Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Radiology

Rupture of the Pectoralis Major: A Case Report

A. Diani[1*], N. Yassine[1], M. Boussif[1], Benzalim, M[1], Alj, S[1]

[1]Department of Radiology, Ibn Tofail Hospital, Mohamed VI University Hospital, Faculty of Medicine and Pharmacy, Cadi Ayyad University Marrakech, Morocco

DOI: 10.36347/sjmcr.2023.v11i05.005 | **Received:** 10.03.2023 | **Accepted:** 28.04.2023 | **Published:** 03.05.2023

***Corresponding author:** A. Diani
Department of Radiology, Ibn Tofail Hospital, Mohamed VI University Hospital, Faculty of Medicine and Pharmacy, Cadi Ayyad University Marrakech, Morocco

Abstract **Case Report**

The rupture of the pectoralis major muscle is a rare entity. It occurs in young, healthy athletes during violent, eccentric contraction of the muscle with the arm held in an abducted and extended position, particularly in weightlifting. Diagnosis of pectoralis major tendon rupture can be made based on clinical examination but imaging plays a crucial role into confirming the diagnosis. Magnetic resonance imaging (MRI) is the most sensitive imaging modality for diagnosing, grading, evaluation and surgical planning of pectoralis major rupture. Early surgical treatment is associated with better outcome. We report a case of rupture of the pectoralis major in a 32-year-old man who presented a rupture of the pectoralis major after weight lifting.

Keywords: Pectoralis major muscle; rupture; shoulder; MRI.

INTRODUCTION

Rupture of the pectoralis major muscle is a relatively rare injury that can occur in athletes and individuals who engage in activities that require intense upper body movements. The incidence has been escalating, likely due to an increased interest in health and fitness [1].

While the diagnosis of pectoralis major rupture can often be made based on clinical examination, radiologic imaging, particularly magnetic resonance imaging (MRI), is essential in confirming the diagnosis, determining the severity of the injury, and guiding treatment [2].

Due to the rarity of this condition, it may be missed at initial presentation—or misdiagnosed as a sprain—and managed non-surgically [3]. It is imperative to promptly identify the condition, because early treatment maximizes the functional outcome of what can be a debilitating injury.

We report a case of rupture of the pectoralis major in a 32-year-old man who presented a rupture of the pectoralis major after weight lifting.

CASE PRESENTATION

A 31-year-old man, with no particular medical history, experienced a sudden and severe pain in his right chest while doing his routine workout in the gym. Although the patient presented a total functional impotence of the shoulder, he didn't consult and he chose to undergo medical treatment. One month later, the patient presented to our department due to persistent pain and decreased muscle strength during adduction and internal rotation movements of the arm. Additionally, he is bothered by the asymmetry of his chest, which he finds unappealing.

Upon inspection, clinical examination reveals a disappearance of the anterior relief of the axillary fossa. Palpation reveals a discontinuity along the path of the major pectoral muscle. Passive and active movements of adduction and internal rotation show muscle weakness.

A plain radiograph of the right shoulder revealed no fracture, dislocation, or other bony abnormality. The diagnosis of a ruptured major pectoral muscle was suspected and hence MRI was performed, showing a disinsertion of the tendon of the pectoralis major muscle from its humeral insertion, with the presence of liquid infiltration in high signal intensity in DP sequence without any hemorrhagic signs in T2 MERGE sequence, and detachment of the long portion of the homolateral biceps and retraction of the muscular body (Figure1). There was an associated signal abnormality in the clavicular and sternal chief of the

pectoralis major, showing hyperintensity on DP-weighted imaging, consistent with muscle edema.

The diagnosis of a complete rupture of the tendon of the major pectoral muscle grade III was confirmed.

