

CASE REPORT

Partial thickness tear of the supraspinatus at the musculotendinous junction in a softball catcher

Shoji Fukuta¹, Shinji Kawaguchi², and Koichi Sairyo²

¹Department of Orthopaedic Surgery, National Hospital Organization Kochi National Hospital, Kochi, Japan, ²Department of Orthopedics, Tokushima University, Tokushima, Japan

Abstract : We report a rare case of a partial thickness tear of the supraspinatus at the musculotendinous junction in a softball catcher. Preoperative magnetic resonance images of the shoulder showed high signal intensity areas at the musculotendinous junction, along with discontinuity of the articular side of the supraspinatus. Arthroscopic examination revealed articular-side partial tear at the musculotendinous junction. The patient was able to return to playing softball 20 weeks after arthroscopic side-to-side repair. *J. Med. Invest.* 68 : 386-388, August, 2021

Keywords : rotator cuff tear, supraspinatus, musculotendinous junction

INTRODUCTION

With the technological advances in imaging modalities and arthroscopic devices, partial-thickness articular-side rotator cuff tear has recently been recognized as a clinical entity. There are multiple factors in the etiology of articular-side tears although they are often caused by intrinsic tendon degeneration with aging (1). Partial-thickness articular side tear is also common in young overhead athletes, due to repetitive microtrauma or internal impingement (2).

Partial articular supraspinatus tendon avulsion is a partial tear that occurs primarily at the insertion of the tendon on the greater tuberosity (3). Musculotendinous rupture of rotator cuff muscles is very rare, and only three reports have been published on complete tear at the musculotendinous junction (4-6). Here, we present a case of partial tear at the musculotendinous junction of the supraspinatus associated with overhead throwing by a softball catcher. This is the first report of successful arthroscopic repair for this injury.

CASE PRESENTATION

A 43-year-old right-handed man presented with a 10-month history of right shoulder pain. The patient reported that he had regularly played recreational softball for 30 years. He had first experienced pain in his right shoulder when throwing the ball from the catcher's position behind home plate to second base. The pain was felt at the late, accelerated phase of throwing. Nevertheless, he continued playing softball without seeking treatment. The pain gradually worsened until the patient had difficulty sleeping because of night pain. He visited a local clinic and underwent magnetic resonance (MR) imaging of the right shoulder, which showed abnormalities. He was then referred to our clinic for further treatment. He did not have nonsteroidal anti-inflammatory drugs nor intra-articular corticosteroid injection before

arrival to our clinic.

Palpation around the shoulder joint did not elicit pain. On physical examination, his active and passive range of motion (ROM) on the affected side was the same as that on the contralateral side : flexion, 175° ; abduction, 175° ; external rotation, 60° ; and internal rotation, 2nd lumbar vertebra with the arm at the side. O'Brien test and crank test were positive, while Neer's impingement sign and Hawkins's sign were negative. No signs of shoulder instability or neurological deficit were evident. The University of California at Los Angeles (UCLA) shoulder rating score (7) was 20 points.

Plain radiograph of the right shoulder showed no obvious abnormalities. MR images showed high signal intensity areas at the musculotendinous junction, along with discontinuity of the articular side of the supraspinatus (Figure 1). Arthroscopic repair was performed under general anesthesia after a diagnosis of partial supraspinatus rupture at the musculotendinous junction. During diagnostic arthroscopy, a 15-mm articular-side partial tear was identified at the musculotendinous junction (Figure 2A). Tear of the superior glenoid labrum was not detected and rotator interval looked normal. Subacromial bursoscopy showed no tear on the bursal side. The tear at the musculotendinous junction was repaired with one side-to-side suture placed anteriorly and securing the posterior aspect of the torn tendon to the superior glenoid labrum without a suture anchor (Figure 2B).

After surgery, the patient's arm was placed in a simple sling for 2 weeks. Passive ROM exercise was encouraged immediately after surgery. Active ROM exercise was commenced 6 weeks postoperatively. Twelve weeks after surgery, gentle throwing was allowed from a short distance. He was able to return to playing softball 20 weeks after surgery. MR images acquired at his final follow-up 12 months postoperatively showed no abnormal signal change and restored continuity of the supraspinatus (Figure 3). The patient experienced no limitations in activities of daily living, but pain during throwing persisted. He was able to engage in sports activities at up to 80% of his pre-injury level. The UCLA shoulder score improved to 31 points at the last follow-up.

Received for publication June 16, 2021 ; accepted June 30, 2021.

Address correspondence and reprint requests to Shoji Fukuta, Department of Orthopaedic Surgery, National Hospital Organization Kochi National Hospital, 1-2-25 Asakuranisimachi, Kochi city, Kochi, 780-8507, Japan and Fax : +81-88-843-6385.

