Case Report | Acta of Shoulder and Elbow Surgery |2020 January-June; 4(1): 11-14

Superior Capsular Reconstruction for Shoulder with an Irreparable Massive Posterosuperior Rotator Cuff Tear - A Case Report

Dinesh Chidambaram[1]

Abstract

A 65 year old gentleman presented with complaints of progressive pain over right shoulder for the past six months following fall onto his right shoulder one year back. He was diagnosed with massive retracted irreparable posterosuperior rotator cuff tear, for which superior capsular reconstruction with fascia lata autograft was performed. At 9 months follow up, patient has normal range of shoulder movements without any pain.

Keywords: Superior capsular reconstruction, Fascia lata graft

Introduction

Balanced force couples contributed by intact rotator cuff provides the glenohumeral stability in both coronal [1] and transverse [2] plane, during wide range of movements. In massive posterosuperior (supraspinatus and infraspinatus) rotator cuff tears, this balanced force couple is lost, leading to drop in joint reaction force [3] ending up in proximal migration of proximal humerus impinging against the acromion. This occurs due to unapposed action of delotid muscle during overhead activities and if it is not addressed in time, it will invariably result in cuff tear arthropathy.

Despite advances in surgical techniques chronic retracted tears are not always repairable due to poor elasticity [4], degenerative fatty infiltration [5] and muscle atrophy. Even if repaired, such tears have high chances of re-tear. Treatment options for such conditions includes physiotherapy (anterior deltoid strengthening exercises), debridement with subacromial decompression [6,7], partial repair [8,9] and tendon transfer [10,11,12]. Most of these procedures relieve shoulder pain but none of them failed to restore muscle strength during elevation and external rotation. Reverse shoulder arthroplasty [13] is indicated for patients older than 70 years.

This report describes a case of irreparable massive rotator cuff tear successfully treated by mini-open superior capsular reconstruction(SCR), to restore superior stability of the shoulder joint with a favorable post-operative outcome.

[1]Department of Orthopaedics, Royal Care Superspeciality Hospital,
Neelambur, Coimbatore, Tamil Nadu, India.

Address of Correspondence
Dr. Dinesh Chidambaram,
Consultant Trauma and Arthroscopy Surgeon,
Royal Care Superspeciality Hospital, Neelambur,
Coimbatore, Tamil Nadu, India.
E-mail: dineshchidambaram75@gmail.com

Case report

A 65 years old, right hand dominant gentleman came to outpatient department with presenting complaints of progressive pain over right shoulder for the past 6 months. Patient gives history of fall on his right shoulder 1 year back. He has difficulty in overhead activities and difficulty in activities of daily living like combing hair, wearing shirt and eating food. Physical findings on initial examination were markedly resticted shoulder range of movements and decreased abductor/external rotator muscle strength were observed. Atrophy of the supraspinatus and infraspinatus muscles were observed. Preoperative UCLA score was 8/35.

Shoulder examination

On evaluation, x-ray findings showed proximal migration of the humeral head without much arthritis. Magnetic resonance imaging (MRI) was performed which revealed a massive rotator cuff tear (supraspinatus and infraspinatus muscles), which was retracted far behind the glenoid fossa with severe atrophy and grade III fatty infiltration (Goutalier classification) with occupational ratio less than 30 percent. The subscapularis muscle was intact.

Thus a diagnosis of massive retracted cuff tear, Patte type 5 was made, with Goutalier grade III fatty infiltration and severe atrophy with poor occupational ratio(<30%), without glenohumeral arthritis (Hamada type 2). Considering the chronicity and massively retarcted posterosuperior rotator cuff tear, patient's persistent discomfort, surgery was elected. Miniopen superior capsular reconstruction with fascia lata autograft was performed.

