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**Case Report**

# Three-anchor repair of acute partial distal pectoralis major rupture in a Jiu-Jitsu athlete: a case report

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## ABSTRACT

Pectoralis major (PM) tendon tears are uncommon but increasingly reported injuries, particularly among young, active males participating in high-demand sports and weightlifting. Surgical repair is generally recommended for young athletes to optimize strength, function, and cosmesis. We present a 22-year-old male with no significant medical history who sustained an indirect eccentric contraction injury to his right PM tendon during jiu-jitsu training. He experienced acute sharp pain and functional limitation. Initial conservative management with oral analgesics and physical therapy failed, leading to surgical intervention approximately one month post-injury. Preoperative MRI suggested a tear at the humeral insertion, but intraoperative findings confirmed a partial rupture involving the distal fibers of both superior and inferior sternocostal portions. The tendon was repaired using three suture anchors with SutureTape and FiberTape in a Krackow configuration. At 4-week follow-up, the patient demonstrated good motor recovery with satisfactory range of motion and improved quality of life. Secure anatomic reattachment of the PM tendon using three suture anchors achieved stable fixation and restoration of the humeral footprint. This technique is reproducible and effective for partial distal tears in active patients, with favorable early clinical outcomes

**Keywords:** Pectoralis major tendon rupture, Suture anchor repair, Partial tear, Shoulder surgery, Jiu-Jitsu, Case report

## INTRODUCTION

Pectoralis major (PM) tendon ruptures, first described in 1822, have increased in incidence over the past two decades due to the rising popularity of weightlifting and contact sports such as Jiu-Jitsu.[1]

These injuries predominantly affect young, physically active men (typically 20-40 years old) and most commonly occur during eccentric contraction with the arm in extension and external rotation.[2]

The PM muscle is a powerful adductor, internal rotator, and flexor of the humerus, playing a critical role in athletic performance and daily activities. Clinically, patients often report a sudden “pop” or sharp pain, followed by ecchymosis, swelling, weakness in adduction/internal rotation, and cosmetic deformity with thinning or loss of the anterior axillary fold.[2,3]

Diagnosis is primarily clinical, supported by imaging. Magnetic resonance imaging (MRI) is the gold standard for confirming the tear, assessing its location, and determining partial versus complete involvement.

However, discrepancies between MRI and intraoperative findings are well-documented, particularly with partial-thickness tears.[2,3]

Anatomically, the PM is a broad, fan-shaped muscle with clavicular and sternocostal heads that converge into a bilaminar tendon inserting on the lateral lip of the intertubercular groove of the humerus. Tears are classified by timing, location, and extent using systems such as Tietjen or the ElMaraghy classification.[4]

Although partial tears may initially be managed conservatively, persistent symptoms in young athletes often warrant surgical repair. Early intervention (ideally within 6-8 weeks) is associated with superior functional outcomes, strength recovery, and patient satisfaction compared to delayed repair or nonoperative treatment.[1,5]

We report the successful surgical repair of a partial distal PM tendon tear using three suture anchors in a 22-year-old jiu-jitsu athlete, with favorable early follow-up.

## CASE REPORT

A 22-year-old male with no significant past medical history presented with right shoulder pain and functional limitation.

One month prior to admission, he sustained an indirect trauma to the right PM during jiu-jitsu training due to an eccentric contraction mechanism (shown in Figure 1).

He reported a sudden onset of severe, sharp pain localized to the anterior chest/shoulder, exacerbated by movement and partially relieved by rest.