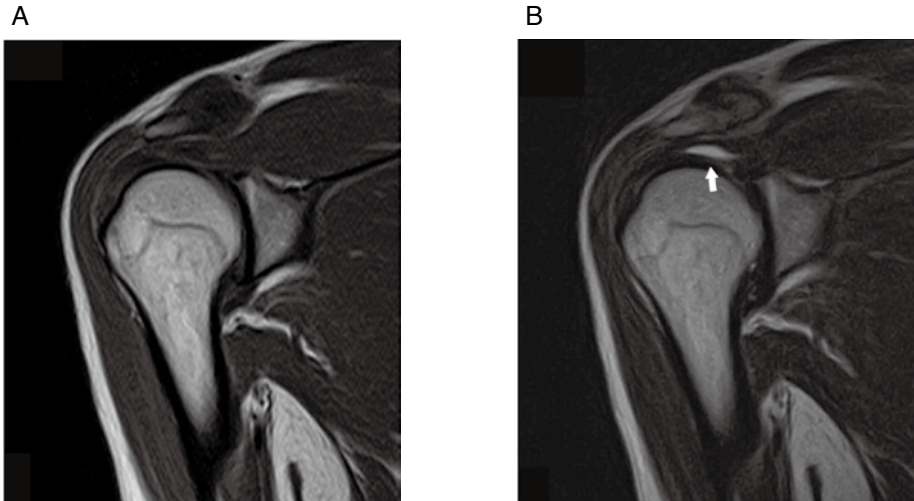


Figure 1. Pre-operative magnetic resonance images : (A) T1-weighted (B) T2-weighted oblique coronal view of the right shoulder. High signal intensity at the musculotendinous junction of the supraspinatus suggested musculotendinous rupture (arrow).

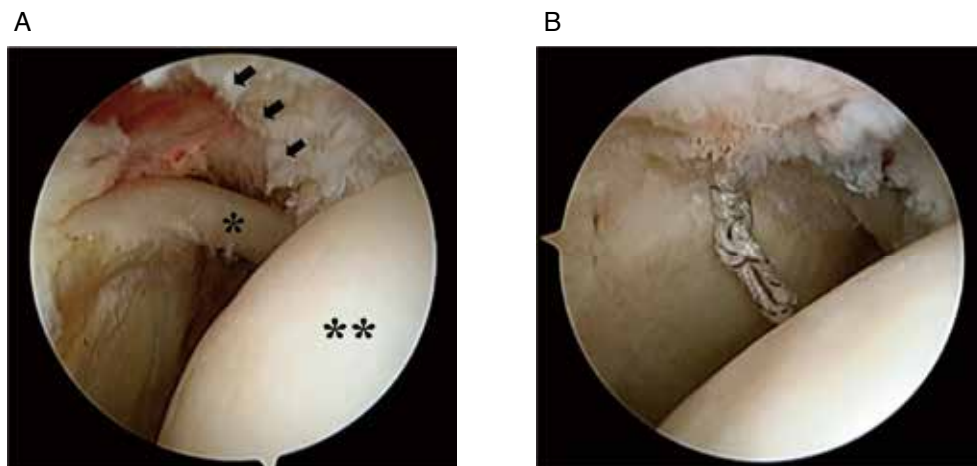


Figure 2. Arthroscopic views. (A) Musculotendinous junction disruption with exposed supraspinatus muscle (arrows). (B) After repair of musculotendinous junction.

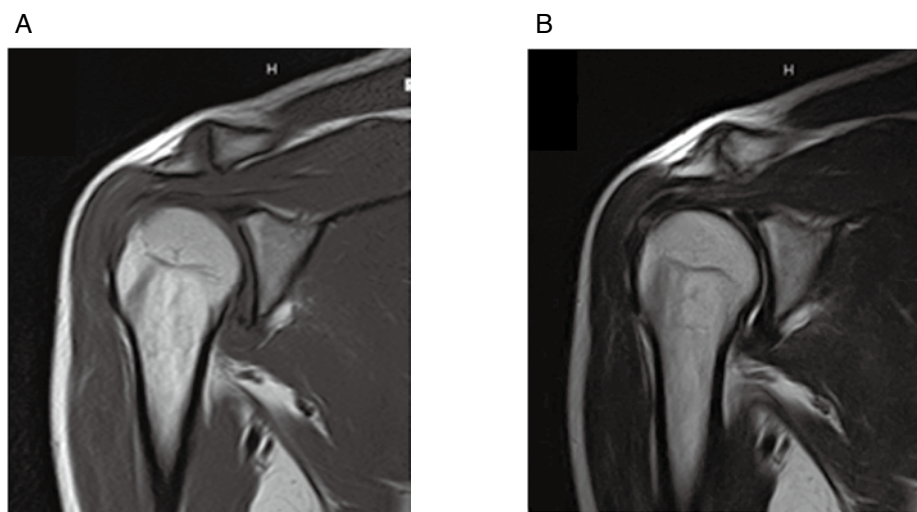


Figure 3. Postoperative magnetic resonance images : (A) T1-weighted and (B) T2-weighted oblique coronal view of the right shoulder. Continuity of the supraspinatus was observed and the high signal intensity at the musculotendinous junction disappeared.

