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Case Report

Orthopaedics Section

Mini-open Double-row Subscapularis Repair with Biceps Tenodesis for a Missed Lafosse Type 3 Subscapularis Tear with Biceps Subluxation: A Case Report

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ABSTRACT

The accuracy of diagnosing full-thickness Subscapularis (SSC) tendon tears depends on the presence or absence of Long Head of Biceps Tendon (LHBT) and subluxation is quite variable. This case report outlines a middle aged man with symptomatic medial dislocation of the long head of the biceps with associated rotator cuff injury. Magnetic Resonance Imaging (MRI) of the left shoulder reported hyper intensity of SSC tendon and long head of biceps tendon rupture. Patient successfully underwent diagnostic arthroscopy with mini-open double row repair of the subscapularis with biceps tenodesis at the base of the bicipital groove. Patient regained full and painless Range of Motion (ROM) following six months of surgery. SSC tear can be easily missed even in MR imaging studies by radiologist. Clinical expertise is required for shoulder examination and when combined with MR study can help in identifying the lesion accurately.

Keywords: Arthroscopy, Range of motion, Rotator cuff tear

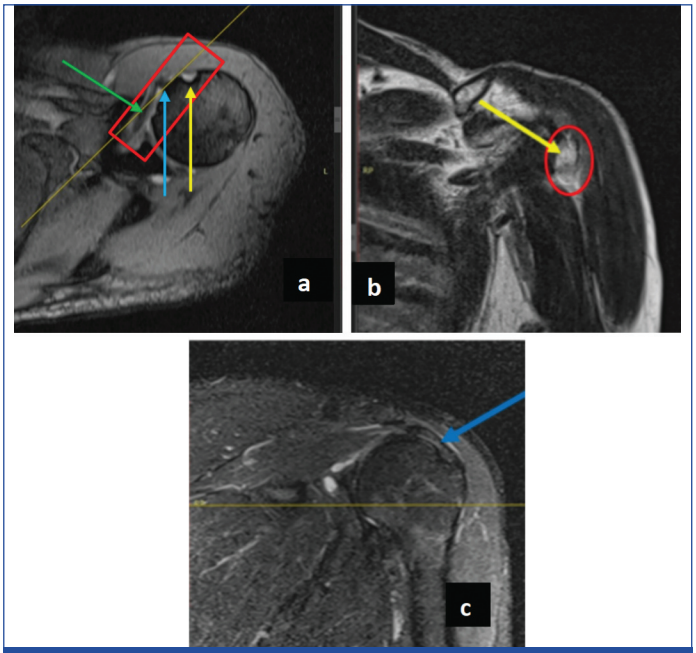
CASE REPORT

A 45-year-old manual labourer presented to the Orthopaedics outpatient department with a left-sided shoulder pain and restriction of movement for three months. His symptoms began following a slip and fall three months back. He described the fall resulted in an anteromedial directed force to the left arm and shoulder. He reported no history of trauma or surgeries to the shoulder and mentioned no other significant medical conditions.

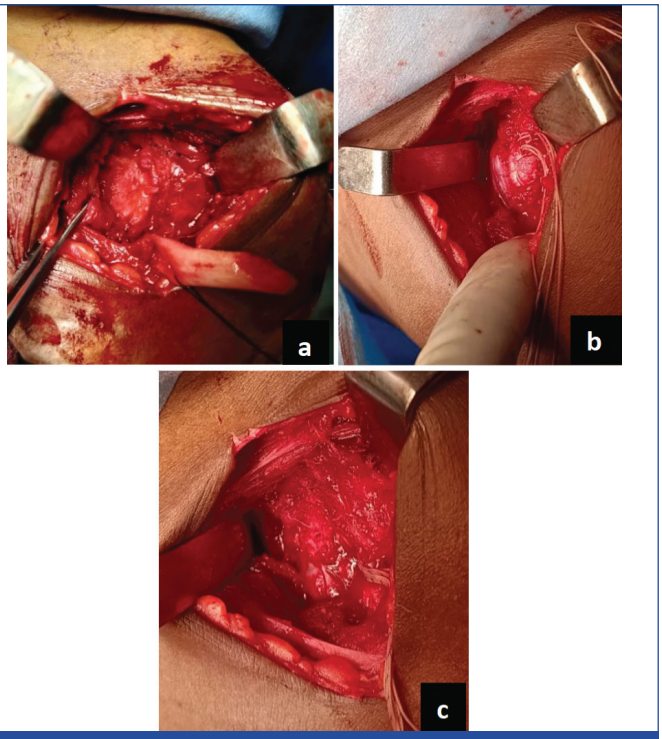
During the examination, the patient's pain was localised to Codman's point. Passive ROM was 160° of forward flexion overhead. Active internal rotation of the left arm behind the back extended to the L5-S1 vertebrae. The patient also demonstrated positive results on the lift-off and belly press tests. With the elbows flexed and arms at the patient's sides, active external rotation was measured at 0 to 90° both in adduction and abduction. The patient demonstrated 5/5 strength in all directions of movement of the left shoulder except abduction and internal rotation.

