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Isolated Infrapinatus Tear and Suprascapular Nerve Neuropathy after Barbotage and Steroid Injection of Calcific Tendinitis

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Isolated rupture of infrapinatus after barbotage for calcific tendinitis has not been reported in the literature. We report on a case of isolated infrapinatus rupture and suprascapular nerve neuropathy after steroid injection and barbotage of calcific tendinitis in rotator cuff. At 6-month follow-up after surgery, satisfactory clinical and radiological outcomes were observed with daily activity level. The author reports this case and review the literature.

Keywords: Calcific tendinitis, Rotator cuff tear, Suprascapular nerve neuropathy, Barbotage, Steroid injection

Introduction

Calcific tendinitis is one of the most common causes of shoulder pain. It is an active cell-mediated response that is subject to spontaneous improvement. Treatment of calcific tendinitis comprises non-surgical modalities, including administration of anti-inflammatory analgesics, repeated barbotage, steroid in-

jections, and extracorporeal shock wave therapy (ESWT), as well as surgical excision, including invasive or arthroscopic surgeries. Among these, barbotage is considered one of the most effective treatments for refractory cases in which symptoms of calcific tendinitis persist without resorption¹⁾. The present study reports a complication of multiple steroid injections and barbotage procedures of calcific tendinitis, which led to rotator cuff tear and infrapinatus retraction that compressed the suprascapular nerve, ultimately leading to fatty degeneration of the infrapinatus tendon.

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Case Report

A 34-year-old woman had pain in the left shoulder that was aggravated 6 months prior to visiting the outpatient clinic. The patient works in fashion retail and had been receiving steroid injections every week for 3 months after being diagnosed with calcified tendinitis at a private clinic. There were no additional

treatments such as ESWT. One month prior to the visit, she developed snapping and pain when lifting her shoulders, after which the pain was worse; the symptoms were exacerbated during recent injections. The patient had no history of diabetes or rheumatoid arthritis. At the initial physical examination, the active ranges of motion were: forward flexion of 120°, abduction of 130°, outward rotation of 15°, and inward rotation at L4; when passive range of motion was assessed, she could not maintain outward rotation, showing an external lag sign. She had tenderness in the posterior shoulder joint and tested positive for the Neer and Hawkins tests. Plain radiograph findings indicated resorptive phase which shows trace of calcific deposits along the tendon near the greater tubercle in the left rotator cuff (Fig. 1). Magnetic



Fig. 1. The calcific deposit (arrow) in the subacromial space is almost completely resorbed.

resonance imaging (MRI) showed an isolated infraspinatus tear accompanied by grade 4 fatty degeneration (Fig. 2). In addition, electromyography and nerve conduction velocity tests indicated suprascapular neuropathy inferior to the spinoglenoid notch. Nerve conduction velocity showed delayed latency, and electromyography showed abnormal spontaneous activity (fibrillation) on the infraspinatus muscle. These results were compatible with partial denervation of the suprascapular nerve. The patient's preoperative American Shoulder Elbow Society (ASES) score was 52 points, with a pain score of 7. The Constant score was 44 points.

We suspected that the retraction of the infraspinatus tendon compressed the suprascapular nerve and performed an arthroscopic suprascapular nerve release and rotator cuff repair. Posterior and anterior portals were made to insert a diagnostic arthroscope, through which we observed an infraspinatus tear within the glenoid cavity. A complete infraspinatus tear at the myotendinous junction was observed after moving the arthroscope to the subacromial space, and calcific deposits were seen on the surface of the irregularly damaged tendon (Fig. 3A). The tendon remnant could not be completely restored, and it was transferred to the 5 mm medial side and restored using a knotless anchor (4.5 mm, SwiveLock; Arthrex, Naples, FL, USA) via the Mason-Allen technique (Fig. 3B). The retracted infraspinatus tendon was released to the spinoglenoid notch using radiofrequency device (Super TurboVac; ArthroCare, Sunnyvale, CA, USA) (Fig. 4). The patient's ASES score increased to 72 points 6 months following surgery, and the pain visual analog scale score improved by 3 points. The Constant score was 55 points. The active ranges of motion were also slightly improved, with forward flexion of 135°,

