

Surgical Repair of Distal Pectoralis Major Tendon Avulsion Sustained during Sports: Our Experience. A Case Report

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ABSTRACT

Pectoralis major tendon rupture is an uncommon injury that occurs in weightlifters and rugby players. The objective of this article is to report a clinical case, including its diagnosis and treatment, compare it with similar cases in the published literature, and describe our experience in its management. We present the case of a 45-year-old man with acute pain of 1 week's duration following physical activity. Physical examination revealed pectoral asymmetry, extensive ecchymosis, and loss of the deltopectoral groove. A deltopectoral approach was used, and three anchors were placed in a double-row configuration. There were no complications, and the patient regained full range of motion and resumed his usual sports activity 6 months after surgery. **Conclusion:** The outcomes and complications were similar to those reported in the literature reviewed, although there is no consensus regarding the material to be used for surgical repair. An accurate diagnosis should be made and appropriate treatment indicated to prevent future complications.

Keywords: Muscle tear; pectoralis major; anchors; humerus; arm; sports.

Level of Evidence: IV

Reparación quirúrgica del pectoral mayor por desinserción distal durante la práctica deportiva. Nuestra experiencia. Reporte de caso

RESUMEN

La rotura del tendón del pectoral mayor es una lesión poco común que ocurre en levantadores de pesas y jugadores de rugby. El objetivo de este artículo es comunicar un caso clínico, su diagnóstico y el tratamiento, compararlo con casos similares publicados, y concluir con nuestra experiencia para su resolución. Presentamos a un paciente de 45 años que refiere dolor agudo de una semana de evolución luego de realizar actividad física. En el examen físico, se detecta asimetría pectoral, un hematoma extenso y borramiento del surco deltopectoral. Se realizó un abordaje deltopectoral y se colocaron 3 anclajes en doble hilera. No hubo complicaciones y el paciente recuperó la movilidad completa y reanudó su actividad deportiva habitual a los 6 meses de la cirugía. **Conclusiones:** Los resultados y las complicaciones según la bibliografía analizada fueron similares, si bien no hay un consenso sobre qué material utilizar para la reparación quirúrgica. Se debe realizar un diagnóstico correcto e indicar el tratamiento apropiado para evitar futuras complicaciones.

Palabras clave: Desgarro muscular; pectoral mayor; anclajes; húmero; brazo; deporte.

Nivel de Evidencia: IV

INTRODUCTION

Muscle injuries due to overload are very common, particularly in sports. The muscles most frequently affected are those that cross two joints, act predominantly eccentrically, and contain a high proportion of fast-twitch fibers.¹ Pectoralis major tendon rupture is a rare injury that occurs primarily in men who participate in sports such

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as rugby or weightlifting.² The pectoralis major muscle has a broad origin; its muscle fibers form two heads, the sternal and clavicular heads, which converge to form a common tendon that inserts on the lateral lip of the bicipital groove.²

These injuries occur when the muscle is subjected to sudden stretching as a result of abrupt elongation during eccentric contraction. The pathologic lesion invariably involves the muscle fibers closest to the myotendinous junction. Several grades are distinguished according to severity: grade 1, tearing of a few muscle fibers; grade 2, tearing of a greater number of fibers with intact fascia; grade 3, tearing of multiple fibers with fascial disruption; and grade 4, complete rupture of the muscle and fascia. In the latter case, surgical repair is the only indicated treatment.³

Typical symptoms include severe pain during physical activity, swelling, and functional impairment. Complete injuries may produce an “axe-blow” sign, while extensive injuries may result in hematoma formation.³ Musculoskeletal ultrasound and magnetic resonance imaging (MRI) are complementary studies used to support the diagnosis.^{1,3}

Ultrasound is the imaging modality of choice for diagnosing muscle injuries. Its main role is to confirm the clinical suspicion, determine the location of the injury, and assess its extent.³

The pectoralis major is generally divided into two portions, clavicular and costosternal, which converge to form a common tendon that inserts distally on the lateral lip of the bicipital groove of the humerus.⁴

