

Revision Arthroscopy Assisted Latissimus Dorsi Tendon Transfer for Failed Posterosuperior Massive Irreparable Rotator Cuff Repair: A Case Report

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Abstract

Posterosuperior massive irreparable rotator cuff tear remains one of most challenging pathologies faced by clinical surgeons, typically affecting patients with re-tear after an attempted repair, and there is no expert consensus on the standard treatment method. Due to the severe pathological changes of the rotator cuff, only a few surgical methods are effective in its treatment, among these methods, latissimus dorsi transfer provides a possible treatment solution for patients. We report a 64-year-old housewife female patient who underwent arthroscopic rotator cuff repair. Three months later, an arthroscopy assisted latissimus dorsi tendon (LDT) transfer was performed for her, as a result of failed prior rotator cuff repair. At the follow-up one year after revision procedure, the patient exhibited obvious improvements both on shoulder symptoms and functions. Arthroscopy assisted LDT transfer is a promising treatment strategy in dealing with posterosuperior massive irreparable rotator cuff tears, resulting in satisfactory outcomes.

Abbreviations

LDT: latissimus dorsi tendon

Introduction

Posterosuperior massive irreparable rotator cuff tears create a big treatment challenge for its high rate of re-tear after primary repair surgery. With heavy tendon fatty infiltration and significant retraction, it is very difficult for ruptured tendons to naturally heal [1], resulting pain and limited function lead to progressive poor tissue and bone quality. To solve this problem, a variety of treatment protocols have been used on the theoretical basis of pathological tissues debridement, tendon reduction and anatomical dynamics enhancement, including arthroscopic debridement, tuboplasty, partial repair, complete repair, graft augmentation, biceps augmentation, several kinds of tendon transfer, superior capsular reconstruction, biodegradable subacromial spacer insertion and arthroplasty. Over the past 30 years, tendon transfers have been proven to be able to reliably restore shoulder function and reduce associated pain in patients with posterosuperior massive rotator cuff tears. Specific treatment method options for different patients should be considered in line with multiple factors involve systematic condition, functional demands, previous history of shoulder surgery and severity of tear. Among these surgical approaches, latissimus dorsi tendon transfer has emerged as a promising alternative that is potentially biomechanically superior [2-4]. Therefore, we report the case of a 64-year-old patient who sustained posterosuperior massive irreparable rotator cuff re-tear and revision arthroscopy assisted LDT transfer. The literature on posterosuperior massive irreparable rotator cuff tears was also reviewed.

Materials and Methods

Case Details Report

A 64-year-old household female patient was admitted to the department of orthopedics of our hospital with main complaint of right shoulder pain and mobility disorder 1 month. There were surgical scars on the patient's right shoulder, the shoulder appeared slightly swollen and tenderness. Active and passive motions of shoulder joint were obviously constrained. Patient's peripheral sensation is normal. She was diagnosed with right posterosuperior massive irreparable rotator cuff tears 4 months ago and then performed with arthroscopic rotator cuff repairs for treatment. There was no previous medical history and irrelevant family medical history. She had no history of smoking and drinking. Right shoulder joint nuclear magnetic resonance showed that infraspinatus and supraspinatus tendon were torn and retract to the glenoid edge (Figure1,2).

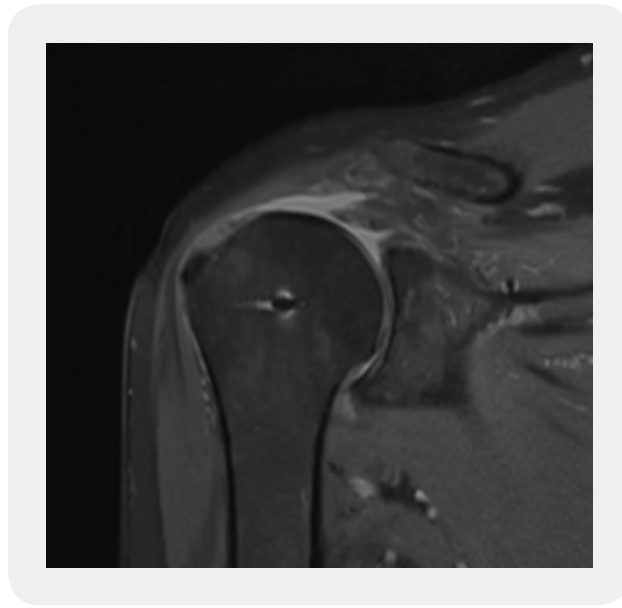


Figure 1: coronal plane of preoperative nuclear magnetic resonance showed that infraspinatus was torn and retracted to the glenoid edge.