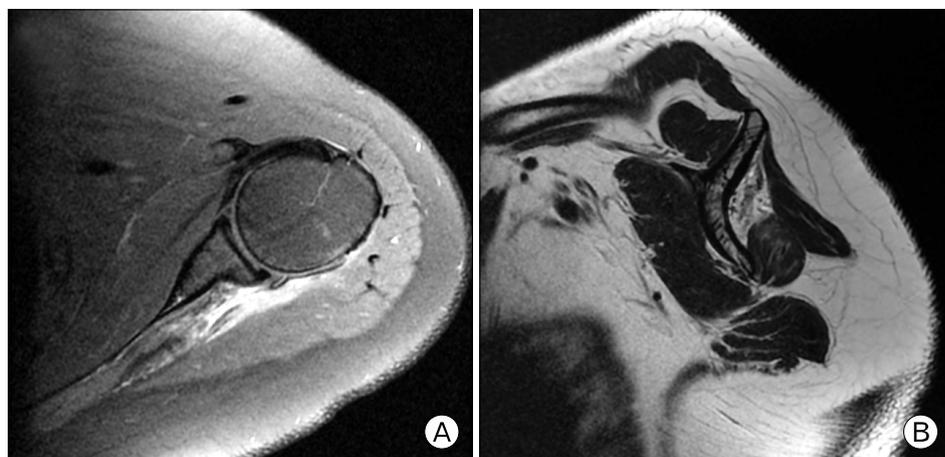


Fig. 2. (A) Magnetic resonance imaging showed that the distal region of the infraspinatus tendon had a full-thickness tear, while the proximal region was retracted medially past the glenoid cavity with fatty atrophy. (B) An incomplete full-thickness tear of the teres minor muscle was also present.

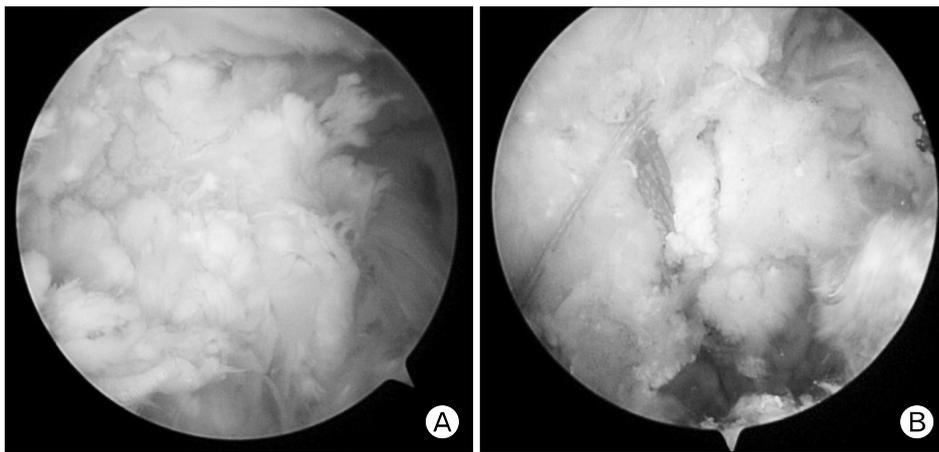


Fig. 3. (A) An infrapinatus tear accompanied by calcification was observed. (B) Arthroscopic infrapinatus tendon repair was performed using knotless anchor suture.

