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Original research

Six-year follow-up of patients treated with oncoplastic reduction mammoplasty: A cohort study

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HIGHLIGHTS

- This study evaluates long-term recurrence rates in patients treated with oncoplastic reduction mammoplasty (ORM) for predominantly stage II-III cancers.
- Six-year local recurrence rate is 2%, distant recurrence rate is 6%, and cancer-specific survival is 96%.
- The study further supports that ORM is oncologically safe in the long-term.

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ABSTRACT

Background: Current evidence for the oncological safety of oncoplastic breast conservation is poor as it is based mostly on short-term follow-up data. Hence, we report long-term recurrence rates in patients treated with oncoplastic reduction mammoplasty (ORM).
Methods: A prospectively maintained database was searched to identify patients who underwent ORM between 2005 and 2010. A retrospective review of medical records was carried out, including patients with ductal carcinoma *in situ* and invasive breast cancer.
Results: Follow-up data from 65 consecutive patients with ORM were reviewed, of which 50 patients were eligible to measure long-term recurrence rates. The average weight of the resected tissue was 272 g altogether. The mean preoperative tumour size was 2.95 cm on imaging. 64% of patients had stage II – III cancers. Incomplete excision rate after ORM was 16.1%, completion mastectomy rate was 10.7%. During a median follow-up of 72 months, 2% local, 6% distant recurrence rates were detected. The breast cancer-specific survival rate was 96% per cent.
Conclusions: Based on these long-term follow-up data, ORM is an oncologically safe treatment option.

1. Introduction

Plastic surgical techniques in combination with oncological surgery, which is called oncoplastic breast conserving surgery, has become an integral part of breast cancer surgical treatment over the last two decades [1–4]. Besides oncological safety good aesthetic outcome is an important goal now, since superior cosmetic results is shown to provide significant psychological benefits in breast cancer patients and better quality of life [5].

Majority of oncoplastic breast conservations is carried out with volume displacement techniques, which comprises of tumour excision followed by reshaping of the breast parenchyma as well as an adequate reduction of the breast skin-envelope [6]. This is commonly referred as oncoplastic reduction mammoplasty (ORM), or therapeutic mammaplasty [7,8]. ORM is frequently accompanied by the reduction of the contralateral breast to improve symmetry [9].

The evidence for oncological safety of ORM is relatively vague and prospective randomized trials are unlikely to be ever

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undertaken given the complex ethical considerations [2,10]. ORM can be applied for large malignancies including those which were conventionally treated with mastectomy with relatively low incomplete excision rate [3]. It has also been demonstrated previously that ORM does not delay adjuvant chemotherapy, which further contributes to the oncological safety of this surgical technique [4].

The current evidence for local and distal recurrence rates is largely built on single-institutional retrospective studies [1,7,9–28]. Majority of these reports are based on relatively short follow-up time between 13 and 54 months [1,7,9,11,13–25]. There are only five studies that report true recurrence rates based on at least five years follow-up after oncoplastic breast conservation [10,12,26–28]. Three studies, altogether 299 patients' follow-up time extend beyond six years, which is the current evidence for long-term recurrence rates after breast conservation surgery involving oncoplastic techniques [10,27,28]. Hence, we studied long-term, six-year recurrence rates in patients treated with ORM for invasive and noninvasive breast cancer.

2. Methods

Details of patients treated with ORM were recorded into a standardised institutional database. The following characteristics were recorded prospectively in the oncoplastic dataset: demographic data (age, BMI, brassiere size, risk factors for breast cancer and breast surgery), preoperative tumour size, pre- and postoperative pathology, surgical, oncological management, surgical complications, time and site of recurrence. The clinical records included in the oncoplastic dataset were analysed for demographic, tumour, treatment characteristics and recurrences. Missing data was retrospectively searched via case records and included in the analysis. Preoperative tumour size was determined as the largest diameter given on any preoperative imaging. Patients with previous ipsilateral or contralateral DCIS or breast cancer were excluded. All patients were diagnosed between August 2005 and September 2010.

