J Shoulder Elbow Surg (2016) 25, e265–e275

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

ORIGINAL ARTICLE

Recovery of active external rotation and elevation in young active men with irreparable posterosuperior rotator cuff tear using arthroscopically assisted latissimus dorsi transfer

Dario Petriccioli, MD, Celeste Bertone, MD*, Giacomo Marchi, MD

Department of Orthopedics, Istituto Clinico Città di Brescia, Brescia, Italy

Background: Massive irreparable posterosuperior rotator cuff tears represent a serious functional disablement for young and active patients in their daily activities. Latissimus dorsi (LD) muscle-tendon transfer can restore elevation and external rotation where supraspinatus and infraspinatus function is lost.

Materials and methods: Between 2009 and 2013, 45 consecutive patients underwent arthroscopically assisted LD transfer for an irreparable posterosuperior rotator cuff tear. Thirty-three patients agreed to participate in this retrospective study. For 8 patients, we used a standard passage of the LD through the plane between the infraspinatus–teres minor and the deltoid muscles. For the remaining 25 patients, we transferred the LD tendon in front of the triceps muscle according to a personal described technique. The follow-up period was 35.7 months. Final follow-up included assessment by standard radiographs, bipolar surface electromyography, pain score by visual analog scale, Constant-Murley shoulder score, and Disabilities of the Arm, Shoulder, and Hand score. For quantitative strength evaluation measurements, a Biodex dynamometer was used.

Results: Overall clinical outcomes improved at the final follow-up and were significantly age related. We found similar results for revision and primary patients with mean increase in Constant-Murley scores of 29.5 and 30.5 points, respectively. In our series, we recorded osteoarthritis progression in 33.3% of patients.

Conclusion: Arthroscopic LD tendon transfer for irreparable posterosuperior rotator cuff tears can achieve good clinical outcomes at a midterm follow-up, especially in active men 60 years of age or younger and in patients with low preoperative elevation (<80°) but an intact or reparable subscapularis tendon.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Irreparable rotator cuff tears; latissimus dorsi; tendon transfer; arthroscopy; isokinetic dynamometer; electromyography

Massive posterosuperior rotator cuff tears represent a serious limitation for young and active patients in their daily activities. Surgical repair of massive posterosuperior rotator cuff tears is associated with poor clinical results and a high retear rate because of irreversible degenerative changes of the musculotendinous unit.[8,35,42]

The local institutional ethics board approved this study, and all patients gave their informed consent in writing.

*Reprint requests: Celeste Bertone, MD, Via Gualla 15, I-25128 Brescia, Italy.

E-mail address: bercel1971@gmail.com (C. Bertone).

1058-2746/$ - see front matter © 2016 Journal of Shoulder and Elbow Surgery Board of Trustees. All rights reserved.
http://dx.doi.org/10.1016/j.jse.2015.12.011

Inability to repair a massive rotator cuff tear is not uncommon, but the true incidence of irreparable rotator cuff tears is not known. In practices devoted to the management of shoulder injuries, up to 10% of rotator cuff tears may be irreparable.[4,20,21,35]

Since the first description by Gerber et al[15] in 1988, transfer of the latissimus dorsi (LD) from the medial humeral insertion to the lateral side of the supraspinatus footprint has been used as an alternative for rotator cuff repair of massive posterosuperior tears.[1,3,7,10,12-14,20]

LD transfer to the rotator cuff has been used to treat individuals with obstetric brachial plexus palsy and residual shoulder weakness.[2,12,17,24,33] In these patients, a healthy and strong LD muscle is used to restore active external rotation. In patients with massive posterosuperior rotator cuff tears, the transfer restores elevation and external rotation where supraspinatus and infraspinatus function is lost.[18,23,24,42]

Several authors have investigated different techniques to perform LD muscle-tendon transfer in open surgery, reporting variable results.[1,3,5,7,10,22,27,28,32,34,37,38,47,51,54] Recently, different authors have proposed arthroscopically assisted LD transfer to avoid the incision through the deltoid muscle required in the "open" approach.[4,9,16,19,21,29,49]

In our previous publication,[45] we described an arthroscopically assisted LD transfer in which the passage of graft differs from previously reported surgical techniques. We reviewed our retrospective cohort of patients who had undergone arthroscopically assisted LD muscle-tendon transfer for the management of irreparable posterosuperior rotator cuff tears. The aim of this retrospective study was to evaluate the midterm functional results of arthroscopic surgical management of such tears using 2 different passage techniques and to determine whether personal passage of graft results in a reproducible, safe, and functional treatment for massive rotator cuff tears.