Pectoralis major tendon tears are classified according to type, location, and extent; however, most authors agree that acute tears are those of less than 3-6 weeks' duration.⁵ Ecchymosis, swelling, and severe pain associated with acute injuries can make the initial clinical diagnosis difficult and differentiation between complete and partial tears challenging.^{5,6}

Ultrasound can be used to diagnose pectoralis major injuries and accurately characterize the tear. It may show avulsion of the tendon from its humeral insertion, with a wavy appearance; in other cases, the tendon cannot be visualized. Hyperechoic fluid may also be observed adjacent to the humeral cortex and along the tendon bed due to the associated hematoma.^{7,8}

The objective of this article is to report a clinical case, including its presentation, diagnosis, and treatment; compare it with similar cases reported in the literature; analyze the differences; and present our experience with its management.

CLINICAL CASE

A 45-year-old man with no relevant medical history and a history of nonmedical anabolic-androgenic steroid use presented with acute pain that had begun one week earlier while performing a 120-kg flat bench press at the gym. He was admitted to the emergency department for observation and received intravenous hydration and corticosteroids. Compartment syndrome was ruled out in the setting of an extensive brachiothoracoabdominal hematoma. Physical examination revealed pectoral asymmetry, hematoma, loss of the deltopectoral groove, and limited left glenohumeral adduction due to pain. Musculoskeletal ultrasound showed a complete tear of the pectoralis major tendon at its humeral insertion.

MRI showed an extensive area of fiber disruption with heterogeneous signal intensity in the superolateral portion of the left pectoralis major, accompanied by fluid collections and measuring approximately 123 x 73 mm, consistent with a tear and avulsion involving the humeral insertion (Figure 1).

No involvement of the clavicular portion at the level of the pectoralis minor was detected. This finding was accompanied by an extensive deep fluid collection between the pectoralis major and minor muscles, corresponding to a hematoma measuring approximately 12 x 33 mm (Figure 2).

The patient provided informed consent for publication of the case and clinical images.

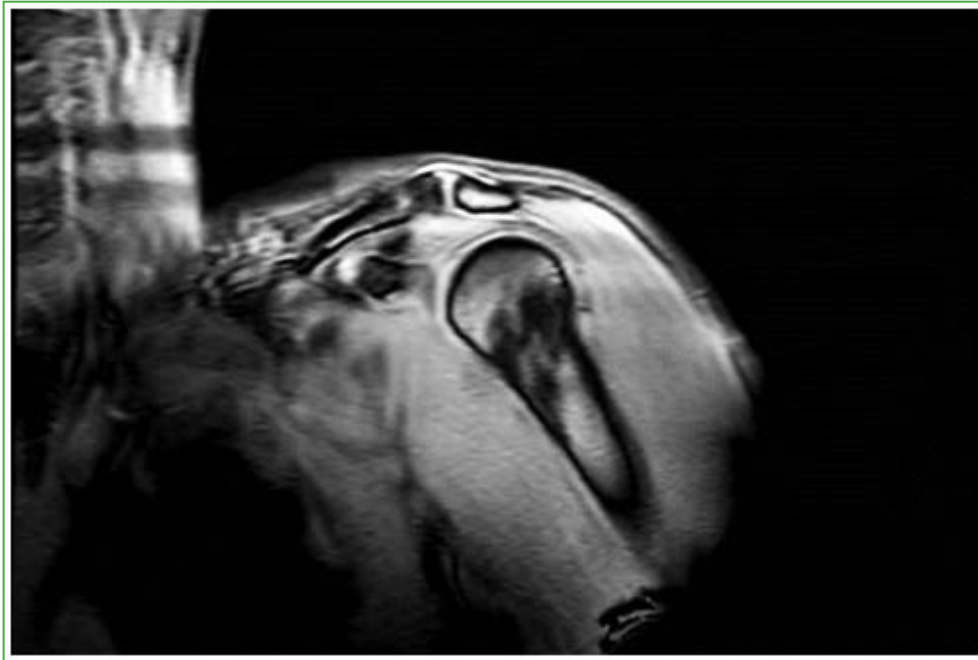


Figure 1. Coronal MRI of the shoulder showing an extensive area of fiber disruption with heterogeneous signal intensity in the superolateral portion of the pectoralis major.

