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# Incidence of shoulder functional morbidity following ipsilateral mastectomy and latissimus dorsi flap reconstruction☆

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ABSTRACT

*Introduction:* The aim of this study was to investigate the incidence of shoulder morbidity in our cohort of patients with latissimus dorsi flap reconstruction after mastectomy.
*Methods:* This is a retrospective study of prospectively collected data of 72 patients using validate Oxford shoulder score for function and quickDASH score for disability. Scores were collected preoperatively and at time of final review or study. We also reviewed patient records for patients who had a formal diagnosis of shoulder pathology. Results were analysed with student t-test.
*Results:* Analysis of scores showed a statistically significant worsening of both oxford shoulder score ($p < 0.005$) and quickDASH score ($p < 0.005$), when pre and post-operative scores were compared. Seven patients had a formal diagnosis of shoulder pathology, and all of them recovered well. There was no significant difference in oxford shoulder score or quickDASH scores between patients with or without shoulder pathology. About 40% patients had some functional loss or disability at 4 years after the surgery.
*Conclusion:* Our study shows a high incidence of significant shoulder functional morbidity following latissimus dorsi flap reconstruction but number of patients requiring specific treatment is low.
*Level of evidence:* Level IV, therapeutic study.
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## Introduction

Patients with breast tumours amenable to surgical resection usually undergo mastectomy with reconstruction. Latissimus dorsi (LD) flap reconstruction has been one of the principal option, which is safe and provides aesthetically pleasing results.[1] Since its first description by Iginio Tansini in early 1900, LD flap has been used extensively in breast, head & neck and free flap reconstruction.

Latissimus dorsi is an important muscle for normal shoulder joint biomechanics,[2] particularly in shoulder extension, adduction, internal rotation, depression and lateral torso flexion.[3] Certain activities of daily living rely on LD function, including swimming, climbing stairs and walking on crutches.[4]

Extent to which removal of this muscle would affect shoulder movement, has been a matter of debate in literature. A number of studies report a wide range of effects of LD harvesting, from no functional deficit to significant functional limitation of shoulder joint. However, most studies demonstrate the worst shoulder functional deficit at 3–6 months following LD transfer, which almost always return to baseline at an year post op.[5]

In this study, we review and present the incidence of shoulder function morbidity in our cohort of patients, who had LD flap reconstruction following mastectomy.

## Patients and methods

This is a retrospective review of prospectively collected data of patients from our unit, who had LD flap reconstruction following mastectomy for breast cancer, between 2007 and 2014.

Patient list was generated from our departmental database. Patients who were deceased at the time of study were excluded.

☆ Study was primarily carried out at Macclesfield Hospital, in collaboration with colleagues in other units.

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Demographic data was recorded in an Excel sheet. We reviewed electronic and paper patient records and a detailed review was performed for patients who were found to have any shoulder symptoms. Subjective scores in the form of Quick DASH and Oxford Shoulder Scores were collected pre operatively. Post operative scores at time of review were collected by post.

QuickDASH is a shortened version of the DASH Outcome Measure, which is a validated method of measuring upper limb function, proven to be a useful self-report outcome measure.[6] Final scores were categorized according to severity of the disability in to no (0), minimum (1–20), mild (21–40), moderate (41–60) and severe (>60) disability. Oxford shoulder score (OSS) is a short, practical, reliable, valid and sensitive tool to measure outcome of shoulder function.[7] Scores were categorised according to functional outcome in to satisfactory (40–48), mild (30–39), moderate (20–29) or severe (<20) functional loss.

Data analysis was performed using SPSS statistical software v24.0 (IBM Corp., North Castle, NY, USA). Descriptive analyses were presented as frequencies, mean and range for continuous variables and scores. Student t-test was used for analyses of means. For all statistical tests, a value of $p < 0.05$ was considered to be significant.

## Results

Questionnaires were sent to 83 patients and after two rounds of mailing, 72 (87%) patients returned completed questionnaires. Mean age at time of procedure was 53 years (30–76) and mean time to surgery at time of study was 53 months. There was a similar distribution of laterality (49% vs 47%) with 4% bilateral procedures. At the time of final review, 26 patients (36%) performed regular sports and 42 (58%) were in job.

A statistically significant difference was found in both Oxford shoulder score and quickDASH scores, when final scores were compared with preoperative scores. Oxford shoulder score showed a mean drop of 4.5 points ($p < 0.05$), suggesting a worsening shoulder function postoperatively. QuickDASH score showed a mean difference of 11.6 points ($p < 0.05$), showing a worsening disability of shoulder function postoperatively.

