



Research Article

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Immediate Breast Reconstruction with Laparoscopic Harvested Omental Flap after Breast Cancer Surgery

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Abstract

Here we present a rarely used technique for breast reconstruction after complete or subtotal subcutaneous mastectomy for breast cancer utilizing a laparoscopically harvested omental flap.

The procedure was performed in selected patients with multicentric carcinomas, large, central tumors (also post treatment with neoadjuvant chemotherapy), tumors with extensive intraductal components, diffuse carcinomas *in situ* and in patients desiring the procedure. To date, 65 of these procedures (39 complete and 26 partial mastectomies) have been performed.

After the sentinel node biopsy, laparoscopy was performed in order to estimate the size of the omentum. The omentum was dissected, preserving the right gastroepiploic vessels as the pedicle of the omental flap. After performing the subcutaneous mastectomy through an infra mammary incision, a subcutaneous tunnel was created, and the omentum pulled out through a 2-3 cm paraxiphoidal incision, and placed within the breast defect.

The cosmetic result was excellent to satisfactory in the majority of cases. There was one loss of the omental flap due to fat necrosis, and one gastric perforation was managed laparoscopically. In three patients, an additional augmentation with lipofilling became necessary. Small skin necrosis could be conservatively treated. Postoperative radiation in patients with positive lymph nodes and subtotal mastectomy was performed without complications. There was no local recurrence to date.

In selected patients, this technique produces good results, creating a breast with a natural, soft consistency, and with minimal donor site morbidity. It provides an esthetically appealing supplement to the established methods. Difficulties include preoperative estimation of the size of the omentum. However, if the volume should be inadequate in the beginning, it frequently increases within the first six months. Also this technique can only be applied for unilateral reconstruction.

Keywords

Breast cancer; Tumors; Laparoscopy; Oncoplastic surgery

Introduction

More than 70% of breast cancer patients can be treated in a breast-preserving manner with good results, to which modern neoadjuvant chemotherapies and the reduction of the tumor-free margin (no ink on tumor) also contribute [1]. However, a significant percentage of breast pathologies remain which require complete or subtotal removal of the breast parenchyma. These are the domain of oncoplastic surgery, which can achieve good cosmetic results with various flap plastics or breast implants. However, in some cases large defects of the donor site with potential morbidity can occur [2-5].

As an additional option for autologous breast reconstruction, the omentum majus is also an option. In 1963, for example, Kiricuta reconstructed breast and thorax defects with an omentum flap [6]. The laparoscopic preparation of the omentum majus to cover a soft tissue defect was described by Saltz et al. [7]. Later on, Cothier-Savey et al. and Jimenez et al. reported breast reconstructions with laparoscopically prepared omentum flap [8,9]. This technique was mainly investigated in the Far East, whereby Zaha et al. recently reported a series of 200 cases with good results [10-13].

In Europe, only one group has reported a small number of breast reconstructions using a free omentum flap [14]. We started breast reconstruction in 2014 with a laparoscopically prepared, vascular pedicled omentum flap and report a series of 65 cases after total or subtotal subcutaneous mastectomy.

Materials and Methods

From November 2014 until December 2017, 65 patients with ages between 26 and 72 years were treated. In 39 of the patients, a complete subcutaneous mastectomy was performed, while the other 26 patients underwent only a partial subcutaneous mastectomy. Indications for the procedure were an extended DCIS (ductal carcinoma in situ), remaining multicentric carcinoma after neoadjuvant chemotherapy, large tumors with positive hormone receptor status in small breasts or the desire of patients with small carcinomas to avoid radiation therapy. Patients with skin-infiltrating tumors and inflammatory carcinomas were excluded. Furthermore, large abdominal operations, especially those of oncological nature, were considered as exclusionary criteria. 14 patients with multicentric carcinomas had neoadjuvant chemotherapy. In 27 of all cases, postoperative radiotherapy was necessary (Table 1).

Surgical procedure

The sentinel node (SN) biopsy was usually performed first, except in neoadjuvantly treated patients in which the SN biopsy had already been performed pretherapeutically. Laparoscopy was then performed to estimate the size of the omentum. The laparoscopic trocar was inserted through the umbilicus. Two additional 5 mm working trocars were placed next to the camera trocar on both sides.

The omentum majus was then removed from the greater curvature of the stomach while preserving the right gastroepiploic vessels, which serve as the vascular pedicle. The mobilization continued into the spleen hilus in order to gain as much tissue as possible. Subsequently, the omentum was detached from the transverse colon,

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Table 1: General overview of the patient set.

| Patients Characteristics | |
|-----------------------------|----------|
| Patients | |
| N (#of patients) | 65 |
| Avg. age | 53 |
| Min. age | 26 |
| Max. age | 72 |
| Type of Mastectomy | |
| Total Mastectomy | 60% |
| Partial Mastectomy | 40% |
| Cancer Type | |
| Tis | 19 (29%) |
| pT1a | 2 (3%) |
| pT1b | 8 (13%) |
| pT1c | 22 (34%) |
| pT2 | 7 (11%) |
| ypTx | 7 (11%) |
| N+ | 13 (20%) |
| Therapy | |
| Postmastectomy radiotherapy | 27 |
| Neoadjuvant chemotherapy | 14 |
| Surgery | |
| Avg. surgery time (min) | 154 |
| Max. surgery time (min) | 195 |
| Min. surgery Time (min) | 117 |

starting laterally, and the preparation was carried out up to the right flexure. An inframammary skin incision was made, which was later used to perform the subcutaneous mastectomy. A clamp was used to subcutaneously build a tunnel into the direction of the xyphoid and the clamp was inserted into the abdomen under laparoscopic vision, after which the incision was extended to approximately 3-4 cm. The omentum was then carefully pulled out of the abdomen through this tunnel and placed in front. The subcutaneous mastectomy was then performed *via* the infra mammary incision. Depending on the size of the omentum or the oncological necessity, the mastectomy was done completely or partially.