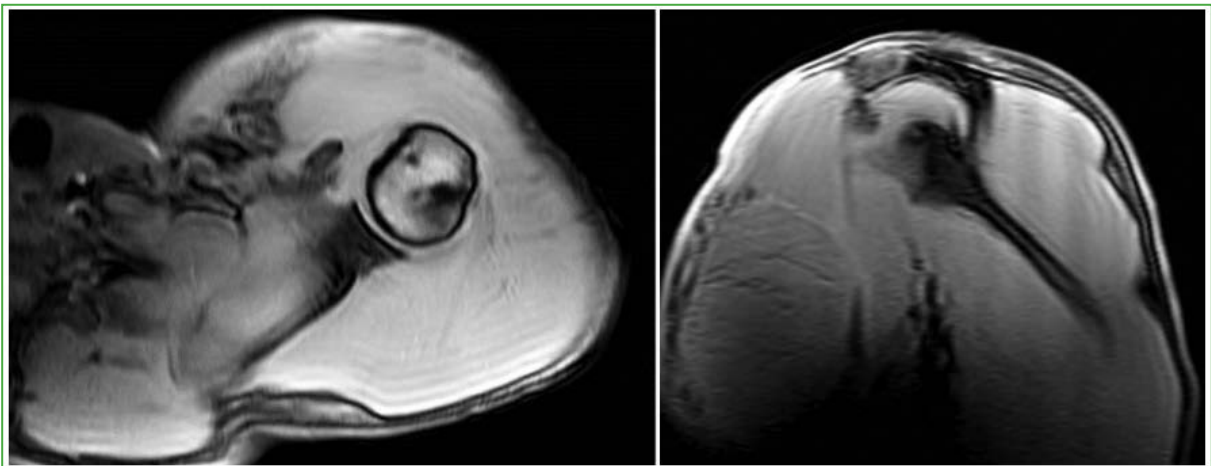


Figure 2. Axial MRI of the shoulder showing an extensive deep fluid collection between the pectoralis major and minor muscles, corresponding to a hematoma measuring approximately 12 x 33 mm.

Surgical Technique

The patient was placed under general anesthesia in the beach-chair position with the operating table inclined at 45°. A deltopectoral approach to the left shoulder was performed. During exploration, the pectoralis major tendon was identified and found to be retracted. It was repaired with a Vicryl® suture (Figure 3). Three 2.7-mm anchors were then placed in a double-row configuration along the lateral edge of the bicipital groove (Figures 4 and 5).



Figure 3. Deltopectoral approach, exploration of the muscle plane, and identification and traction of the pectoralis major with forceps.



Figure 4. Placement of anchors in the proximal humerus.



Figure 5. Placement of three anchors in the proximal humerus.

To optimize visualization of the anatomical landmarks, the deltoid and the clavicular head of the pectoralis major were retracted (Figure 6).

The sutures were then passed through the myotendinous junction (Figure 7) and tied. Finally, the wound was closed in anatomical layers, with an intradermal skin closure (Figures 8 and 9).



Figure 6. Placement of three anchors in a double-row configuration from the pectoralis major to the bicipital groove and greater tuberosity of the humerus.



Figure 7. Anchors placed along the edge of the bicipital groove and in the greater tuberosity, with sutures passed through the pectoralis major.



Figure 8. Layered closure with myorrhaphy of the pectoralis major and deltoid muscles.



Figure 9. Intradermal skin closure.

Immediately after surgery, the patient was immobilized in a Vietnam shoulder sling for 4 weeks. During this period, he began pendulum exercises and flexion-extension exercises of the elbow 5 times a day, supplemented with physical therapy. Return to sports was allowed at 3 months, and return to the gym with moderate loads was planned for 6 months.

