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## CASE REPORTS

# Isolated suprascapular mononeuropathy following nondisplaced scapular fracture

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Fractures of the scapula are relatively rare, accounting for only 0.4%-0.9% of all fractures and for only about 3%-5% of fractures to the shoulder girdle.<sup>2</sup> Given the scapula's extensive muscular envelope and rich blood supply, fractures have traditionally been treated nonoperatively, healing reliably and without compromise of shoulder girdle function. The suprascapular nerve (SSN), which innervates the supraspinatus and infraspinatus muscles, lies in intimate contact with the scapula and is vulnerable in the setting of bony injury.

This report describes the clinical presentation, imaging, and electrodiagnostic findings of a patient in whom isolated mononeuropathy of the SSN developed as a result of a scapular fracture. The incidence of concomitant SSN injury in the setting of scapular fractures, to our knowledge, has not been reported.

## Case report

A 20-year-old right hand-dominant collegiate football player presented to the medical staff on the sidelines after colliding with an opponent. He experienced a blow to the left occiput and neighboring trapezial region. This resulted in a combination of cervical hyperflexion and lateral rotation toward the contralateral shoulder coupled with depression of the ipsilateral scapula.

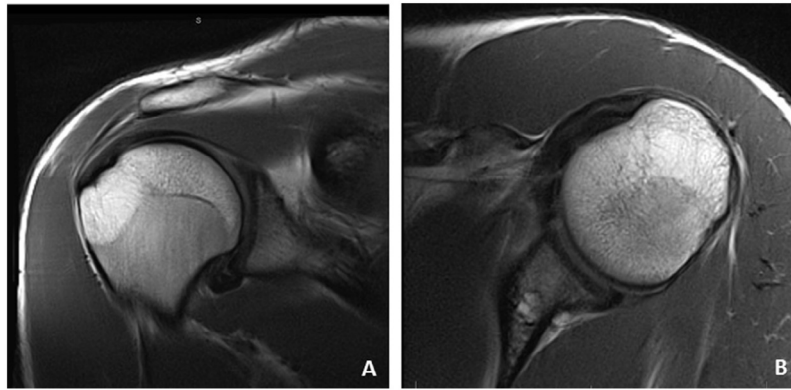
On walking off the field, the patient reported transient dizziness and light headedness that quickly resolved. At that time,

he was promptly removed from play given the suspicion for concussion. Neurologic examination on the sidelines showed he was oriented to person, place, and time and had no short-term memory deficits. The patient denied he was experiencing a headache or any neck pain. He did, however, acknowledge unilateral left-sided burning pain and paresthesia originating in the left supraclavicular region that radiated into the entire hand. This was coupled with an inability to move the left shoulder or elbow. Physical examination revealed no midline tenderness to palpation of the cervical and thoracic spine and showed full painless cervical spine range of motion (ROM). The patient's radiating pain significantly improved over the course of 2-3 minutes, but mild to moderate left-sided paratrapezial pain persisted. A second neurologic examination was performed. This revealed normal sensory function in the distribution of the C5-T1 dermatomes and grade 5 muscle power on testing of elbow flexion and extension, wrist extension, finger abduction, and distal interphalangeal joint as well as proximal interphalangeal joint flexion bilaterally. Detailed examination of the left shoulder showed no pain to palpation over the clavicle, acromioclavicular joint, or proximal humerus. The patient did have a previous left shoulder injury several years ago that resulted in an asymptomatic distal clavicle nonunion. Although he had full painless passive ROM, grade 3 muscle power was noted on testing of active shoulder abduction in the scapular plane and external rotation with the arm in 0° of abduction. Grade 5 internal rotation strength with the arm at 0° of abduction was observed. The belly press and liftoff signs were negative.