The MRI of the left shoulder joint [Table/Fig-1a-c] showed Proton Density Fat Suppressed (PDFS) hyper intensity of SSC at the humerus attachment site, complete tear of biceps tendon and retraction of fibres till the level of humeral neck, partial articular sided supraspinatus tear. Clinical examination and further evaluation suggested a complete tear of subscapularis which was confirmed with the radiologist later. Speed's test was negative and Popeye sign was negative which was not correlating to the MRI report.

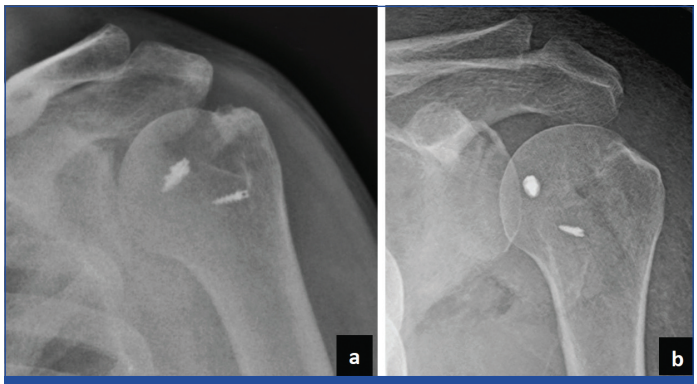
The treatment options were discussed with the patient, informed and written consent was obtained and the plan was made for diagnostic arthroscopy to confirm the findings and mini-open biceps tenodesis and SSC repair if indicated. A diagnostic arthroscopy was carried out using a standard posterior viewing portal along with two anterior portals. The posterosuperior cuff was intact and small Partial Articular Supraspinatus Tendon Avulsion (PASTA) lesion of less than 5 mm was identified decided not to address the lesion at this stage. Intraoperatively it was decided to do mini-open repair in beach chair position and through Delto-pectoral approach about 5 cm incision made, through deltopectoral interval complete tear of upper 2/3rd fibres of SSC and bare lesser tuberosity with subluxed biceps tendon were documented. Through rotator cuff interval biceps tenotomy done near proximal insertion [Table/Fig-2a]. Lesser tuberosity freshened and SSC was repaired using trans tendon, double row, transosseous equivalent method by double loaded 5.5 mm titanium anchor medially at medial footprint and 5.5 mm PEEK knotless anchor laterally near biceps groove [Table/Fig-2b,c]. Suprapectoral biceps tenodesis done at the base of groove using 3 mm anchor [Table/Fig-3a,b]. Passive ROM was stable and showed no abnormal findings. The wound was thoroughly irrigated with normal saline and closed in layers. A sterile dressing was applied to all incision sites, and the patient was fitted with a sling and an abduction pillow to keep the shoulder in a neutral position. The procedure was well-tolerated, with no complications observed.



[Table/Fig-1]: Magnetic resonance imaging scan showing: a) Green arrow indicates the Subscapularis (SSC) tear, blue arrow shows subluxated biceps tendon and yellow arrow points to the biceps grove; b) Yellow arrow shows the Subscapularis (SSC) tear; c) Blue arrow shows the partial articular tear of supraspinatus.



[Table/Fig-2]: Intraoperative images showing: a) Tenotomised Long Head of Biceps Tendon (LHBT) and bear lesser trochanter with toothed forceps showing the torned Subscapularis (SSC) tendon; b) The first row repair; c) After the double row repair.



[Table/Fig-3]: Postoperative radiographs showing: a) The PEEK knotless and titanium anchor for Subscapularis (SSC); b) Suture anchors with base of biceps grove after biceps tenodesis using suture anchor.

Codman ROM exercises started from postoperative day one under the supervision of physiotherapist till day 12.

