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Original article

Delay of adjuvant radiotherapy due to postoperative complications after oncoplastic breast conserving surgery

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ABSTRACT

Background: In the past a mastectomy was the first approach of treating breast cancer. Oncoplastic techniques combined with breast conserving surgery (BCS) and radiotherapy has become an alternative to mastectomy in patients with non-metastasized breast cancer. The aim of this study was to analyse the amount and types of complications occurring after oncoplastic BCS before and after adjuvant radiotherapy and the delay of adjuvant therapy due to the complications.
Method: A retrospective study based on all patients who received immediate oncoplastic BCS by a plastic surgeon at two medical hospitals in The Netherlands between 2013 and 2015. (n = 150). The performed oncoplastic BCS techniques were the primary outcome measures. In particular major complications with the need for antibiotics or surgical intervention. A one-year follow-up was achieved for all patients.
Results: 52% of the 150 included patients received an oncoplastic BCS through the reduction pattern, 35% with a LICAP and 10% with an AICAP. Complications occurred in 37.5% of the patients, 10% of the patients needed treatment with antibiotics and in 6.6% of the patients a revision operation was indicated. 79.6% of all postoperative complications occurred before the start of adjuvant radiotherapy. In 8.2% of the patients the adjuvant radiotherapy had to be delayed due to a complication.
Conclusion: This study provides a detailed overview of the used techniques of oncoplastic BCS and their postoperative complications. Most complications occurred before the start of the adjuvant radiotherapy. Just a small amount caused a delay for the radiotherapy to start.

1. Introduction

Breast cancer represents 25% of all cancers in women and is therefore the most common cancer in women worldwide. With 1.7 million newly diagnosed cases in 2012, breast cancer is the second most common cancer overall [1]. One in every eight women in the EU will develop breast cancer before the age of 85 [3].

In the past, a mastectomy was the first approach to treat breast cancer. Nowadays, breast conserving surgery (BCS) combined with radiotherapy has become the standard local treatment for most women with breast cancer. The aim of BCS is complete tumour removal performed in a cosmetically acceptable manner [2,3]. Combining BCS with plastic tissue handling is called oncoplastic breast conserving surgery and was introduced by Audretch in the 1990s [4].

Oncoplastic BCS allows the removal of larger tumours with better aesthetic results compared to standard BCS and in various cases a mastectomy can be avoided [5,6]. Excision of greater than twenty percent of the breast results in more noticeable defects, which makes those patients good candidates for oncoplastic BCS [7]. Reconstruction is preferably done during the same operation as the tumour resection performed. A second surgery to correct breast deformities is in general unnecessary [5].

Many different kinds of oncoplastic techniques have been introduced over the years to minimize deformities and to obtain

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the best possible aesthetic satisfaction [5]. These techniques can be divided into those that displace volume of surrounded breast tissue and techniques where autologous tissue from an extra mammary site is used to replace the lost breast tissue [5,8]. Oncoplastic BCS through a Wise reduction, Grisotti or Batwing pattern are examples of volume displacement. A lateral or anterior intercostal artery perforator (LICAP/AICAP) flap and the latissimus dorsi flap reconstruction are common techniques of volume replacement. The Wise breast reduction pattern can be used for almost all tumour locations in patients with large and ptotic breasts and will cause an inverted T-scar on the breast. The Grisotti pattern and the Batwing pattern are more suitable for tumours that are located in a central location. The Batwing pattern is used for nipple sparing BCS, while Grisotti flap is ideal for non nipple sparing BCS to create a neoareola by transposing an area of skin to close the defect. Volume replacement with autologous tissue for tumours medially located can be provided by an anterior intercostal artery perforator flap (AICAP) where a pedicled flap is transposed from the inframammary region to fill up the defect. The LICAP is a pedicled flap from the lateral side of the breast to fill up the defect after resection of a laterally located tumour. To reconstruct large lateral defects after tumour resection the latissimus dorsi myocutaneous flap (LD) can be used.

Studies have shown that oncoplastic BCS is a safe approach regarding oncologic results compared to conservative BCS· [2,9–14] Most studies are mainly focused on oncological outcomes such as radical resections and recurrence rates. Only few studies focus on the postoperative complications in oncoplastic BCS and the different techniques of reconstruction that are used. Also the influence of radiotherapy on the complication rate is rarely analyzed [15–17].