Materials and methods

Between January 2009 and December 2013, 45 consecutive patients underwent LD transfer for an irreparable posterosuperior rotator cuff tear. Indications were a painful shoulder with massive irreparable posterosuperior rotator cuff tear involving supraspinatus and infraspinatus tendons, as confirmed by magnetic resonance imaging. A rotator cuff tear was considered irreparable in the presence of grade III retraction (a minimum of >3 cm lateral to medial), according to the Patte classification,[43] and grade III fatty infiltration, according to the Fuchs classification.[11] All patients had chronic pain, impaired shoulder function with limited anterior active elevation, weakness of external rotation, intact or reparable subscapularis tendon, and functional teres minor (grade <2 muscle atrophy). In 7 patients (15.5%), arthroscopic repair of a Lafosse[31] grade I or II subscapularis tendon tear was performed at the same time as the LD transfer. We also included patients who had undergone previous surgery for rotator cuff tears.

Of the original 45 patients, 12 patients were lost to follow-up. Five of them did not respond to the invitation to participate in the study. One patient had poor general condition due to pancreatic cancer.

Table I Demographic and clinical data of the study group

Patient characteristic	No. of patients
Male	22
Female	11
Average age	57.9 years
Right shoulder	22
Left shoulder	11
Dominant side	23
Nondominant side	10
Primary surgery	29
Revision surgery	4
One surgery	3
Two or more surgeries	1
Work style	
Retired	6
Sedentary worker	9
Manual worker	18
Associated subscapularis tendon tear	7
Lafosse stage I	3
Lafosse stage II	4
Type of LD tendon transfer	
Personal technique	25
Standard technique	8

One patient had a failure of the transfer and was revised with a reverse shoulder arthroplasty (Aequalis Reverse Shoulder; Tornier, Bloomington, MN, USA) 17 months after surgery. The other 5 patients were satisfied with the final outcome but did not want to make the long trip to our office for re-evaluation. Thirty-three patients agreed to participate in this retrospective study (dropout, 12/45 [26.7%]).

The study group (Table I) consisted of 22 men and 11 women whose average age at the time of surgery was 57.9 years (range, 31-69 years). There were 11 left shoulders and 22 right shoulders. The dominant shoulder was involved in 23 (69.7%) patients. Eighteen patients (54.5%) were manual workers, and 15 were sedentary workers or retired. Twenty-nine patients (88%) had undergone LD tendon transfer as a primary reconstruction; for 4 of them (12%), the transfer had been a salvage procedure for previously failed rotator cuff repair surgery.

Patients were monitored by means of clinical and radiologic examination. The clinical assessment included a quantitative strength measurement carried out with an isokinetic dynamometer (Biodex System 3; Biodex, Shirley, NY, USA) and electromyography (Dantec Keypoint; Natus Medical Inc, Bristol Circle, Oakville, ON, Canada) of LD muscle activation and axillary nerve integrity. All patients were monitored for a minimum of 12 months (average, 35.7 months; range, 12-60 months) after surgery.

Clinical evaluation

All patients underwent a standard physical examination performed before surgery and at the final follow-up by an independent investigator who was not a member of the surgical team. Standardized clinical evaluation included active range of motion measurements (with a goniometer), muscle strength measurements in forward elevation with a digital dynamometer (Lafayette Manual Muscle Tester; Lafayette Instrument Co Europe, Loughborough, UK), and the additional items required to complete the Constant-Murley score (best,