The patient was followed-up for six months regularly. Active ROM exercises were allowed from three weeks, patient was able to return to his occupation after six weeks. Internal rotation improved till T12 level at the last follow-up, Active abduction increased till 160° and painless. Power improved to 5/5 in all directions of movement of the left shoulder [Table/Fig-4]. Patient has now returned to his previous occupation

DISCUSSION

The SSC muscle is the sole anterior component of the rotator cuff and is the most powerful muscle [1]. The SSC muscle represents the single anterior part of the transversal "force couple," and SSC reconstruction is important for centering the humeral head and restoring normal glenohumeral joint biomechanics [2]. Clinical tests to determine SSC function include the lift-off test, belly-press test, internal rotation lag sign, Napoleon test and bear-hug test. Barth JR et al., have shown the bear-hug test to be the most accurate of four clinical tests in detecting SSC tears, yet its sensitivity is only about 60%. In addition, loss of internal rotation can significantly limit the ability to detect these tears on examination [3].

One indicator for a SSC tear is the location of the LHBT relative to the intertubercular groove. Subluxation or dislocation of the LHBT

[Table/Fig-4]: Follow-up images showing: a) Internal rotation upto T12; b) Active abduction upto 160 degrees; c) Bear hug test with normal power; d) Lift off test with normal power; e) Healed surgical scar of shoulder arthroscopy.

has traditionally been recognised as a key pathology linked to SSC tears. Since the SSC tendon attaches to the lesser tuberosity of the humerus, forming the medial border of the biceps pulley, a tear in this tendon is thought to increase the likelihood of the LHBT being displaced or subluxated over the lesser tuberosity [4]. There are several reports that the dislocation and subluxation of the LHBT are associated with SSC tear, patten reported that biceps tendon abnormalities were found in association with tears of SSC in seven of nine patients [5,6].

Most studies on medial dislocation of the LHBT suggest that rotator cuff damage is often a common and essential factor associated with the dislocation [7]. Beyond facilitating shoulder movement, the rotator cuff plays a crucial role in stabilising the LHBT. Additional ligamentous support is provided by the superior transverse humeral ligament, the Superior Glenohumeral Ligament (SGHL), and the coracohumeral ligament, which together create a sling that secures the LHBT within the intertubercular sulcus, also known as the bicipital groove, between the greater and lesser tubercles of the humerus. The SSC further aids in keeping the LHBT in place within the bicipital groove by attaching to the lesser tuberosity of the humerus. Interestingly, the transverse humeral ligament is often considered an extension of the SSC tendon, and some researchers argue that it may not exist as a distinct ligament at all [8].

Identifying SSC tendon tears before surgery remains a difficult task. According to Barth JR et al., the bear-hug test is the most reliable clinical indicator, although its sensitivity is only approximately 60% [9]. SSC tears are identified during arthroscopic evaluation in approximately 20-70% of patients with rotator cuff tears. For accurate diagnosis, an arthroscopic view of the articular side of the tendon insertion is recommended, as the majority (over 90%) of SSC tears originate on the articular cephalad aspect of the tendon insertion. It is difficult to accurately diagnose SSC tear using routine MRI. Adams CR et al., reported that radiologists using MRI diagnosed only 8 of 24 less than 30% tear size of SSC tears (33%) identified by arthroscopy, with overall sensitivity of 61% and specificity of 96% [4,5].

Adams CR et al., introduced a structured method for preoperative diagnosis of SSC tendon tears. According to their protocol, a tear is diagnosed if at least two out of four specific criteria are fulfilled. These criteria include identifying a SSC tendon tear on axial imaging, detecting a tear on sagittal imaging, observing LHBT subluxation and noting muscle atrophy on a sagittal slice. By use of this method, a sensitivity of 73% was reported [4]. A systematic review by Saltzman

BM et al., evaluated 8 arthroscopic SSC studies. After subanalysis of the data, they found a lower rerupture rate with a double-row repair (0%) compared with a single-row technique (5-10%) [10].

CONCLUSION(S)

This case report demonstrates a successful treatment outcome of a missed SSC tear repair. This also shows the requirement of high clinical and technical expertise to diagnose and manage SSC tear and associated long head of biceps tendon rupture. SSC tear can be easily missed even in MRI studies by radiologist. Clinical expertise is required for shoulder examination and when combined with MR study can help in identifying the lesion accurately.

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