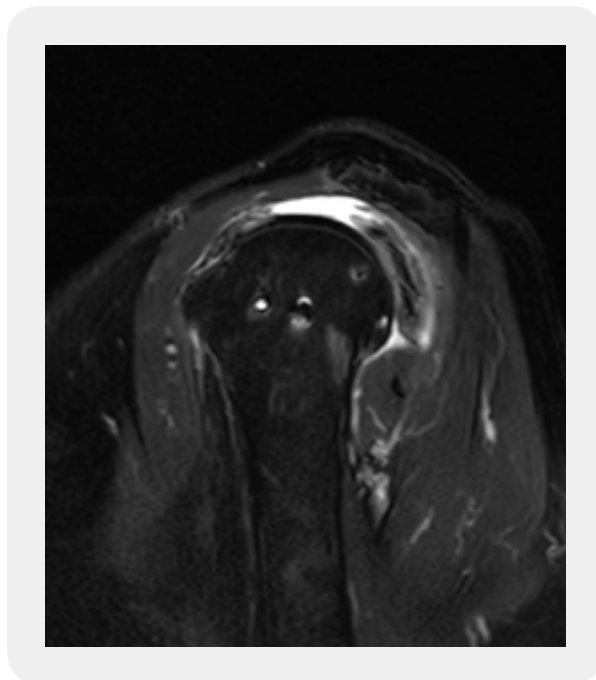


Figure 2: sagittal oblique of preoperative nuclear resonance showed that infraspinatus and supraspinatus were obviously torn

Functional recovery post-hip fracture surgery are available, thus more preventive efforts to secure the health and safety of the older community dwelling adult at the present time may be strongly indicated.

Treatment

The operation was performed under general anesthesia and cervical plexus block. The patient is placed in the lateral decubitus position, and the arm was placed on an arm fixing brace with 30° flexion and 45° abduction. The routine posterior, anterior and lateral portals of shoulder arthroscopy were established with subcutaneous incisions about 1cm. Arthroscopy was used to enter the joint cavity along the posterior approach for exploration. Under the microscope, the supraspinatus and infraspinatus muscles were torn in the whole layer, and the broken tendon was retracted to the edge of the glenoid, and the local tissue scar was hypertrophic (Figure 3). Then debrided the pathological tissues of the inferior acromial capsule and joint cavity, remained anterior acromioplasty unchanged. After the rotator cuff was fully loosened, the retracted rotator cuff cannot be moved to the greater tuberosity footprint area. Burnished the osteophyte in the footprint area freshen the surface. Carefully loosen the posterior tendon transposition area, fixed up 2 internal row anchors of Johnson company in the footprint area, then sutured retear parts of the supraspinatus and infraspinatus tendons.

Loosened the arm fixing brace, lift the surgical limb with the help of an assistant, a 6-8cm straight vertical incision is performed in the middle of the posterior half and distally to the axillary fold., Divided the subcutaneous tissue until the border of the LDT is found and followed, cut off the stop point of the latissimus dorsi muscle, then weaved the proximal latissimus dorsi muscle (Figure 4), and pulled it to cover the surface of the greater tuberosity footprint area of the humerus under arthroscopy, Use 2 external row rivets of Johnson company to fix through the line (Figure 5). Rinsed the surgical cavity and sutured the incision.

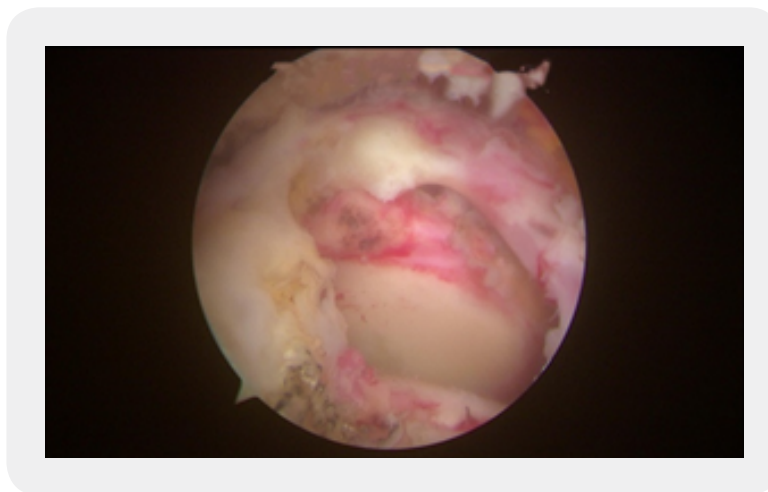


Figure 3: *Intraoperative arthroscopic imaging showed supraspinatus muscle was torn in the whole layer, and the local tissue scar was hypertrophic.*

