

Pectoralis Major Rupture in a 49-Year-Old Woman

Daniel M. Avery III, MD, Gregory F. Carolan, MD, and Anthony Festa, MD

Abstract

Pectoralis major ruptures have been increasing in incidence over the past decade, most likely attributable to physical activities, such as sports and weight training. Men account for the vast majority of cases with elderly women making up the remaining small percentage. In this case report, we describe a pectoralis major rupture in a middle-aged woman that has never been documented and provide a brief review of the literature.

Ruptures of the pectoralis major were first described in 1822.^{1,2} Most of the early ruptures reported were owing to work-related injuries.¹⁻³ In the last few decades, there have been more reports of these injuries in the scientific literature,³ with a majority occurring during sports-related activities.⁴⁻⁸ Based on the current literature, these injuries are seen almost exclusively in men, typically aged 20 to 40 years.⁹ The incidence of pectoralis major ruptures in women is extremely low, with no reported cases occurring in middle-aged women.

In this report, we describe a traumatic pectoralis major rupture, which was related to weightlifting activities, and its subsequent surgical treatment in a middle-aged woman. We include a current literature review to place this injury, previously unreported in this demographic, into context. The patient provided written informed consent for print and electronic publication of this case report.

Case Report

An active, 49-year-old, right-hand-dominant woman presented to the office 2 weeks after an injury while exercising. She reported bench-pressing 10-lb dumbbells when she felt a pop in her right anterior shoulder. This was associated with immediate pain and deformity. She was a physically fit individual, exercising 5 to 7 times per week, performing aerobic and weight-training activities. She denied any prior pain in that shoulder. Her medical and surgical histories are notable for having undergone bilateral subpectoral breast augmentation 11 years before the injury. The augmentation was revised for exchange of implants 5 years prior to injury. Her physical examination at presentation showed a loss of contour in the axillary fold,

which was accentuated with resisted shoulder adduction (Figure 1). There was mild swelling with trace ecchymosis in the anterior shoulder with no neurovascular compromise.

Standard radiographic assessment of the right shoulder showed no pathology. Magnetic resonance imaging (MRI) showed a complete rupture of the pectoralis major tendon off of its humeral insertion with retraction (Figures 2 and 3). We saw no muscle atrophy or other pathology.

After a discussion with the patient about her treatment options, she elected for surgical repair of the pectoralis major tendon. The outpatient procedure was performed under general anesthesia with a regional block. We used a deltopectoral approach and identified the tendon end that was easily reducible to its humeral insertion. We performed a transosseous repair using #2 FiberWire (Arthrex, Naples, Florida) with 4 Mason-Allen stitches. The patient was rehabilitated with early passive range of motion, progressing to active range of motion at 6 weeks. Strengthening was initiated at 12 weeks, and the patient resumed her functional activities, including rock climbing, at 6 months (Figure 4).

Discussion

Ruptures of the pectoralis major muscle have been reported as the result of work-related activities,^{1,2,5} but more than half of all reported cases in the English literature in the past few decades have been related to sports-related activities,⁴⁻⁸ likely because of the rise in the general population's interest in health and

Figure 1. Preoperative photograph showing loss of contour in the right axillary fold.



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Figure 2. Axial right chest fat-suppressed proton-density magnetic resonance imaging. Short arrow points to the biceps tendon and long arrow points to the retracted pectoralis major muscle tendon.



Figure 4. Postoperative photograph showing restoration of right axillary contour.

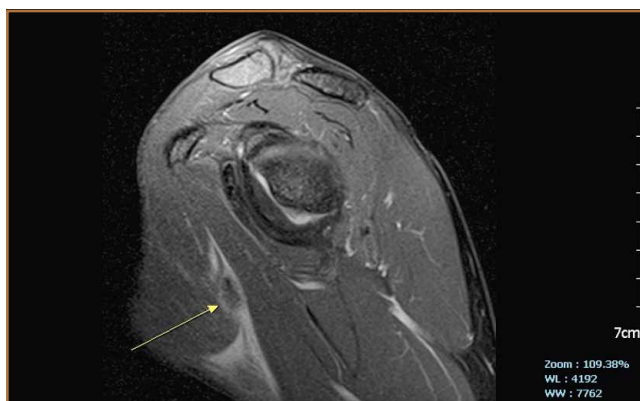


Figure 3. Sagittal right chest fat-suppressed proton-density magnetic resonance imaging. Long arrow points to the retracted pectoralis major muscle tendon.

