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A Bone-Through Repair of Acute Rupture of the Sternocostal Head of the Pectoralis Major- A Case Report

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Abstract

The pectoralis major tendon rupture is rare. The anatomical structure of the pectoralis major muscle explains the rarity of this injury. We report an amateur bodybuilder in his 30s who presented to the emergency department 30 minutes after experiencing acute pain following a weighted push-up. The physician discharged the patient with oral analgesics and advised him to rest. Two days later, the pain worsened, prompting him to consult our emergency department. Clinical and radiological findings, including MRI, revealed a complete rupture of the sternocostal component of the

pectoralis major tendon with significant retraction, necessitating surgical intervention. We performed a trans-osseous suture with bone-through technique to repair the pectoralis major tendon rupture. Range of motion was gradually increased as tolerated by the patient, with good functional outcome. Through our case, we highlight several important clinical considerations that are detailed in the article below.

Keywords: Pectoralis major tendon; rupture; MRI; surgical management; bodybuilder

Introduction

The pectoralis major muscle, as the largest muscle of the anterior chest, is composed of two distinct anatomical segments: the clavicular head and the sternal head. These two muscular components converge and insert together onto the intertubercular groove (bicipital groove) of the humerus (fig. 1).

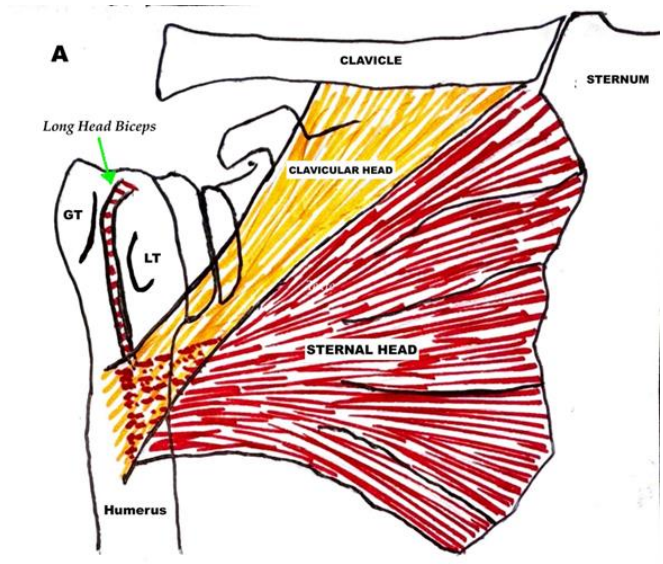

Figure 1: Pectoralis major anatomy and insertion.

Injuries to this muscle are uncommon. Given that only a few cases are reported in the medical literature and there are limited clinical signs of this special injury, it is underdiagnosed or overlooked at the earliest examination (1-2-3). We report a patient in his 30s who presented with an acute traumatic rupture of the pectoralis major tendon, which was treated surgically.

Case Report

An amateur bodybuilder in his 30s arrived at the emergency department 30 minutes after experiencing acute pain during a weighted push-up. The physician noted no swelling or bruising, and the initial radiograph was normal. The patient was discharged with a prescription for oral analgesics and was advised to rest. At home, the pain intensified whenever he moved his right arm, and he observed a change in skin color along with swelling in the anterior chest. Two days later, he went to our emergency department, and we were consulted for this clinical presentation. Examination revealed significant bruising and swelling over the right arm and thorax (fig. 2a), along with a palpable defect (gap) in the area of the pectoralis major tendon insertion, exacerbated during adduction against resistance. During this follow-up visit, he reported that he didn't take enough time to warm up before exercising. We performed magnetic resonance imaging that revealed a complete rupture of the sternocostal component of the pectoralis major tendon with significant retraction (fig. 2b), prompting the patient to undergo surgery.

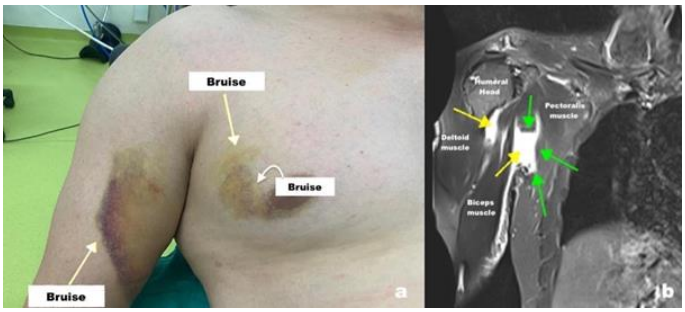

Figure 2: **(**a) Clinical photograph showing anterior chest bruising (white arrows);

(b) MRI demonstrating complete rupture and retraction of the sternocostal head of the pectoralis major muscle (green arrows) with a hematoma in the resulting space (yellow arrows).

In the operating room, we placed the patient in the beach chair position under general anesthesia and performed a

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deltopectoral approach that allowed us to identify the rupture. After thorough irrigation and evacuation of the hematoma, we isolated the proximal end of the tendon (fig. 3a). We created a vertical trough (5cm) over the insertion footprint of the pectoralis major muscle tendon, and then we drilled two holes lateral (5mm) to the trough (fig. 3b).

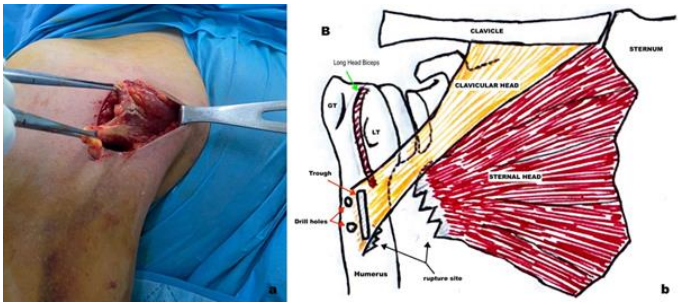

Figure 3: (a) Intraoperative view showing the rupture;
(b) Prepared bone trough and drilled belly.

