

Subscapularis partial tear nodule causing shoulder rotational triggering

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Abstract Subscapularis nodules are rare causes of shoulder pain. There have been no reports of nodular swellings arising from the articular surface of the subscapularis tendon. We report two original cases of intra-articular subscapular nodules with reciprocal middle glenohumeral ligament thickening. In both cases, the patients had long standing deep-seated anterior shoulder pain with failed conservative treatments. Arthroscopy, magnetic resonance imaging and histology reports revealed nodules

with underlying partial subscapularis tears. Arthroscopy may be needed to identify and successfully treat rare symptomatic nodules as causes of pain and clicking in the shoulder joint.

Level of evidence V.

Introduction

Nodules of the subscapularis muscle/tendon are rare causes of shoulder pain. There have been two such cases of desmoid tumours reported in the literature [8]. Although other intra-articular tumours of the shoulder have been reported, there are no reports of benign nodules arising from the subscapularis tendon. This article describes two cases of nodules arising from the intra-articular surface of a partially torn subscapularis tendon causing shoulder pain and clicking. To our knowledge, no such cases have been previously reported in literature.

Case report

The first case is of a 27-year-old right-handed patient presented with pain in his left shoulder for 6 months duration whilst exercising in the gym. He was performing posterior deltoid ‘fly’ lifts when he suddenly felt a non-specific, deep-seated pain in his shoulder. The pain was initiated and aggravated when stretching his shoulder and reaching posteriorly behind his body as well as on abduction and external rotation. The patient ceased any active shoulder work and all gym activities. No previous history of relevance was noted.

On examination, he was tender over the anterior joint line with pain on passive abduction and external rotation of

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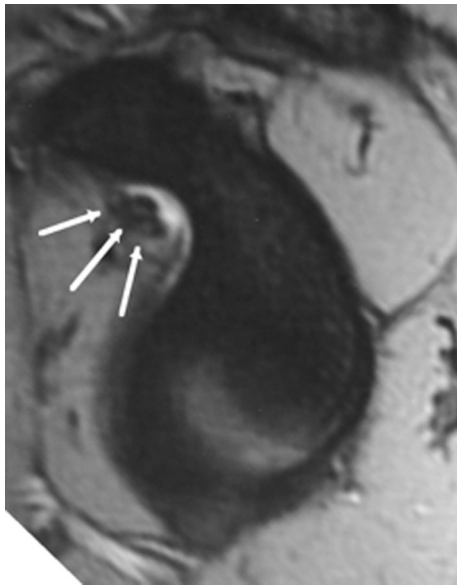


Fig. 1 A T2-weighted fat suppressed MRI examination of the shoulder revealing the synovial nodule (*arrows*) arising from the superior margin of the tendinous portion of subscapularis

the shoulder. Resisted external rotation from full internal rotation and resisted abduction from 0° to 45° generated pain. Active and passive range of movement of the shoulder was full, and the power of his rotator cuff was normal. Belly-press test, bear-hug test and lift-off test were all negative. No shoulder instability was clinically detectable. Plain radiographs of the shoulder were normal. Magnetic resonance imaging (MRI) scans of the shoulder identified a small nodular swelling arising from the synovial surface near the superior edge of the subscapularis muscle, along with a reciprocal thickening of the middle glenohumeral ligament (MGHL) (Fig. 1).

A diagnostic arthroscopy revealed a soft nodule on the superior margin of the subscapularis tendon projecting into the joint (Fig. 2a). The nodule was of 4 mm size, white in colour and easily deformable by a probe tip. A partial articular tear of the subscapularis tendon was observed deep to this site. The MGHL was found to be tight and thickened, with ‘triggering’ of the nodule under the MGHL with internal and external rotation when tested dynamically (Fig. 2b), as well as indentation with fibrillation of the adjacent articular surface of the humeral head (HH). The adjacent glenoid labrum appeared to be irregular, but was firmly attached to the glenoid (Fig. 2). The rest of the shoulder examination was normal.

