

## Abstract

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# Consequences of latissimus dorsi transfer on shoulder function

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**Objectives:** The latissimus dorsi is one of the largest muscles in the body. This muscle recognizes many applications in reconstructive surgery [1]. Since its introduction, the technique of latissimus dorsi myocutaneous flap breast reconstruction has yielded results characterized by excellent tissue vascularity and low donor site morbidity [2]. This study was undertaken to determine the functional consequences associated with the latissimus dorsi muscle donor site.

**Methods:** Twelve women (mean age of  $50.1 \pm 7.5$  years) were studied before and up to 3 months after a latissimus dorsi transfer following mastectomy (one woman sustained a bilateral musculo-tendinous transfer), six of the thirteen shoulders sustained a 6 month follow-up. They sustained a bilateral isokinetic shoulder assessment involving the internal (IR) and external (ER) rotators and the abductor (ABD) and adductor (ADD) muscles. The ER-IR were tested in a lying supine position ( $45^\circ$  of abduction in the frontal plane) at  $60^\circ/s$  and  $240^\circ/s$  in the concentric mode. The ABD-ADD were assessed in a newly designed lying lateral position between  $0^\circ$  and  $90^\circ$  of abduction in the frontal plane at  $60^\circ/s$  and  $180^\circ/s$  in the concentric mode [3]. The passive goniometric range of motion was measured in flexion, extension, internal and external rotation with shoulder placed either at  $0^\circ$  or at  $90^\circ$  of abduction. The subjective pain was evaluated by means of a visual analogic scale (VAS) before and after isokinetic assessments. The subjects also benefited from specific clinical testing of conflict (Hawkins, Yocum and Neer test) on both shoulders.

**Results and Discussion:** Six months post-surgery, patients recovered a subnormal passive mobility, with only the external rotation at  $0^\circ$  of abduction standing significantly inferior ( $p < 0.05$ ; 7%) in comparison with the contralateral healthy shoulder. They did not describe any complaints through the VAS either before or after the isokinetic measurement except for one woman who presented a slight pain before and after the strength assessment (2.2. and 3.7 respectively on the VAS). Four out of thirteen operated shoulders (three months follow-up) and three out of six (six months follow-up) showed a Hawkins and/or Yocum positive testing.

Three months after the latissimus dorsi transfer, the affected shoulder developed a significant ( $p < 0.05$ ) weakness on the IR ( $16.8 \pm 10.6\%$  at  $60^\circ/s$ ), the ADD ( $38.6 \pm 12.5\%$  at  $60^\circ/s$ ) and the ABD ( $9.3 \pm 12.4\%$  at  $60^\circ/s$ ) in comparison with the pre-surgery strength profile. Hence, compared to the healthy side, the operated shoulder showed a significant ( $p < 0.05$ ) decrease of strength on the IR ( $14.8 \pm 21.4\%$  at  $60^\circ/s$ ) and ADD ( $37.3 \pm 9.4\%$  at  $60^\circ/s$ ). No improvement occurred within the 6 months follow-up group and they still presented a significant ( $p < 0.05$ ) deficit six months after surgery ( $20.9 \pm 12.9\%$  on the IR;  $37.1 \pm 7.9\%$  on the ADD;  $17.9 \pm 10.9\%$  on the ABD at  $60^\circ/s$ ) in comparison with the non-operated shoulder.

The ER/IR and ABD/ADD concentric ratios were increased on the operated shoulder comparatively to the healthy side after surgery. For instance, at 3 months post-surgery, we obtained  $0.96 \pm 0.17$  versus  $0.68 \pm$