We used non-absorbable sutures passed through the proximal end of the tendon and the pectoralis major muscle (fig. 4a) and then threaded those sutures through trans-osseous tunnels created in the proximal humerus, using the trans-osseous suture with bone through technique (fig. 4b).

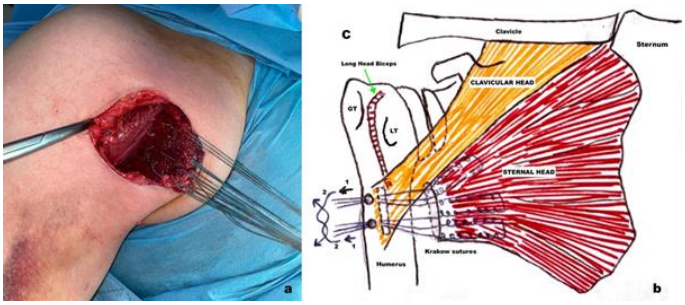

Figure 4: (a) Sutures placed in tendon/muscle belly;
(b) Sutures passed through trans-ossous tunnels (bone-through technique).

After tying the sutures together, we were able to restore the anatomical configuration of the pectoralis major muscle (fig. 5).

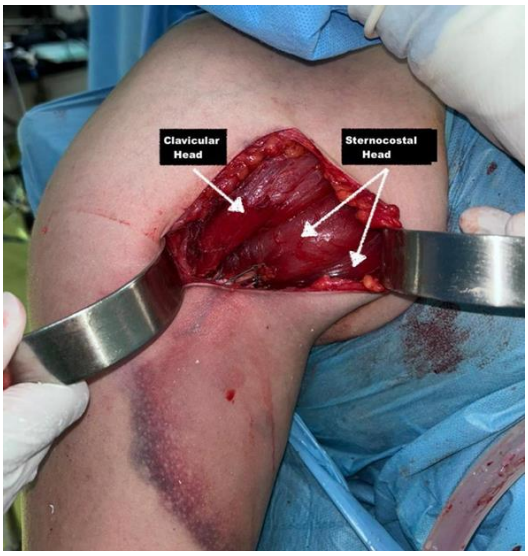

Figure 5: Final anatomic repair.

The patient was kept in an arm sling with an abduction pillow for three weeks. The histopathological examination of the tissues was normal. A structured rehabilitation program was prescribed, including pendulum exercises twice a day for three weeks. After the three weeks, passive stretching of the patient's shoulder was permitted. Range of motion was gradually increased as tolerated by the patient. Full active range of motion was allowed at three months with full recovery at the end of three months, except for external rotation, which was limited to 60°. One year later, the patient reported high levels of satisfaction with the outcomes of the surgery, and no adverse events were observed.

Discussion

Rupture of the pectoralis major is a rare injury. The first case in the literature was reported in 1822.[2] It is commonly seen in male athletes, with one documented instance occurring in a young active female.[4] The rarity of this injury is explained by the anatomical structure of the pectoralis major muscle. In fact, it is a large, powerful, and superficial muscle located in the front of the thoracic cage, which contains two components: the clavicular head and the sternocostal head. Its fibers come together at their attachment site on the greater tubercle of

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the humerus through the pectoralis tendon.[5] Tears of the pectoralis major can occur due to excessive tension or following a direct trauma. In other words, the rupture occurs particularly during maximal contraction when the arm is in an externally rotated, extended, and abducted position or, in a rarer instance, following a direct impact to the muscle.[5-6] There are four types of injury locations for the pectoralis major; Type 1: rupture-avulsion of the pectoralis major tendon from its humeral insertion; Type 2: rupture at the level of the musculotendinous junction; Type 3: rupture of the muscle belly of the pectoralis major, however, the tendon remains intact; Type 4: avulsion of the sternal attachment of the pectoralis muscle.[7] Our case was a type 1 lesion. The classic clinical presentation of a pectoralis major tendon rupture includes sudden pain accompanied by a "pop" sensation. On clinical examination, we found bruising and swelling in the anterior part of the thorax and ipsilateral arm. Contralateral adduction highlights the rupture of the pectoralis tendon. In case of total rupture, a gap is observed; however, tissue swelling may obscure it.[5-6] The diagnosis of the rupture is confirmed by MRI. Ultrasound can be performed when MRI is unavailable.[5] The treatment of this type of rupture is often surgical. Repair techniques include transosseous fixation, anchors, or endobuttons. For chronic rupture, the use of tendon autografts or allografts may be necessary. Currently, the optimal timing for surgery is not established. However, acute rupture should be repaired as soon as possible for optimal recovery. Conservative treatment is reserved for older patients.[8-9] After surgical repair, return to sports is only considered after 5 to 6 months.[10] In our case, we performed an MRI, which confirmed and specified the tendon lesion. Given the young age and functional demands of the patient, we opted for surgical treatment, performing a transosseous technique repair using non-absorbable sutures as illustrated in figure (4b), and we were able to restore the shape of the pectoralis major muscle.

Conclusion

Although ruptures of the pectoralis major muscle were previously considered uncommon, the incidence has been escalating with increased interest in health and fitness and participation in strenuous sports activities. Through our case, we want to highlight a few points:

- Warm-up is mandatory to prevent such injuries.
- A bruise is not the only sign to look for.
- Resisted adduction is advantageous in clinical examination.
- This injury is confirmed by MRI.
- Surgical management is recommended for young patients.

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