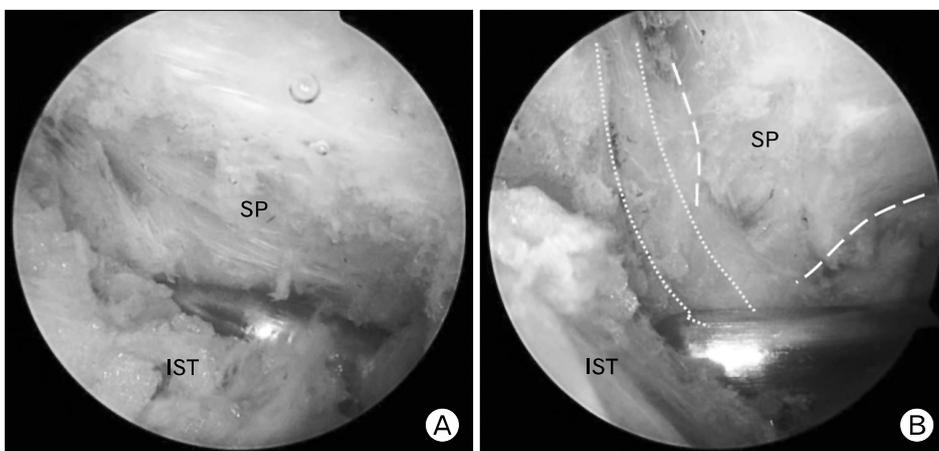


Fig. 4. (A) Arthroscopic suprascapular nerve release was performed using metal trocar. (B) The dotted line shows suprascapular nerve compressed by scapular spine. SP: scapular spine, IST: infrapinatus.

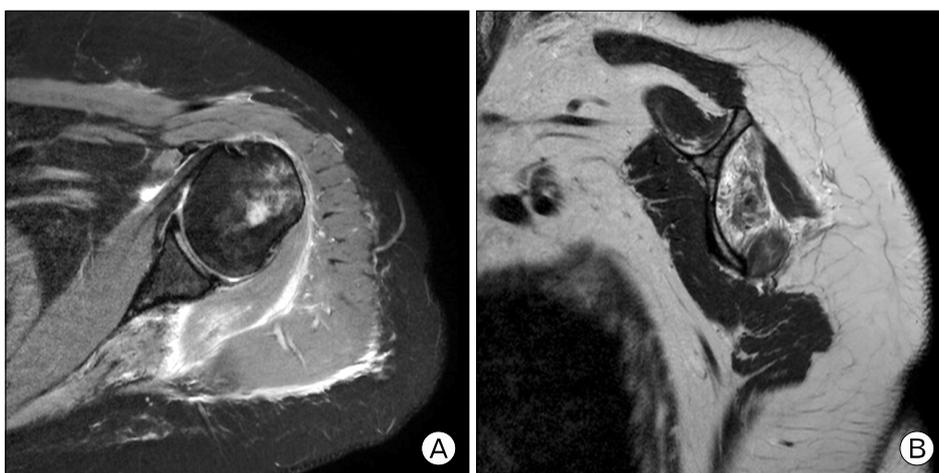


Fig. 5. Magnetic resonance imaging of 6 months following surgery showed that the infrapinatus tear was repaired (A) and that infrapinatus muscle mass was slightly increased (B).

abduction of 150°, outward rotation of 40°, and inward rotation to T12. Six months following MRI showed well maintained tendon continuity and increased infrapinatus muscle bulk (Fig. 5).

Discussion

Calcific tendinitis is a common shoulder disease accompanied by severe pain. Because symptoms disappear spontaneously over time, it is usually treated with non-surgical modalities, including

anti-inflammatory drugs, physical therapy, and steroid injections. ESWT, ultrasound-guided barbotage, and surgical excision may be considered if the patient does not respond to the above non-surgical treatments, but surgical intervention accounts for only about 10% of all cases²⁾. Patients in the resorptive phase of acute calcific tendinitis may not respond to narcotic analgesics because calcific deposits may induce a chemical abscess; in such cases, active treatment, such as steroid injections and barbotage, may be performed.

