

Clavicular avulsion of the costoclavicular (rhomboid) ligament: MRI findings

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Sprain of the costoclavicular (rhomboid) ligament is an uncommon but symptomatic traumatic injury. To date, there is no report of the MRI findings of isolated, traumatic, rhomboid ligament injury. We report a case of traumatic rhomboid ligament avulsion from the clavicular insertion diagnosed by MRI. Radiologists and treating physicians alike may find this information useful in their clinical practice.

Introduction

The costoclavicular (rhomboid) ligament functions as an important stabilizer of the sternoclavicular (SC) joint and medial clavicle (1, 2). Rhomboid ligament injury has been reported in the setting of SC joint dislocation (3), but the imaging appearance and diagnosis of isolated rhomboid ligament injury has never been reported.

Case report

A 22-year-old male sustained blunt trauma to his anterior chest/sternum while playing recreational American football. He complained of persistent sternal pain, worse with deep inspiration and elevation of the left upper extremity against resistance, despite five days of rest and over-the-counter nonsteroidal anti-inflammatory medication. Radiographs of the bilateral SC joints (AP, bilateral obliques) obtained four weeks following the injury were negative (not shown). Selected images from an MRI of the SC joints obtained seven days after injury are shown in Fig. 1, A-D. Based on the imaging findings, a diagnosis of complete rhomboid ligament avulsion was proposed. The patient was placed in an upper-extremity sling, including a contralateral

“figure of 8” harness for six weeks; physical therapy was gradually instituted beginning at four weeks of immobilization. Eighteen months following the original injury, the patient is asymptomatic and has complete range of motion of the left upper extremity.

Discussion

The costoclavicular (rhomboid) ligament is a triangular, fan-shaped, bilaminar ligament that extends superolaterally from the first costal arch to insert on the undersurface of the medial clavicle. It may be flat, raised or depressed (the latter of which has been termed a rhomboid fossa) (4). The rhomboid ligament inserts into the clavicle approximately 1 cm lateral to the SC joint capsule and functions as an important stabilizer of the clavicle and SC joint. In addition to the costoclavicular (rhomboid) ligament, at the medial edge of the clavicle, the SC joint capsule (ligament) functions as the primary stabilizer of the SC joint (1, 2).

Injuries to the SC joint have been graded anatomically and typically heal following conservative treatment. Grade I sprains involve partial tears of the SC joint capsule (ligament) and an intact costoclavicular (rhomboid) ligament. On examination, this appears as a lax SC joint. Grade II sprains involve complete tear of the SC joint capsule (ligament) and an intact costoclavicular (rhomboid) ligament. This typically results in pain and swelling localized to the SC joint, with occasional visible deformity (anterior sibiluxation of the medial clavicle relative to the sternum). Grade III sprains involve complete tears of both the SC and rhomboid ligaments. They result in an unstable medial clavicle, which can sublux/dislocate either anteriorly or posteriorly (retrosternally) (5).

The present case is unusual in that the costoclavicular (rhomboid) ligament was injured without evidence of injury to the SC joint capsule (ligament). Clinically, the patient

Citation: Dheer S, Zoga AC, Morrison WB. Clavicular avulsion of the costoclavicular (rhomboid) ligament: MRI findings. *Radiology Case Reports*. (Online) 2011;6:579.

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Competing Interests: The authors have declared that no competing interests exist.

