

## Supraspinatus Unusual Atrophy Pattern: A Case Report

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### Abstract

We present the case of an unusual atrophy pattern of the supraspinatus muscle subsequent to suprascapular nerve compression by a paralabral cyst located in the spinoglenoid notch. A 58-year-old right-handed manual female worker presented to a specialized shoulder consultation with severe progressive pain in her right shoulder. Clinical exam revealed isolated limitation in active abduction and a painful Jobe test. MR-arthrogram showed a 12 × 10 mm paralabral cyst consecutive to a superior labral anterior to posterior (SLAP) II lesion, associated with an isolated supraspinatus Thomazeau stage II atrophy and Goutallier stage II fatty infiltration. A rotator cuff tear was excluded. After a failed nonoperative management, the patient underwent arthroscopic cyst decompression, SLAP debridement and biceps tenodesis, and presented satisfactory pain relief at 12 months follow-up with a constant score of 76 points. A control MR-arthrogram showed no recurrence of the cyst with regression of atrophy to stage I. In addition to confirm the known association between SLAP lesions and paralabral cysts, and to support the debated reversibility of atrophy, this presented case reveals the existence of a new type of lesion induced by suprascapular nerve compression, consisting in isolated denervation of the supraspinatus muscle. This can be explained by an anatomic variation of the supraspinatus branch of the nerve which had an unusually distal origin, whereas typical compression patterns involve either supraspinatus and infraspinatus, or infraspinatus alone.

**Keywords:** Selective supraspinatus atrophy; Suprascapular nerve compression; Neuropathy; shoulder arthroscopy; Paralabral cyst; SLAP lesion

### Introduction

First described by Koppell et al. in 1959, suprascapular nerve compression is a rare entity and is often overlooked as an etiologic factor of shoulder pain. Common causes include trauma, repetitive overhead activities, rotator cuff tears and progressive compressive lesions, such as cysts [1,2]. The suprascapular nerve may be compressed at the suprascapular notch, where it courses under the transverse ligament, or at the spinoglenoid notch, causing supraspinatus and/or infraspinatus atrophy, respectively. All cases of suprascapular nerve compression described in the current literature report atrophy of either both supraspinatus and infraspinatus, or isolated infraspinatus alone. To the author's knowledge, this is the first case report of isolated supraspinatus atrophy due to suprascapular nerve compression by a ganglion cyst, secondary to superior labral anterior posterior (SLAP) injury.

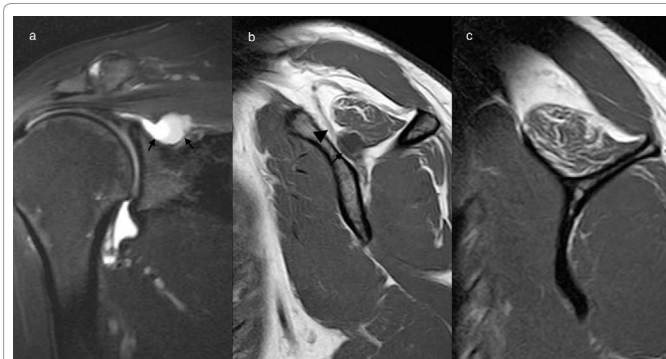
### Case Report

A 58-year-old right-handed female, manual worker, presented to our specialized shoulder consultation with a one-year history of progressive right shoulder pain, especially located in the scapular region. She recalled no history of shoulder trauma. Physical examination revealed no significant shoulder girdle muscular atrophy, an active shoulder abduction limited to 40° with a painful and weak Jobe test. The rest of the rotator cuff presented no limitation in strength and range of motion. The cross-arm test was also painful.

Plain shoulder radiographs were normal, and an MR-Arthrogram revealed a 12 × 10 mm spinoglenoid notch cyst communicating with the glenohumeral joint (Figures 1a and 1b) associated with a SLAP II lesion. This exam also revealed substantial and isolated supraspinatus Thomazeau stage II muscle atrophy with a Goutallier stage II fatty infiltration (Figure 1c). The infraspinatus muscle, however, showed no visible changes.

After a failed trial of conservative measures with physical therapy

and anti-inflammatory medication, a surgical treatment was discussed and carried out by the senior author (GC), consisting in arthroscopic biceps tenodesis, labral debridement and cyst decompression. The operation was carried out in the beach chair position with a 30 degrees scope inserted through a posterior portal and a second anterolateral



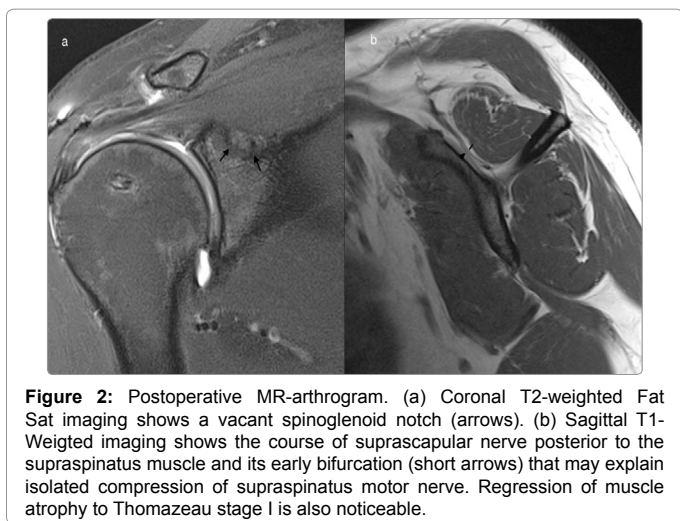
**Figure 1:** Preoperative right shoulder MR-arthrogram. (a) Coronal T2-weighted Fat Sat imaging shows a para-labral cyst in the spinoglenoid notch (arrows). (b) This results in suprascapular nerve compression (short arrow) as demonstrated on sagittal T1-Weighted imaging. (c) Consecutive sagittal T1-Weighted imaging in shows a Thomazeau stage II atrophy with a Goutallier stage II fatty infiltration.

