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Skin-sparing mastectomy and immediate reconstruction with DIEP flap after breast-conserving therapy

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Summary

Background:

Currently about 70% of women who suffer from breast cancer undergo breast-conserving therapy (BCT) without removing the entire breast. Thus, this surgical approach is the standard therapy for primary breast cancer. If corrections are necessary, the breast surgeon is faced with irritated skin and higher risks of complications in wound healing. After radiation, an implant-based reconstruction is only recommended in selected cases. Correction of a poor BCT outcome is often only solved with an additional extended operation using autologous reconstruction.

Material/Methods:

In our plastic surgery unit, which focuses on breast reconstruction, we offer a skin-sparing or subcutaneous mastectomy, followed by primary breast reconstruction based on free autologous tissue transfer to correct poor BCT outcomes. Between July 2004 and May 2011 we performed 1068 deep inferior epigastric artery perforator (DIEP) flaps for breast reconstruction, including 64 skin-sparing or subcutaneous mastectomies, followed by primary DIEP breast reconstruction procedures after BCT procedures.

Results:

In all free flap-based breast reconstruction procedures, we had a total flap loss in 0.8% (9 cases). Within the group of patients after BCT, we performed 41 DIEP flaps and 23 ms-2 TRAM flaps after skin-sparing or subcutaneous mastectomies to reconstruct the breast. Among this group we had of a total flap loss in 1.6% (1 case).

Conclusions:

In cases of large tumour sizes and/or difficult tumour locations, the initial oncologic breast surgeon should inform the patients of a possibly poor cosmetic result after BCT and radiation. In our opinion a skin-sparing mastectomy with primary breast reconstruction should be discussed as a valid alternative.

key words:

breast cancer • oncoplastic • autologous breast reconstruction • mastectomy

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BACKGROUND

Within the industrialized countries, the lifetime breast cancer risk for women is around 9% to 10%, and in some parts of the world it is around 25%, with a tendency to affect younger women. Beside individual systemic treatment options, surgery and radiotherapy are the most significant modalities for treatment. In 70% of all breast cancers, breast surgeons are able to excise only the tumour within clear margins without removing the entire breast, called "breast-conserving therapy" (BCT). This well accepted and reliable therapy also involves obligatory adjuvant radiotherapy of the affected breast. Chemotherapy, immunotherapy, and antihormonal therapy are not frequently used as adjuvant therapy.

In case of large tumours relative to the size of the breast, or unfavorable anatomical tumour location within the breast, BCT sometimes leads to cosmetically poor long-term results [1,2].

Asymmetry of the breasts, unnatural breast shape with large defect-zones, and chronic pain cause patients to return to the breast surgeon.

After radiation therapy, the reconstructive surgeon is faced with irritated skin and a much higher percentage of wound healing problems, and implant-based reconstruction is only recommended in selective cases. In contrast, post-radiation reconstruction can frequently only be solved by the use of additional extended autologous surgery [3,4].

In our plastic surgery unit, which specializes in breast reconstruction, in such cases we offer a skin/nipple-sparing mastectomy, followed by primary breast reconstruction based on free autologous tissue transfer, if possible, mostly as a DIEP flap, in attempting to avoid the need for post-radiation reconstruction.

With regard to DCIS, younger patients, multiple risk factors, the aim of sustained long-term good results, and optional abandonment of otherwise inevitable radiotherapy in case of BCT, skin-sparing mastectomy and immediate reconstruction, either with implants or autologous tissue, can serve as initial alternative and successful treatment option to obtain local control and cosmesis [5].

MATERIAL AND METHODS

Our plastic surgery unit belongs to an interdisciplinary breast centre, and specializes in breast reconstruction. We offer a wide spectrum of reconstruction procedures after breast cancer. Our main focus is autologous tissue transfer. During 7 years we have been able to reconstruct more than 1050 breasts by free autologous tissue transfer.

Among them, we were confronted with patients who underwent BCT plus adjuvant radiotherapy in the past. Referred patients with asymmetry of the breasts and unnatural breast shape and large defect-zones are seen in our outpatient clinic. Beside a partial augmentation of the volume, the skin envelope also needed to be replaced. After radiotherapy, we try to avoid enlarging the skin envelope with any type of skin expansion.

In our opinion the only solution of this problem is autologous tissue reconstruction, with the possibility to enlarge

Table 1. Shows the total amount of free-flap-breast-reconstruction procedures we performed between 2004 and 2011 in 940 patients after breast cancer. The lower part gives information about the distribution of autologous free flap breast reconstruction after BCT in 64 patients.

