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CASE REPORT

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Pectoralis Major Musculotendinous Rupture in a Professional Female bodybuilder: Case Report from Surgical Intervention to Competitive Recovery

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ABSTRACT

This case report elucidates the rare occurrence of a pectoralis major tendon rupture in a professional female bodybuilder, detailing the diagnostic process, surgical intervention, rehabilitation protocol, and the athlete's subsequent return to competitive bodybuilding. Pectoralis major ruptures are uncommon injuries, predominantly observed in male athletes participating in weightlifting or contact sports, with instances in women being exceedingly scarce. This case report contributes valuable insights into the management of such injuries and highlights the potential for successful return to high-level athletic performance following surgical repair and structured rehabilitation.

Methods: Diagnosis was confirmed via magnetic resonance imaging (MRI), which revealed complete loss of the pectoralis major muscle contour over the right anterior chest wall and identified the myotendinous stump. Surgical repair was performed using cortical buttons with unicortical fixation. Postoperative radiographs confirmed correct implant positioning. The patient followed a progressive rehabilitation protocol emphasizing gradual range of motion and strength recovery.

Case Report: A professional female bodybuilder presented with acute right anterior shoulder pain and visible deformity following a bench press maneuver. MRI demonstrated a complete rupture of the pectoralis major tendon, with retraction to the myotendinous junction (blue arrow). Surgical reconstruction was undertaken using cortical button fixation. At the 6-month follow-up, MRI revealed reestablishment of the muscle contour, and the patient had resumed full competitive training without functional limitations.

Conclusion: Pectoralis major ruptures in female athletes are exceptionally rare. Early diagnosis and surgical repair, followed by structured rehabilitation, can lead to full recovery and return to high-level athletic performance. This case reinforces the effectiveness of operative treatment in restoring both function and aesthetics in elite athletes.

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Introduction

Pectoralis major ruptures are relatively uncommon injuries, predominantly observed in active males between the ages of 20 and 40, particularly during weightlifting activities such as the bench press. Historically, these ruptures were considered rare, with only a few hundred cases documented up to 2010. However, recent studies indicate an increasing incidence, especially among athletes engaged in high-load resistance training [1-3].

These injuries typically occur at the tendinous insertion or the myotendinous junction and are strongly associated with eccentric overload mechanisms during weightlifting. While the vast majority of reported pectoralis major ruptures involve males, cases in females are exceedingly rare. The few documented instances in women often involve elderly patients with diminished muscle integrity or cognitive impairments, in which injury results from tearing of atrophic muscles during assisted lifting or transfer maneuvers [4].

The rarity of this condition in females, particularly those engaged in high-intensity athletic disciplines, underscores the clinical and academic relevance of the present case. This report describes a complete rupture of the pectoralis major tendon in a professional female bodybuilder—an athlete demographic scarcely represented in the existing literature. The patient's rigorous training regimen and the demands of professional bodybuilding provide a distinct etiological context, contrasting with previously reported cases that typically involve middle-aged or elderly women or those with significant comorbidities [5].

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In such high-performance individuals, surgical treatment is generally indicated due to both functional demands and aesthetic considerations. This differs from management strategies in older or sedentary populations, where non-operative treatment may be more appropriate.

Case Report

A 38-year-old professional female bodybuilder with over 20 years of competitive experience presented with acute onset of pain and functional impairment in her right shoulder following a heavy bench press session. During the eccentric phase of a repetition with 160 kg (352 lbs), she experienced a sudden, sharp pain in the anterior region of the right shoulder and chest, accompanied by an audible "pop."

The patient sought medical attention 10 days post-injury. On physical examination, ecchymosis was noted along the anteromedial aspect of the right arm. There was a visible loss of the pectoralis major muscle contour over the right anterior chest wall (Figure 1), along with localized tenderness on palpation. Shoulder range of motion was preserved. However, the patient demonstrated a clear reduction in strength during resisted adduction compared to the contralateral side.

