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Shoulder-related donor site morbidity and patient-reported satisfaction after delayed breast reconstruction with pedicled flaps from the back: A comparative analysis

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Summary *Background:* We report a study evaluating and comparing shoulder-related morbidity associated with delayed breast reconstruction using either the conventional latissimus dorsi (LD) flap or the thoracodorsal artery perforator (TAP) flap.
Material & Methods: We conducted a retrospective cohort study of women over 18 years of age who had a unilateral, delayed breast reconstruction by either an LD or TAP flap at one center over a 56-month period. Shoulder function was assessed using the Constant Shoulder Score (CSS), which evaluated pain, activity of daily life (ADL), range of motion (ROM), and strength. A number of secondary outcomes were also examined.
Results: Forty-nine women were included. Demographic and breast treatment data were comparable between the groups. The mean total CSS score for the reconstructed side of the TAP flap was statistically significantly better than that of the LD flap, with a difference of 10.9 points (95% confidence interval [CI] = 2.6-19.2, p-value 0.01). The mean total CSS score for the nonreconstructed side was not statistically significant between groups, with a difference of 0.1 points (95% CI = -6.1-6.2, p-value 0.98). The subscore analysis revealed that women reconstructed using the TAP flap had a difference of 3.2 points for pain (p-value 0.003) and 5.5

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points for ROM (p-value 0.011). The factors ADL and strength were of equal magnitude in both groups.
Conclusions: Patients who undergo delayed breast reconstruction by the TAP flap seem less prone to suffer from postoperative pain and restricted ROM, thereby suggesting that this flap should be considered an advantageous alternative to the conventional LD flap. A randomized clinical trial is warranted to provide sufficient evidence to this statement.

Introduction

The pedicled thoracodorsal artery perforator (TAP) flap has been demonstrated to be a versatile flap suitable for several reconstructive purposes.[1-5] Its use and benefits in breast reconstruction have been established previously. [6-17]

Several publications describe the TAP flap combined with an implant for total breast reconstruction, thus suggesting it as an alternative to the conventional musculocutaneous latissimus dorsi (LD) flap. [7-9,11-17] Hypothetically, the advantage of using the TAP flap is sparing of the muscle function, as it is left nearly undissected. This may be associated with less donor site morbidity; however, the number of studies and level of evidence available is still very limited to support these associations. [18,19] No published studies objectively compare donor site morbidity of the TAP flap to that of the LD flap. A number of papers report on the sequelae after harvest of the LD flap with regard to shoulder function; however, the evidence is ambiguous. [20-36]

The aim of this study was to evaluate and compare, systematically for the first time, the shoulder-related morbidity associated with delayed breast reconstruction using either of the two flaps.

Material & methods

We performed a retrospective cohort study in accordance with the STROBE guidelines. Inclusion criteria were women over 18 years of age who had a unilateral delayed breast reconstruction by either an LD or TAP flap at our department between January 1, 2009 and August 31, 2013. There were no exclusion criteria.

All patients referred to our department for unilateral, delayed breast reconstruction during the inclusion period were screened for eligibility. They were identified by inspection of incoming referrals and scheduled surgeries for the specified time period. Following this, the patients' eligibility was confirmed by review of their medical records, thus ensuring that the performed surgery was consistent with the inclusion criteria. All eligible patients were then invited to participate by written invitation followed by a telephone call.

The surgical method was evaluated to ensure comparability and uncover any difference in technical approach that might affect the results.

All LD flap-based breast reconstructions were performed by one of two consultant plastic surgeons using a similar approach: A classical myocutaneous flap was raised with a horizontal skin paddle carried on the entire LD muscle that was released from its insertion on the thoracic vertebrae, thoracolumbar fascia, and iliac crest. The humeral insertion was divided, and in most cases, the thoracodorsal nerve was cut. The LD flap was transposed to the recipient site and draped over a prepectorally placed implant.

The TAP flap procedures were performed by one of the previously mentioned consultant plastic surgeon as a pedicled TAP flap combined with an implant and an ADM (TAPIA) as previously described by the authors.[17]

The postoperative regime and rehabilitation program was similar between groups. The focus was shoulder function, and rehabilitation was handled by the same team of specialized physiotherapists.

All enrolled women were seen in the outpatient clinic by the first author for interview, clinical examination, and clinical photography (Figure 1).

All data on demographics, medical history, course of the breast reconstruction, and rehabilitation was collected by interview and validated by following the review of the medical records.

Patients were also asked to indicate and quantify need for and habits of training or physiotherapy targeted on the shoulder, back, and upper arm at the time of follow-up. Additionally, all women completed the postoperative module of the Breast-Q questionnaire for postmastectomy breast reconstruction.[37,38]

Finally, all patients were asked two standardized questions indicating their overall satisfaction. The first focused on the course of the reconstruction with the following question *"In relation to the breast reconstruction you have been through, knowing the course of the reconstruction, the result of the surgery and the following need for rehabilitation as well as the possible side-effects you may have experienced would you consider going through the same procedure again?"* The second focused on the satisfaction with the aesthetic result and was worded: *"On a scale from one to ten, with one indicating complete dissatisfaction and ten indicating the highest satisfaction, how would you evaluate the overall appearance of your reconstructed breast?"*

The clinical examination focused on the function of the shoulder using the Constant Shoulder Score (CSS), which is the recommended tool by The European Society of Shoulder and Elbow Surgery.[39] This test yields a score between 1 and 100 with a higher score indicating a good shoulder function. The CSS evaluates four parameters: two subjective including pain and activity of daily life (ADL) and two objective including range of motion (ROM) and strength. The evaluation was conducted in accordance with the guidelines for this test.

The TAP flap was introduced as a new procedure for delayed breast reconstruction in our department in July 2011. Before this, women eligible for breast reconstruction with a