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Delayed Repair of a Ruptured Pectoralis Major Muscle

A Case Report

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Ruptures of the pectoralis major muscle are quite uncommon, but not rare. The first reported case was described by Patissier in 1822.⁹ Fewer than 100 cases have been reported in the English literature in the past 25 years. Often, a partial or complete pectoralis major muscle rupture is misdiagnosed as a muscle sprain and is treated with a sling. A number of cases have been reported in which there was a delay of 3 months to 5 years between the time of injury and successful surgical repair.^{2,4,6-8,11,13} We report a case of a pectoralis major rupture that was successfully repaired 13 years after the initial injury.

CASE REPORT

A 34-year-old, active, right-handed man was seen with an acute rupture of the right pectoralis tendon sustained during weightlifting. This tendon rupture was surgically repaired by suturing the avulsed tendon through drilled holes in the humerus. During rehabilitation after surgery, the patient reported that 13 years previously he had sustained a similar type of injury to his left shoulder while weightlifting. He regained most of his range of motion but continued to have profound weakness in humeral adduction. Examination of the left shoulder revealed loss of the axillary fold with a thin band of tissue remaining, which is consistent with a rupture of the left pectoralis major muscle. Surgical repair was proposed with the expectation of restoring at least partial function.

The surgery was performed by the senior author (RAM) using a deltopectoral approach. The deltopectoral interval was identified and the deltoid muscle and the cephalic vein were retracted laterally. The clavicular head of the

pectoralis major muscle was found to be partially intact, but the sternal head was ruptured. Interestingly, the avulsed sternal head was adherent to the remaining clavicular head, thereby preventing further retraction. The injured sternal head was subsequently mobilized with sharp and blunt dissection so that direct attachment to the humerus was possible. After mobilizing the ruptured tendon, the surgeon identified the insertion of the tendon and placed a suture into its stump. A trough was made on the humerus with a bur, and five drill holes were placed posteriorly and superiorly to the intact clavicular head insertion on the humerus. Sutures were used to secure the tendon through the drill holes. After surgery, the patient's upper arm was immobilized in internal rotation and abduction for 5 weeks.

At 5 weeks postoperatively, the patient was able to internally rotate the humerus and had 90° of forward flexion. At 3 months, rehabilitation included some light weight-training. At 6 months, the patient's tendon appeared quite improved functionally and cosmetically, and he began gentle strengthening exercises. At 9 months, the patient was functioning normally with no real functional limitation except for some mild stiffness in external rotation. The patient was very satisfied with the results (Fig. 1).

DISCUSSION

The pectoralis major muscle is a powerful adductor, internal rotator, and flexor of the humerus.¹ It originates from the medial third of the clavicle, the lateral side of the anterior manubrium and sternum, the cartilages of the first six ribs, and the external abdominal oblique fascia.³ The fibers of the clavicular portion, or the anterior lamina, originate from the clavicle and upper sternum and course to their insertions on the inferior surface of the humerus. The sternal head is composed of a manubrial end and a lower abdominal portion. The fibers of the abdominal portion insert highest on the humerus and have been found to

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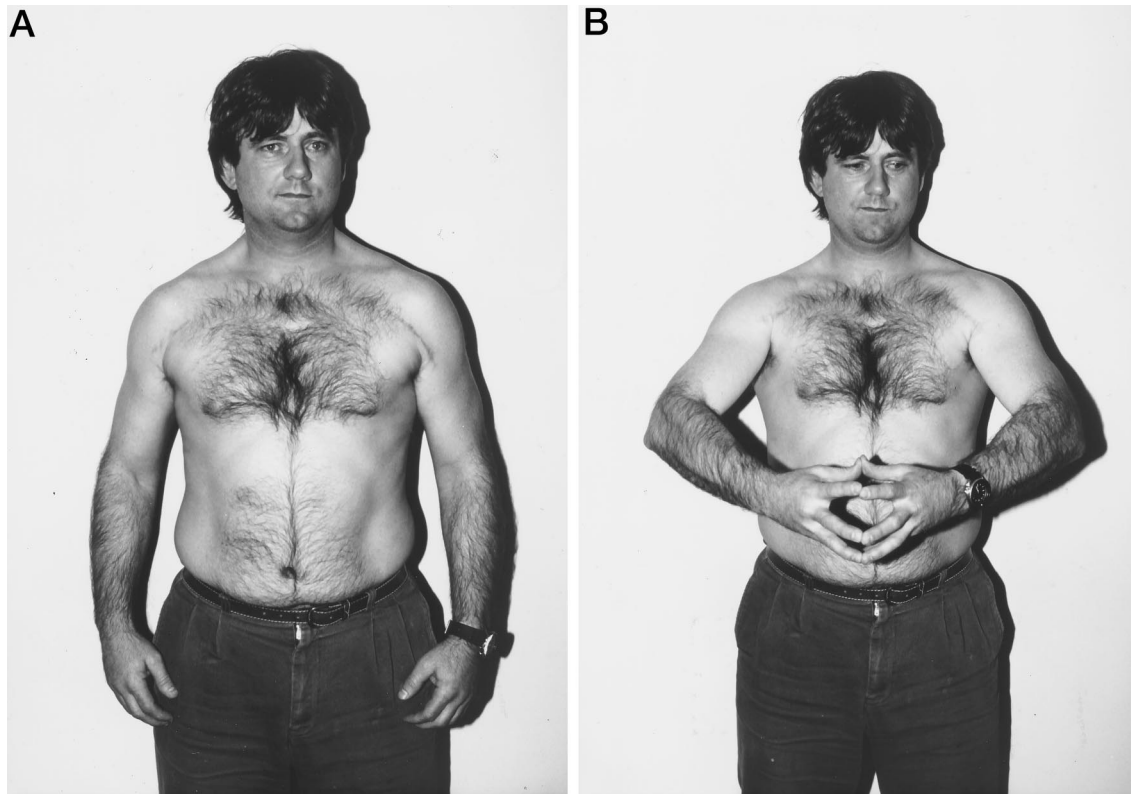