fitness with an increased emphasis on strength training.⁹ The vast majority of these injuries occur in young to middle-aged men (20 to 40 years old).^{3,9,10} The pectoralis major is at risk for rupture in activities where the arm is extended and externally rotated during maximal contraction,^{6,11} most commonly seen in a bench-press exercise. Patients at the time of tear commonly hear a pop or feel a tearing in the shoulder followed by pain.^{9,10}

Swelling, ecchymosis, and loss of anterior axillary fold are the most common observations during the physical examination.¹⁰ Although a hollow sheath can give the appearance of an intact tendon, careful inspection and palpation for contractility and girth can show asymmetry to the unaffected shoulder. Examination findings can be as diffuse as generalized weakness and pain, although weakness and discomfort associated with adduction and internal rotation are commonly seen.¹⁰

Radiographs are a typical first choice of imaging modality in an acute injury. They can help identify a pectoralis major rupture if there is a bony avulsion or, less commonly, if loss of the pectoralis major shadow can be identified.¹ Ultrasound is a relatively inexpensive way to identify and locate a tendon

rupture.¹² MRI, however, has become the diagnostic imaging modality of choice for its ability to accurately identify the extent of tear, location of tear, location of tendon if retracted, presence or amount of muscle atrophy, and associated pathology.¹⁰

Nonoperative treatment of pectoralis muscle injuries is generally reserved for proximal tears, partial tears, and for tears in elderly or low-demand individuals.^{9,10} Treatment includes sling immobilization in an adducted, internally rotated position, cold compression, and analgesics.

Surgical repair is generally indicated in all young, active patients regardless of chronicity¹⁰ to achieve the greatest patient satisfaction, cosmesis, and chance of return to high level of activity.⁹ Some authors recommend acute repair (within 8 weeks) to achieve optimal results.^{1,9} However, delayed surgical intervention in cases of failed conservative treatment is possible, as are good to excellent outcomes.¹³ According to Schepsis and colleagues,¹⁴ there is no significant outcome difference between acute and delayed repairs, with both demonstrating superior results to nonoperative treatment.

Operative repair most commonly employs the deltopectoral approach^{9,10} and, less commonly, an anterior axillary approach.¹⁴ Different techniques have been described for reattaching the avulsed tendon to the humerus, including transosseous tunnels, suture anchors, unicortical buttons, and screws and washers.^{9,10,15}

Rehabilitation after surgery requires sling immobilization with early pendulum exercises for the first 6 weeks. Passive forward elevation is generally allowed with the arm in an adducted position,⁹ and some authors recommend passive range of motion in all planes with avoidance of abduction and external rotation.¹⁴ At 6 weeks, passive range of motion is allowed to progress without limit and active range of motion is initiated. At 2 to 4 months, patients begin resistance and strengthening, with release to unrestricted activity at 6 months, although some authors discourage heavy pressing indefinitely.⁹

Outcomes after surgical repair have been favorable.^{11,16-19} In a meta-analysis, Bak and colleagues¹ found excellent surgical results in comparison with those treated nonoperatively, with better results in younger patients. Complications after surgical repair are low but include infection (the incidence of which increases with use of the anterior axillary approach),^{9,20} rerupture (0% to 7.7%),¹⁷⁻¹⁹ heterotopic ossification,⁴ and hematoma requiring evacuation.¹⁷

Although young men are most likely to incur these injuries, a subset of women are affected, accounting for approximately 3% of these injuries, with the only reported injuries in the English literature in patients aged 73 to 97 years.^{3,10} As opposed to their male counterparts who sustain these injuries secondary to indirect trauma, women have been reported to sustain these injuries as the result of direct trauma during lifting and/or transfer maneuvers as they are grasped in the axilla.³ This can result from stiff and atrophic muscles in these patients who require this type of assistance.¹⁰ Young and middle-aged women may be protected from these injuries based on a larger tendon-to-muscle diameter, greater elasticity, and less energetic injuries.²⁰

Conclusion

Our patient is the first middle-aged woman reported to have a rupture of the pectoralis major muscle. The mechanism of injury is similar to that reported as the cause of these injuries in men, but her age and sex make her presentation and treatment unique. Although it is plausible that her previous breast augmentation surgeries may have predisposed her to this injury, the surgical technique for that procedure does not expose or violate the tendinous insertion of the pectoralis major, making it less likely to be a causative factor. It is more likely that her high level of physical fitness and activity had more to do with the injury than any other factor; however, definitive statements are impossible given that this injury is unique in her demographic.

With the explosive rise in the popularity of weight training and physical fitness among women over the past few decades, it is possible that this injury will be more commonly seen in this demographic, as suggested by Petilon and colleagues.⁹ The diagnosis should be entertained by the evaluating physician.

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