Surgical technique

Shoulder arthroscopy was started with the patient in beach chair position under general anaesthesia. Posterior portal was established for initial assessment of the glenohumeral joint. Intraarticular arthroscopy revealed autoloss of biceps tendon and an intact subscapularis. Then anterior portal was established through the rotator interval and clearance done. Bursal scopy revealed subacromial bursitis. Lateral and anterolateral portals were created to complete subacromial decompression. Cuff tissue was not visualised at all as it was withdrawn far behind the glenoid fossa,

Table 1: A- special tests

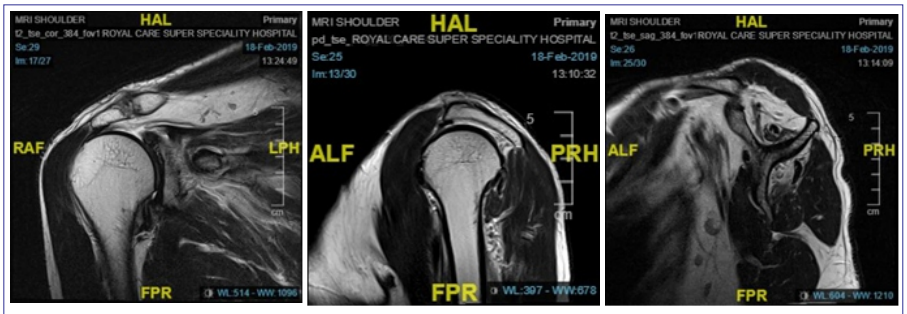
SPECIAL TESTS	RIGHT	LEFT
Neers	+	-
Hawkins	+	-
Empty Can	+	-
Full Can	+	-
ER Lag Sign	+	-
Gerbers	-	-
Belly Press	-	-
Arm Drop	+	-
Speed	+	-

Table 1: B Showing range of movements

RANGE OF MOVEMENT	RIGHT	LEFT
Total elevation	70°	180°
Internal rotation	L 5	T 12
External rotation	30°	70°
Abduction	45°	180°
Extension	45°	60°

Fig. 1 X ray shows proximal migration without much glenohumeral arthritis (Hamada classification-type2)

Fig. 5 Shows clinical images of postoperative movements



(MRI) Fig. 2A Showing retaction more than 5 cms, **Fig. 2B** Massive posterosuperior tear, **Fig. 2C** Severe atrophy

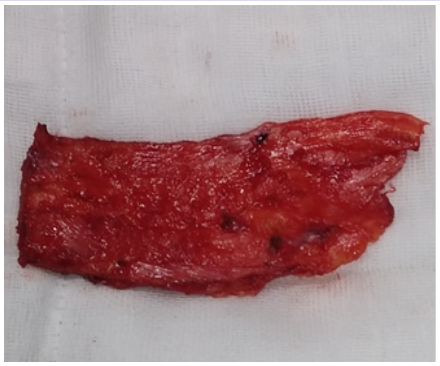


Fig. 3 Showing fascia lata 10 x 4 cm - harvest

Fig. 4 Immediate postoperative X-ray showing Glenoid & foot print anchors

hence the tear was considered irrepairable.

Right thigh was prepared for the harvest of fascia lata. Skin incision was made over the lateral thigh around the greater trochanter of the femur and 10 x 4 cm fascia lata was harvested. Then graft was folded twice and stitched to keep it from unfurling (graft size after folding: 5 cm mediolaterally and 4 cm anteroposteriorly).

Bony bed over the superior glenoid and rotator cuff footprint on the greater tuberosity was prepared. Two 5mm titanium suture anchors were inserted onto the superior glenoid of the right shoulder. Free sutures were passed onto the medial and lateral end of the graft outside the shoulder, using a suture shuttle (scorpion).

By mini-open approach the graft was inserted into the subacromial space through the lateral incision and then medial side of the fascia lata is attached to the superior glenoid and the knots were tied one by one. Lateral side of the fascia lata was attached to the rotator cuff footprint on the greater tuberosity by using the double row suture bridge technique. Finally, side-to-side sutures were added

Table 2: Postoperative range of movements

RANGE OF MOVEMENT	RIGHT	LEFT
Total elevation	160°	180°
Internal rotation	T 12	T 12
External rotation	60°	70°
Abduction	160°	180°
Extension	60°	60°

between the graft and the infraspinatus tendon to improve force coupling in the shoulder joint.

