



Arthroscopic Repair of a Fascia Lata Patch for Massive, Irreparable Rotator Cuff Tear: A Report of Two Cases

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Abstract

Recent years have witnessed an increasing number of methods and more sophisticated technology of surgical treatments for rotator cuff. However, the selection of appropriate tissue for repairing massive irreparable rotator cuff remains one of the greatest challenges in the field of repair surgery. In this Paper, we herein present 2 patients who received arthroscopic repair of massive irreparable rotator cuff tear with fascia lata patches in March and May 2017 and they were followed up for 50 and 48 months respectively. Magnetic Resonance Imaging (MRI) were performed before and after the surgery and yearly thereafter. The first patient's American Shoulder and Elbow Surgeons (ASES) score increased from 43.0 to 93.0 points and Visual Analog Score (VAS) for pain decreased from 9 preoperatively to 0 postoperatively and the constant-Murley score increased from 14 to 91 points. Regarding the second patient, ASES score increased from 52.7 to 94.8 points and VAS for pain decreased from 9 preoperatively to 0 postoperatively and the constant-Murley score increased from 24 to 93 points. Therefore, arthroscopic repair with fascia lata patches could effectively improve shoulder function and relieve pain in patients with massive irreparable rotator cuff tears and is thus worthy of clinical application.

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Introduction

Rotator cuff tear, which usually leads to shoulder dysfunction and pain, has become one of the diseases that cause shoulder joint dysfunction [1]. Among various types of rotator cuff injuries, massive irreparable rotator cuff tear is causative of the most serious clinical symptoms [2]. Despite the growing number of surgical treatment options, massive irreparable rotator cuff tears still represent a challenge for orthopedic surgeons [3]. What are worse, conservative strategies such as physiotherapy and drug therapy can merely show limited curative effect. Hence, surgical repair remains a viable option for patients with irreparable rotator cuff tears who suffer from weakness in shoulder with or without severe pain [4]. Those who endure massive irreparable rotator cuff tears always have a long onset time and concomitant with severe tendon cuff contractions [5]. During the repair of rotator cuff injury, the tension from tendon retraction makes this tendon residual difficult to pull back to cover the bony footprint, which constitutes an obstacle to placing a single-row or double-row suture in conventional arthroscopic surgery. In addition, retraction of tendon, scarring, and difficult visualization are technical barriers that must be dealt with in repair. The approach adopted extensively including avulsed latissimus dorsi tendon transfer, superior capsular reconstruction of the shoulder or reverse shoulder replacement [6-8]. Not only has curative effect been partially achieved, but these surgical means have given rise to a variety of complications encompassing restriction, subluxation and instability of shoulder joint as well as nerve injury [9]. Evidently, it is in urgent need to find a novel operative method. In fact, several researchers have already theoretically investigated the possibility of arthroscopically repairing massive irreparable rotator cuff tear with a fascia lata patch [10]. The current case study focuses on the clinical use of a fascia lata patch in repair surgery instead. The repair with fascia lata patch proved to be feasible in a rabbit model for rotator cuff tear established by Varvitsiotis D. He has reported on fascia lata allograft bridging *in vitro* [11]. In this report, we introduce two cases of massive irreparable rotator cuff tear precipitated by chronic degeneration and treated with arthroscopic patching with fascia lata, which was completed in 2017. The two patients exhibited improved clinical signs after the operation as shoulder function of the injured extremity greatly recovered and the pain was almost gone.

