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Aesthetic outcome and oncological safety of nipple–areola complex replantation after mastectomy and immediate breast reconstruction[☆]

Raphael Wirth*, Andrej Banic, Dominique Erni

Department of Plastic and Hand Surgery, Inselspital, University of Bern, Bern, Switzerland

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Summary Immediate breast reconstruction (IBR) has become an established procedure for women necessitating mastectomy. Traditionally, the nipple–areola complex (NAC) is resected during this procedure. The NAC, in turn, is a principal factor determining aesthetic outcome after breast reconstruction, and due to its particular texture and shape, a natural-looking NAC can barely be reconstructed with other tissues. The aim of this study was to assess the oncological safety as well as morbidity and aesthetic outcome after replantation of the NAC some days after IBR.

Retrospective analysis of 85 patients receiving 88 mastectomies and IBR between 1998 and 2007 was conducted. NAC ($n = 29$) or the nipple alone ($n = 23$) were replanted 7 days (median, range 2–10 days) after IBR in 49 patients, provided the subareolar tissue was histologically negative for tumour infiltration. Local recurrence rate was assessed after 49 months (median, range 6–120 months). Aesthetic outcome was evaluated by clinical assessment during routine follow-up at least 12 months after the last intervention.

Malignant involvement of the subareolar tissue was found in eight cases (9.1%). Patients qualifying for NAC replantation were in stage 0 in 29%, stage I in 15%, stage IIa in 31%, stage IIb in 17% and stage III in 8%. Total or partial necrosis occurred in 69% and 26% if the entire NAC or only the nipple were replanted, respectively ($P < 0.01$). Depigmentation was seen in 52% and corrective surgery was done in 11 out of 52 NAC or nipple replantations. Local recurrence and isolated regional lymph node metastasis were observed in one single case each. Another 5.8% of the patients showed distant metastases.

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* Corresponding author. Department of Plastic and Hand Surgery, University Hospital Inselspital, 3010 Bern, Switzerland. Tel.: +41 31 632 2111; fax: +41 31 382 4496.

E-mail address: raphael.wirth@insel.ch (R. Wirth).

We conclude that the replantation of the NAC in IBR is oncologically safe, provided the sub-areolar tissue is free of tumour. However, the long-term aesthetic outcome of NAC replantation is not satisfying, which advocates replanting the nipple alone.

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Breast-conserving therapy, comprising wide local excision of the primary tumour and adjuvant radiotherapy, represents the treatment of choice for most women with breast cancer. However, ablative surgery is still indispensable in approximately one-third of the cases due to aggressive, extensive or multicentric tumour growth, contraindications for radiotherapy or following the patient's wish. To most of these cases, breast reconstruction can be offered to overcome the psychological burden caused by the disfigurement resulting from the loss of the breast. To date, immediate breast reconstruction (IBR) is favoured over the delayed procedures, after having been proven not to affect tumour recurrence or long-time survival.^{1–6}

In the belief that the nipple–areola complex (NAC) has a significant probability of containing occult tumour cells, the resection of the NAC is commonly included in all conventional mastectomy techniques.⁷ Depending on tumour location, stage and grade, invasion of the NAC has been estimated between 5 and 58%.^{8–10} The NAC in turn allegorises an aesthetically essential part of the female breast.¹¹ Accordingly, the aesthetic outcome after breast reconstruction is substantially influenced by the quality of the NAC reconstruction, which is commonly achieved by transplantation of the contralateral nipple, grafting of skin or labia, implants, local flaps or tattooing or combinations of each. However, due to its particular colour, structure and texture, a natural-looking NAC can hardly be reconstituted with either of these techniques.^{12,13} Therefore, it has been proposed to maintain the original NAC, which is replanted after excluding tumour infiltration by histological examination of the underlying tissue.^{2,14} Furthermore, the use of the original NAC bears the advantage of not causing any other donor-site morbidity. However, there is a paucity of data documenting oncological and surgical safety as well as aesthetic outcome of this procedure.

In this retrospective analysis, we wanted to assess the local recurrence rate, early complication rate and long-term outcome of NAC reconstruction with the use of the original tissue, a procedure that is routinely performed at our institution.

Patients and methods

The study was conducted according to the guidelines for clinical studies of the local Ethical Committee.

The database of our institution was checked for IBR after mastectomy due to invasive breast cancer or carcinoma in situ from 1998 to 2007, and the charts of these patients, including the pre- and postoperative photographs, were used for further data processing. The indications for all surgical and adjuvant treatments were made by an interdisciplinary tumour board. Tumour recurrence was assessed by contacting the general practitioners of the patients.

Aesthetic outcome was evaluated clinically during routine clinical follow-up and by photographic analysis at least 12 months after the last intervention on the NAC.

If there was no clinical or radiological evidence for tumour infiltration of the NAC and the distance of the tumour to the NAC was at least 1 cm, the entire NAC and a disk of some millimetre of underlying tissue were excised at a diameter of 40–44 mm. The NAC was then thinned out to a full-thickness skin graft except the nipple that was preserved as a composite graft consisting of skin, glandular ducts and connective tissue. The graft was wrapped in saline-soaked gauze and stored in the refrigerator at a temperature of 4 °C. The resected retroareolar and retropapillary tissue was sent for pathohistological examination, which was also performed in cases where preoperative decision was made not to replant the NAC. The specimens were stained with haematoxylin/eosin, and immunohistochemistry was performed additionally. Provided this tissue was free of tumour, the entire NAC or the nipple alone was replanted, depending on the preference of the surgeon. In the latter case, the areola was tattooed. Nipple or NAC replantations were performed by several surgeons using the same technique.

Descriptive statistical data are given in medians and ranges, unless otherwise indicated. Comparisons between groups were performed with a chi-square test. A *P*-value of <0.05 was taken to determine statistical significance.

Results

During the study period, 88 IBRs after mastectomy necessitated by breast cancer were performed in 85 patients. Out of these, tumour infiltration was found in eight cases (9.1%, Table 1), in which the NAC was rejected. In another 28 cases, the replantation of the NAC or nipple alone was not performed because the patients refused it (fear of additional surgery or having occult tumour cells replanted) or due to surgical reasons including postoperative complications, the difficulty in estimating correct NAC position or aesthetically displeasing NAC. This resulted in 52 replantations of the entire NAC (*n* = 29) or the nipple alone in conjunction with areola tattooing (*n* = 23). The median age of these 49 patients was 48 years (25–72 years). More than 50% of the patients had tumours larger than 2 cm, more than one-third had nodal involvement and, in more than one-fourth, the distance of the tumour to the NAC was less than 2 cm (Table 2). The median tumour size was 20 mm (3–51). Patients qualifying for NAC replantation were in stage 0 in 29%, stage I in 15%, stage IIa in 31%, stage IIb in 17% and stage III in 8%.

Six breasts received a modified radical mastectomy (MRM) and 46 a skin-sparing mastectomy (SSM). A free transverse rectus abdominis musculocutaneous/deep

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