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## ORIGINAL ARTICLE

# Traumatic full-thickness transtendinous rotator cuff tears: a case series

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**Hypothesis:** Our purpose was to describe an arthroscopic repair technique for and outcomes of traumatic transtendinous rotator cuff tears affecting the supraspinatus tendon.

**Materials and methods:** A retrospective review was performed on a series of patients between January 2009 and January 2012. Demographic data, as well as preoperative and postoperative clinical data including strength, visual analog scale pain score, Subjective Shoulder Value, American Shoulder and Elbow Surgeons score, and Simple Shoulder Test score, were obtained.

**Results:** Seven patients were identified with magnetic resonance imaging showing full-thickness, transtendinous supraspinatus tears with extension into the infraspinatus, which were consistent with physical examination and arthroscopic findings. The mechanism of injury was traumatic in all cases, usually a fall with the arm abducted. The mean remaining stump of tendon measured 1.3 cm. All patients underwent open or arthroscopic repair by a side-to-side (tendon-to-tendon) technique with additional suture anchor augmentation. At an average follow-up of 41.5 months (range, 33-50 months), all patients had postoperative improvements in strength and visual analog scale pain scores (range, 0-1), as well as Subjective Shoulder Value, Simple Shoulder Test, and American Shoulder and Elbow Surgeons scores greater than 90.

**Conclusion:** We have described the occurrence of a rare rotator cuff tear in the purely tendinous portion of the muscle, leaving at least 1 cm of tendon attached to an intact footprint. We also have presented an arthroscopic side-to-side repair technique and postoperative outcomes. To our knowledge, this is the first article describing this uncommon rotator cuff tear.

**Level of evidence:** Level IV; Case Series; Treatment Study

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**Keywords:** Transtendinous; traumatic rotator cuff tear; full thickness; rotator cuff repair; side-to-side repair; outcomes; case series

This study was approved by the Partners Human Research Committee Institutional Review Board (protocol No. 2012P000685).

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Most rotator cuff tears occur at the tendon-bone junction, and such tears infrequently occur at the musculotendinous junction. Rotator cuff tears within the tendinous portion of the rotator cuff itself, medial to its attachment site, are very rare (Figs. 1-3). In a study of rotator cuff injuries in athletes, Cohen et al<sup>5</sup> looked at the epidemiology of rotator cuff contusions in football players. Using magnetic resonance

imaging, they identified an intrasubstance tendon tear in a single player. Clavert et al and Park et al both described intratendinous partial-thickness tears of the supraspinatus, but none were full-thickness tears.<sup>3,18</sup> Other than these instances, transtendinous rotator cuff tears have not been reported in the literature.

Traumatic rotator cuff tears in young patients are relatively rare.<sup>1,9,17,19</sup> Among patients younger than 40 years, rotator cuff tears are seen in athletes who participate in repetitive overhead activities such as baseball, golf, or tennis.<sup>10</sup> However, there is a second subset of athletes described who sustain rotator cuff tears because of a traumatic injury.<sup>7,11</sup> A recent systematic review analyzed rotator cuff tears in patients younger than 40 years and another systematic review documented traumatic rotator cuff tears, but neither of these studies reported on transtendinous tears.<sup>3,11</sup> In an older population, rotator cuff pathology may be degenerative or traumatic or a combination of both.

