

# Surgical Repair for Rhomboid Major Tear: A Case Report

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**ABSTRACT:** Rhomboid tears are a rare type of tendon injury. Although rhomboid tears can present with periscapular pain and scapular dyskinesia, their clinical presentations and diagnostic procedures remain largely unknown. In addition, few reports are available on the surgical treatment of rhomboid tears. We report a rhomboid repair case for a complete rhomboid major tear diagnosed based on physical findings and magnetic resonance imaging (MRI). A 28-year-old man presented with right medial scapular pain that appeared after carrying a heavy box. He had right medial scapular tenderness, with worsening pain during shoulder joint elevation. The inferior pole of the right scapula was lateral compared with the left scapula, and a dent was observed on the medial scapula. Magnetic resonance imaging revealed a tear in the right rhomboid major at its insertion, with muscle retraction. Two months of conservative treatment failed to improve his symptoms; therefore, we performed a surgical repair. We created the bone holes on the medial border of the scapula and repaired the torn rhomboid major muscle to its insertion using the Krackow stitch technique. He had a satisfactory functional outcome without postoperative retearing. This case report provides new information on the clinical presentation and surgical procedure of rhomboid major tears and the first MRI finding that depicts a rhomboid tear clearly. In cases of rhomboid tears, persistent medial scapular pain and winging scapula can be clinically problematic, requiring surgery. In addition to physical findings, a periscapular MRI is useful in diagnosing rhomboid tears. The results of this case study suggest that surgical repair using locking sutures is an option for treating complete rhomboid tears with muscle retraction.

**KEYWORDS:** Rhomboid tear, periscapular pain, scapula winging, surgery

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## Introduction

Shoulder pain is the third most frequent musculoskeletal disorder.<sup>1,2</sup> Shoulder pain is commonly caused by neuromusculoskeletal disorders, such as rotator cuff tendinopathy, subacromial impingement syndrome, and adhesive capsulitis.<sup>3,4</sup> However, non-neuromusculoskeletal disorders such as abdominal disease<sup>5,6</sup> or bone tumor<sup>7</sup> can mimic musculoskeletal shoulder pain. Scapula winging, an abnormal scapular mechanism, is another disorder that causes shoulder pain and dysfunction.<sup>8-10</sup> Alteration in normal scapular position and motion can result in loss of retraction/protraction control, loss of elevation control, and loss of kinetic chain function, causing significant shoulder dysfunction.<sup>8-10</sup> The most common causes of scapular winging are neurological disorders (long thoracic nerve, accessory nerve, or dorsal scapular nerve palsy)<sup>8-14</sup>; however, there are rare reports of periscapular muscle injury<sup>15-19</sup> and scapular fracture<sup>20-23</sup> causing scapular winging.

The rhomboid major is a periscapular muscle that originates from thoracic vertebra spinous processes and inserts into the medial border of the scapula.<sup>17</sup> The muscle contributes to scapula stability by retracting the scapula toward the thoracic vertebra and elevating its medial border.<sup>24-26</sup>

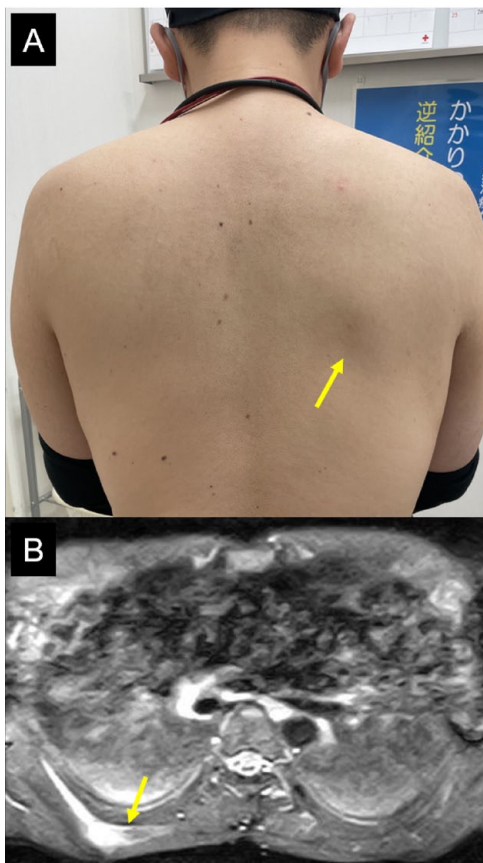
Rhomboid major tears are a rare type of tendon injury. Although recent reports indicate that rhomboid tears present with periscapular pain and scapular dyskinesia,<sup>15-17,19</sup> their clinical presentations and diagnostic procedures are not fully understood. In addition, few reports are available on the surgical procedure of rhomboid tear repairs.<sup>15,16,19</sup>