DISCUSSION

Musculotendinous injuries of the upper and lower extremities are well-described clinical entities (8), though these injuries rarely occur in the rotator cuff. Several case series have been reported, along with the pathology and natural history of musculotendinous rupture of the infraspinatus (9, 10). However, only 7 cases of complete rupture of the supraspinatus at the musculotendinous junction have been reported in the literature (4-6). Lädermann *et al.* (4) presented a series of supraspinatus injuries at the musculotendinous junction in which 5 patients had a definitive history of acute trauma, while 2 had no history of trauma. Characteristic MR imaging findings in the acute phase of the injury are muscular edema at the musculotendinous junction, similar to that observed in the musculotendinous rupture of the infraspinatus (9, 10). Although the mechanism of this injury remains unclear, inlet impingement secondary to acromioclavicular osteoarthritis might lead to a predisposition to rupture at the musculotendinous junction.

In our case, the MR imaging of the right shoulder was acquired 10 months after the onset of symptoms, so muscle edema could not be detected. An area of high signal intensity at the musculotendinous junction with discontinuity of the articular side of the supraspinatus was the only significant finding. In contrast to a report by Lädermann *et al.* (4), our patient had no abnormality in the acromioclavicular joint and the partial rupture was located on the articular side. Hence, the musculotendinous rupture may have occurred as a result of eccentric contraction during throwing or repeated overhead activity.

There is no consensus regarding the ideal treatment protocol for rupture at the musculotendinous junction. Of the 7 reported cases of supraspinatus musculotendinous rupture, 6 cases were managed conservatively and the remaining case was managed by surgery for open side-to-side repair of the musculotendinous junction. At the latest follow-up, 2 of the conservatively managed cases showed a complete recovery, 1 showed improvement, and 3 complained of loss of function. In a case series of musculotendinous rupture of the infraspinatus presented by Walch *et al.* (10), the authors noted that early tendon repair to restore muscle tension in the infraspinatus might prevent the progression of muscle function loss. Lädermann *et al.* (4) proposed non-surgical management of incomplete injuries. The natural history of a complete rupture at the musculotendinous junction of supraspinatus entails rapid fatty infiltration and functional deterioration. Recent developments in arthroscopic techniques offer some advantages for managing the chronic symptoms of partial

rupture in patients who participate in overhead sports.

We reported an uncommon case of partial tear of the supraspinatus at the musculotendinous junction in a throwing athlete. High signal intensity areas at the musculotendinous junction on MR images are useful for the diagnosis. This type of injury should be taken into consideration for a painful throwing shoulder.

REFERENCES

1. Fukuda H, Hamada K, Nakajima T, Yamada N, Tomonaga A, Goto M : Partial-thickness tears of the rotator cuff : a clinicopathological review based on 66 surgically verified cases. *Int Orthop* 20 : 257-65, 1996
2. Connor PM, Banks DM, Tyson AB, Coumas JS, D'Alessandro DF : Magnetic resonance imaging of the asymptomatic shoulder of overhead athletes : a 5-year follow-up study. *Am J Sports Med* 31 : 724-7, 2003
3. Snyder SJ, Pachelli AF, Del Pizzo W, Friedman MJ, Ferkel RD, Patte G : Partial thickness rotator cuff tears : results of arthroscopic treatment. *Arthroscopy* 7 : 1-7, 1991
4. Lädermann A, Christophe FK, Denard PJ, Walch G : Supraspinatus rupture at the musculotendinous junction : an uncommonly recognized phenomenon. *J Shoulder Elb Surg* 21 : 72-76, 2012
5. Benazzo F, Marullo M, Pietrobono L : Supraspinatus rupture at the musculotendinous junction in a young woman. *J Orthop Traumatol* 15 : 231-234, 2014
6. Hertel R, Lambert SM : Supraspinatus rupture at the musculotendinous junction. *J Shoulder Elbow Surg* 7 : 432-435, 1998
7. Bosch U, Skutek M, Fremerey RW, Tscherne H : Outcome after primary and secondary hemiarthroplasty in elderly patients with fractures of the proximal humerus. *J Shoulder Elbow Surg* 7 : 479-84, 1988
8. Zarins B, Ciullo JV : Acute muscle and tendon injuries in athletes. *Clin Sports Med* 2 : 167-182, 1983
9. Lunn JV, Castellanos-Rosas J, Tavernier T, Barthélémy R, Walch G : A novel lesion of the infraspinatus characterized by musculotendinous disruption, edema, and late fatty infiltration. *J Shoulder Elbow Surg* 17 : 546-553, 2008
10. Walch G, Nové-Josserand L, Liotard JP, Noël E : Musculotendinous infraspinatus ruptures : an overview. *Orthop Traumatol Surg Res* 95 : 463-470, 2009