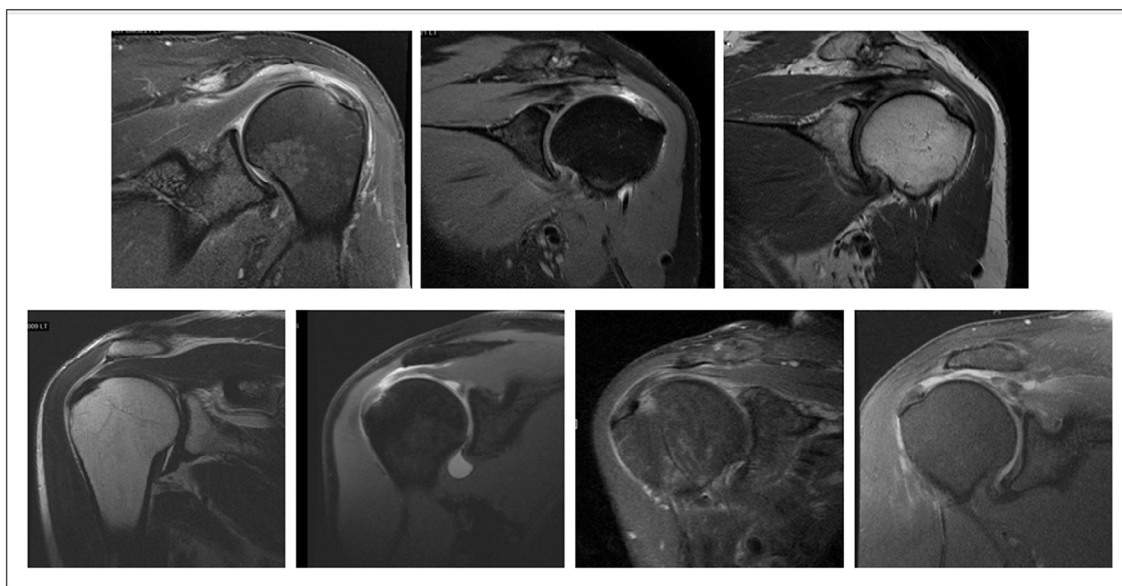
With the limited observations and discussions of transtendinous injuries in the literature, there is no guidance regarding operative management. In this article, we present a case series of patients with traumatic transtendinous rotator cuff tears and describe our operative repair technique. In addition, we discuss learning points gained from our general experience with this uncommon type of rotator cuff tear.

## Materials and methods

This is a retrospective case series of prospectively collected data on patients with transtendinous rotator cuff tears. Between January 2009 and January 2012, patients undergoing evaluation

for rotator cuff repair were identified to have transtendinous rotator cuff tears by the senior surgeon (L.D.H.). Transtendinous rotator cuff tears were defined as tears within the tendinous portion of the rotator cuff, with most of the tendon footprint intact and at least 1 cm of attached tendon. Nine patients were identified to have transtendinous rotator cuff tears, giving an incidence of 1.79% (9 of 502). Two patients were excluded: One died before final follow-up, and one was lost to follow-up after 12 months. All patients were noted to have a rotator cuff tear on magnetic resonance imaging (Fig. 1) with correlating clinical presentation including pain and weakness with supraspinatus testing. Two patients were noted to have concomitant pathologies: One had a Type I superior labrum anterior posterior lesion, and a subscapularis tear was observed in the patient who was lost to follow-up. Preoperative evaluation included a comprehensive history and physical examination. No patients had any prior surgical intervention on the affected shoulder. Preoperative and postoperative evaluations included shoulder range of motion, strength measurement (Lafayette Manual Muscle Testing system; Lafayette Instrument, Lafayette, IN, USA), Subjective Shoulder Value (SSV), Simple Shoulder Test score, American Shoulder and Elbow Surgeons score, and visual analog scale pain score. Postoperative range of motion was measured using a validated goniometric smartphone application (GetMyROM; Interactive Medical Productions, Hampton, NH, USA).<sup>15</sup>

Each patient underwent shoulder arthroscopy in the beach-chair position, and a transtendinous tear was visually confirmed (Fig. 2). The rotator cuff was inspected, and the medial tendinous component was fully mobilized, removing any adhesions to the surrounding tissue. The edges of the tendon were gently debrided, and a retention suture was placed to aid in mobilization of the tissues. Initially, mobilization was attempted such that the medial tendon reached the greater tuberosity. However, it was determined that this would over-tension the repair, jeopardizing tendon healing. Because of a lack of evidence on the outcomes of this repair and a slight



**Figure 1** Magnetic resonance images showing transtendinous tears of the supraspinatus tendon. One should note the intact supraspinatus footprint with the remaining tendon retracted medially.

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