Case Presentation

Patient one

A 62-year-old female who retired as a yoga enthusiast, presented with a 2-years history of right shoulder pain without obvious predisposing causes. At first, the pain was more severe during physical activity and could relieve at rest. Then, the symptom gradually aggravated and was accompanied by nocturnal pain. The movement of her right shoulder was remarkably restricted although she did not complain about neck pain and finger numbness. The symptoms could not be significantly alleviated after physical therapy, NSAIDs, local blockade and other symptomatic treatments. X-ray examination showed a type 3 acromion and MRI identified a tear of the right supraspinatus muscle (Figure 2a, 2c). Specialized examination indicated a restricted right shoulder abduction, active activity: 30°, passive activity: 180°, internal rotation: Active L1/passive L5, external rotation: Active: 10°/passive 30°, Neer's sign:(+), Hawkins sign:(+), abduction resistance(+), internal rotation resistance(-), external rotation resistance(+), Jobe's test:(+), Drop Arm test:(+), Lift-off test:(+), Bell-press test:(+), Sulcus test:(-) (Figure 3a, 3c). American Shoulder and Elbow Surgeons (ASES) score [12], Visual Analog Score (VAS) [13] for pain and the Constant-Murley score [14] were 43, 9 and 14 points respectively [15]. According to imaging findings and clinical signs, the patient was diagnosed with a massive irreparable rotator cuff tear. Subsequently, the surgery of fascia lata patch transplantation was performed for the patient. All procedures were performed under general anesthesia in the lateral decubitus position with the arm in balanced skeletal suspension. During repair, the arm was placed in 45 degrees of abduction and neutral rotation. Firstly, subacromial decompression was performed. Then, the rotator cuff tendon was debrided to a stable edge, and anatomic footprint soft tissues were debrided to bare bone. The upper and lower surface of the free edge of the supraspinatus tendon were released and pulled back to the bony footprint, but it exposed the defect of 4 cm × 2.5 cm. Hence 4 sutures were reserved to the free edge of the supraspinatus muscle with a sutures hook (ARTHREX Medizinische Instrument GmbH, Germany) under arthroscopy. Skeletal suspension was loosened afterward. The fascia lata graft (size, 8 cm × 5 cm) is harvested from the lateral aspect of the homolateral thigh distal to the greater trochanter. The fascia lata is folded in half (size, 4 cm × 5 cm). Directly under the incision, tendon-tendon suture was built between the fascia lata patch and the free edge of the supraspinatus. At last, Titanium suture anchor (Smith & Nephew Medical Limited, USA) was placed in a single row of suture with the folded fascia lata patch (Figure 1). Postoperatively, the patient was transferred to the rehabilitation department for rehabilitative training with the guidance of physical therapist. Two weeks after stitches were taken

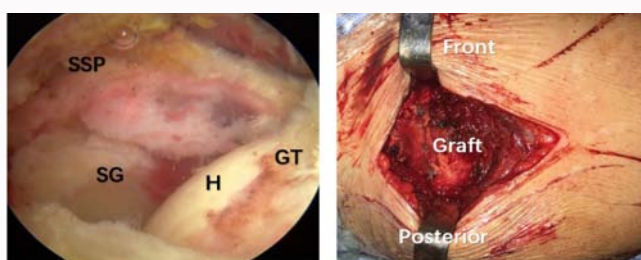


Figure 1: Patient one: Arthroscopic images of right shoulder from the posterior portal in patient. a) Rotator cuff tear. b) Small incision assisted graft transplantation (H, humeral head; GT, greater tuberosity; SSP, supraspinatus tendon; SG, scapula glenoid).

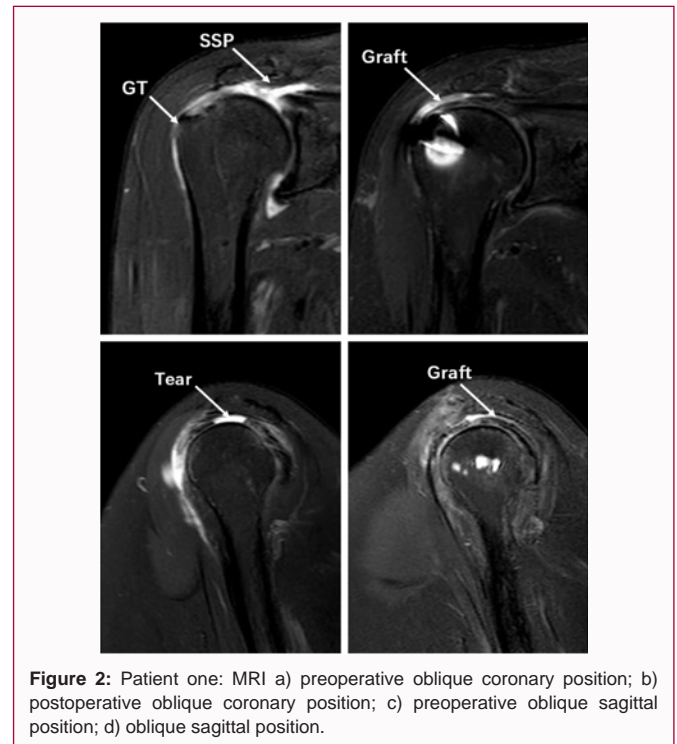


Figure 2: Patient one: MRI a) preoperative oblique coronary position; b) postoperative oblique coronary position; c) preoperative oblique sagittal position; d) oblique sagittal position.