DOI: 10.2484/rcr.v6i4.579

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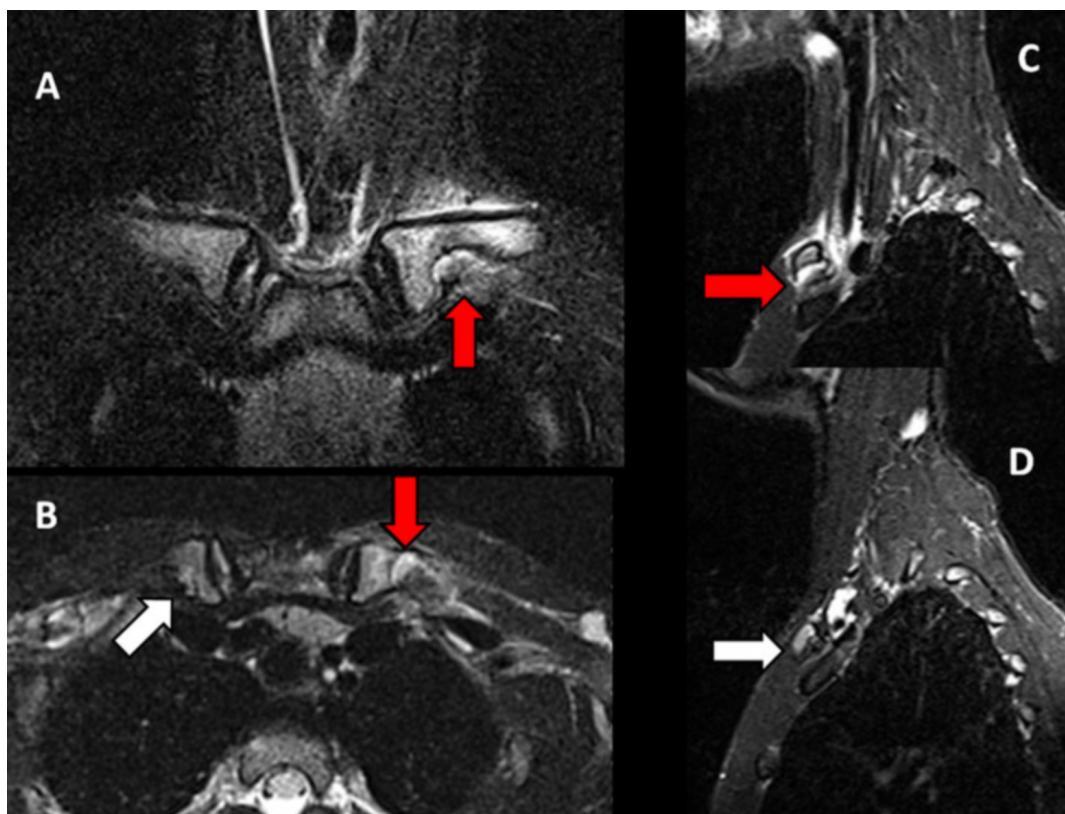


Figure 1. A: Coronal STIR (TR=4290 ms, TE=38, TI=120) image demonstrates a fluid gap at the expected location of the clavicular insertion of the rhomboid ligament and the adjacent, torn, free edge of the ligament (red arrow). Note the surrounding, reactive soft tissue and avulsive, clavicular bone-marrow edema. Sternoclavicular joints are normal. B: Axial, T2-weighted, fat-saturated (TR=4870 ms, TE=69 ms) image demonstrates fluid in the expected location of the rhomboid ligament and the torn, free edge of the ligament (red arrow). Note the normal contralateral side, demonstrating the low-signal tendon enthesis (white arrow). C: Sagittal, T2-weighted, fat-saturated (TR=4950 ms, TE=60 ms) image demonstrates a complete tear of the rhomboid ligament from the undersurface of the medial clavicle (red arrow). Clavicular bone marrow and surrounding, soft-tissue edema are also present. D: Sagittal, T2-weighted, fat-saturated (TR=4950 ms, TE=60 ms) image of the contralateral side shows a normal, low-signal, rhomboid ligament insertion (white arrow), without associated soft-tissue and bone-marrow edema.

appeared to have a grade I sprain. This is not surprising given that the costoclavicular (rhomboid) ligament is a secondary stabilizer of the SC joint/medial clavicle. Sprain of the SC joint is usually the result of medially or posteriorly directed forces at the shoulder (5), resulting in greater leverage on the more medial SC joint (capsule) than on the costoclavicular (rhomboid) ligament. In the present case, the force was directed posteriorly, at the chest wall, which may have conceivably resulted in greater traction on the costoclavicular (rhomboid) ligament than on the SC joint capsule (ligament).

Studies in the radiology literature have described the imaging evaluation of SC joint anatomy (6), the articular disc and SC capsular rupture, and frank dislocation (3, 7). In these reports, rhomboid ligament injury, either partial or complete tears, was estimated to occur in approximately 14% of cases of traumatic SC joint injury (3).

To date, there has been no report of the MRI appearance of isolated rhomboid ligament injury. In our case, a discrete, fluid gap at the clavicular enthesis of the rhomboid ligament indicated a complete avulsion at this location. Edema interposed between the fibers of the ligament also indicated a tear of this structure. Bone-marrow edema within the medial clavicle was attributed to avulsive stress. Surrounding, reactive, soft-tissue edema was noted as well. We propose that the grading of sprains to the rhomboid ligament should be similar to other ligamentous injuries elsewhere in the body: grade 1 sprain would demonstrate surrounding edema, with intact ligamentous fibers; grade 2 sprain would demonstrate edema interposed within the rhomboid fibers, compatible with a partial tear; and grade 3 sprain, a complete tear, would demonstrate complete fiber disruption.

This case demonstrates that rhomboid ligament injury, in the absence of any SC joint pathology, is both clinically

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significant and able to be diagnosed with MRI. Knowledge of the appearance and ability to diagnose isolated rhomboid ligament injuries on MRI will be of benefit to the interpreting radiologist and treating physician alike.

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