconstruction (IIBR) on the basis that radiotherapy causes a higher rate of implant-related complications, including capsular contracture, resulting in a poor cosmetic outcome [4–7]. This means that when PMRT is considered likely, IIBR is less likely to be offered and delayed autologous BR is favored.

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This commits women to a much larger, more complicated and more costly procedure, and to living without a reconstructed breast for many months to several years. Many women never undergo delayed BR despite being appropriate candidates because the rigors of the cancer treatment make them reluctant to undergo further major procedures. Immediate BR has been shown to result in less distress and better psychosocial well-being than delayed BR [8], and is a reasonable initial option for women with high-risk tumors. If the long-term results of IIBR and PMRT are not acceptable to the patient, free-flap BR can still be performed at a later stage, with the patient still getting the initial benefits of IBR [9,10].

Despite the reluctance of some clinicians to offer IBR in the setting of PMRT, there is emerging research to support the belief that patient satisfaction is acceptable when IIBR is offered and an informed choice is made [11].

The aim of this study was to evaluate patient-reported outcomes (quality of life, satisfaction with surgery, distress, body image and decisional regret) and surgeon-reported aesthetic outcomes following immediate two-stage tissue expander/implant BR and PMRT. Surgical complications and outcomes were also described, including the proportion of women who ultimately underwent autologous BR following an unsatisfactory expander/implant procedure.

Methods

Participants were treated in a two-surgeon specialist breast and oncoplastic surgical practice that is part of a multidisciplinary cancer center. Oncoplastic surgeons performed the majority of IBRs; a small number were performed by plastic surgeons (when it was the patient's preference). All autologous free-flap procedures were performed by plastic surgeons. At the time of the study, direct-to-implant reconstruction was not performed at the center, so all patients choosing IIBR underwent a staged procedure. Acellular dermal matrix was not utilized in any cases.

Study eligibility

All women with invasive breast cancer who underwent IIBR and PMRT over a 42-month period (2009–2013) were identified using the clinic database and were invited to participate. Women were eligible for recruitment six months after completion of the second stage reconstructive procedure (exchange of tissue expander for permanent implant). Women planning autologous BR after PMRT were also eligible for inclusion as they underwent insertion of a tissue expander at the time of mastectomy as a skin-saving procedure.

Study design

A cross-sectional study design was used. Following recruitment and informed consent, participants completed a series of validated on-line questionnaires at a single time point at least six months after completion of the second stage of BR. They also attended for clinical review and the operating surgeon evaluated the aesthetic outcome using a standardized rating scale. The images of a subgroup of women who also consented to photography underwent additional aesthetic evaluation by an independent surgeon.

Surgical procedure

Women underwent skin sparing or total skin sparing (with nipple preservation) mastectomy. Sentinel node biopsy and/or axillary lymph node dissection was performed as indicated by preoperative and intra-operative assessment. A tissue expander was placed in a sub-pectoral pocket at the time of mastectomy. It was expanded over several months (during chemotherapy and before radiotherapy). Radiotherapy was delivered with the expander fully inflated. The expander was exchanged for a permanent implant as a second procedure at least six months after the completion of radiotherapy. When it was the patient's preference, or if there were early signs of marked capsular contracture, poor tolerance of the implant or a poor aesthetic outcome, women were encouraged to make a choice between proceeding with the second stage of IBR and having an 'immediate-delayed' autologous BR with a free transverse rectus abdominis myocutaneous (TRAM) or deep inferior epigastric perforator (DIEP) flap at the time of tissue expander removal (at least six months after radiotherapy).

Radiotherapy

The standard radiotherapy protocol delivered 50Gy in 25 fractions to the chest wall employing a CT-planned, 3D conformal technique, using tangential beams of 6–18 MV photons. The use of bolus was at the radiation oncologist's discretion. Treatment of the regional supraclavicular nodes, internal mammary nodes and/or axillary nodes was determined by the radiation oncologist with multidisciplinary team discussion.

Outcomes and measures

Demographic, tumour, treatment and surgical complication data were collected from each patient's medical record. Psychological outcomes were evaluated using standardized, validated patient-reported outcome measures (PROMs): quality of life (QoL) measured with FACT-B (higher score, better QoL) [12]; satisfaction with breast surgery measured with Breast Q–Reconstruction (Post-operative) module [13]; psychological distress measured with Impact of Events Scale (higher scores, higher distress) [14]; body image measured with Body Image Scale for Cancer Patients (higher score, higher distress) [15]; post-decisional regret measured with Decision Regret Scale (higher score, more regret) [16].

Surgeon-rated aesthetic outcomes were measured using the Kroll Scale (a global and itemized aesthetic tool) [17] and Baker Scale (a measure of capsular contracture) [18]. Photographs were evaluated by an independent surgeon using the Kroll Scale [17].

Statistical analysis

Analysis was undertaken using SPPS (version23) [19]. Descriptive statistics were used to describe participant and tumour characteristics. Mean scores, standard deviation and range were calculated for each PROM and surgeon-rated measure.

The study was approved by the St Vincent's Hospital Sydney Human Research Ethics Committee (study number 11/156) and was registered as a clinical trial in Australasia (ACTRN12 614000078651). All participants gave informed written consent.

Results

There were 832 new breast cancer referrals during the study period. 371 (44.6%) underwent mastectomy, 160 (43.1%) of mastectomy patients underwent PMRT, and 54 (33.8%) of these elected to have IIBR and were eligible for the study. 47 women consented to participate and completed the PROM questionnaires. 34 (72%) underwent surgeon-reported aesthetic evaluation by the operating surgeon and 30 (88%) of these consented to photography and had photographic evaluation by an independent surgeon.

Forty-nine breasts in 47 women were treated with mastectomy, IIBR and PMRT. Participant, tumour and treatment demographics