At final review, 7 patients (10%) had a formal treatment of shoulder morbidity, who did not have any shoulder pathology preoperatively. Three of them were treated with hydro-dilatation and manipulation for adhesive capsulitis. Two patients had arthroscopic subacromial decompression for impingement syndrome. Two patients were treated by physiotherapy and pain management. One of them had tamoxifen induced arthralgia, presenting as shoulder dysfunction and the other had non-specific shoulder pain. All of these patients had recovered well at time of final review.

We compared the data of patients with or without a diagnosis of shoulder morbidity. There was no statistically significant difference in mean age ($p = 0.303$), Oxford shoulder score ($p = 0.099$) or quickDASH score ($p = 0.377$), as shown in Table 1.

Further evaluation of the data, after categorising the scores revealed that majority of patients are managing well in terms of shoulder function following LD flap reconstruction. However, moderate to severe shoulder functional loss (Fig. 1) and disability (Fig. 2) was found in 11% and about one third of the patients had some limitation of shoulder function, even at more than four years postoperatively.

**Table 1**
comparison analysis of patients with and without a shoulder pathology.

| | Patients with shoulder pathology | Patients with no shoulder pathology | Significance of difference between groups |
|---|---|---|---|
| Mean age (years) | 51 | 53 | $p = 0.303$ |
| Mean Oxford shoulder score | 36 | 42 | $p = 0.099$ |
| Mean qiuckDASH score | 23 | 17 | $p = 0.377$ |

## Discussion

In our study cohort of patients who underwent LD flap reconstruction following mastectomy for breast cancer, 40% patients had some shoulder functional morbidity even at four years postoperatively. However, only one in ten patients had moderate to severe functional loss or disability and majority of patients are managing well with activities of daily living.

Shoulder functional loss has been a concern, following LD flap reconstruction, as this muscle plays an important role in shoulder function, particularly adduction, extension and internal rotation.[8] For this reason, different studies have looked into possible functional loss of sacrificing this muscle for reconstruction procedures.[9,10] In past, most of the studies presented LD as an expendable option for reconstruction, with no significant compromise of function due to contributions of other muscles.[11–13] Spear et al[14] found no long-term significant deterioration in active or passive shoulder range of motion. However, they found a moderate strength deficit in shoulder extension and adduction and a lower exercise tolerance in long term activities. Another prospective cohort study[15] found that shoulder adduction was affected more than extension.

Glassey et al[16] demonstrated a significant deterioration of DASH scores and worsening of strength, disability scores and discomfort, up to 6 months following breast reconstruction. In spite of this early functional loss, at one-year post op, scores returned back to pre-operative levels. However, a long-term follow-up study,[17] noticed significantly impaired shoulder function many years after surgery. Contrary to this, Hankins and Friedman[18] reported no subjective complaints of shoulder mobility or weakness in their review at seven years postop.

Hamdi et al[19] compared operated side with opposite normal side, evaluating shoulder function loss. They found little impact on shoulder function on both short and long term recovery. But, in a survey conducted by Losken et al,[20] they reported no impairment in activities of daily living in most of their patients.

A recent review by Blackburn et al[5] demonstrates that there is considerable morbidity in the immediate post-operative period with functional recovery varying between studies. The NHS audit[21] also found that around 20% of patients who underwent LD flap breast reconstruction reported issues with activities involving use of their back or shoulder muscles most or all of the time. In the literature, a common recommendation is the significant role physiotherapy can play in the recovery following surgery, in allowing as close to normal shoulder function.[4,16]

Our study includes a large sample size, with a mean review at four years post procedure. Results of this study are comparable to previous studies as majority of patients had no or minimal disability of shoulder function. In spite of these apparently good result, incidence of shoulder functional morbidity in our cohort is 40, and one in ten patients have moderate to severe shoulder disability at four years. A small number of patients (10%) required specialist orthopaedic input and all of them recovered well.

A limitation of our study is that there is no comparison with normal population. This study shows an incidence of shoulder functional morbidity in patients with LD flap breast reconstruction after mastectomy for breast cancer. However, some of the patients

