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# Breast-conserving therapy for breast cancer: Cosmetic results and options for delayed reconstruction

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Received 28 November 2016; accepted 9 May 2017

## KEYWORDS

Breast neoplasms;  
Mastectomy;  
Segmental;  
Reconstructive surgical procedures;  
Cosmetic techniques;  
Observer variation

**Summary Objectives:** Optimisation of the cosmetic outcome after breast-conserving therapy (BCT) is important. We aimed to determine the cosmetic outcome following BCT and factors influencing this cosmesis and identify the most favourable options for delayed breast reconstruction.

**Materials and methods:** Four reconstructive surgeons evaluated the cosmetic outcome of 109 patients after BCT. Additionally, the surgeons indicated which patients were amenable for delayed reconstruction and the preferred type of reconstruction. The inter- and intra-observer agreement of the surgeons was rated.

**Results:** The mean overall cosmetic outcome was rated as fair (2.7/4.0, SD 0.9, 1.0–4.0). Risk factors for a poor cosmesis were larger breast size (OR 3.81,  $p = 0.040$ ), larger tumour (OR 1.63,  $p = 0.028$ ) and axillary lymph node dissection (ALND) (OR 3.09,  $p = 0.013$ ). Reconstruction of the ipsilateral side was recommended in 55.6% and 94.5% and contralateral reconstruction in 16.7% and 73.3% of patients with good and poor cosmesis, respectively. Flap reconstruction and lipofilling were most commonly reported for the ipsilateral, and breast

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<http://dx.doi.org/10.1016/j.bjps.2017.05.005>

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reduction for the contralateral breast, with reasonable improvement expected (2.2/4.0, SD 0.5, 1.08–3.3). The inter- (0.5–0.7) and intra-observer (0.63–0.79) agreement of the cosmesis was moderate to good, however, poor regarding the recommended reconstruction techniques (mainly  $< 0.50$ ).

**Conclusion:** Cosmetic outcome after BCT is influenced by breast and tumour size and ALND. Although several reconstructive options are available, the optimal method for revision surgery has not yet been determined. Future studies are necessary to obtain evidence-based guidelines for reconstructive surgery after BCT.

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## Introduction

Breast cancer surgery has changed dramatically over the past few decades. Breast-conserving therapy (BCT) was introduced in the 1970s as an alternative for the Halsted radical mastectomy and refers to breast-conserving surgery (BCS) in all cases followed by radiotherapy. Several trials demonstrated that BCT yields survival rates comparable to those achieved with mastectomy alone, and therefore, BCT has become the standard of care for early-stage breast cancer.<sup>1–3</sup> The main advantage of BCT is preservation of the breast and saving healthy breast tissue, resulting in an improved patient satisfaction compared with mastectomy.<sup>4</sup> However, studies consistently show unsatisfactory cosmetic outcomes in up to 40% of all patients, depending on patient and tumour characteristics, with large excision volumes being a major contributor to a poor cosmetic outcome.<sup>5–8</sup> A poor cosmetic outcome is mostly described as pronounced breast asymmetry, changed shape of the breast, nipple displacement, scar retraction and skin alterations.<sup>7–12</sup> Poor cosmetic results have a large impact on body image and are responsible for lower self-esteem, impaired feelings of sexuality and depression. Therefore, focussing on the best achievable cosmetic result will most likely lead to a decrease in psychological distress and improve quality of life after surgery for breast cancer.<sup>13–18</sup>

Although many reconstructive treatment options are available for BCS, such as standard BCS, immediate oncoplastic surgery or mastectomy with (delayed) reconstruction, limited number of studies are performed to investigate the differences in oncological and cosmetic outcome. Moreover, because of differences in methods to evaluate the cosmetic result, it is difficult to compare the available literature. At length, there is still no consensus regarding the optimal reconstructive technique.<sup>19</sup> The decision as to which delayed reconstruction technique should be used depends on a variety of factors such as the size and shape of the breast, the availability of tissues around the breast and at other sites, and the effects of radiotherapy on breast parenchyma. It is fairly unknown which patient and tumour characteristics are amenable to delayed reconstruction and subsequently which technique should be used.<sup>20</sup>

## Aim of the study

This study aimed to determine the cosmetic outcome following BCT and identify the influence of patient and

tumour factors on the cosmesis. Furthermore, we aimed to determine the inter- and intra-observer agreement of breast reconstructive surgeons when choosing their preferred technique for delayed reconstruction.

## Methods

### Patients

In total, 109 patients were included in this study. All patients underwent BCT for T1–T2 invasive breast cancer. Exclusion criteria were previous breast surgery, thoracotomy and patients who had undergone radiation of the chest region for other malignancies.

The study was performed in accordance with the Declaration of Helsinki, guidelines for Good Clinical Practice and STROBE guidelines.<sup>21</sup> Written informed consent was obtained, and patient, tumour and treatment characteristics were collected from hospital records. Breast surgery consisted of palpation-, wire- or ultrasound-guided lumpectomy. The calculated resection ratio (CRR) was determined by comparing the specimen volume to the optimal resection volume as described by Krekel et al.<sup>22</sup> Additional surgical procedures included either a sentinel node (SN) procedure or an axillary lymph node dissection (ALND). All patients received radiation therapy of the whole breast and a radiotherapy boost to the tumour bed, according to formerly applicable Dutch guidelines and determined by a multidisciplinary team of breast cancer experts. The breast cup sizes were determined by the authors (V.L.N., J.H.V., N.M.A.K. and M.P.v.d.T.) from the photographs and rated as A/B, C/D and >E.

### Photographs

Digital frontal photographs of the breasts including the suprasternal notch were obtained. Patients were photographed in the supine position by one photographer, and the images were compiled into a power point presentation.

### Cosmetic evaluation and reconstructive options

All photographs were evaluated by four dedicated reconstructive breast surgeons with at least 10 years of experience with breast reconstructive surgery. The cosmetic outcome of the affected breast was evaluated by each

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