The patient had a favorable course without complications. Six months after surgery, he had regained full range of motion and returned to his usual physical and sports activities.

The modified Constant-Murley score indicated a poor functional score (<50) before surgery. Three months after surgery, the functional outcome was fair (70 points); at 6 months, it was good (85 points); and at 1 year, it was excellent (90 points).

DISCUSSION

Some authors, such as De Cicco et al., reported clinical and cosmetic improvement with treatment in both the acute and chronic stages and noted that direct repair can be performed using suture anchors, cortical button fixation, or transosseous sutures.² In a case report, Arismendi et al. noted that the use of conventional MRI for the diagnosis of pectoralis major tendon ruptures has been questioned. Nevertheless, most authors agree that MRI is the diagnostic method of choice for acute complete avulsion of the tendon from its humeral insertion.⁶

In a study of 36 surgically treated pectoralis major tears, Chang et al. reported that MRI is highly useful in acute pectoralis major injuries when the technologist and radiologist are aware of the suspected injury.⁹

Compared with conservative treatment, surgical treatment provides better functional outcomes, with recovery of strength and shoulder range of motion. Surgical techniques using anchors, screws, or staples have also been reported, all with satisfactory results. This technique provides good functional outcomes, is minimally invasive, and carries a low risk of neurovascular injury.¹⁰

Eid Caballero used botulinum toxin as an initial procedure to relax the pectoralis muscle bundles, prevent retraction, and allow tension-free closure. In a second stage, mesh placement was considered to reinforce the repair of the torn area.¹¹

In controlled laboratory studies involving 24 cadaveric shoulders, Sherman et al. evaluated different fixation methods and found no statistically significant differences with respect to age, bone density, sex, or shoulder laterality. Failure patterns were similar in all groups and occurred at the tendon-suture interface.¹²

Butt et al., in a comprehensive literature review and expert opinion, noted that chronic injuries in which primary reconstruction is not possible may be repaired using autografts such as hamstring tendon, fascia lata, or patellar tendon grafts.¹³ In a meta-analysis of 112 cases, Bak et al. reported that surgical treatment was superior to conservative treatment and recommended surgery for complete tears. They also reported better outcomes in patients who underwent surgical repair during the acute stage (0-8 weeks) than in those treated during the chronic stage (9-52 weeks).^{2,6,14}

In recent years, tendon ruptures and injuries have been associated with anabolic steroid use. These substances have been shown to induce changes in tendons that result in decreased elongation and a lower force required to produce tendon failure under maximal stress.^{10,15}

The modified Constant-Murley score was used to assess shoulder function before surgery and at 3, 6, and 12 months. This tool includes both subjective and objective components and is divided into four subscales: pain (maximum, 15 points), activities of daily living (maximum, 20 points), range of motion (maximum, 40 points), and strength (maximum, 25 points). Higher scores indicate better function (range, 0-100). Scores of 0-55 indicate a poor outcome; 56-70, a fair outcome; 71-85, a good outcome; and >86, an excellent outcome.¹⁶

In our experience, imaging studies such as ultrasound and MRI were highly useful for diagnosis and surgical planning. Surgical treatment consisted of exploration and identification of the pectoralis major, followed by repair using anchors in a double-row configuration.

The severity of this type of injury in weightlifters, as in our case, should be emphasized, given the substantial loads involved in this sport.

CONCLUSIONS

The outcomes and complications reported in the literature were similar, although there is no consensus regarding the optimal material for surgical repair. Accurate diagnosis and appropriate treatment are essential to prevent complications. In our experience, surgical treatment consisting of exploration of the injury, identification of the pectoralis major, and reattachment to its insertion site using three anchors in a double-row configuration, followed by early rehabilitation, allowed the patient to return to his usual activities without complications.

Conflicts of interest: The authors declare no conflicts of interest.

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