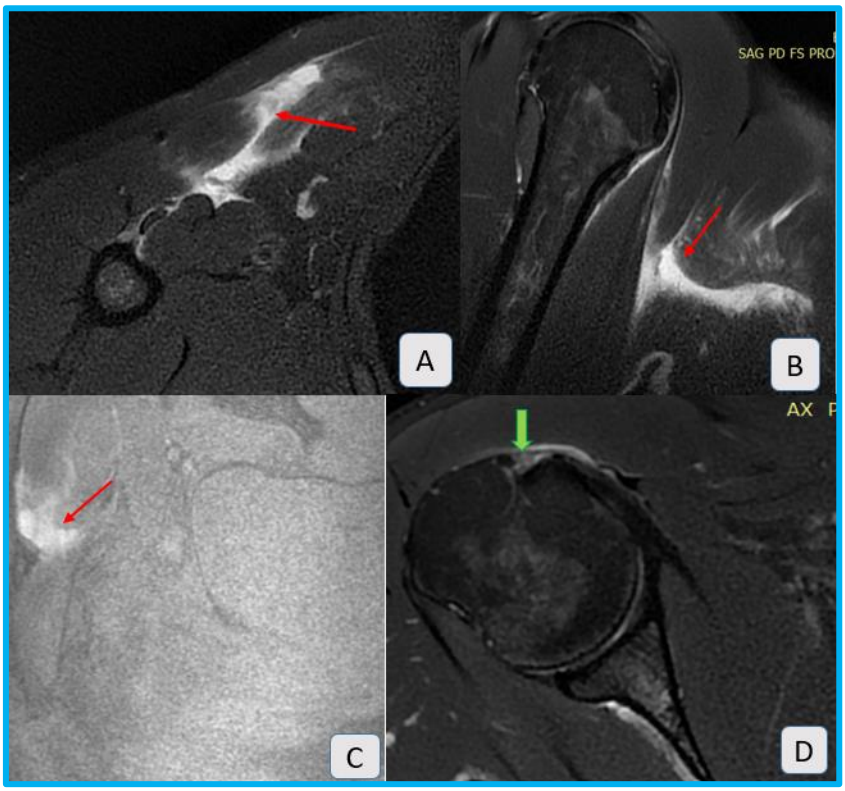

Figure 1: Axial and sagittal T2 DP fat-saturated MRI of the shoulder (A, B,D), with a sagittal MERGE sequence(C): shows a hyperintense DP fluid signal indicative of a rupture of the large pectoralis major without hemorrhagic signs on the MERGE sequence(reds arrows), and a disinsertion of the long head of the biceps, as evidenced by the empty appearance of the bicipital groove (green arrow)

The patient was treated surgically and the arm was immobilized for few weeks. At five months of follow-up, the patient had regained full range of movements and returned to his pre-injury level of activity.

DISCUSSION

The pectoralis major is a large, powerful muscle that is located in the anterior part of the chest. It is responsible for movements of the shoulder joint, including adduction, flexion, and medial rotation [4].

Rupture of the pectoralis major is a relatively rare injury, accounting for approximately 3% of all musculoskeletal injuries in athletes. It was first described by Patissier in 1822 in Paris [5], followed by Letenneur in 1861 [6].

The majority of these lesions affects men between the ages of 20 and 40 during and most commonly occurs in weightlifters and other athletes who perform activities that involve intense upper body movements [7, 8]. The use of anabolic steroids as a contributing factor has been reported by several authors [9]. Most lesions are located at the musculotendinous junction and result from violent, eccentric contraction of the muscle, such as during bench press [10]. Other possible mechanisms of injury include direct trauma to the muscle and degenerative changes in the muscle due to aging or chronic overuse. Partial tears are more common than complete tears. Similarly, distal tears are more common than proximal tears [11].

Diagnosis of pectoralis major tendon rupture can be made based on clinical examination, but imaging is necessary to confirm the diagnosis and assess the extent of injury.

Patients who experience a rupture of the pectoralis major muscle typically report sudden and severe pain in the chest or shoulder, accompanied by a tearing sensation. There may also be swelling and ecchymosis in the affected area, as well as functional impotence and limited range of motions in the shoulder [12]. Diagnosis is typically made based on a physical examination, which may reveal a visible deformity in the chest or upper arm.

Radiologically, several imaging modalities can be used to diagnose pectoralis major rupture, including

ultrasound, magnetic resonance imaging, computed tomography (CT), and X-ray. Ultrasound is a quick and reliable initial imaging modality for detecting complete tears of the pectoralis major. US also facilitates higher spatial resolution than does MR imaging, and it may be used to interrogate subtle abnormalities of the tendon [2]. It is particularly useful in diagnosing partial tears of the pectoralis major muscle, as it can detect changes in the muscle architecture and identify areas of fluid accumulation, but it remains operator dependent [7].

