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Two-stage delayed breast reconstruction with an expander and free abdominal tissue transfer: Outcomes of 65 consecutive cases by a single surgeon☆

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Summary *Background:* Traditional single-stage breast reconstruction with autologous tissue leaves an obvious skin island. Alternatively, a staged reconstruction with the creation of a skin envelope with a tissue expander which is then replaced with a de-epithelialised flap, leaves a breast with the original mastectomy scar and no skin island.
Methods: Consecutive patients who underwent the two-stage reconstruction between 2004 and 2010 were included in the study. Data were collected retrospectively on patient demographics, adjuvant treatments, surgical procedures and outcomes.
Results: A total of 65 patients who initially had a non-skin sparing mastectomy underwent two-stage breast reconstruction, of which the majority were delayed ($n = 63$, 95%) and unilateral ($n = 64$, 98.5%).

Each patient was individually assessed for their suitability for the two-stage reconstruction. In 89% ($n = 58$) of cases, the expander was inserted in a subcutaneous pocket, while in the remaining a subpectoral pocket was elected. After the first stage, seven complications were recorded (10.7%), notably three expander extrusions, three seromas and one implant infection. Of the 65 patients, 63 proceeded to the second stage of reconstruction with 38 transverse rectus abdominis myocutaneous (TRAM) (60%), 12 superficial inferior epigastric artery (SIEA) (19%), and 13 deep inferior epigastric perforator (DIEP) (21%) flaps. Mean follow-up time since the completion of the second stage was 42 months (range 6–80 months), with complete flap loss recorded in 4.6% and minor fat necrosis in 9.5% of cases.

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Conclusions: The two-stage breast reconstruction using skin expansion and autologous tissue transfer eliminates the need for a visible skin paddle and produces a sensate breast with a more natural-looking breast mound.

Introduction

Breast reconstruction with autologous tissue is considered the 'gold standard' due to its ability to maintain a good long-term cosmetic appearance in terms of texture, consistency, ptosis and fluctuance with body weight.[1] However, the traditional single-stage autologous reconstruction following a non-skin sparing mastectomy leaves a visible skin island on the breast, which often contrasts with the surrounding native skin. The skin paddle is insensate and can also transfer hair, striae, scars or tattoos from the donor area.

Two-stage breast reconstruction provides an enhanced aesthetic result by using the original breast skin, which is sensate and eliminates the need for a skin paddle. An anatomical tissue expander is used to create the skin envelope in the first stage, which is then filled with autologous free tissue in the second stage. The staged technique is versatile and can be used in both skin-sparing and non-skin-sparing mastectomy patients in the setting of both immediate and delayed reconstruction, depending on the patient's preference and oncological safety.

Operative technique

Each patient is assessed individually for their suitability for the two-stage reconstruction. The patients are given the opportunity to attend a reconstruction support group where they are able to see the results of both single and two-stage reconstruction patients prior to surgery.

In the first stage, placement of an integral port expander is dependent on the patient's skin quality and adjuvant treatments. The anatomical integrated port expander (Inamed™) can be inserted subcutaneously, if enough, good-quality subcutaneous tissue is present. Subcutaneous expander placement does allow better control of breast shape and inframammary fold.[10] However, if the breast has received radiotherapy or is anticipated in the future or if there is inadequate subcutaneous tissue, subpectoral placement is preferred to minimise implant-related complications. The expander is inserted at the time of the mastectomy in patients undergoing immediate/delayed reconstruction. Symmetrising surgery, such as breast reduction or mastopexy, is also performed during the first stage to allow the contralateral breast to undergo ptosis/settle during the expansion process.

After implant insertion, expansion is usually commenced at 2 or 3 weeks, if there is a history of previous irradiation. Expansion is performed weekly at approximately 100 ml per visit till the desired volume is reached. With the two-stage technique, overexpansion of the breast pocket is essential to ensure that there is an adequate volume for the flap, avoiding any unnecessary compression that can potentially compromise flap vascularity.

During the second stage of the reconstruction, the expander is removed and circumferential and radial capsulotomies are performed to allow insetting of the flap into the pocket. The inframammary fold is only released if there is asymmetry compared with the contralateral breast. The senior author prefers to use the internal thoracic vessels as the recipient vessels due to their reliability, ease of access and medialisation of the flap. After microsurgical vessel anastomosis, the flap is trimmed to the required volume and positioned in the created pocket. The majority of the flap is de-epithelialised and a small monitoring skin paddle (approximately 3×1 cm) is placed within the lateral aspect of the mastectomy scar. The volume of the flap is usually kept slightly larger than required to allow for postoperative shrinkage. A few months after the second stage, once the reconstructed breast undergoes ptosis, the skin paddle can be excised and nipple reconstruction can be performed under a local anaesthetic.

Aims

The purpose of this study was to determine the feasibility and safety with the two-stage approach of autologous breast reconstruction. We describe our experience with the staged reconstruction and present the outcomes of 65 consecutive cases undertaken by the senior author.

Patients and methods

All consecutive patients who underwent the two-stage reconstruction between 2004 and 2010 have been included in the study. Data were collected retrospectively regarding patient demographics, adjuvant treatments, surgical procedures and outcomes.

Results

Between 2004 and 2010, a total of 65 patients underwent two-stage autologous breast reconstruction by the senior author (NC) The median age of the patients was 48 years (range 30–64 years) with a median body mass index (BMI) of 26 kg m^{-2}. Recorded risk factors include smoking (9%), hypertension (7%), thrombo-embolic disease, such as pulmonary embolism or deep vein thrombosis (5%), and previous cerebrovascular accident (2%). All patients are required to stop smoking prior to surgery.

The majority of reconstructions were delayed (95%) and unilateral (95%, $n = 62$). All the patients had previously undergone non-skin-sparing mastectomy and 41% had received adjuvant radiotherapy. The expander was inserted