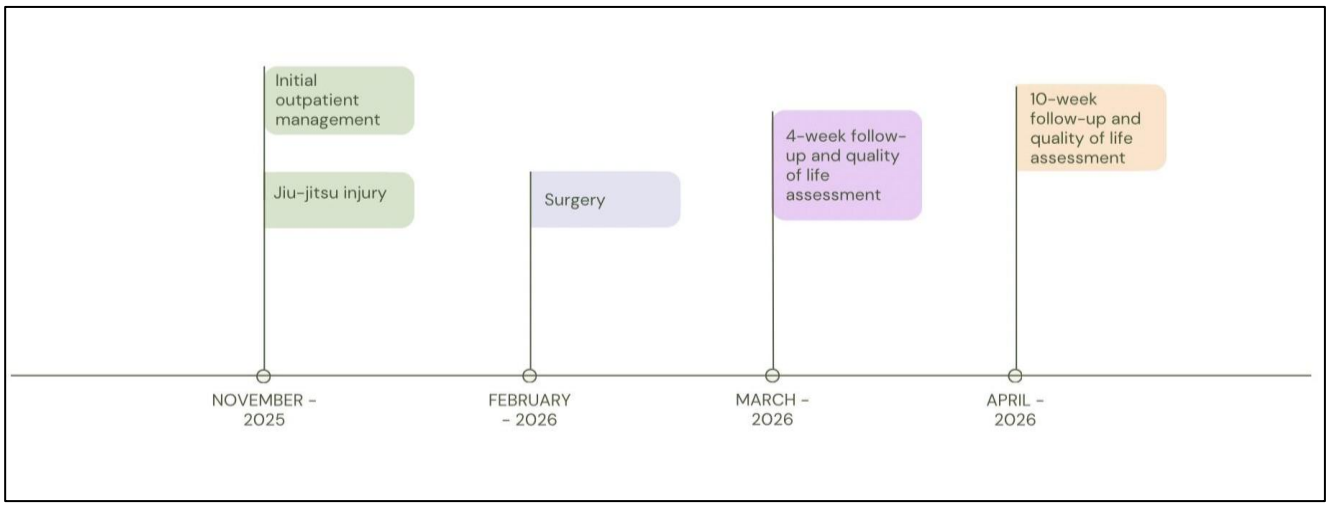


**Figure 1: Timeline of the case.**

Initial management consisted of oral analgesics and physical therapy, but symptoms persisted, prompting referral for surgical evaluation. Preoperative MRI demonstrated findings consistent with a tear at the humeral insertion of the PM (Figure 2 and 3). On physical examination, there was tenderness over the anterior axillary fold, mild asymmetry compared to the contralateral side, and weakness in resisted adduction and internal rotation. These findings raised suspicion for a PM injury and guided the differential diagnosis (Table 1).

The patient was taken to the operating room approximately one month after injury. Under balanced general anesthesia, he was positioned in the beach-chair position. The right shoulder and upper extremity were prepped and draped sterilely using chlorhexidine solution. The arm was secured in a surgical holder in adduction and external rotation.

A standard deltopectoral approach was utilized, identifying the coracoid process, deltopectoral groove, and cephalic vein (which was preserved). Layer-by-layer dissection exposed the humeral insertion of the PM tendon. Intraoperative findings revealed a partial rupture of the distal fibers involving both the superior and inferior portions of the sternocostal head, with intact anterior-layer fibers superiorly (Figure 4).

Nonviable tissue was debrided, and the humeral footprint was meticulously prepared with a burr until bleeding bone was achieved to promote tendon-to-bone healing. The tendon was repaired using 1.3 mm SutureTape and FiberTape placed in a Krackow configuration (Figure 5).

Two initial 5.5 mm drill holes were created proximally and distally, and 5.5 mm SwiveLock anchors were inserted. An intermediate 4.75 mm drill hole was then made to optimize fixation without excessive cortical weakening. Initial anchor placement at this site failed due to high cortical bone density, causing anchor breakage; the failed implant was removed and successfully replaced with a new anchor (Figure 6). Final fixation achieved excellent tension and stability across the repair site. Repair integrity was confirmed with passive range of motion in internal and external rotation (Figure 7).

The wound was copiously irrigated, closed in layers, and dressed sterilely. Extremity was immobilized in universal shoulder immobilizer. Patient tolerated procedure well and was discharged to recovery in stable condition.

***Postoperative course and follow-up***

The patient was maintained in a shoulder immobilizer for the initial postoperative period per standard bone-to-tendon repair protocol. At the 10-week follow-up visit, he demonstrated good motor recovery with painless passive and active-assisted range of motion approaching functional levels, full strength in non-resisted movements, and no signs of re-tear or infection. Quality-of-life assessment showed significant improvement in daily function and return to light activities, with high patient satisfaction regarding pain relief and cosmetic appearance of the anterior axillary fold. He continued a structured rehabilitation program focused on progressive range of motion and scapular stabilization.