out. At the third week, fully passive shoulder activity was initiated and during 3 to 6 weeks, passive and active activities were both initiated. After 6 weeks, strengthening was initiated; the patient began to exercise fully autonomously. She was permitted unrestricted activities at 6 months postoperatively, although violent confrontational movement is still not allowed [16,17]. Six months after the operation, the patient was reexamined in orthopedic outpatient and found that her shoulder function and feeling significantly improved compared with those before operation (Figure 3). ASES score, VAS for pain and the Constant-Murley score were 85.8, 3 and 84 points respectively. A repeated MRI indicated a successful fascia lata patch—there was no interruption of ligament signal and no sign of loose suture anchor in the footprint. One year after the operation, shoulder pain no longer existed. Moreover, the ranges of abduction and abductor strength were almost the same as those of the healthy side. ASES score, VAS for pain and the Constant-Murley score were 93, 0, 91 points respectively. A repeated MRI revealed a continuous supraspinatus tendon (Figure 2b, 2d). The patient was satisfied with the outcome of the treatment. Telephone return visit once a year, the patient did not complain of special discomfort.

Patient two

A 62-year-old elderly woman, who was self-employed and engaged in light physical activity for a long time, complained of pain in the right shoulder joint a year ago. As the pain was mild at first, she did not pay due attention. Then the pain gradually worsened and was accompanied by nocturnal pain and limited movement without any neck pain or finger numbness. Therefore, she went to the local hospital and was diagnosed with peri-arthritis of the shoulder. Though she was treated with the remedy of peri-arthritis, her symptoms could not be alleviated. Five days ago, her symptoms worsened again. She visited the outpatient department of sports medicine in Changsha Center Hospital. X-ray examination revealed a degenerative right shoulder joint and a type 2 acromion. MRI showed a tear of the right supraspinatus tendon. Specialized examination indicated a restricted

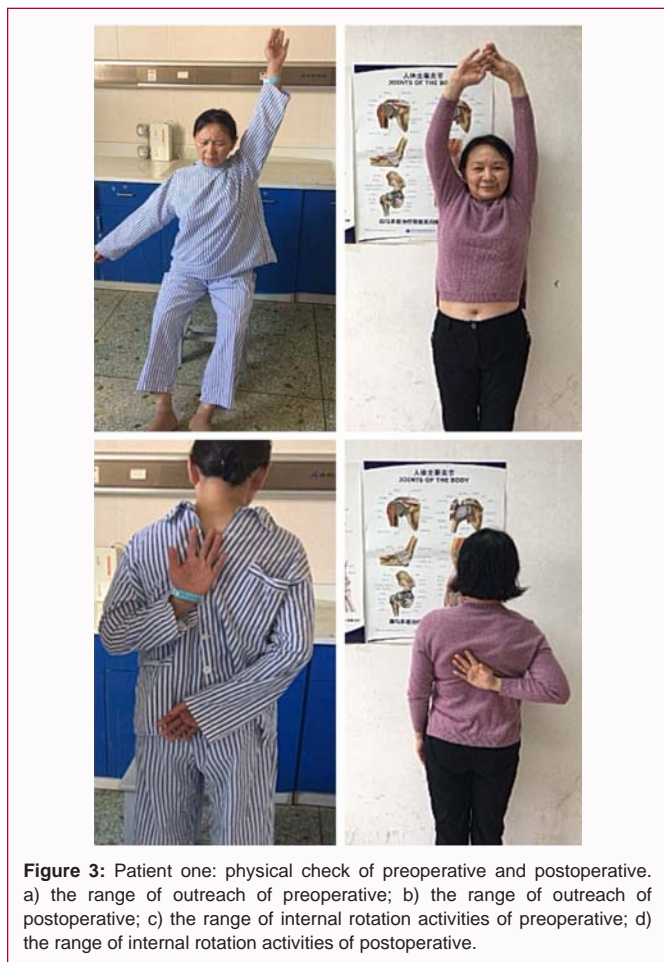


Figure 3: Patient one: physical check of preoperative and postoperative. a) the range of outreach of preoperative; b) the range of outreach of postoperative; c) the range of internal rotation activities of preoperative; d) the range of internal rotation activities of postoperative.