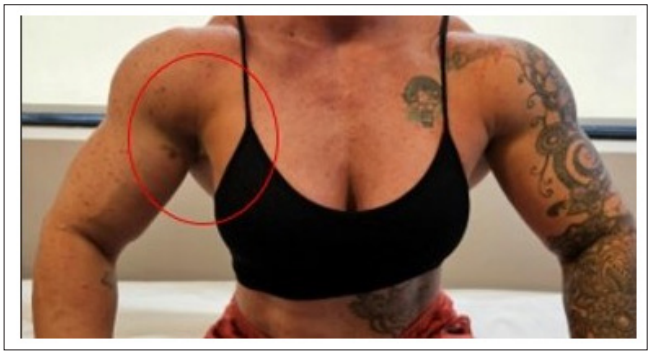

Figure 1: Loss of the pectoralis major muscle contour over the right anterior chest wall was observed in the right side (red circle).

No other positive orthopedic test findings were observed, and neurovascular examination of the right upper extremity was unremarkable.

Magnetic resonance imaging (MRI) was performed, confirming a complete rupture at the myotendinous junction of the sternal head of the pectoralis major.

After comprehensive discussion of treatment options and taking into account the patient's athletic status and performance goals, surgical repair was indicated and subsequently planned.

Surgical Technique

The patient was placed in the supine position under general anesthesia combined with an interscalene brachial plexus block. The right upper extremity was prepared and draped in a standard sterile fashion. A 7 cm incision was made just medial to the deltopectoral interval, along the axillary fold.

The deltopectoral interval was identified, and blunt dissection revealed a complete rupture of the myotendinous junction of the sternal head of the pectoralis major. A small remnant of the tendon remained attached to the humerus but was severely degenerated (Figure 2). The muscle belly was retracted medially toward the axillary crease. Dissection was carefully carried out both superficial and deep to the muscle, with particular attention to preserving the lateral pectoral nerve.

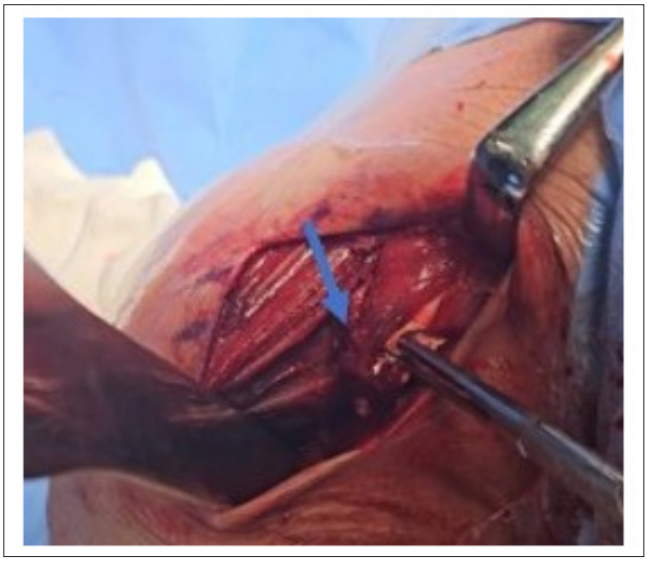

Figure 2: Myotendinous rupture of the pectoralis major muscle (blue arrow).

A semitendinosus autograft was harvested and prepared. A two Suturfix (Sartori®, São Paulo, SP, Brasil) was placed in a Krackow whipstitch configuration at each end of the graft. The tendon was then woven through the superior and inferior portions of the pectoralis major muscle using the Pulvertaft technique, creating two distinct limbs laterally. These limbs were secured with high-strength sutures using a Krackow stitch, and the limbs were tied together with multiple Suturfix (Sartori®) sutures to form a robust neo-tendon resembling the native pectoralis major insertion.