The lesion was soft, avascular and well circumscribed, which are all features suggesting a benign tumour or non-neoplastic lesion. The nodule was resected with a shaver and radio-frequency electrocautery, and the subscapularis fibres were noted to be intact and not degenerate (Fig. 2c). The tight MGHL was debrided with an oscillating shaver, and the free edge of the glenoid labrum was trimmed to a normal contour.

Immediate post-operative clinical examination revealed resolution of the deep-seated pain with shoulder motion in the recovery room, and the patient has remained symptom free at his final follow-up at 2 years.

The second case is of a 44-year-old right-hand dominant female that presented with vague anterior left shoulder pain for over 6 months with failed conservative management. The pain was constant in nature and impacted her activities of daily living. On examination, the patient had clicking of her anterior shoulder in internal and external rotation with the shoulder in neutral abduction. Her pain was aggravated with external rotation with the shoulder in neutral abduction. Bear-hug and lift-off tests were both negative. Intra-articular bupivacaine injections and subacromial injections partially relieved her pain.

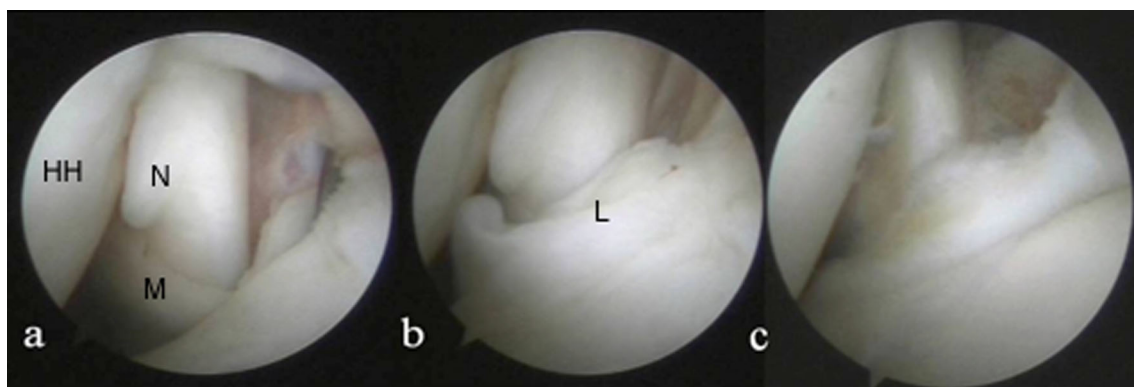


Fig. 2 a Arthroscopic view of the glenohumeral joint, in external rotation, showing the relationship between the nodule (*N*) on the superior margin of the subscapularis tendon to the thickened MGHL (*M*). A probe is retracting the glenoid labrum for better visibility. Also note the indentation caused by the nodule on the humeral head (*HH*)

chondral surface. b The view of the relationship of the nodule with the MGHL is obscured when the labrum is released from the retracting probe. The labrum can be seen to be irregular at its margin (*L*). **c** The nodule has been ablated, and the MGHL and labral free margin debrided

The patient then underwent left shoulder arthroscopy. Mild fraying of the anterior glenoid labrum was seen, which was debrided back to a healthy margin. The rotator cuff was attached normally along the chondral margins, although the subscapularis had a nodule on the superior border at its lateral-most extent. The erythematous and inflamed nodule was excised and sent for histology. Underneath the nodule, a partial tear of subscapularis tendon was noted. The remainder of subscapularis tendon and rotator cuff was well attached to insertions. A grade 4 central glenoid cartilage loss, which is not uncommon, was observed. The arthroscope was placed into the subacromial space and subacromial bursa excised. There was mild superior fraying of the rotator cuff, corresponding to fraying of the coracoacromial ligament and the down grown acromion. The acromion was partially excised in order to create a flat surface and create space between acromion and rotator cuff. A broad-arm sling was applied, and post-operatively the patient was permitted full active and passive range of motion. The patient had noticed immediate effect in the recovery room.