right shoulder abduction, active activity: 30°, passive activity: 180°, internal rotation: Active L1/passive L5, external rotation: Active: 10°/passive 30°, Neer's sign:(+), Hawkins sign:(+), abduction resistance(+), internal rotation resistance(-), external rotation resistance(+), Jobe's test:(+), Drop Arm test:(+), Lift-off test:(+), Bell-press test:(+), Sulcus test:(-). ASES score, visual analog score for pain and the constant-Murley score were 52.7, 9 and 24 respectively. This patient was diagnosed with a massive irreparable rotator cuff tear on the basis of the imaging and body tests. The operation was the same as that of the first patient. (5 cm × 5 cm crescent defect was discovered while exploring the supraspinatus muscles, the 6 cm × 4 cm fascia lata was taken from the ipsilateral lateral thigh). The postoperative rehabilitation plan was the same as the first patient. Six months after operation, the patient was reexamined in orthopedic outpatient department and we found that her shoulder function and feeling significantly improved compared with those before the operation. ASES score, VAS for pain and the Constant-Murley score were 71.4, 3, 69 points respectively. A repeated X-ray examination indicated a degenerative right shoulder joint and a type 1 acromion. One year after the operation, the pain in the shoulder significantly alleviated than that before operation. The ranges of abduction and abductor strength were still slightly worse than the healthy side. ASES score, VAS for pain and the Constant-Murley score were 89.8, 1, 87 points respectively. A repeated MRI examination indicated a continuous supraspinatus tendon. The patient is currently enjoying normal life and is engaged in moderate physical activity. The outcome of the operation is satisfactory. No discomfort with annual telephone return visit.

Discussion

It is demanding to completely repair massive irreparable rotator cuff tears taking into account the development of tendon retraction with inelasticity, muscle atrophy and fatty infiltration [18]. Given the growing sophistication of technology of rotator cuff tear, it is noteworthy that arthroscopic single-row or double-row suture for directly repairing massive irreparable rotator cuff tears may induce forceful tension of repaired rotator cuff tissue and no relief or even exacerbation of postoperative pain [19,20]. Furthermore, direct suture repair cannot fully cover the head of the humerus, which increases the risk for both upward movement of humeral head and postoperative tear [21,22]. Extensive research effort has been devoted to the restoration of massive irreparable rotator cuff tear [23-25], whereas few studies can provide data on patching repair followed by postoperative rehabilitation exercise that yields satisfying curative effect. Takeshi Kokubu pioneered the treatment of rotator cuff tear with fascia lata patch and applied this procedure to the treatment of a candidate [26]. After the operation, the pain apparently eased and the function of the injured extremity was ameliorated considerably compared with those before the surgery. Thus, the operation he developed attained a desirable clinical outcome and effectively prevented postoperative complications such as shoulder osteoarthritis. However, post-operative follow-up or rehabilitation training were not mentioned in his report. A.P. Rosales-Varoa investigated 10 patients with a complete symptomatic rotator cuff tear and used a suture augmented with their own fascia lata [27]. It has been proved that this surgical method can improve functional results and reduce the retear rate. Therefore, fascia lata patch have exhibited great potential to be applied in repairing massive irreparable rotator cuff tears [28,29]. The simple procedure does not require any special instrument and might also open up a new avenue for reducing the forceful rotator cuff tension generated by direct suture [30]. Another intriguing finding is that such a procedure could reduce shoulder pain, improve shoulder function and lower the incidence of rotator cuff retear [7,11,31]. Particularly, as far as histology is concerned, the patch was taken from the patient herself and consequently did not elicit an adverse immunogenic response beyond that noted in relation to suture [28]. In this paper, we described 2 patients with confirmed irreparable, massive tear of rotator cuff who underwent successful arthroscopic reconstruction using fascia lata patch. Though the same procedure was employed, clinical effect somewhat differed between these two patients early. A systematic rehabilitation exercise was developed for the patients after surgery. However, the second patient did not fully follow the doctor's guidance in the early postoperative period, and the recovery was worse than the first patient at 6 months after surgery. Indicating that the postoperative functional recovery and pain relief were positively correlated with postoperative rehabilitation. Rehabilitation exercise is of great importance for postoperative recovery [30]. Contrary to other operational manners including avulsed latissimus dorsi tendon or biceps tendon transfer, artificial patch, reverse total shoulder replacement, the technique of patching the fascia lata could relieve the local trauma of shoulder joint, alleviate the edema of shoulder and is less time-consuming [7,32]. Hence, this method plays a positive role in the rehabilitation of the shoulder joint by alleviating postoperative shoulder pain and it is advisable to perform early rehabilitative exercise of the shoulder.

Conclusion

In line with reports from current literature and the clinical practice

of our hospital, it is found that the application of fascia lata patch in the treatment of massive, irreparable rotator cuff tear can obviously alleviate the pain and improve the function of the shoulder. However, few experimental studies have been conducted in this research field and little systematic review concerning fascia lata patch for massive, irreparable rotator cuff tear has been published yet. Meanwhile, it is essential to extend the follow-up time to postoperative patients and randomized controlled study for the sake of evaluates the effectiveness comprehensively.

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