X-ray imaging and CT can be used to rule out associated fractures or dislocations, but they are not sensitive enough to diagnose pectoralis major rupture. Plain X-Ray of the arm and shoulder may show a bony tear of the outer lip of the bicipital groove [13]. MRI is the most sensitive imaging modality for diagnosing, grading, evaluation and surgical planning of pectoralis major rupture. It provides better visualization of the extent of injury, degree of muscle retraction, and associated soft tissue injuries [2, 14].

The radiologic findings in pectoralis major rupture vary depending on the severity of the injury. In partial tears, ultrasound and MRI may show focal areas of muscle thinning or disruption, with associated fluid accumulation. In complete tears, there may be complete disruption of the muscle fibers and tendon, with retraction of the muscle belly. US findings of pectoralis major tendon injuries include disruption, absence, and retraction of the tendon and muscle fibers, as well as hematoma [15]. MRI can be used to distinguish recent lesions in T2 sequences, highlighting edema and hematoma, from old lesions in T1 sequences, showing retraction of the muscle body. It may also reveal associated injuries, such as rotator cuff tears or bone avulsion fractures [2].

Similar to findings at US, tears of the pectoralis major tendon seen at MR imaging exhibit different degrees of tendon abnormality, depending on the degree of injury. A grade I strain of the muscle belly will have feathery intramuscular fluid-sensiive signal intensity, which represents edema and/ or hemorrhage. A grade II injury will appear as a partial tear with an intramuscular hematoma. A grade III injury will appear as a complete tear with possible retraction [2].

In 1980, Tietjen suggested an anatomic classification of the pectoralis major's injuries for the purpose of making conservative vs surgical treatment recommendations. It is based on the extent and anatomical location of the tear. Type I is a contusion or sprain, which is the most common. Type II is a partial tear, which is very difficult to differentiate from a complete rupture. Type III is a complete tear that is relatively uncommon and can be easily missed initially. Type III injury is divided into four groups, depending on the location of the tear. Type IIIA is a tear at the muscle origin, resulting in cosmetic deformity swelling, and bunching of muscle away from the origin. Type IIIB is a tear at the muscle belly; it is associated with swelling and tenderness secondary to formation of a hematoma at the site of the tear. Type IIIA as well as IIIB are usually a result of a direct blow, commonly inflicted in automobile accidents. Finally, Type IIIC, a tear at the musculotendonous junction, and Type IIID, a tear of the muscle-tendon insertion, usually demonstrate marked weakness in adduction, ecchymosis extending down the arm and the tendonous defect usually palpable. Rupture of the tendon at or near the insertion onto the humerus usually occurs when the muscle is at full tension and additional force is added [16]. A more contemporary classification system was recently proposed by ElMaraghy and Devereaux [17].

Rupture of the pectoralis major can also be categorized according to their location: muscle origin or belly, musculotendinous junction, intratendinous region, humeral insertion, or area of bone avulsion at the humeral attachment [2].

Surgical repair is generally recommended for complete ruptures of the pectoralis major tendon, as non-operative management has been associated with poor functional outcomes and a high risk of re-rupture. Postoperative rehabilitation typically involves immobilization in a sling for several weeks, followed by gradual strengthening exercises and range of motion exercises. Patients may also be advised to modify their activities and avoid heavy lifting or strenuous upper body exercises to prevent re-injury [1, 18].

CONCLUSION

Pectoralis major rupture is a rare clinical entity that has become more common over the past 30 years with increasing participation in competitive sports and weightlifting. Proper understanding of the mechanism of injury, clinical and radiological findings is essential to minimize delays in diagnosis and maximize the functional outcome of this often debilitating injury.

Diagnosis of a pectoralis muscle tear may be difficult. Functional impotence, along with pain and loss of axillary fold, are signs that further investigation is warranted.

MRI is the imaging modality of choice to confirm the diagnosis, particularly in cases of acute rupture, where clinical examination may be limited by marked ecchymosis, swelling, and tenderness. Surgical repair is generally recommended for complete ruptures.