The lateral aspect of the humerus was exposed and decorticated at the anatomical footprint of the pectoralis major. With the arm in medial rotation to facilitate exposure near the bicipital groove, a Homan retractor was used for improved visualization. Two unicortical holes were drilled vertically into the humerus, lateral to the long head of the biceps tendon. The high-strength sutures from the neo-tendon were passed through cortical buttons, which were inserted into the bone tunnels and fixed under appropriate tension using unicortical fixation was performed using a 12,5 x 4,5 x 2,8 mm Fastfit STD Button (Razek®, São Paulo, SP, Brasil). The muscle was tensioned appropriately before final fixation(Figure 3). Finaly radiograph shows cortical buttons fixed using a unicortical technique. Finally, the radiograph shows cortical buttons fixed using a unicortical technique (Figure 4).

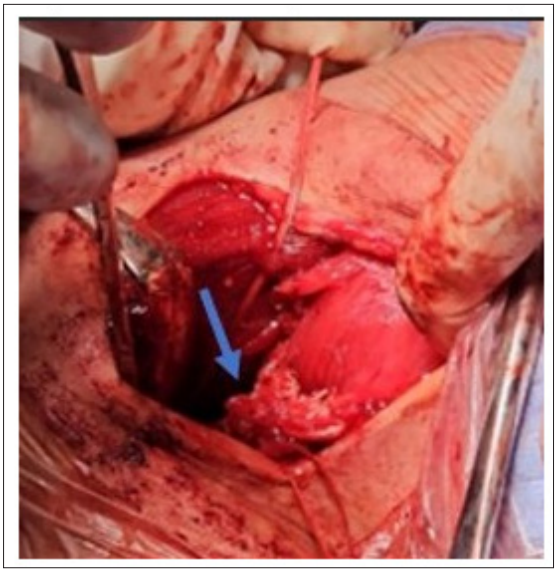

Figure 3: Pectoralis major reconstruction (blue arow).

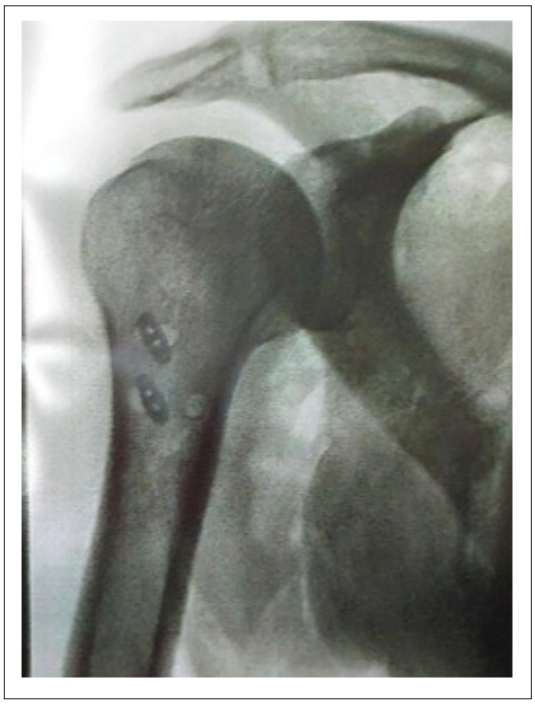

Figure 4: Radiograph shows cortical buttons fixed using two unicortical fixation technique.

After thorough irrigation, the wound was closed in layers. The patient was placed in a shoulder immobilizer sling for six weeks postoperatively.

Postoperative Rehabilitation

Rehabilitation was initiated immediately postoperatively. Pendulum exercises and scapular isometric strengthening were permitted from the first postoperative day. After one week, passive range of motion was initiated, with external rotation limited to 30 degrees and abduction restricted to 45 degrees until the end of the third week. Thereafter, range of motion was progressively advanced, with increases of approximately 15 degrees of abduction and external rotation per week [6].