Radiographs of the cervical spine and left shoulder were immediately obtained and showed normal findings. The player

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**Figure 1** (A) Coronal T1-weighted magnetic resonance image depicting an intact supraspinatus tendon. (B) Axial T1-weighted magnetic resonance image depicting an intact subscapularis tendon, normal long head of biceps tendon, and no evidence of fracture signal in region of glenoid neck.

was diagnosed with transient brachial plexus neurapraxia, or “stinger,” and a mild concussion with a plan to undergo re-evaluation of his injuries in 24 hours. On re-examination, improvement was observed with grade 4 shoulder abduction and internal rotation strength noted. A significant strength discrepancy remained, however, when compared with the contralateral uninjured shoulder. A cervical spine magnetic resonance imaging (MRI) scan was obtained and showed no evidence of acute disc herniation or any other injury. The patient was observed for another 72 hours, and gentle passive ROM shoulder exercises were instituted to prevent the development of stiffness. On re-examination, the patient complained of persistent paratrapezial pain radiating into the left shoulder, and the findings of the remainder of his physical examination were unchanged. A subsequent MRI scan of the left shoulder showed no evidence of traumatic rotator cuff tear or contusion (Fig. 1).

The patient was diagnosed with a brachial plexus neurapraxia involving the C5 and C6 nerve roots and was closely observed. Daily passive ROM shoulder exercises were performed. Six weeks after the original injury, the patient’s paratrapezial pain had improved but his active abduction and external rotation strength showed no improvement. Mild atrophy in the suprascapular and infrascapular fossae was noted at this time. The patient underwent a nerve conduction study and electromyography (EMG). The nerve conduction study revealed normal sensory function in all nerve distributions and normal motor function of the median and ulnar nerves. EMG evaluation, however, revealed abundant fibrillation and positive wave potentials within the infraspinatus and supraspinatus muscles coupled with high amplitude, indicating acute injury. Voluntary motor unit potentials were also absent in the supraspinatus and infraspinatus muscles, consistent with a dense isolated mononeuropathy of the SSN at or proximal to the suprascapular ligament. On the basis of the EMG findings, the prognosis for nerve recovery at this point was guarded.

In an effort to evaluate for potential points of SSN compression, the initial shoulder MRI study was re-evaluated, and there was no evidence of a spinoglenoid notch or supraglenoid

cyst formation. A computed tomography (CT) scan of the scapula was then obtained to look for potential calcification of the suprascapular ligament. The results of the CT scan revealed a nondisplaced fracture of the scapular body and spine extending into the base of the suprascapular notch (Fig. 2). After consultation with several senior shoulder surgery colleagues, it was deemed that there was no role for either operative stabilization of the fracture or decompression of the nerve. It was decided to observe the patient and perform a second nerve conduction study and EMG in 3 months.

Three months later, the second EMG study revealed continued SSN mononeuropathy but with decreased fibrillation and wave potentials. Furthermore, abundant polyphasic motor unit potentials with improved recruitment were noted, indicating robust reinnervation. Although continued injury was evident on EMG, clinically, the patient showed significant improvement. No atrophy in the supraspinatus and infraspinatus fossae was evident, and grade 5 muscle power equal to the contralateral limb was observed with shoulder abduction and external rotation. Given the discrepancy between the patient’s clinical and electrodiagnostic findings, return to sport was prohibited. The patient was cleared to begin progressive upper-body weight lifting exercises in the weight room. The prognosis for full nerve recovery was now expected in an additional 4–6 months. The patient continued a progressive strengthening and conditioning program, and at 12 months after the injury, ROM and strength of the injured shoulder were equal to those of the contralateral side. Additional EMG studies were not obtained. The patient was cleared to return to play without any restrictions.

## Discussion

The SSN originates from the upper trunk of the brachial plexus, which is formed by the C5, C6, and occasionally, C4 nerve roots. It exits through the posterior cervical triangle before coursing along the posterior clavicle in an oblique fashion across the superior border of the scapula.<sup>6,10,13</sup> Traversing in

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