REFERENCES

1. Potter, B. K., Lehman Jr, R. A., & Doukas, W. C. (2006). Pectoralis major ruptures. *American Journal of Orthopedics (Belle Mead, NJ)*, *35*(4), 189-195.

2. Lee, Y. K., Skalski, M. R., White, E. A., Tomasian, A., Phan, D. D., Patel, D. B., ... & Schein, A. J. (2017). US and MR imaging of pectoralis major injuries. *Radiographics*, *37*(1), 176-189.
3. Hanna, C. M., Glenny, A. B., Stanley, S. N., & Caughey, M. A. (2001). Pectoralis major tears: comparison of surgical and conservative treatment. *British Journal of Sports Medicine*, *35*(3), 202-206.
4. Marmor, L., Bechtol, C. O., & Hall, C. B. (1961). Pectoralis major muscle: function of sternal portion and mechanism of rupture of normal muscle. *JBJS*, *43*(1), 81-87.
5. Patissier, P. (1882). Traite Des Maladies Des Artisans. Paris: Jean-Baptiste Bailliére, p. 162-164.
6. Lettenneur, M. (1861). Rupture sous-cutanie du Muscle grand pectoral. *Inf Section Med J*, *52*, 202-205.
7. Beloosesky, Y., Grinblat, J., Katz, M., Hendel, D., & Sommer, R. (2003). Pectoralis major rupture in the elderly: clinical and sonographic findings. *Clinical imaging*, *27*(4), 261-264.
8. Bak, K., Cameron, E. A., & Henderson, I. J. P. (2000). Rupture of the pectoralis major: a meta-analysis of 112 cases. *Knee Surgery, Sports Traumatology, Arthroscopy*, *8*(2), 113-119.
9. Schepsis, A. A., Grafe, M. W., Jones, H. P., & Lemos, M. J. (2000). Rupture of the pectoralis major muscle: outcome after repair of acute and chronic injuries. *The American Journal of Sports Medicine*, *28*(1), 9-15.
10. Garrigues, G. E., Kraeutler, M. J., Gillespie, R. J., O'Brien, D. F., & Lazarus, M. D. (2012). Repair of pectoralis major ruptures: single-surgeon case series. *Orthopedics*, *35*(8), e1184-e1190. Disponible sur: https://pubmed.ncbi.nlm.nih.gov/22868603/
11. Wolfe, S. W., Wickiewicz, T. L., & Cavanaugh, J. T. (1992). Ruptures of the pectoralis major muscle: an anatomic and clinical analysis. *The American Journal of Sports Medicine*, *20*(5), 587-593.
12. Liu, J., Wu, J. J., Chang, C. Y., Chou, Y. H., & Lo, W. H. (1992). Avulsion of the pectoralis major tendon. *The American Journal of Sports Medicine*, *20*(3), 366-368.
13. Arciero, R. A., & Cruser, D. L. (1997). Pectoralis major rupture with simultaneous anterior dislocation of the shoulder. *Journal of Shoulder and Elbow Surgery*, *6*(3), 318-320. Disponible sur: https://pubmed.ncbi.nlm.nih.gov/9219140/
14. Lee, J., Brookenthal, K. R., Ramsey, M. L., Kneeland, J. B., & Herzog, R. (2000). MR imaging assessment of the pectoralis major myotendinous unit: an MR imaging—anatomic correlative study with surgical correlation. *American Journal of Roentgenology*, *174*(5), 1371-1375.
15. Lee, S. J., Jacobson, J. A., Kim, S. M., Fessell, D., Jiang, Y., Girish, G., & Magerkurth, O. (2013). Distal pectoralis major tears: sonographic characterization and potential diagnostic pitfalls. *Journal of Ultrasound in Medicine*, *32*(12), 2075-2081.
16. Tietjen, R. O. N. A. L. D. (1980). Closed injuries of the pectoralis major muscle. *The Journal of trauma*, *20*(3), 262-264.
17. ElMaraghy, A. W., & Devereaux, M. W. (2012). A systematic review and comprehensive classification of pectoralis major tears. *Journal of shoulder and elbow surgery*, *21*(3), 412-422.
18. Petilon, J., Ellingson, C. I., & Sekiya, J. K. (2005). Pectoralis major muscle ruptures. *Operative Techniques in Sports Medicine*, *13*(3), 162-168.