An oncoplastic breast surgeon, or a breast and a plastic surgeon together decided the indication and technique of ORM, as detailed previously [4]. Oncoplastic technique was determined by patients' anatomy, preferences and tumour location. All patients were treated with oncoplastic reduction mammoplasty, when a significant volume excision was followed by reshaping of the breast parenchyma with volume displacement technique and accompanied by adequate skin envelope reduction (level II oncoplastic techniques as defined by Clough et al.) [6]. Simple reshaping such as dual plane mobilization without skin reduction was excluded, since this technique is routinely performed for smaller lesions in order to prevent deformity. Excision margin was considered clear if the closest margin to the excision plane was at least 1 mm with invasive cancer or 2 mm with DCIS. Radiotherapy, chemotherapy and hormone therapy were administered according to evidence-based guidelines of the Beatson West of Scotland Cancer Centre in the given time period.

Surgical, oncological, radiology and pathological reports were analysed for follow-up to determine the pattern and timing of recurrence up to April 2015. Length of follow-up was determined as time elapsed from first treatment. Patients were followed up every 12 months by surveillance mammogram and clinical examination, and abnormal clinical findings were further investigated as appropriate. Recurrences were documented by clinical examination, radiological tests and/or pathological assessment. Local and distant recurrence rates were the primary outcome of interest as these correlate with the overall oncological safety of ORM. The seventh edition of the American Joint Committee on Cancer staging system (2010) was used for tumour staging [29].

For statistical calculations, two-tailed Mann–Whitney test was used to assess possible associations between preoperative tumour size and applied surgical technique or incomplete excision rates. Fisher's exact test was used to calculate associations between incomplete excision rate and oncoplastic technique. For all analyses, $P < 0.050$ was considered statistically significant. Statistical calculations were performed using SPSS® Statistics version 19.0 (SPSS, Chicago, Illinois, USA).

This study was designed and reported in line with the STROBE criteria [30].

3. Results

A total of 65 patients treated with ORM were considered for the study, but six patients were excluded due to early loss of follow-up (shorter than 3 years), and further three patients were excluded for previous contralateral breast cancer. Hence, 56 patients were included in the follow-up finally. Their median age was 54 (range 27–79) years. The median length of follow-up was 72 (range 36–120) months for the whole cohort. The indication for ORM was invasive cancer in 52 patients and DCIS in four patients. Altogether, almost two-thirds of this cohort was diagnosed with stage II or III breast cancer (32 patients) (Table 1). Eight patients had multifocal invasive cancer.

The majority of patients were treated with ORM from a “Wise” pattern excision, followed by “Benelli”-type round block excision, “melon slice” wedge resection, “Grisotti”-flap and “Lejour” vertical mammoplasty (Table 2). The average weight of the resected breast tissue was 272, (25–1000) grams altogether, which included the tissue resected around the cancer as well as tissue removed with technical – and not oncological – indications. Mean preoperative tumour size was 2.95 (range 1–7.7) cm on imaging. There was no significant association in preoperative tumour size and the surgical

Table 1
Tumour characteristics and overall, local and distant recurrence rates, based on first event of recurrence.* one patient had a complete pathological response after neoadjuvant chemotherapy, and tumour size, grade, nodal status was not determined.

Patients		Recurrences		
		Overall	Local	Distant
	No.	No.	No.	No.
All patients	**50**	**4**	**1**	**3**
Invasive cancer	**46**	**3**	**0**	**3**
T1*	16	0	0	0
T2	28	3	0	3
T3	2	0	0	0
G1*	7	0	0	0
G2	16	1	0	1
G3	23	2	0	2
Ductal	43	2	0	2
Lobular	2	1	0	1
Mixed	1	0	0	0
Hormone rec +ve	33	3	0	3
Hormone rec −ve	13	0	0	0
Her-2 +ve	8	1	0	1
Her-2 −ve	38	2	0	4
Node +ve*	11	2	0	2
Node −ve	35	1	0	1
DCIS	**4**	**1**	**1**	**0**
Stage of disease				
0	4	1	1	0
IA	13	0	0	0
IB	1	0	0	0
IIA	21	1	0	1
IIB	7	0	0	0
IIIA	4	2	0	2

Cumulative figures are in bold.