Nodule histology revealed fibrous connective tissue with a focal collection of immature fibroblasts in an area with

several thin-walled vascular structures and extravasated red blood cells. This focus was surrounded by unremarkable, mature fibrous connective tissue (Fig. 3).

In both cases, the primary diagnosis was a partial superficial subscapularis tendon tear leading to healing with nodular scar formation.

Discussion

These are the first two cases of our knowledge of intra-articular subscapular nodules causing MGHL thickening, with partial subscapularis tears as the likely cause. In the reported cases, we assume pain was caused due to impingement of the nodule by the MGHL in abduction and external rotation of the arm, due to the proximity of the ligament to the subscapularis tendon. The impingement has been confirmed by dynamic arthroscopic examination. Our primary differential cause of the nodular swelling is a partial superficial subscapularis tendon tear leading to healing with nodular scar formation. Another possibility is chronic impingement of the nodule on the MGHL causing inflammatory thickening of the adjacent ligament with subsequent triggering and pain.

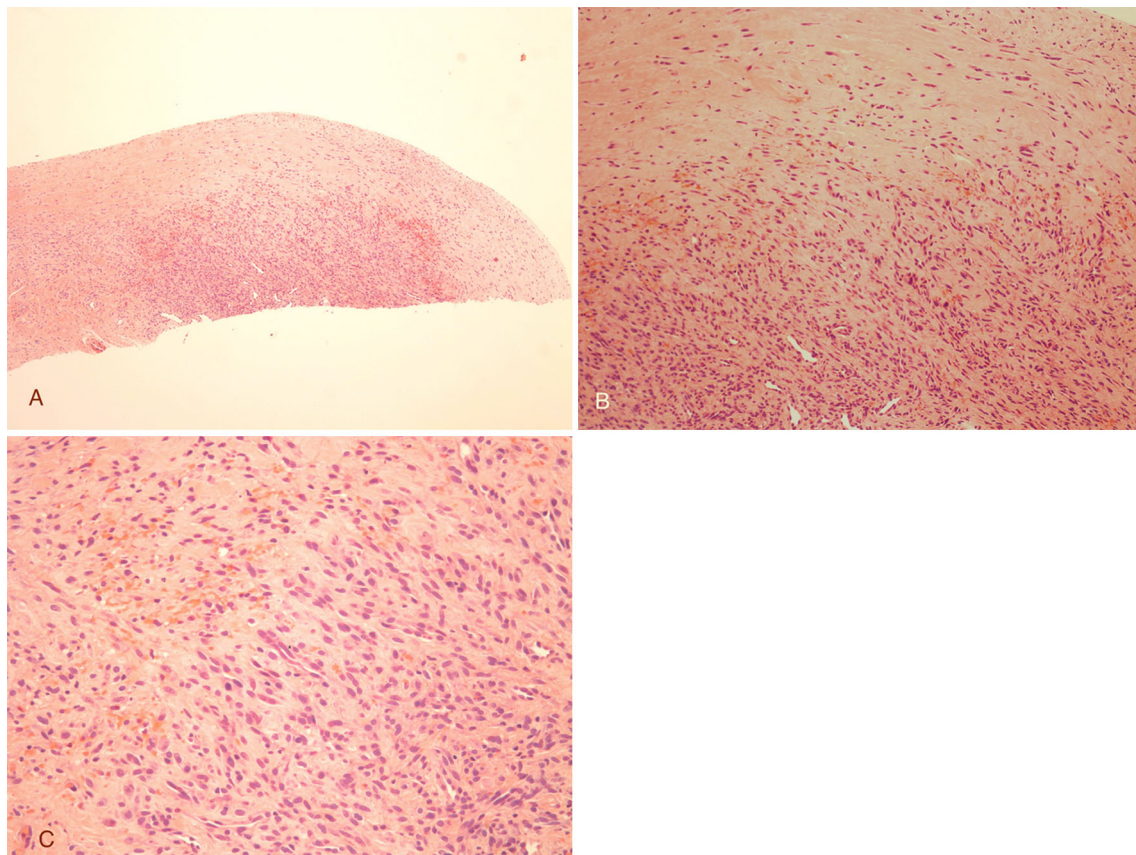


Fig. 3 **a** Low power, **b** medium power, **c** high power images. Demonstrated is fibrous connective tissue with a focal collection of immature fibroblasts in an area with several thin-walled vascular

structures and extravasated red blood cells. This focus was surrounded by unremarkable, mature fibrous connective tissue

Alternately, a thickened/scarred MGHL could have caused the synovial swelling, as the MRI revealed the nodule to arise from near the superior margin of the tendon.

