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Shoulder function following autologous latissimus dorsi breast reconstruction. A prospective three year observational study comparing quilting and non-quilting donor site techniques[☆]

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Summary Latissimus dorsi harvest and axillary surgery can affect shoulder function. The effect of autologous latissimus dorsi flap (ALD) breast reconstruction and donor site quilting have been inadequately studied.

A cohort of ALD flap breast reconstruction patients were assessed pre-operatively and at eight post-operative time-points (up to 3 years after reconstruction) using the self-administered Disabilities of the Arm, Shoulder and Hand (DASH) outcome measure, for which validated normative data is available. Patients with incidental shoulder conditions and bilateral reconstructions were excluded.

This was a prospective, observational study with blinded data interpretation: 58 patients, 22 of whom had donor site quilting, were assessed. Groups were compatible demographically, in breast care management and in pre-operative DASH score (quilting 6.5, non-quilted 6.4; $P = 0.98$). Scores were significantly increased at initial post-operative clinic review (mean 49, SD19; $P < 0.001$), 6 week (29, SD20; $P < 0.001$), and 3 month (19, SD19; $P < 0.01$), thereafter remaining at a plateau value of ~ 15 ($P > 0.05$). Seroma incidence was reduced in the quilted group (5% vs 70%). A strong, significant correlation was found between 3 month DASH score and long term function ($r = 0.66$, $P < 0.0003$); patients with DASH > 20 fare significantly worse in the long-term (mean 20 point increase, SD5.0, $P < 0.001$). Higher post-operative DASH scores correlated

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significantly with pre-operative DASH ($r = 0.58$) and BMI ($r = 0.36$). Adjuvant therapy had no effect on shoulder function. Axillary dissection had a weak correlation with a higher DASH score, but only at the 3-month post-operative time-point ($r = 0.32$, $P = 0.03$).

ALD flap breast reconstruction generally results in a functionally insignificant increase (6.5 points) in longterm DASH score, although a small subset of patients do develop longterm impairment, and quilting does not appear to inhibit shoulder function.

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The Latissimus Dorsi flap is a commonly used technique in reconstructive breast surgery,^{1–3} although seroma frequently arises.⁴ Hokin et al,¹⁷ established that the flap could be extended, providing sufficient volume for implant-free breast reconstruction, and acceptable donor site cosmesis and sensation. Accordingly, in 2005 of 227 immediate and delayed breast reconstruction procedures at the Canniesburn Unit, 70% were by extended autologous latissimus dorsi (ALD) flap; all received standardised post-operative physiotherapy (Box 1). Functional shoulder impairment is reportedly minimal following latissimus dorsi harvest,^{5–7} but the assessments used are difficult to standardise, may be unreliable, or have not been applied to the extended flap. Nor has the effect of donor site quilting to reduce seroma⁸ been assessed.

Shoulder function was therefore assessed prospectively using the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire⁹ as a simple, reliable and standardised functional outcome tool. The aim was to define the time course of recovery of shoulder function following ALD flap breast reconstruction, to determine if donor site quilting adversely affects recovery, and to identify patient related and therapeutic risk factors for poor function. Identification would enhance pre-operative counselling, and choice of reconstruction.

Methods

A prospective, observational study with blinded data interpretation on 58 patients undergoing unilateral, pedicled-ALD flap breast reconstruction. Patients with incidental shoulder conditions and bilateral reconstructions were excluded. All patients undergoing ALD flap breast reconstruction between January 2003 and August 2005 were considered for recruitment. This study was not aimed at a specifically selected cohort of patients and had no

impact on patient care. After appropriate counselling, consideration of body habitus, adjuvant care and co-morbidity the reconstructive technique had already been chosen by the patient prior to recruitment.

Patients were not formally randomised to surgeon with regard to donor site quilting, but there was no inherent bias in the referral process. Patients came from the same population and referral centres. Excisional surgery and oncological management was undertaken by the referring breast surgeon and could not be influenced by the study team.

Primary outcome measure – DASH

After instruction by a specialist physiotherapist following the user's manual guidelines,⁹ patients completed the DASH outcome measure pre-operatively (on admission prior to surgery). Subsequently the DASH was issued for postal return at eight post-operative time-points (first clinic visit, 6 weeks, 3, 6, 12, 18, 24 and 36 months). Those failing to return the DASH on two successive occasions, were issued no further questionnaires.

Secondary measures

Demographic data (age, BMI, chest circumference, cup size), breast management (timing of mastectomy and axillary dissection relative to reconstruction, adjuvant chemotherapy, radiotherapy, or hormonal management), co-morbidities, presence of shoulder conditions, and intra-operative details (division of latissimus dorsi tendon, thoracodorsal nerve and donor site quilting) were recorded from patients' clinical records. Post-operative complications (donor site) including dehiscence, formation of clinically apparent seroma (sufficient to indicate aspiration), and complications indicating re-operation on the donor site were recorded.

Box 1. Post-operative physiotherapy regime.

In order to minimise any possible shoulder dysfunction, post-operative physiotherapy regimes are used at the Canniesburn Plastic Surgery Unit. The guidelines were devised and written in conjunction with the consultant plastic surgeons, based on many years of experience treating breast reconstruction patients.

Patients are advised on short-lever flexion and abduction exercises of the shoulder to approximately 90 degrees and scapular protraction/retraction/elevation and depression.

This active exercise regime was initiated on the first post-operative day until 3–4 weeks when progressive exercises were commenced. Patients were instructed on the exercises and given a written handout to follow. This initial timescale is a general guideline and can be adapted depending on the individual's requirements. A general timescale of 3 months is given for return to unrestricted function of the affected upper limb.

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