We report a rhomboid repair case using locking-type sutures for a complete rhomboid major tear with persistent medial scapular pain and scapular winging.

## Case Presentation

A 28-year-old man presented to our hospital with right medial scapular pain. He experienced scapular pain after carrying a heavy box with his upper extremities elevated 2 months earlier. He visited an orthopedic clinic and was diagnosed with periscapular muscle injury after radiographs showed no abnormal findings. Using non-steroidal anti-inflammatory drugs for 2 months did not improve his condition, and he was referred to our hospital. He had no notable medical history. He had tenderness on the medial side of the right scapula. Although the range of motion was not limited, the pain worsened during anterior and lateral shoulder joint elevation. The Constant score<sup>27</sup> was 78, and the visual analogue scale (VAS) was 2.5 cm. Compared with the left scapula, the inferior pole of the right scapula was more lateral, and a dent suggestive of muscle rupture was observed on its medial border (Figure 1A). Based on the physical examination findings, we considered rhomboid tear or avulsion fracture of the inferior pole of the scapula as the differential diagnosis. We performed computed tomography (CT) and magnetic resonance imaging (MRI) because surgical treatment is required for these conditions,<sup>15,16,19-23</sup> and his condition had failed to improve after 2 months of conservative treatment. Computed tomography showed no abnormal





**Figure 1.** Clinical photograph of the scapula. The inferior pole of the right scapula (arrow) was more lateral than the left scapula, and a dent suggestive of muscle rupture was observed on the medial scapula border (A). Magnetic resonance image of the periscapular muscles. The image with short inversion time inversion recovery technique shows a tear of the right rhomboid major at its insertion (arrow) with surrounding fluid retention (B).

findings. Magnetic resonance imaging (short inversion time inversion recovery sequence) revealed a tear in the right rhomboid major at its insertion, with surrounding fluid retention (Figure 1B). Symptoms did not improve after 2 months of medical treatment and activity modification, interfering with work and sports activity. Consequently, we scheduled the surgical rhomboid major repair.

Surgery was performed under general anesthesia, with the patient in a prone position. A skin incision was made along the medial scapular border from the scapular spine to the inferior angle (Figure 2A). After soft tissue dissection, the lower trapezius muscle was retracted using a muscle retractor to expose the rhomboid major tear (Figure 2B). The rhomboid major insertion on the medial border of the scapula was freshened with a curette, and 6 bone holes were created using a 1.8-mm Kirschner wire. Three no. 2 FiberWire® nonabsorbable sutures (Arthrex, Naples, FL, USA) were passed from the rhomboid major tear site to the musculotendinous junction using the Krackow stitch technique<sup>28</sup> to reduce the torn rhomboid major muscle to its insertion (Figure 2C). We then threaded these