There have been no reports of non-tumour nodular swellings arising from the articular surface of the subscapularis tendon. Desmoid tumours of the subscapularis muscle belly have been reported [8]. Sikka et al. [8] reported two cases of desmoid tumour of the subscapularis presenting with isolated loss of external rotation of the shoulder and vague shoulder pain. In these two cases, the tumour involved the subscapularis muscle belly and did not present intra-articularly.

Bae et al. [1] describe an intra-articular elastofibroma, which eroded the proximal humerus and caused restriction of internal rotation of the shoulder. Our case differs from this case in that the size of the swelling is smaller (4 mm compared to 4.5 cm), is not a tumour as evidenced by histology and did not limit movement, although movement did cause pain. Additionally, the MGHL revealed thickening in our case. There are no reports in current literature regarding MGHL thickening or association with subscapularis tendon nodules.

Studies of the biomechanics of the shoulder show that the MGHL is closely related to the subscapularis tendon, and its function is dependent on the position of the humerus. As it approaches its insertion into the proximal humerus, the fibres of this ligament blend with the subscapularis tendon approximately 2 cm medial to the insertion into the lesser tuberosity [3, 4]. It has been found that the MGHL becomes taut in 45° abduction and 10° extension and external rotation [7]. The functions of the MGHL have been shown to be (1) to support the arm, (2) to restrain external rotation of the arm from 0° to 90° abduction and (3) to provide anterosuperior stability.

The subscapularis is the largest and strongest muscle of the rotator cuff and is essential for stability of the shoulder. Full tears are generally degenerative in origin or due to impingement; however, isolated partial or full thickness tears are rare and usually of traumatic origin [6] and often involved the biceps tendon. The incidence and methods of treatments of intra-articular partial subscapularis tears are unknown as they are mainly discovered on arthroscopic examination [5]. Clinically, the patient experiences anterior shoulder joint pain and limited daily activity. Findings include increased external rotation compared to the contralateral side. Barth et al. [2] determined from their study of 208 subscapularis tears that the degree of test positivity of belly-press test, lift-off test and bear-hug tests increased in proportion to the severity of the tears, although 24 % of tears were discovered during surgery. These usually involved limited partial thickness tears. A negative lift-off test, positive belly-press test and negative bear-hug test suggest a limited partial thickness tear. Positive findings in

all 3 tests and a significant lesion suggest a severe lesion and require rapid surgical treatment. Kim et al. [5] reported in their case series of 29 shoulders with isolated partial articular-surface tear of subscapularis tendons successful treatment with arthroscopic repair. Tears of <5 mm were arbitrarily selected for debridement, whereas those above 5 mm were repaired. Limitations of this case report are that there is no histological report for the first mentioned case, and it is important to remember that the outcome of these two patients cannot be generalised for other patients.

Magnetic resonance imaging shoulder performed on this patient was initially reported as normal by the radiologist. On second review of the MRI films after the arthroscopic findings, it was found that there was indeed a lesion over the subscapularis. As described by other authors, such lesions may be easily missed unless specifically searched for and indicate that an arthroscopic examination of the shoulder with persistent symptoms may be beneficial, even when MRI examination has been reported as normal.

Histology can be a useful aid to arthroscopy and imaging and in our second case demonstrated a benign nodule with inflammatory characteristics. A low threshold for arthroscopy, as has already been advocated for isolated partial subscapularis tears, can therefore prove useful for detecting and successfully treating rare symptomatic subscapularis nodules that cause pain and clicking in the shoulder.

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