**Table 1: Differential diagnosis of exertional shoulder/chest pain.**

| Differential diagnosis | Findings supporting in this case | Findings against in this case |
|---|---|---|
| **Complete PM tendon tear** | Acute eccentric mechanism, pain, functional limitation, MRI changes at insertion | Intraoperative: only partial distal fiber involvement |
| **Subscapularis tendon tear** | Weakness in internal rotation | No intraoperative subscapularis pathology |
| **Rotator cuff tear (other)** | Pain with shoulder movement | Focal findings limited to PM region on MRI/clinical exam |
| **Proximal humerus fracture/dislocation** | Trauma history | No radiographic evidence (assumed normal preop imaging) |
| **Simple muscle contusion/strain** | Exertional mechanism | Persistent symptoms + MRI and intraoperative tear confirmation |
| **Long head of biceps rupture** | Anterior shoulder pain | No biceps tendon involvement intraoperatively |

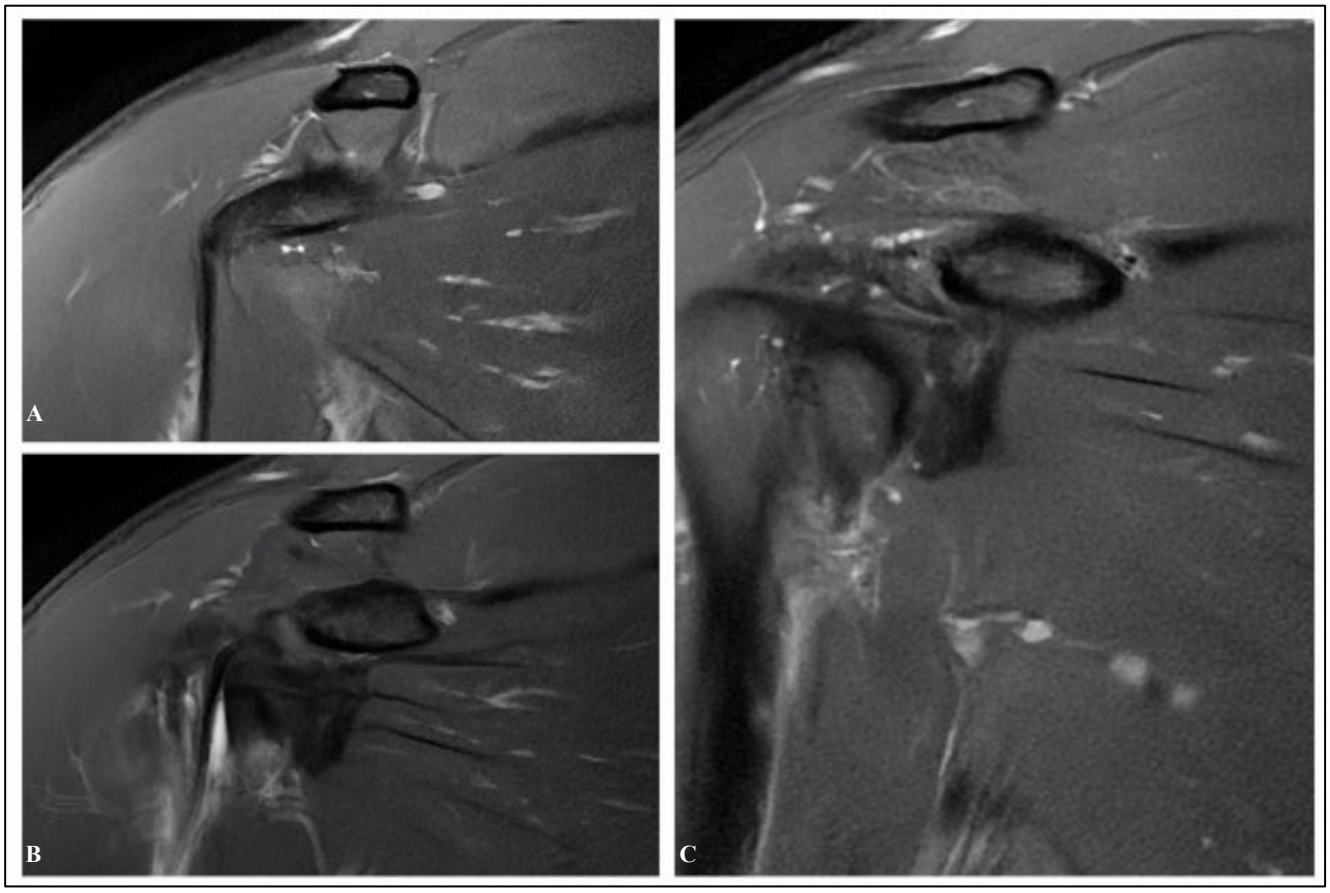


**Figure 2 (A-C): Pre-op MRI showing PM rupture on T2 (coronal plane).**

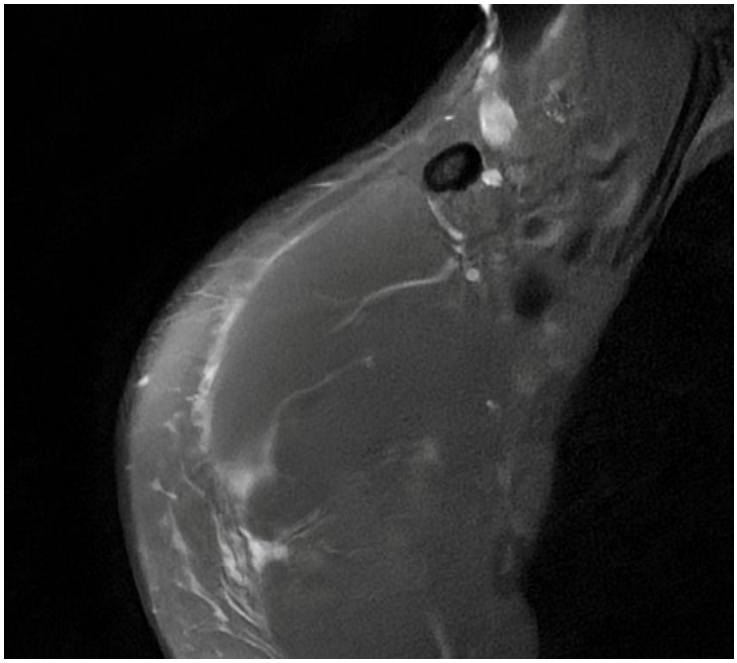

**Figure 3: Pre-op MRI showing full PM rupture on T2 (Coronal plane).**


**Figure 4: (A) Intraoperative dissection by planes of the right deltopectoral approach; (B) intraoperative view of the anterior axillary region showing a partial rupture of the right PM tendon; (C) identification and grasping of the injured tendon edges using an open technique to proceed with the suturing and re-anchoring of the PM muscle.**