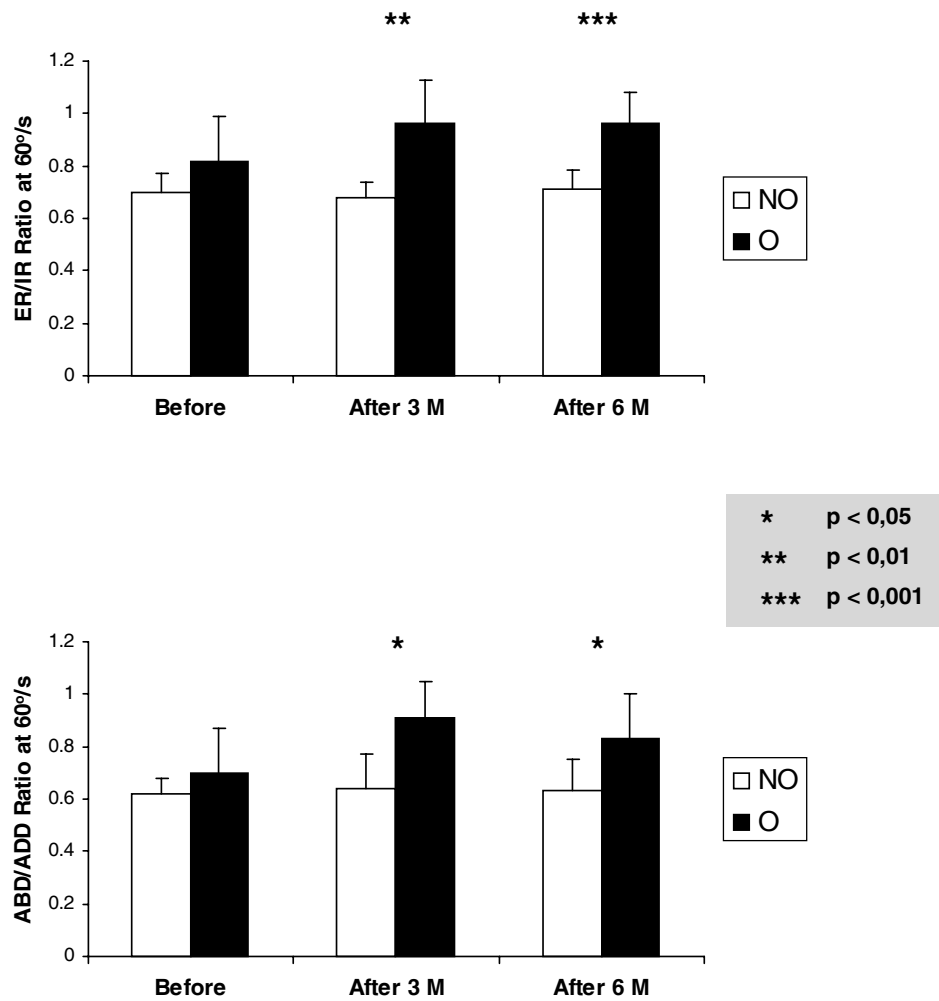


Fig. 1. ER/IR and ABD/ADD ratios at 60°/s in the concentric mode before, three (3 M) and six (6 M) months after latissimus dorsi transfer.

0.06 for the ER/IR ratio at 60°/s and  $0.91 \pm 0.13$  versus  $0.64 \pm 0.13$  for the ABD/ADD ratio at 60°/s (Fig. 1).

**Conclusion:** Three and 6 months after a latissimus dorsi transfer following mastectomy, the operated shoulder showed a significant weakness mainly in the IR and ADD muscles, entailing to higher ER/IR and ABD/ADD ratios in comparison with the contralateral side. In spite of a satisfactory passive motion pattern, some of these shoulders developed positive conflict signs.

## References

- [1] J.K.G. Laitung and F. Peck, Shoulder function following the loss of the latissimus dorsi muscle, *Br J Plastic Surg* **38** (1985), 375–379.
- [2] S.A. Slavin, Improving the latissimus dorsi myocutaneous flap with tissue expansion, *Plast Reconstr Surg* **93** (1994), 811.
- [3] B. Forthomme, J.L. Croisier and J.M. Crielaard, Proposal for the assessment protocols for different shoulder muscle groups, *Isokinetics Exerc Sci* **11** (2003), 69.