Postoperatively patient was advised to use abduction sling till six weeks due to poor bone quality and put on passive ROM exercises till the end of first month. Active ROM exercises were started after one month. Patient was symptomatically better and doing well without any pain. Muscle training exercises started after two months. At 9 months follow up patient had normal range of shoulder movements without pain. He was doing his activities of daily living without any difficulties. Postoperative UCLA score was 31/35.

Discussion

There are various treatment options for symptomatic patients with massive irreparable rotator cuff tears, but there is no consensus. Mihata et al [14] described superior capsular reconstruction(SCR) using fasica lata autograft from patients thigh, a new surgical technique for irreparable rotator cuff tear to improve superior stability by restoring the balanced force couples across the shoulder joint. Hirahara et al [15] and Burkhart et al [16] modified this technique using acellular dermal allograft instead of fascia lata autograft and concluded that SCR is a joint preserving surgery and a good alternative to reverse shoulder arthroplasty in patients with massive irreparable rotator cuff tears. Regarding anatomy of the superior capsule, it is a thin layer of interwoven collagen [17] attached to the undersurface of supraspinatus and infraspinatus, extending from the glenoid medially to humeral head laterally, thereby resisting superior translation of humeral head.

In a biomechanical study Ishihara et al [18] demonstrated the role of superior capsule, in which tear, in the superior capsule significantly increased anterior translation, whereas defect in the superior capsule significantly increased glenohumeral translation in all directions and increased contact pressure between humeral head and coraco acromial arch, compared to the intact superior capsule. Thus superior capsule acts as an hammock overlying the shoulder joint to prevent the humeral head from making contact with undersurface of acromion. Regarding graft thickness, Mihata et al [19] conducted a biomechanical cadaveric study and concluded that 8 mm thick fascia lata graft attached in 15 to 45^0 abduction restored shoulder joint stability.

Mihata et al [20] compared fascia lata autograft versus acellular human dermal allograft to assess the ability to restore superior stability and concluded that fascia lata graft resored superior glenohumeral stability, subacromial contact pressure and superior glenohumeral joint force whereas dermal allograft partially restored superior glenohumeral stability. Mihata et al [21] showed that acromioplasty along with SCR reduces subacromial contact area thereby postoperative rates of graft abrasion was avoided. Posterior side to side suturing[22] of the graft to residual infraspinatus tendon improved superior stability of the shoulder joint.

Conclusion

In summary arthroscopic/mini-open superior capsular reconstruction is a joint preserving surgery, reliable and useful alternative treatment to reverse shoulder replacement in patients with irreparable rotator cuff tears with severe fatty degeneration and atrophy in selected patients. SCR improves the function of shoulder joint by restoring superior glenohumeral stability. Normal muscle strength is restored and pain is relieved. Pseudoparalysis is reversed as stable fulcrum is created. SCR with fascia lata graft is cost-effective and durable reconstruction modality in selected patients with good functional outcomes.

References

1.Inman VT, Saunders JB, Abbott LC. Observations of the function of the shoulder joint. 1944. Clin Orthop Relat Res. 1996:3e12.

2.Burkhart SS. Partial repair of massive rotator cuff tears: the evolution of a concept. Orthop Clin North Am. 1997; 28:125e132.

3.Parsons IM, Apreleva M, Fu FH,Woo SL. The effect of rotator cuff tears on reaction forces at the glenohumeral joint. J Orthop Res. 2002; 20:439e446.

4.Bedi A, Dines J, Warren RF, Dines DM. Massive tears of the rotator cuff. J Bone Joint Surg Am 2010; 92:1894-1908

5.Goutallier D, Postel JM, Bernageau J, Lavau L, Voisin MC. Fatty muscle degeneration in cuff ruptures. Pre- and postoperative evaluation by CT scan. Clin Orthop Relat Res 1994; 78-83

6.Burkhart SS. Arthroscopic debridement and decompression for selected rotator cuff tears. Clinical results, pathomechanics, and patient selection based on biomechanical parameters. Orthop Clin North Am 1993; 24:111-123.