Emphasis was placed on strengthening the shoulder stabilizers, particularly the rotator cuff and surrounding periscapular muscles, which are essential for dynamic shoulder stability. Isometric strengthening exercises were incorporated early to support this goal [7].

At six weeks, the sling was discontinued, and active range of motion exercises were introduced. Light resistance exercises were started at approximately 8 to 10 weeks postoperatively. By 10 weeks, the patient had regained near-complete range of motion and initiated a progressive strengthening protocol under supervision.

Follow-Up

The rehabilitation protocol was initiated immediately postoperatively. Pendulum exercises and scapular isometric strengthening were allowed from the first day. After one week, passive range of motion exercises were introduced, with external rotation restricted to 30 degrees and abduction limited to 45 degrees until the end of the third postoperative week.

Subsequently, the patient gradually progressed in range of motion, increasing abduction and external rotation by approximately 15 degrees per week. Rehabilitation focused heavily on strengthening the dynamic stabilizers of the shoulder, particularly the rotator cuff and periscapular muscles, which are essential for maintaining glenohumeral stability. This was achieved through the progressive incorporation of isometric and later isotonic exercises, with attention to neuromuscular control.

At six weeks, the shoulder immobilizer was discontinued, and active range of motion was initiated, along with the introduction of light resistance training. By 10 weeks (2.5 months) postoperatively, the patient had achieved nearly full passive and active range of motion and was cleared to begin progressive strengthening exercises.

At the four-month follow-up, the patient exhibited full, pain-free range of motion and had regained approximately 80% of her pre-injury strength. By the six-month mark, she had recovered 100% of her baseline strength and muscular contour (Figure 5). At ten months postoperatively, the patient successfully returned to competition and completed a professional bodybuilding show at a comparable level of performance to her pre-injury status.

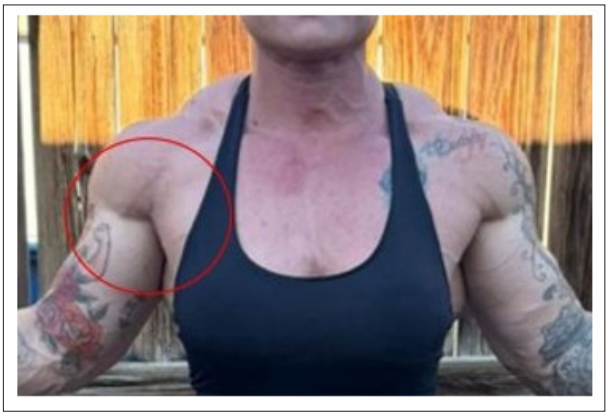

Figure 5: Follow-up at 6 months shows restoration of the pectoralis major muscle contour and the tendon graft fixed to the humerus (red circle).

Interestingly, despite prior literature suggesting that female athletes in rehabilitation may exhibit higher levels of anxiety and self-direction than their male counterparts, this patient demonstrated outstanding compliance with the prescribed rehabilitation protocol—an important contributor to her favorable outcome [8,9].

The structured and progressive rehabilitation protocol employed in this case illustrates the importance of balancing soft tissue healing with the gradual restoration of flexibility, neuromuscular control, and muscular strength. Such an approach is critical to optimizing functional outcomes and preventing reinjury, especially in high-demand athletes.

Discussion

Pectoralis major tendon ruptures have traditionally been considered rare injuries; however, their incidence has increased in recent years, particularly among young, athletic individuals involved in weightlifting and other high-resistance activities[9]. These injuries most commonly occur during the eccentric phase of exercises such as the bench press, when the muscle is subjected to maximal tensile loading [10-12].

A comprehensive meta-analysis conducted by Bak et al. revealed that between 1941 and 1998, only 150 cases had been reported in the literature, with a mean age of 28 years at the time of injury[14]. Initially, the majority of these injuries were related to occupational trauma, but after 1972, the predominant mechanism shifted toward sports-related activities. This epidemiological evolution underscores the growing association between high-intensity training and pectoralis major injuries.