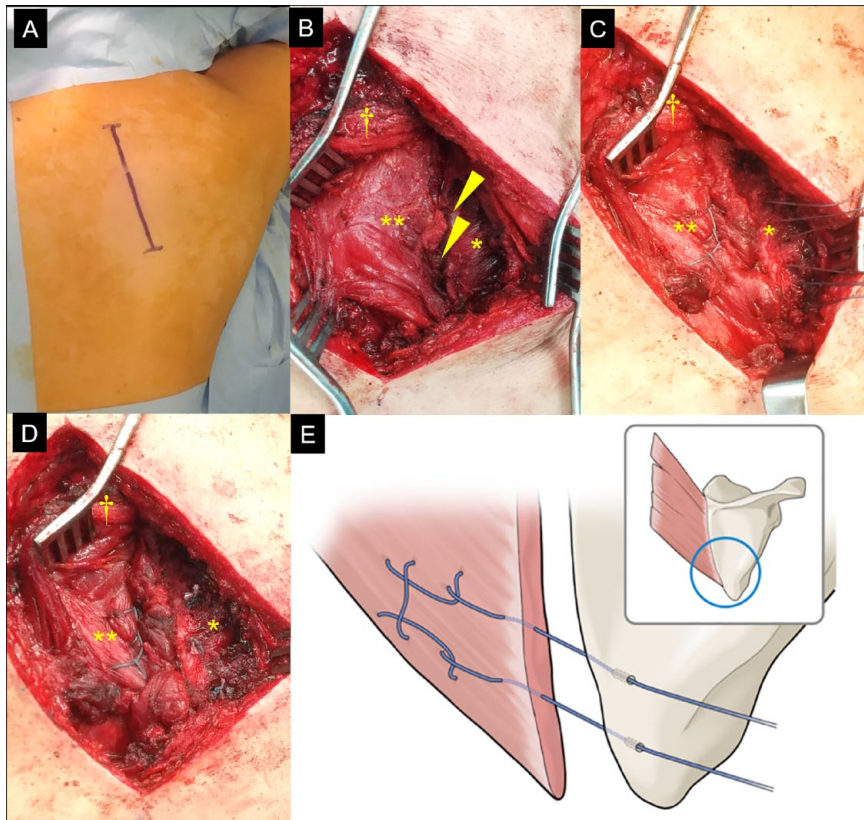
sutures through the bone holes and tied them on the medial border of the scapula (Figure 2D and E).

During the first postoperative month, an active range of shoulder motion was permitted with a clavicle brace. Scapular training was started 2 months postoperatively. The medial scapular pain subsided, and the patient resumed heavy work 6 months postoperatively. Magnetic resonance imaging performed 8 months postoperatively showed no findings suggesting a rhomboid major retear (Figure 3). The Constant score was 98, and the VAS was 0 cm at 1 year postoperatively.