Patients (total)	940
Flaps (total)	1068
DIEP	760
ms-2 TRAM	294
I-/S-GAP	10
SIEA	4
Rest-SSM + DIEP/ms-2 TRAM after BCT	64
DIEP	41
ms-2 TRAM	23

the skin envelope by inserting a skin island after skin-sparing or subcutaneous mastectomy.

Between July 2004 and December 2011 we operated on 64 patients with poor cosmetic results after extended BCT and adjuvant radiotherapy; 41 received a skin-sparing or subcutaneous mastectomy followed by a DIEP flap, and in 23 patients followed by a free ms2-TRAM flap as reconstruction procedure. In the latter cases, more perforator vessels are needed to be taken to ensure a sufficient flap perfusion.

The donor site of a DIEP flap-based breast reconstruction is basically comparable to an abdominoplasty, in which the waste skin and fatty tissue of the external abdomen is used without affecting abdominal wall integrity. The blood supply of the elevated tissue complex is ensured by a single or multiple perforator vessels connected to the inferior epigastric artery. Normally muscle tissue is not needed. In our cases, reperfusion of the flap was reached by anastomosis to the internal mammary vessels. This surgical technique has been described in detail elsewhere [6-8].

In cases of poor cosmetic results after BCT in the past, we are confronted with the situation of insufficient skin envelopes associated with remaining breast tissue. In some cases an implant was inserted to augment the breast volume. In a first step we always removed the implant, including the capsule and the remaining breast tissue in terms of a nipple- or skin-sparing mastectomy. In cases after BCT with asymmetry of breast volume, we performed a skin-sparing or subcutaneous mastectomy, depending on the oncologic situation. With the technique of DIEP flap-based reconstruction, we were able to augment volume and simultaneously increase the skin envelope by inserting a size-adapted skin island. Thus, the poor cosmetic result was solved in a single surgical procedure.

RESULTS

During the past 7 years, between July 2004 and December 2011, we performed 1068 breast reconstruction procedures with autologous tissue transfer in 940 patients, mostly using the DIEP flap in 760 reconstructions followed by ms-2-TRAM flap (294 reconstructions) and free flaps of gluteal area origin (S-/I-GAP: 10 cases) (Table 1).