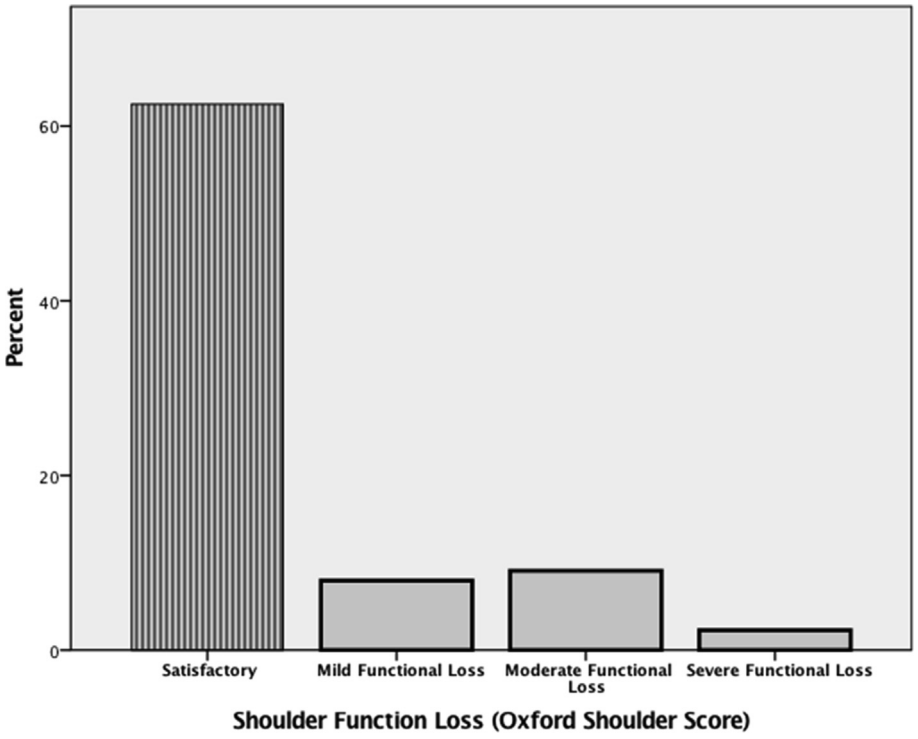


**Fig. 1.** Shoulder functional loss following ipsilateral LD flap reconstruction (categories based upon Oxford Shoulder Score – OSS).

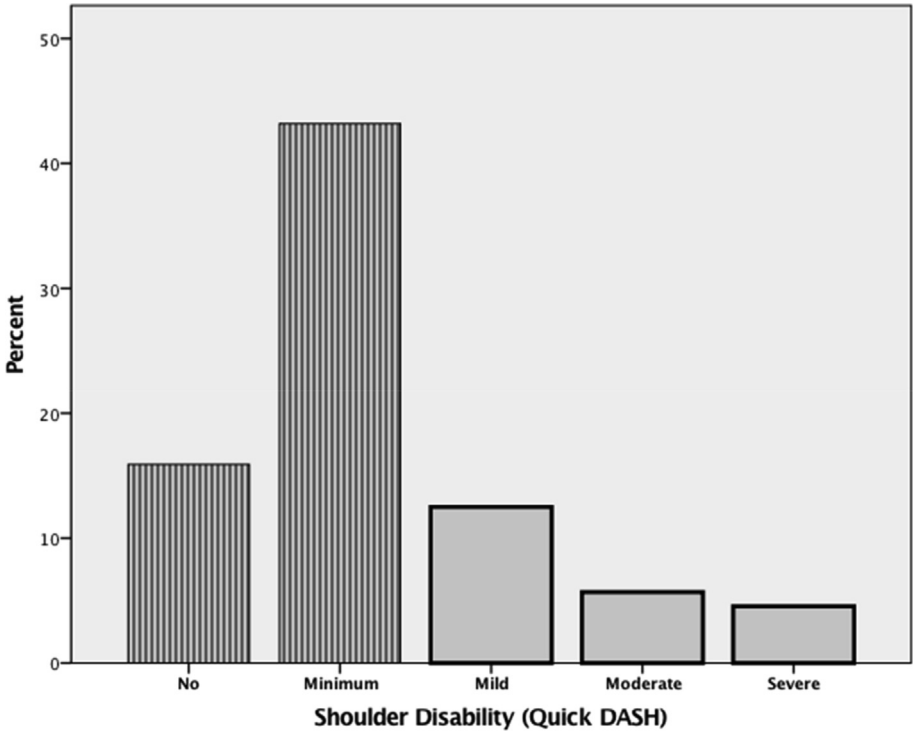


**Fig. 2.** Shoulder disability following ipsilateral LD flap reconstruction (categories based upon Quick DASH score).

might have developed shoulder symptoms with no relation to this procedure. A comparison with a sex and age matched cohort of patients with no surgery and a prospective study with objective muscle function evaluation may quantify the extent of shoulder functional morbidity in these patients.

## Conclusion

Our study has found that women, who undergo LD flap reconstruction after mastectomy, may have a significant shoulder functional morbidity, even at four years postoperatively. However, only

a small number of patients require specialist management. Shoulder related functional morbidity should be discussed as part of decision making and consent process for this commonly performed procedure. A formal physiotherapy program after this procedure may help in early return of shoulder function back to preoperative level.

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## Conflict of interest

There is no conflict of interest in this study.

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