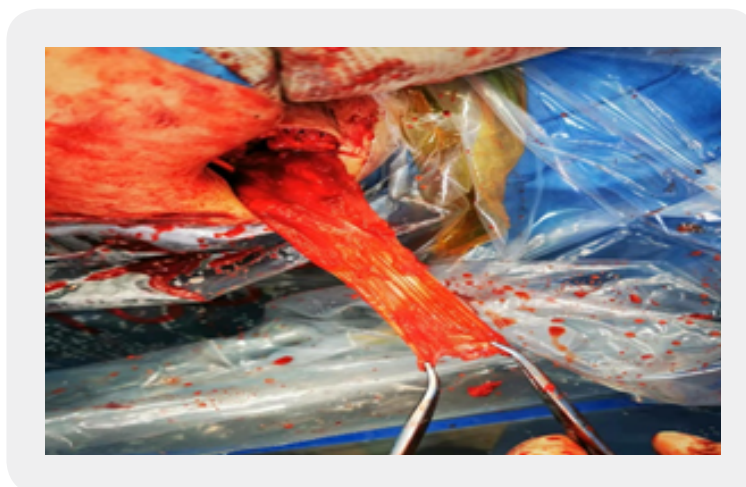


Figure 4: Cut off the stop point of the latissimus dorsi muscle, then weaved the proximal latissimus dorsi muscle

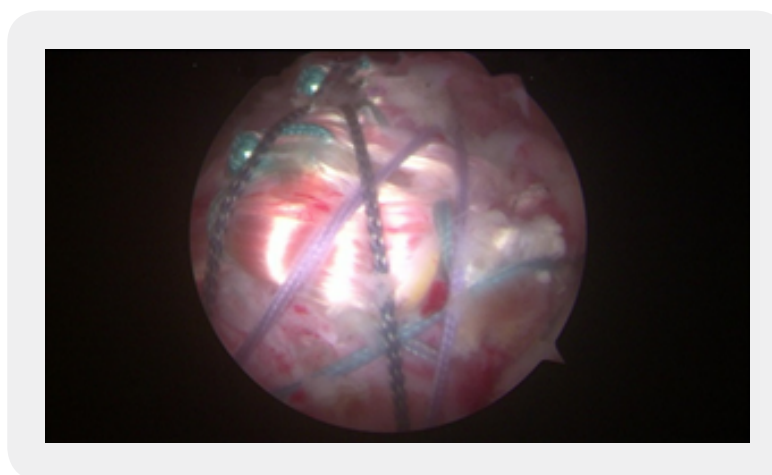


Figure 5: The latissimus dorsi tendon is fixed onto the area of the greater tuberosity. Outcome and Follow-up

The patient received symptomatic treatments including celebrex to mitigate inflammatory response and wore shoulder joint 30° abduction brace immediately from the first day after surgery. The patient was asked to register with and follow up outpatient department of orthopedics and rehabilitation regularly. By the 3 months, nuclear magnetic resonance showed the integrity of LDT was intact, rotator cuff healed well (Figure 6,7). By 1 year, the patient felt her pain relieved greatly, and the range of motion for shoulder got obvious increase. Tests based on pain level, active and passive range of motion were used to evaluate postoperative outcomes. The visual analogue scale score decreased from 8 preoperatively to 3 postoperatively, which indicates the patient's pain symptom was significantly relieved. It proved to be that satisfactory surgical results can be achieved as the constant Murley score improved vastly from 18 preoperatively to 60 postoperatively, and the University of California-Los Angeles score increased from 7 preoperatively to 22 postoperatively. The patient was able to resume normal life without complications such as infection and neuropathy.

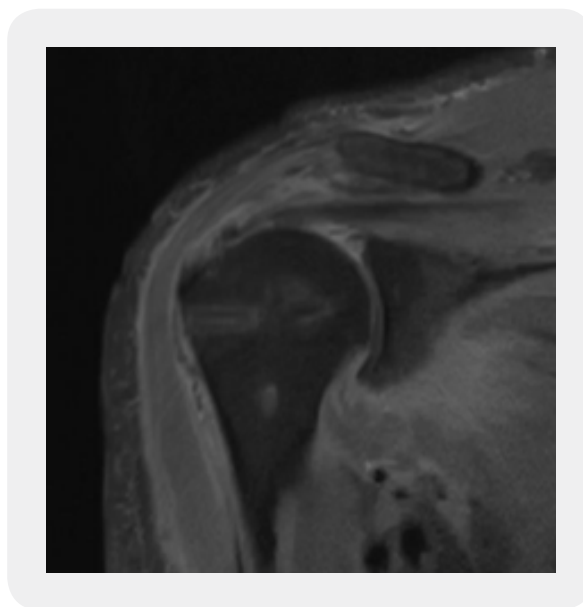


Figure 6: coronal plane of postoperative nuclear magnetic resonance showed the integrity of LDT was intact, rotator cuff healed well