In the present case, the patient's long-standing history of high-volume, high-intensity resistance training—combined with reported anabolic steroid use—likely contributed to tendon vulnerability and increased risk of rupture[3]. This is consistent with prior reports indicating that anabolic steroids may alter tendon mechanical properties, predisposing athletes to injury.

Anatomically, most pectoralis major tendon ruptures occur at the humeral insertion site, followed by the musculotendinous junction as the second most frequent location[4]. In this case, the rupture was located at the myotendinous junction of the sternal head, which often presents technical challenges for surgical repair due to muscle retraction and compromised tendon quality [13].

Surgical techniques for pectoralis major tendon repair have evolved substantially, with several fixation strategies described, including transosseous sutures, suture anchors, and cortical button constructs[2,5]. The surgical approach described here employed a semitendinosus autograft interwoven through the pectoralis major muscle using the Pulvertaft method, secured to the humerus with cortical buttons via unicortical fixation. This technique provided both biological augmentation and robust mechanical stability, with the added benefit of minimizing the risk of neurovascular injury, particularly to the axillary nerve—an important consideration when compared to bicortical button techniques [14,15].

To the best of our knowledge, this is the first reported case of a complete pectoralis major tendon rupture in a professional female bodybuilder treated with this technique. Previous reports of pectoralis major rupture in women are exceedingly rare and generally involve elderly or sedentary individuals, often in the context of low-energy trauma or assisted transfers.

This case underscores the potential for excellent functional and aesthetic outcomes following timely surgical repair in high-performance female athletes. The technique used here offers a viable option for complex ruptures, particularly when the native tendon is unsuitable for direct repair. The incorporation of a biological graft not only restores function but also satisfies the aesthetic demands unique to bodybuilding, facilitating return to competitive performance. Follow-up MRI at 6 months showed the tendon graft incorporated into the pectoralis major muscle and fixed to the humerus (Figure 6).

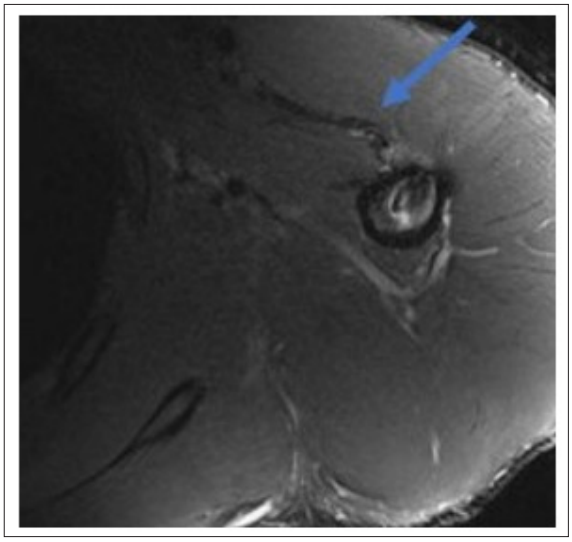

Figure 6: Follow-up MRI at 6 months the tendon graft fixed to the humerus (blue arow).

Conclusion

While pectoralis major tendon ruptures are predominantly observed in active males between the ages of 20 and 40, typically during exercises such as the bench press, this case demonstrates that such injuries can also occur in high-level female athletes. It highlights the need for clinicians to maintain a high index of suspicion, even in populations traditionally considered at lower risk.

Moreover, this case emphasizes the value of early surgical intervention combined with a structured and progressive rehabilitation program to optimize functional and aesthetic outcomes. The patient achieved complete recovery with full restoration of range of motion and strength, and successfully returned to competitive bodybuilding within 10 months postoperatively.

This case expands the current understanding of pectoralis major injuries and reinforces the effectiveness of surgical reconstruction using autograft augmentation and cortical button fixation in elite female athletes.

Level of Evidence: IV

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