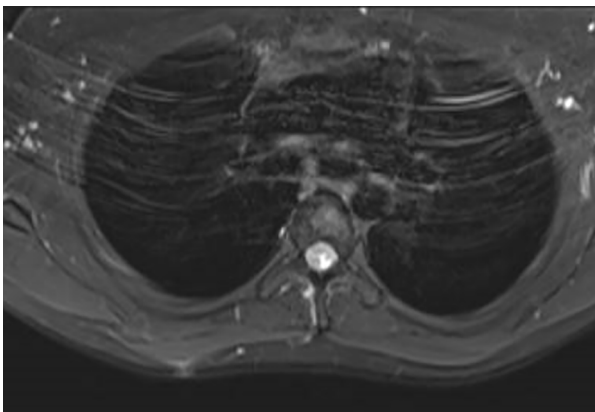
## Discussion

The present case indicated 2 clinical issues. First, a rhomboid tear can cause persistent medial scapular pain and scapular winging, requiring surgery. A previous report demonstrated that rhomboid tears frequently present with pain along the medial border and scapular dyskinesis.<sup>16</sup> Since the rhomboids act to retract the scapula medially,<sup>24,25</sup> a rhomboid tear can cause lateral winging of the inferior scapula pole.<sup>15,17,19</sup> This case presented with pain and a dent on the medial scapula border and lateral winging of the inferior pole, as noted in previous reports. In addition to these physical findings, this case suggests that a periscapular MRI is useful in diagnosing rhomboid tears. Most previous reports focused on physical examination and electromyography to diagnose rhomboid tears,<sup>15,16</sup> with few cases diagnosed using an MRI.<sup>17,19</sup> In this case, MRI clearly depicted the tear at its insertion with surrounding fluid retention, suggesting that an MRI of the periscapular muscles is useful in diagnosing rhomboid tears. Therefore, an MRI is an option for diagnosing suspected rhomboid tears in cases with a clear trauma history, prolonged medial scapular pain, and scapular winging.

Second, a surgical repair using locking sutures is beneficial in treating complete rhomboid tears that do not improve with conservative treatment, as in this case. Treating rhomboid tears includes pain control with anti-inflammatory medication, activity modification, and physical therapy; however, failure of these nonsurgical treatments is considered a surgical indication.<sup>17</sup> A study by Kibler et al<sup>16</sup> describing surgery for rhomboid tears at their insertion reported that surgical repairs for muscular detachment of the lower trapezius and rhomboids using mattress sutures resulted in improved functional outcomes. However, it is desirable to repair rhomboid muscles using running, locked sutures through the tendon or musculotendinous junction because the periscapular muscle tendon is very thin.<sup>17</sup> In a report by Kibler et al,<sup>16</sup> most cases demonstrated scar formation and non-obvious direct detachment with muscle retraction between the rhomboid edge and the medial scapula. Therefore, a locking-type suture, such as the Krackow suture, would provide a more rigid fixation for complete rhomboid tears with muscle retraction, as seen in this case. Moreover, in this case, no retear was observed on MRI 8 months after surgery, and a satisfactory functional outcome



**Figure 2.** Intraoperative findings of the rhomboid major repair. In the supine position, a skin incision was made along the medial scapular border from the scapular spine to the inferior angle (A). When the lower trapezius muscle (dagger) was retracted using a muscle retractor, the torn rhomboid major (double asterisk) was observed, and there was a gap from the tear (arrowheads) between the torn rhomboid major and its insertion (asterisk) (B). After creating bone holes on the medial border of the scapula, we threaded 3 fiber wires and applied them to the torn rhomboid muscle using the Krackow stitch technique through the bone holes (C). Fiber wires were fastened with the torn rhomboid major muscle reduced at its insertion (D). Schematic illustration of the rhomboid major repair using Krackow sutures (E).



**Figure 3.** Magnetic resonance T2-weighted image at 8 months postoperatively showed no findings suggesting a retear of the rhomboid major.

was obtained 1 year postoperatively. This case suggests that surgical repair using locking sutures can be used for complete rhomboid major tears with muscle retraction.

### Conclusions

This case report provides new information on the clinical presentation and surgical management of rhomboid major

tears. In rhomboid tear cases, persistent medial scapular pain and winging scapula can be clinically problematic, requiring surgery. In addition to physical findings, a periscapular MRI is useful in the diagnosis. The results of this case study suggest that surgical repair using locking sutures is an option for treating complete rhomboid tears with muscle retraction.

### Declarations

#### *Ethics approval and consent to participate*

Written informed consent was obtained from the patient to publish this case report and any accompanying images. A statement from the ethics committee was not required for this anonymized case report in accordance with the legislation of the Institutional Review Committee of Ashikaga Red Cross Hospital.

#### *Consent for publication*

Written informed consent was obtained from the patient to publish this case report and any accompanying images. A copy of the written consent is available for review by the Associate Editor of this journal.

### Acknowledgements

Not applicable.

### Author contributions

**Ryogo Furuhashi:** Conceptualization; Formal analysis; Validation; Writing – original draft.

**Sakura Yamaguchi:** Formal analysis; Investigation; Validation.

**Atsushi Tanji:** Supervision; Validation.

### Availability of data and materials

Data that support the findings of this study are available from the corresponding author on reasonable request.

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