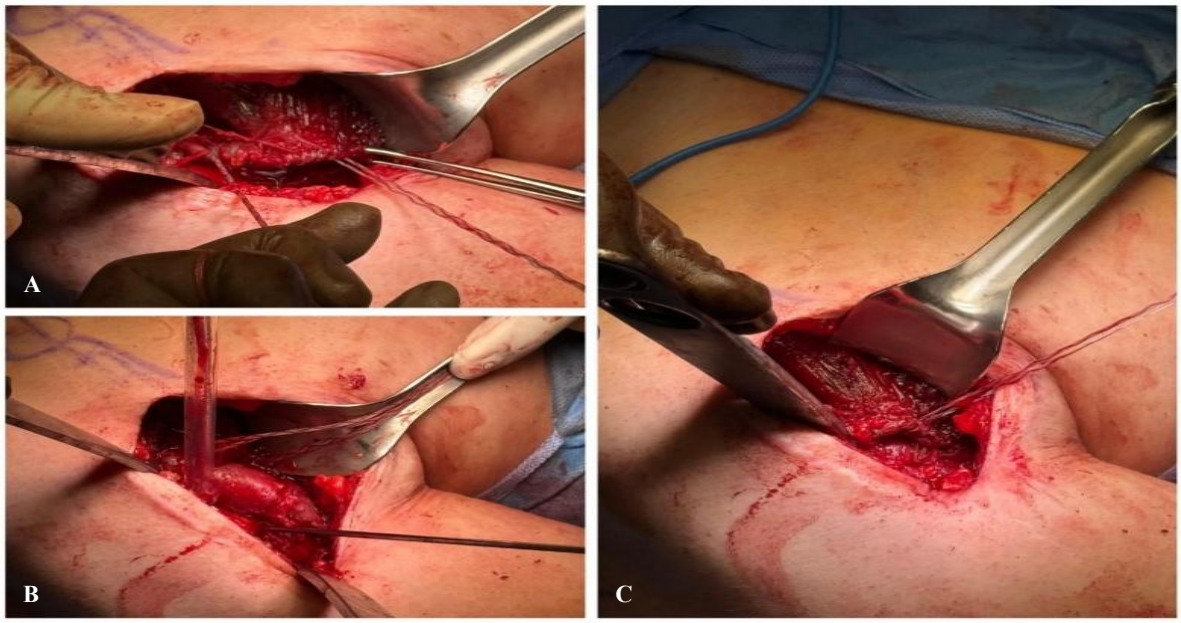


**Figure 5 (A-C): Intraop detail of Krackow technique applied to the right PM tendon prior to its humeral re-anchoring.**

**Figure 6: Placement of the first bone anchor in the proximal humerus for reinsertion of the PM tendon.**

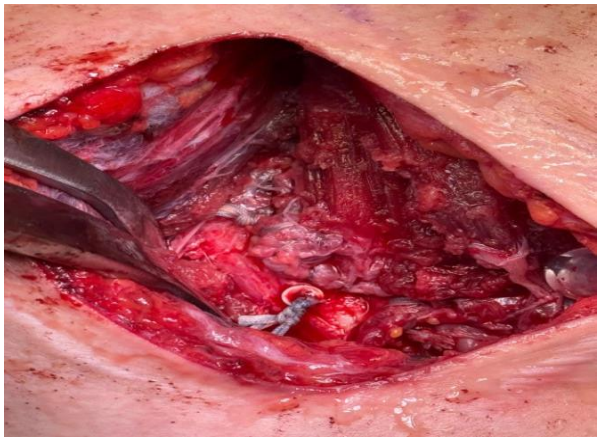

**Figure 7: Final intraoperative detail of the PM repair.**

*The final appearance of the tensioned and reinserted tendon is observed using a configuration of three bone anchors and sutures.

## DISCUSSION

This case highlights the successful management of a symptomatic partial distal PM tendon tear in a young athlete using three suture anchors. Although MRI suggested a complete injury, intraoperative visualization confirmed a partial-thickness tear limited to the distal sternocostal fibers-a known discrepancy reported in the literature.[2,3]

Surgical repair with suture anchors (often 2-3 anchors) combined with Krackow or locking stitches is a reliable, reproducible technique that restores the anatomic footprint and provides strong fixation. The addition of an intermediate anchor addressed the broad insertion while managing cortical density issues, ultimately achieving stable repair without complications.[7-9]

Current evidence supports surgical intervention over conservative management in young, active patients with persistent symptoms, as it yields better functional scores, strength recovery, and cosmetic results.[10] Early repair (within 6-8 weeks) is preferred, consistent with our intervention at approximately 4 weeks post-injury. The favorable early outcome at 10 weeks (good motor function and improved quality of life) aligns with reported short-term benefits of anatomic repair in athletes.

Limitations of this report include its single-case nature, short-term follow-up, and absence of long-term objective strength testing (e.g., isokinetic dynamometry) or validated outcome scores (ASES, Constant).

## CONCLUSION

The use of three suture anchors allowed secure anatomic reattachment of the partially torn PM tendon to the humerus, with excellent intraoperative stability and favorable early clinical results at 10 weeks, including good motor recovery and improved quality of life. This technique is effective for restoring function in young athletes with symptomatic partial distal tears. Early surgical intervention remains the preferred approach when conservative treatment fails.

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