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portal for instrumentation. Articular and subacromial exploration confirmed the absence of rotator cuff lesion. The SLAP II tear was addressed first with a biceps tenodesis in the upper groove using an absorbable 5.5 mm double-loaded suture anchor. The superior labrum was then debrided, directly revealing the cyst stalk which was opened and resected.

The patient was discharged from the hospital the following day. Her shoulder was immobilized in a sling for ten days for pain relief and she was allowed immediate motion as tolerated, as well as a strengthening rehabilitation program. She presented a pain Visual Analog Scale (VAS) of 4 at three months and, at six months, pain VAS and Constant scores of 3 and 76%, respectively. At 1 year follow-up, the constant score was 76% and the pain VAS 2. She was able to go back to work and was merely limited in her daily activities.

A control MR-Arthrogram showed regression of supraspinatus muscle atrophy to Thomazeau stage I (Figures 2a and 2b). An EMG exam showed normal motor and sensitive function units in the supraspinatus nerve.

## Discussion

The suprascapular nerve is a sensorimotor nerve originating from the brachial plexus (C5-C6). After crossing the trapezius muscle, it passes through the suprascapular notch and under the transverse scapular ligament before entering the supraspinatus fossa. Most often, motor innervation of the supraspinatus muscle is provided by the suprascapular nerve after it has emerged from the suprascapular tunnel. After crossing the suprascapular fossa, the nerve goes down around the lateral edge of the scapular spine, the spinoglenoid notch, to supply the infraspinatus [1]. The suprascapular nerve is mostly injured by trauma (scapula fractures), traction, infection or compression. Extrinsic compression may occur from cyst or other space-occupying lesions, such as soft tissue or bony tumors [3]. Several studies have shown the relationship between paralabral cysts and nerve compression at the spinoglenoid notch [3-5]. Compressive cysts are rare and their origin has not yet been precisely elucidated. It is believed that cysts develop when capsulolabral injuries create a synovial fluid extravasation into surrounding tissues with a check-valve effect [6]. Suprascapular compression typically causes pain in the posterior and lateral aspects of the shoulder [7], which can be exacerbated by cross-arm test, as observed in the aforementioned patient's clinical exam [1].

Suprascapular nerve compression lesions usually occur at the suprascapular notch or the spinoglenoid notch. Proximal lesions lead to supraspinatus and infraspinatus weakness, whereas distal lesions lead to isolated infraspinatus weakness [3]. In the presented case, the supraspinatus branch had risen unusually distally from the suprascapular nerve as shown in Figure 2b, which explains why its compression by the spinoglenoid notch cyst caused selective denervation of the supraspinatus muscle. Management of suprascapular compression caused by paralabral cysts varies in the literature between conservative [1] and operative measures [2]. Some authors advocate percutaneous puncture aspiration guided by ultrasound or CT-scan, but this approach is only efficient in about 50% of cases, with a high recurrence rate [8]. Cyst decompression can be performed through open or arthroscopic techniques. Arthroscopic management allows direct visualization and treatment of labral lesions and other concomitant lesions. The most recognized treatment is cyst decompression and SLAP repair or biceps tenodesis, as performed in the presented study. Piatt et al divided 73 patients with suprascapular neuropathy secondary to a spinoglenoid notch cyst into four groups: (1) nonoperative, (2) needle aspiration, (3) arthroscopic treatment of the labrum only, and (4) open or arthroscopic decompression of the cyst with labral repair. Patients in group 4 showed better results than other groups, and patients who went in for surgery (Groups 3 and 4) had a higher satisfaction than patients who had no surgery (Groups 1 and 2) [9].

It is well known that chronic compression of the suprascapular nerve causes muscle atrophy and fatty degeneration in the supraspinatus and/or infraspinatus muscle(s), and in the last years, numerous studies have indicated that both processes were irreversible [10-12]. However, the presented case showed a notable regression of the supraspinatus muscle atrophy (Figures 1c and 2b) from Thomazeau stage II to stage I [13]. This observation is supported by a few other studies. Gerber et al followed 27 patients with rotator cuff repairs for at least two years. One MRI was performed pre- and post- operatively. At the end of the follow up period, they noted that muscular atrophy had at least stopped and may have reversed in successfully repaired tears [11]. Another study published by Thomazeau et al. reported a reversal of supraspinatus atrophy in half of the successfully repaired cuffs [14]. Goutallier et al. evaluated patients with a CT scan grading muscular fatty degeneration who went RCT repair. It was shown that the fatty infiltration of the supraspinatus could also regress after a RCT repair [15]. In this case however, no evident regression of fatty atrophy was noted.

## Conclusion

This is the first case report of a previously unknown injury pattern consecutive to a compressive paralabral cyst, consisting in isolated atrophy of the supraspinatus muscle. The underlying cause was an isolated compression of the supraspinatus branch of the suprascapular nerve, which had risen unusually distally. Surgical treatment showed improvement in shoulder pain and function, as well as regression of muscle atrophy. Compressive paralabral cysts are rare causes of shoulder pain, and are often overlooked or misdiagnosed. They most often result from a SLAP lesion and should be looked for when in presence of weak abduction and/or external rotation associated with an intact rotator cuff, as surgical treatment usually yields successful results. However, this study suggests that it should even be sought for in the presence of isolated weak abduction. More studies are needed to further identify and quantify the occurrence of such anatomic variations and their association with this particular type of lesion pattern.

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