Although steroid injections reduce pain from an inflammatory response, they damage the structure of collagen molecules and decrease their density, which interferes with the movement of tendon cells for regeneration and inhibits proliferation of synovial fibroblasts, ultimately interrupting normal tissue regeneration³⁾. An animal study reported that steroid injections for three consecutive weeks did not induce tendon damage, but five or more biweekly steroid injections caused degradation and necrosis of collagen⁴⁾. In essence, steroid injections are safe overall with an effective outcome in the short-term, but frequent use of steroids may interfere with tendon healing and induce tendon necrosis.

Ultrasound-guided barbotage and irrigation are performed for various conditions depending on the physician, with varying needle sizes, number of barbotage procedures, and use of subacromial steroid injections. It is a relatively safe procedure that reduces tendon pressure that is often increased by calcific deposits, which in turn reduces acute pain and facilitates resorption of the deposits, shortening the natural process of the disease. However, repeated procedures may damage a tendon that is already weakened by calcific deposits, so the needle must be injected along the direction of the tendon fiber in order to minimize damage⁵⁾. Some studies have reported partial tear of the rotator cuff as complications of ultrasound-guided barbotage, but calcific tendinitis accompanied by severe impairment of the shoulder joint, as in this case, has not been reported.

Almost suprascapular nerve paralysis may be caused by nerve conflict due to a glenohumeral notch or spinoglenoid notch mass⁶⁾. Some studies also reported nerve conflict induced by labral cysts or masses, ossification of the superior transverse scapular ligament, and iatrogenic side effects that occurred after superior labral tear repair^{7,8)}. But there is the report that the rotator cuff tear can paralyze the suprascapular nerve. Cases of atrophy of the

infraspinatus muscle caused by a lesion in the infraspinatus tendon are sporadically reported, and fatty degeneration of muscles is known to have a poor prognosis for functional recovery even after surgery⁹⁾. Medial retraction of the rotator cuff tendon changes the course of the suprascapular nerve, creating increased tension on the nerve (Fig. 6)¹⁰⁾.

In the present case, fatty degeneration of the infraspinatus muscle occurred as a result of a torn tendon compressing the suprascapular nerve, and the damage to the nerve was demonstrated via electroneurography. We performed an arthroscopic repair for the infraspinatus tear. MRI after surgery as well as the Constant and ASES scores indicated that the patient's symptoms were improved.

In conclusion, this was an unusual case of calcific tendinitis in which repeated barbotage after steroid injection damaged the infraspinatus tendon; the associated trauma caused a tear, which in turn resulted in the retraction of the infraspinatus, compressing the suprascapular nerve, and ultimately resulting in fatty degeneration of the infraspinatus tendon. This case highlights the fact that repetitive steroid injections and ultrasound-guided barbotage performed by an unskilled operator could result in rotator cuff tear. Multiple barbotage procedures and steroid injection may damage a normal rotator cuff.

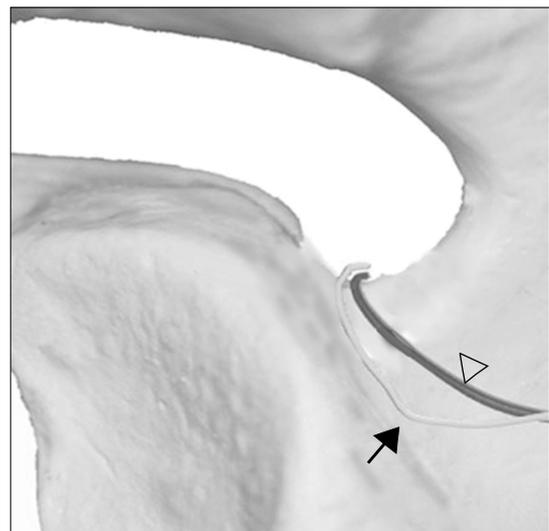


Fig. 6. Relationships of suprascapular nerve and scapular spine. If the infraspinatus tendon was retracted, suprascapular nerve will be compressed by scapular spine. Arrow: suprascapular nerve, arrow head: suprascapular artery.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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