

Terrible Triad of the Shoulder in a Competitive Athlete

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ABSTRACT

The terrible triad injury to a shoulder consists of shoulder dislocation, rotator cuff tear, and brachial plexus palsy. We present a case of a high velocity shoulder dislocation in an athlete with concomitant massive rotator cuff tear and incomplete infraclavicular brachial plexus injury. In this injury, most neurologic symptoms resolve, prompt surgical intervention is warranted, and comprehensive physical therapy is integral to recovery.

The terrible triad injury to a shoulder consists of shoulder dislocation, rotator cuff tear, and brachial plexus palsy. This is exceedingly rare but has been reported sparingly in literature.^{1,4} Most triads describe patients with a low velocity injury (eg, fall from standing) and axillary nerve symptoms due to stretch associated with dislocation.⁵

The purpose of this report is to present a case of high velocity shoulder dislocation in an athlete with concomitant massive rotator cuff tear and incomplete infraclavicular brachial plexus injury. Additionally, we will review the literature of severe

nerve injury combined with massive rotator cuff tear after traumatic dislocation. In this injury, most neurologic symptoms resolve, prompt surgical intervention is warranted, and comprehensive physical therapy is integral to recovery.

The patient provided written informed consent for print and electronic publication of this case report.

CASE REPORT

A 42-year-old male competitive US Masters Diver sustained an acute right shoulder anterior dislocation during a platform diving competition. The platform was 10 m, the highest Olympic diving level, creating a high velocity injury at water impact. Upon impact with the water, the patient lost his hand-grip, forcing his arm overhead and posterior. The patient had no shoulder issues prior to this incident. The patient's shoulder was relocated in the local emergency department shortly after the incident and 2 weeks prior to presentation. This was his first dislocation. The patient demonstrated symptoms of brachial plexopathy while in the emergency department and a magnetic resonance imaging (MRI) of the chest and cervical spine were obtained to rule out a brachial plexus root injury. These were negative for nerve transection or root avulsion and the patient was referred to orthopedics and neurology.

Initial evaluation by the senior author (CCD) came 2 weeks after the injury. On examination, the patient reported right shoulder weakness, and right hand numbness and weakness. The patient's right shoulder had a passive range of motion (ROM) of 105° of forward flexion (FF), 40° of external rotation (ER), and internal rotation (IR) limited to back pocket.

Active ROM was limited to 85° FF. Neurologically, the patient's sensation was proximally intact. Motor exam, based upon a 0 to 5 strength scale, revealed a decrease in wrist and finger extension to 3/5. Wrist and finger flexion and hand intrinsic strength was 0/5. The patient also had decreased sensation over radial, median, and ulnar nerve distributions. The patient's upper extremity was well perfused.

Roentogram at the time of examination showed no signs of fracture or dislocation. MRI revealed complete tears of the supraspinatus and infraspinatus with retraction (Figure). Subscapularis appeared to be intact. A small Hill-Sachs lesion was present without a significant Bankart lesion. Electromyography (EMG) 3 weeks after injury revealed a neuropraxia with no upper motor nerve injury. Major findings were consistent with right brachial plexopathy and mild suprascapular nerve abnormalities. Most significantly, there was involvement of the right axillary nerve affecting the right deltoid.

The patient underwent diagnostic arthroscopy 4 weeks after the injury; no significant labral pathology was

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Figure. Coronal T2 image of acute injury: full thickness supraspinatus rotator cuff tear with superior escape of humeral head.

encountered. A complete tear of the supraspinatus and infraspinatus tendons was repaired using a double row technique. A bursectomy was performed without subacromial decompression since there was no evidence of impingement.

Postoperative protocol consisted of sling immobilization for 4 weeks. Immediate therapy for fingers, wrist, and elbow after surgery was begun without shoulder movement. Supine passive forward flexion and external rotation exercises in the plane of the scapula were initiated after 2 weeks. Formal physical therapy for the shoulder was initiated at 4 weeks postoperatively. The patient complied to therapy 3 days a week for 4 months. Stretching was performed on days without therapy. Additional aqua therapy, before and after surgery, began with letting the arm simply float. Over months, more effort and motion was added.

The patient went from not being able to move his fingers or wrist at all, to a return to typing within 6 weeks. At 7 weeks postoperatively, all neurologic motor symptoms had resolved. Intermittent ulnar paresthesias remained, but continued to resolve. At final follow-up, 13 months postoperatively, the patient had 170° of active FF, 170° of abduction, 70° ER, and internal rotation to T4 level. All motor groups tested in the shoulder, elbow, and wrist were 5/5 and symmetric to the contralateral side. The patient returned to limited competitive diving at 6 months postoperatively and regained full capability at 1 year, finishing 3rd in a diving competition.

DISCUSSION

Rotator cuff tears with associated nerve injuries are rare. Axillary nerve injuries associated with dislocation and rotator cuff pathology are most common (8%).⁶ Supraclavicular and infraclavicular brachial plexus nerve palsies in triads have only been noted in case reports. Prognosis has been variable, with complete recovery in just over half of patients from nerve injury following cuff pathology and

dislocation.⁷ Another report of infraclavicular palsies with dislocation and cuff pathology suggests generally favorable results but prolonged recovery of 2 years or more.⁸

We present a single case of a traumatic high-energy anterior shoulder dislocation, massive rotator cuff tear, and incomplete infraclavicular brachial plexus nerve palsy in an athlete. The mechanism of injury in this patient is most likely brachial plexus contusion injury secondary to dislocation. Unique attributes of this case include the distribution of the palsy in presentation with a high-energy injury, acute diagnosis of rotator cuff tear despite masking nerve symptoms, and remarkable recovery of a competitive athlete in 6 months' time.

Rotator cuff pathology is common with shoulder dislocation. However, given nerve symptoms distally, one must differentiate between a complete brachial plexus injury and rotator cuff pathology. Lack of sensory symptoms proximally and the nature of cuff pain led to the suspicion of cuff pathology. MRI confirmed a massive rotator cuff tear, accounting for his proximal pain and weakness. Acute repair of such tears has been shown to improve pathology and likely contributed to his recovery.⁹

Cases with pathology on EMG involving the suprascapular or axillary nerve have been suggested to have poorer prognosis.¹⁰ The patient returned postoperatively and recovered from nerve symptoms at a pace that is quicker than most cases previously reported in the literature, with no residual axillary symptoms. This can be attributed to the quick diagnosis, the timing of surgery, and the dedication to physical therapy by the patient.

This case report illustrates a highly motivated patient. Physical therapy prescriptions were obeyed and augmented within reason. The timing and amount of physical therapy exceeds the typical rotator cuff repair regimen. While some reports have shown equivocal neurologic recovery, EMG documented neuropraxia will typically resolve. Once neurologic evalu-

ation has concluded, these injuries are no longer amenable to conservative treatment and prompt surgical intervention allows for a tension-free repair. Early surgical intervention with aggressive physical therapy was the reason for success.

This case highlights the importance in detecting nerve pathology associated with triad injury. Initial physical examination should be confirmed with MRI and EMG 3 weeks after the injury. A patient dedicated to physical therapy seems to hasten recovery time and improve overall function. Realistic goals and outcomes largely rely on patient factors and this should be discussed prior to surgery.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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