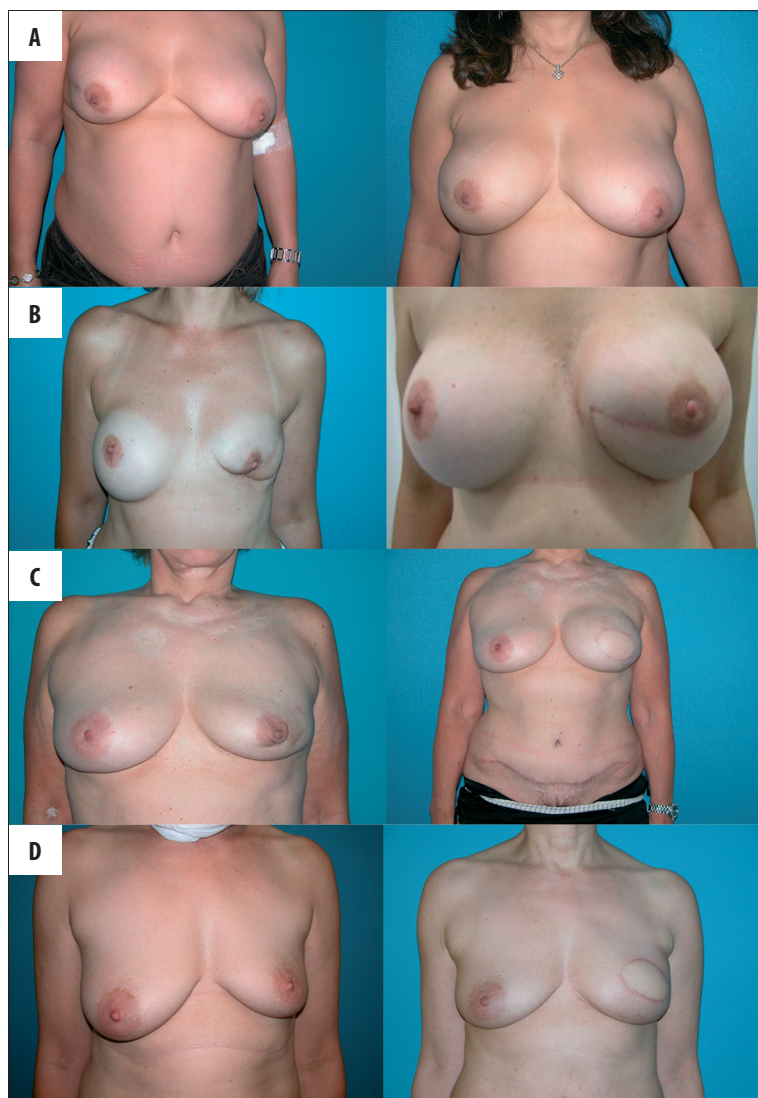


Figure 1. Patient photographs before (left side) and after free-flap-breast-reconstruction-procedures (right side); (A) Patient with Mamma-Carcinoma right side, after BCT, after Radiotherapy, after 2× Implant reconstruction; Procedure: Rest – Nipple – Sparing – Mastectomy and DIEP – Flap – Breast – Reconstruction; (B) Patient after Mamma-Carcinoma left side, after BCT, after Radiotherapy, after Latissimus – Dorsi & Implant – Reconstruction, Implant failure; Procedure: Rest – Nipple – Sparing – Mastectomy and DIEP – Flap – Breast – Reconstruction; (C) Patient after DCIS left side, after BCT, histological R1-Situation, after Re-BCT, histological R1-Situation; Procedure: Rest – Skin – Sparing – Mastectomy and DIEP – Flap – Breast – Reconstruction; (D) Patient after Mamma-Carcinoma left side, after BCT, after Radiotherapy, after Chemotherapy, Recurrence; Procedure: Rest – Skin – Sparing – Mastectomy and DIEP – Flap – Breast – Reconstruction.

In our hospital the standard follow-up after free tissue transfer for breast reconstruction includes postoperative appointments in the outpatient centre at 1, 3, 6 and 12 months after surgery. All included patients presented in our offices within these time frames.

In all free flap-based breast reconstruction procedures we had total flap loss in 0.8% (9 cases). A partial flap loss and margin necrosis occurred in 1.3% (14 cases) and 2.5% (27 cases), respectively. Hematoma within the breast occurred in 26 cases, and at the abdominal wall in 9 cases. Weakness of the abdominal wall appeared in 20 patients. At follow-up, none of the 4 patients with a small hernia within the abdominal wall had to undergo an additional surgical intervention in terms of hernioplasty.

Within the group of patients after BCT, we performed 41 DIEP flaps and 23 ms-2 TRAM flaps after skin-sparing or subcutaneous mastectomy to reconstruct the breast (Figure 1). Among this group, a total flap loss occurred in 1.6% (1 case). A partial flap loss and margin necrosis occurred in 3.1% (2 cases). Hematoma within the breast occurred in 4 cases and at the abdominal wall in 1 case. Weakness of

Table 2. Shows distribution of 64 free-flap-breast-reconstruction procedures we performed between 2004 and 2011 after BCT with bad long term results. Detailed information on Complication rates is given.

Rest-SSM and DIEP / ms-2 TRAM after BET	64
DIEP	41
ms-2 TRAM	23
Total flap loss	1/1.6%
Patial flap loss	2/3.1%
Margin necrosis up to 20%	1/1.6%
Abdominal wall weakness	1
Hernia	0

the abdominal wall appeared in 1 patient. None of the patients showed small hernias within the abdominal wall at follow-up. A statistical comparison to the overall group with the group of BCT and skin-sparing or subcutaneous mastectomy with immediate reconstruction showed a slightly higher incidence of total flap loss (0.8% compared to

1.6%) and partial flap loss (1.3% compared to 3.1%), respectively (Table 2).

Except for 1 total flap loss, we achieved good to excellent cosmetic results after the first reconstructive procedure. In the 2 cases with partial flap loss, the tissue transfer also led to a natural breast shape. After excising the necrotic tissue, we have been able to reshape the breast in an additional operation. One margin necrosis was also removed, with a definitive good result.

The patient with total flap loss had to undergo an alternative reconstructive procedure. A pedicled musculocutaneous latissimus dorsi flap was moved into the defect zone, with a very good cosmetic result. In case of total flap insufficiency, a pedicled autologous tissue transfer serves as a secure second surgical option. In this situation, the latissimus dorsi flap is an excellent salvage flap.

In the long-term, 1 patient had abdominal wall weakness after initial BCT, but this did not lead to an additional operation. No hernia was seen up to 1 year postoperatively within this group.

With these surgical procedures we could correct the asymmetry after BCT with skin-sparing or subcutaneous mastectomy and immediate autologous reconstruction in all cases. Patient satisfaction was high 1 year postoperatively.