The aim of this study was to analyse the numbers and types of complications occurring after oncoplastic BCS before and after adjuvant radiotherapy and the delay of adjuvant therapy due to the complications. We expected to have a higher percentage of radical tumour removal with the oncoplastic BCS than non-oncoplastic BCS as described in literature. In addition, we expected that most complications would occur after radiotherapy rather than beforehand.

2. Patients and methods

2.1. Study population

This retrospective study was based on all patients who received immediate oncoplastic breast conserving surgery by a plastic surgeon at the Maastricht University Medical Centre, The Netherlands, or at the Zuyderland Medical Centre in Sittard-Geleen, The Netherlands, between January 2013 and December 31th 2015. The indication for an oncoplastic BCS was made during the consultation at the oncological surgeon preoperatively. If the surgeon expected that the shape of the breast would change too much after the lumpectomy, patients were sent to the plastic surgeon for an oncoplastic reconstruction. Size of the breast, as well as size and location of the tumour play a pivotal role in this decision.

We used the primary data collected through patient's records from the pathological, surgical, plastic surgical and radiotherapy services. We excluded patients who received a mastectomy, patients who received oncoplastic surgery that was not performed by a plastic surgeon and patients who received delayed instead of immediate breast reconstruction. The study was performed in accordance with the ethical standards of the Declaration of Helsinki.

2.2. Outcome measures

Patient demographics and medical records were reviewed. Comorbidities, risk factors, oncological status, oncological therapy and operative details were collected. The postoperative follow-up period was one year. A major complication was defined as any complication requiring antibiotics or surgical intervention. Complications that did not require antibiotics or surgical intervention were defined as minor complications. Delay of the adjuvant radiotherapy due to a complication was assessed by information from the file of the radiotherapists.

2.3. Pathological classification criteria

Histology grade was based on Scarff-Bloom-Richardson grading system by microscopically examination by a pathologist. Radical resection of the breast cancer was defined as no ink on the tumour by microscopically examination by a pathologist.

2.4. Statistical analysis

Descriptive analysis was performed to characterize the demographic variables of the patients. Mean and standard deviation (SD) were described for the continuous variables with normal distribution and median with interquartile ranges for the continuous variables with skewed distribution. Frequencies and percentages were used for categorical variables. The time free of (major) complication was measured from the date of the surgery to the date of the first complication or, if no complication occurred, to 365 days after the surgery. Kaplan-Meier analysis was used to illustrate the time free of (major) complication.

The demographic variables were compared between the patients with and without a complication and between the patients with a minor complication and a major complication. The differences in demographics between groups were assessed using the Mann Whitney *U* test for continuous variables and Chi-square tests, or Fischer's exact tests as appropriate for categorical variables. Multivariable logistic regression analysis was used to assess the associations of complications with clinically relevant factors including age at operation, BMI, smoking status, hypertension and the weight of the lumpectomy. The variables that were included in the multivariable regression analysis were chosen based on literature and differences between groups [15,18–20].

A p-value ≤ 0.05 was considered to be statistically significant. Data analysis were performed using SPSS software (version 23.0, SPSS INC, Chicago, IL, USA) for Windows [21].

3. Results

In this study 66 patients of the Maastricht University Medical Centre (MUMC) and 84 patients of the Zuyderland Medical Centre Sittard-Geleen were included. Characteristics of all 150 patients are summarized in Table 1. The median age of the patients was 58 years. The median BMI was 26.29 kg/m^2 (23.18–29.92), including 36 (24%) patients with a BMI above 30 kg/m^2. Only 21 (14.4%) patients were active smokers at the time of the operation. A total of 38 (25.3%) patients had received neoadjuvant chemotherapy. The oncological surgeon removed a median of 61 (38–90) grams of tissue with a median tumour size of 15 (11–20) millimeters. No patient died during the 1 year follow up.

As shown in Table 2, more than half of the patients (52.3%) underwent oncoplastic breast reconstruction by means of a wise-pattern breast reduction, followed by LICAP reconstruction (n = 53, 35.5%) and AICAP flap (n = 15, 10.0%). Reconstruction with a Batwing pattern, Grisotti pattern or LD flap was only performed