Retromamillary tissue was sent in separately for histological frozen section examination. In the case of partial resections, the cut-off margins were also examined. If the SN node biopsy was positive, an axillary dissection was performed and the extent of the resection adapted to the size of the omentum, since radiation is necessary in these cases.

After the breast resection, the omentum was swiveled into the subcutaneous defect, taking care that the stem of the vessel was not twisted. After insertion of a suction drainage, the wound was closed. The average operating time was ~154 min (117-195) (Figure 1).

Results

In all 65 cases of complete or subtotal subcutaneous mastectomy for breast cancer utilizing a laparoscopically harvested omental flap, an oncological R0 resection was possible. Excellent to good cosmetic results were achieved in the vast majority of these cases, especially after subtotal mastectomies (Figure 2).

In nine patients, the omentum was not sufficiently large after complete subcutaneous mastectomy. In three of these cases, the interfering incongruence could be permanently compensated by means of lipofilling. Three patients were satisfied with the situation and correction procedures are planned for the remaining three.

In the case of subtotal mastectomies, the extent of resection was adapted, if oncologically possible, to the size of the omentum, which could easily be inserted into all quadrants and led to predominantly good results. The following postoperative radiotherapy did not lead to any permanent changes in the implanted adipose tissue (Figure 3). In the first few postoperative weeks, the omentum was often indurated. Within the first three months, however, it became softer and eventually reached the same consistency as the other breast, so that no palpatory difference was noticeable. In some cases, the volume of omentum also increased by up to 20% within the first six months.



Figure 1: a) Placing the omentum in front of the abdomen, the trocars are placed in the umbilicus and on both sides next to it, b) Placing of the omentum into the subcutaneous defect, c) Finalization of the surgery after skin sutures, 4) Result after 3 months.

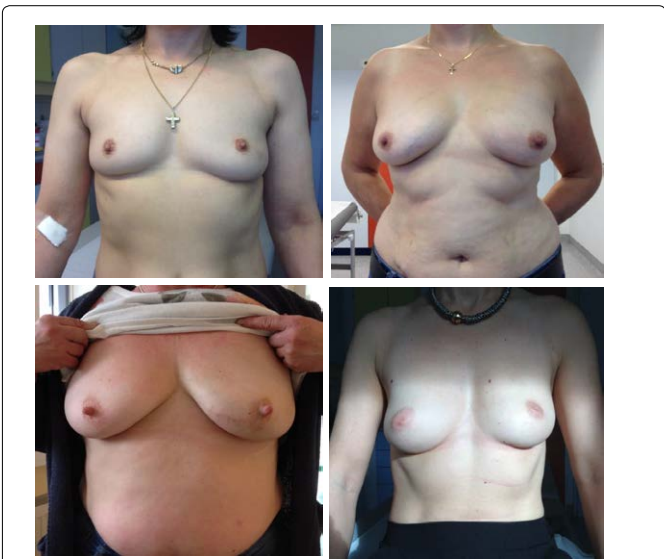


Figure 2: All four pictures show results after complete subcutaneous mastectomy with a laparoscopically prepared omentum flap.



Figure 3: Reconstruction after resection of the upper two thirds of breast tissue after radiation.



Figure 4: Mammogram of the right breast after reconstruction with omentum.

In three cases, antihormonal therapy resulted in considerable weight gain with enlargement of the contralateral breast. Skin necroses occurred in only five patients and predominantly in smokers, which healed completely without surgical intervention. The ample blood supply of the omentum may be a contributing factor for the relatively low number of skin necrosis cases. In one patient, the omentum had to be removed due to multiple fatty tissue necroses that occurred despite intact blood circulation. A gastric perforation that occurred after a week in one patient was successfully treated laparoscopically. It was noticeable that in none of the cases infection-related complications

occurred, which could be due to the unique antibacterial quality of the omentum [15]. Hernia in the area of paraxiphoidal incision has not occurred so far, nor have any local relapses.

Discussion and Conclusion

Breast reconstruction with laparoscopically harvested omentum flap has been described in the past, especially in the Far East. Zaha et al. presented the world's largest series with 200 patients [13]. However, there are only a few studies on this topic in Europe up to this point [14]. The advantages of this method are the small donor site defect of the omentum, comparable to a laparoscopic cholecystectomy. In addition, the nature of the omentum, which in most cases guarantees a natural shape and consistency of the operated breast, plays an important role. Although the technique can only be applied to unilateral reconstruction, the easy availability and minimal changes due to postoperative radiation, with a low overall complication rate, as well as a fast postoperative convalescence are of great benefit for patients.

This case series has also shown that the size of the omentum is difficult to estimate preoperatively, so that for complete mastectomies a careful selection and also corresponding information of the patients about possible corrective interventions is necessary. Corrective interventions are planned after six months at the earliest, as the implanted omentum can increase in size during this time. We have therefore proceeded, if oncologically possible, to adjust the extent of the mammary gland resection to the volume of the omentum, thus achieving excellent esthetic results in all quadrants of the breast [13]. Mammographic examinations of the operated breast can be reliably assessed due to the constitution of the omentum (Figure 4).

Regarding oncological safety, Zaha was able to achieve a very low local recurrence rate with an observation period of 90 months [13]. No local recurrence has yet occurred in the patients described in this case series, although our follow-up time from max. 37 months is currently still too short.

In summary, we believe this surgical method is a valuable addition to the autologous reconstructive spectrum with a low complication rate, low donor site related morbidity and good to very good esthetic results. A prerequisite is a meticulous selection of patients, since the size of the omentum is difficult to determine preoperatively.

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