DISCUSSION

The introduction of oncoplastic surgery as a volume displacement procedure after breast tumour removal made the strategy of breast-conserving therapy a more powerful tool in the treatment of breast cancer [4,9,10]. Regarding this, a question arises: Why do we still perform mastectomies? There are oncological-based reasons for decision making, including multicentric disease and inflammatory cancer, and most recurrences after BCT with previous breast irradiation lead to the indication of mastectomy. Additionally, the possibilities in recognizing genetic dispositions in case of BRCA-associated breast cancer give us the chance for prophylactic risk reduction through, for example, nipple-sparing mastectomy [10].

Our experience suggests additional situations in which to offer nipple-/skin-sparing mastectomy to certain patients. Regardless of using BCT or skin-sparing mastectomy with immediate reconstruction, it should be an oncologically safe procedure, with the best surgical outcome for the patient. However, after BCT and radiation therapy, our experience in reconstruction with DIEP flap or ms-2 TRAM flap after skin-sparing or subcutaneous mastectomy shows a slightly higher complication rate compared to our overall reconstruction procedures. This might be due to the complexity of the procedure and the previously performed surgery. We have to deal with irradiated skin, scars and remaining breast tissue, and the goal for an optimizing patient satisfaction. Furthermore, this might be the only remaining surgical choice for the patient. In all patients, who received a microsurgical reconstruction (n=1068 flaps), we had a complete flap loss of 0.8%, compared to a flap loss 1.6% in patients after BCT and reconstruction. This might be a very low complication rate for flap loss, but salvage procedures are needed in the latter group to solve the problem.

Although mastectomy is an effective procedure, it can have a negative impact on body image, sense of attractiveness, and sexual function [12,13]. BCT, which aims to conserve as much of the unaffected breast tissue as possible, is viewed by many surgeons as the option that most patients prefer, particularly among those who are fully informed about all of the available choices [11]. However, survey data from a cohort of 125 women undergoing surgical treatment of breast cancer, who were educated on mastectomy and BCT, showed that 35% opted for mastectomy even though they understood the benefits of BCT [14]. In the US, the percentage of patients undergoing mastectomy has risen in recent years [15]. This may be in part due to increased use of magnetic resonance imaging, which commonly identifies additional tumour foci in newly diagnosed patients, leading in some cases to a mastectomy that might not have been undertaken otherwise [16]. It could also be driven by fear of disease recurrence or by the poor aesthetic outcomes that are reported by approximately 30% of women after BCT. Further, the increase might be mainly based on the patient's decision for contralateral mastectomy [1,17,18].

We have to consider that poor cosmetic long-term results after BCT mean a prolonged period of suffering. Hoping for amelioration of the cosmetic result over time, they wait months or years before asking a breast surgeon about correction. If they decide on a surgical procedure, it always means at least 1 additional operation.

For those patients who choose it, mastectomy coupled with breast reconstructive surgery offers the dual benefits of confidence in tumour eradication and the restoration of femininity, body image, vitality and quality of life [19,20]. In patients who have undergone breast reconstruction following mastectomy, quality of life scores have been found to be equivalent to those of the general population [21]. Despite these successes, rates of breast reconstruction are low. In a recent audit of 18,216 patients in the UK who underwent mastectomy, less than 30% received breast reconstruction (18.6% immediate reconstruction, 9.5% delayed reconstruction) [22,23]. It is possible that this low rate of reconstructive surgery is driven in part by a failure by some attending physicians to discuss reconstructive options with patients. In addition, institutions vary in the procedures they provide, and this may limit the choices available to patients [24]. Also, in some instances there may be poor coordination and communication between the various specialties involved in managing breast cancer surgery. The aim should be to discuss all options with patients, and to make the full range of surgical procedures available. If this were the case, we would anticipate an increase in the number of breast reconstruction procedures.

CONCLUSIONS

In cases of large tumour sizes and/or difficult tumour locations, the initial oncologic breast surgeon should inform the patient of a possibly poor cosmetic result after BCT and radiation. Therefore, a skin-sparing or subcutaneous mastectomy with primary breast reconstruction following a DIEP flap or ms-2 TRAM flap should be discussed as a valid alternative. However, poor aesthetic outcomes of BCT can be corrected in skin-sparing or subcutaneous mastectomy with immediate reconstruction using the DIEP flap or ms-2 TRAM flap reconstruction, with low complication rates and high level of satisfaction with the aesthetic outcome.

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