Figure 1. Normal contour and bulk of pectoralis major muscle was noted postoperatively in both the resting (A) and contracted (B) positions.

become disproportionately stretched during terminal humeral extension.¹³ Thus, during the bench press maneuver, the lower sternal abdominal fibers of the pectoralis tendon are subjected to inordinate stress and are the first fibers to rupture. This tear propagates to the remaining sternal head and finally to the clavicular head. Our patient demonstrated the more common sternal head avulsion, which had become attached or "condensed" to the remaining clavicular head, preventing gross retraction. Thus, the tendon was capable of sufficient mobilization to allow successful repair, despite the 13-year interval.

In acute pectoralis major muscle ruptures, loss of the anterior axillary fold, swelling, and ecchymosis of the anterior chest wall and upper arm occur after injury. Pain and a sensation of tearing are usually reported as well.⁶ It has been suggested that the swelling accompanying the rupture may make it difficult to achieve an accurate diagnosis and may contribute to the delay in its repair.¹³ Radiographic studies made shortly after injury show soft tissue swelling and loss of the pectoralis muscle shadow, but radiographs cannot accurately determine the extent of the injury.

By 4 weeks after injury, the swelling and ecchymosis usually subside but weakness in adduction, flexion, and internal rotation can still be detected. At this point, isokinetic muscle testing and dynamometry can be used to assess weakness in the pectoralis major muscle.^{8,11} Although palpating the tendon up to its humeral insertion may reveal a gap where the muscle is ruptured,^{4,12} this

method is not always reliable because in some cases the fascial layer remains intact and gives the false impression that the tendon is intact as well.⁵

The extent of the rupture and the disability it causes, the age of the patient, and the patient's level of activity are all factors in determining whether to manage the rupture nonoperatively or operatively. Although the patient may be able to recover some power in internal rotation, flexion, and adduction with simple immobilization, it is likely necessary to surgically repair a complete rupture to allow an athletic patient to return to his or her sport. Furthermore, ruptures of the musculotendinous junction or tendon often result in retraction of the muscle medially, leaving a cosmetic deformity and asymmetric axillary folds. Therefore, for a body builder, nonoperative management may yield an unacceptable appearance in addition to profound weakness.¹⁰

A number of cases of delayed repair of pectoralis major muscle ruptures have been reported in the literature. The longest delays in repair were reported in two patients who underwent repair 5 years after injury.⁶ After surgical repair, both patients achieved significant return of strength, but full strength and complete correction of the cosmetic deformity were not possible. In other cases with shorter delays, repairs were more successful.⁷ In our patient, the spared portion of the clavicular head prevented the muscle from fully retracting medially and contributed to the feasibility of repair.

SUMMARY

Repair of a pectoralis major muscle rupture at the tendinous insertion into the humerus was successfully performed 13 years after the initial injury. Repair was possible only because the ruptured sternal portion of the muscle was scarred to the intact clavicular portion and therefore had not retracted. The attachment of the avulsed sternal head to the intact clavicular head enabled successful restoration of strength and function, as well as normal contour and appearance of the pectoralis major muscle complex.

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