7.Rockwood CA Jr, Williams GR Jr, Burkhead WZ Jr. Debridement of degenerative, irreparable lesions of the rotator cuff. J Bone Joint Surg Am 1995; 77:857-866.

8.Burkhart SS, Nottage WM, Ogilvie-Harris DJ, Kohn HS, Pachelli A. Partial repair of irreparable rotator cuff tears. Arthroscopy 1994; 10:363-370.

9.Duralde XA, Bair B. Massive rotator cuff tears: The result of partial rotator cuff repair. J Shoulder Elbow Surg 2005; 14:121-127.

10.Gerber C. Latissimus dorsi transfer for the treatment of irreparable tears of the rotator cuff. Clin Orthop Relat Res 1992; 152-160.

11.Warner JJ, Parsons IM. Latissimus dorsi tendon transfer: A comparative analysis of primary and salvage reconstruction of massive, irreparable rotator cuff tears. J Shoulder Elbow Surg 2001; 10:514-521.

12.Gerber C, Maquieira G, Espinosa N. Latissimus dorsi transfer for the treatment of irreparable rotator cuff tears. J Bone Joint Surg Am 2006; 88:113-120.

13.Farshad M, Gerber C. Reverse total shoulder arthroplastyfrom the most to the least common complication. Int Orthop 2010; 34:1075-1082.

14.Mihata T, Lee TQ, Watanabe C, Fukunishi K, Ohue M, Tsujimura T, et al. Clinical results of arthroscopic superior capsule reconstruction for irreparable rotator cuff tears. Arthroscopy. 2013; 29(3):459-70

15.Hirahara AM, Andersen WJ, Panero AJ. Superior capsular reconstruction: clinical outcomes after minimum 2-year follow-up. Am J Orthop. 2017; 44(6):266-78.

16.Burkhart SS, Denard PJ, Adams CR, Brady PC, Hartzler RU. Arthroscopic superior capsular reconstruction for massive irreparable rotator cuff repair. Arthrosc Tech. 2016; 5(6):e1407-18.

17.Clark JM, Harryman DT 2nd. Tendons, ligaments, and capsule of the rotator cuff. Gross and microscopic anatomy. J Bone Joint Am. 1992; 74(5):713-25.

18.Ishihara Y, Mihata T, Tamboli M, Nguyen L, Park KP, McGarry MH, et al. Role of the superior shoulder capsule in passive stability of the glenohumeral joint. J Shoulder Elbow Surg. 2014; 23(5):642-8.

19.Mihata T, McGarry MH, Kahn T, Goldberg I, Neo M, Lee TQ. Biomechanical effect of thickness and tension of fascia lata graft on glenohumeral stability for superior capsule reconstruction in irreparable supraspinatus tears. Arthroscopy. 2016; 32(3):418-26.

20.Mihata T, Bui CNH, Akeda M, Cavagnaro MA, Kuenzler M, Peterson AB, et al. A biomechanical cadaveric study comparing superior capsule reconstruction using fascia lata allograft with human dermal allograft for irreparable rotator cuff tear. J Shoulder Elbow Surg. 2017; 26(12):2158-66.

21.Mihata T, McGarry MH, Kahn T, Goldberg I, Neo M, Lee TQ. Biomechanical effects of acromioplasty on superior capsule reconstruction for irreparable supraspinatus tendon tears. Am J Sports Med. 2016; 44(1):191-7.

22.Mihata T, McGarry MH, Kahn T, Goldberg I, Neo M, Lee TQ. Biomechanical role of capsular continuity in superior capsule reconstruction for irreparable tears of the supraspinatus tendon. Am J Sports Med. 2016; 44(6):1423-30

Conflict of Interest: – NIL
Source of Support: NIL

How to Cite this Article

Chidambaram D | Superior Capsular Reconstruction for Shoulder with an Irreparable Massive Posterosuperior Rotator Cuff Tear - A Case Report | Acta of Shoulder and Elbow Surgery | January-June 2020; 4(1): 11-14.