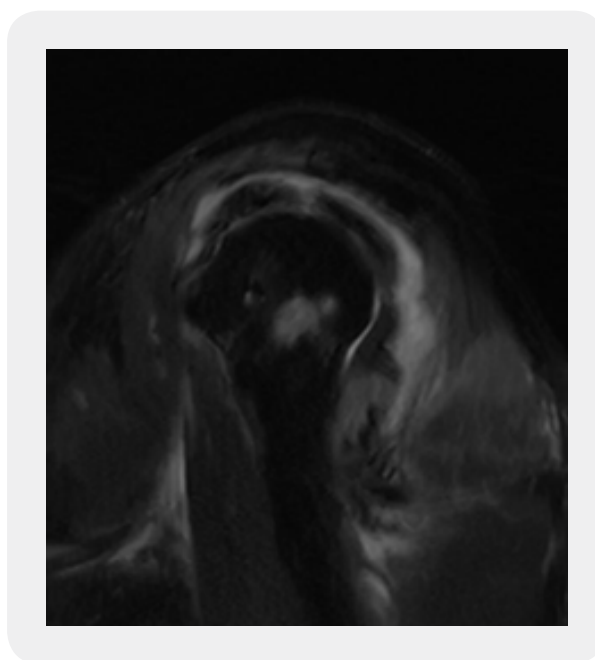


Figure 7: sagittal oblique of postoperative nuclear magnetic resonance showed the integrity of LDT was intact, rotator cuff healed well

Results

Discussions

Massive rotator cuff tears frequently refer to two and more than two tendons torn, or a ruptured tendon larger than 5 cm in diameter [5]. Typically, this means that both the supraspinatus and infraspinatus tendons are ruptured. Irreparable rotator cuff tears are in the absence of unified diagnosis criteria so far, and many controversies remain regarding their treatment. It is generally considered to have some common imaging manifestation: muscular atrophy stage 3 on the nuclear magnetic resonance according to Thomaszeau, a muscle fatty infiltration stage 3 and higher level on computed tomography arthrogram according to Goutallier, and tendon tract to the glenoid edge [6]. In terms of severe muscle lesions and obvious rotator cuff tractions, rotator cuff repair is accompanied by a high failure rate with inability to achieve direct tendon-to-bone repair or as a lack of healing potential, which brings great difficulties to the treatment of orthopaedic surgeons. Massive irreparable rotator cuff tears account for approximately 40% of rotator cuff repair failure [7]. Various treatment strategies have been developed to deal with this plight, but only a limited number including tendon transfer, superior capsular reconstruction and arthroplasty were proved to be effective, the ultimate goal of which is to restore the normal shoulder joint kinematic balance [8]. Superior capsular reconstruction is a viable approach, but not an advantageous one for its finite improvements to the external function of the shoulder. Simultaneously, arthroplasty is most appropriate in patients with arthritis, and its potential postoperative complications include loose prosthesis and lethal joint infection. Patients with advanced and end-stage arthritis are more likely to benefit from joint replacement. Several grafts have been adopted to act as a strengthening interposition grafts to close the cuff defect, but only latissimus dorsi and trapezius tendons were proved to be reliable implants [9-11]. Thanks to its potentially favorable biomechanical orientation, latissimus dorsi tendon possesses especial anatomical advantages allowing for mobilisation of the tendon from its original position to its final transferred position. The transferred tendon can not only enhance the strength of abduction muscles but also increase the acromiohumeral distance, further serving as a reinforcing depressor to constrain the impingement of humeral head. Published series have confirmed the desirable results of arthroscopy assisted LDT transfer for treatment of posterosuperior massive rotator cuff tears [7,12].

Open LDT transfer surgery was first described as a treatment of brachial plexus birth palsies, and then since 1988 for the treatment of posterosuperior rotator cuff tears. In contrast to arthroscopic surgery, open surgery has a larger incision and broader dissection of muscles, which inevitably adds possibilities to damage regional muscles and nearby neurovascular structures [13].

Discouraging complications such as pseudoparalysis and infection are more likely to happen in the long run in the setting of poor quality of muscle. By avoiding major deltoid damage, arthroscopy assisted LDT transfer leads to an acceptable solution for both surgeons and patients, as it can better circumvent postoperative complications. The main drawback is that patients with subscapularis or teres minor tears are associated with higher retear rate, and for these patients, arthroscopy assisted LDT transfer is not preferable [14].

Conclusions

Arthroscopy assisted LDT transfer is a promising therapeutic method in revision rotator cuff retear cases. It is considered to be one of the most suitable surgical options for the treatment of posterosuperior massive irreparable rotator cuff tears.

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Conflicts of Interests

The article is free from any such conflicts between authors or with others in any aspect.

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