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SHOULDER

Out of the ring and into a sling: acute latissimus dorsi avulsion in a professional wrestler: a case report and review of the literature

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Abstract We present a 29-year-old professional wrestler who sustained a traumatic latissimus dorsi tendon rupture from its humeral insertion. To our knowledge, this report is the first to describe the use of two small anterior axillary incisions to repair a traumatic avulsion of the latissimus dorsi. Our new surgical approach is an alternative treatment for highly competitive, muscular athletes, while taking the associated nerves and cosmetic appearance into consideration.

Keywords Latissimus dorsi · Tendon rupture · Tendon avulsion

Introduction

The latissimus dorsi is the broadest muscle of the back, and one of the largest muscles in the body. It originates from the thoracic spine, thoracolumbar spine, and iliac crest. It inserts on the crest of the lesser tuberosity and the medial aspect of the bicipital groove of the proximal humerus. The latissimus dorsi muscle adducts, internally rotates and extends the humerus. It acts to depress the arm against resistance and also pulls the trunk upward and forward when the arms are fixed [11]. Avulsion injuries of the latissimus dorsi tendon are rarely reported in the literature and present with a range of symptoms, physical examination, and subsequent treatment options. These differences in presentation, and the rarity of this injury, often result in a delayed diagnosis [2, 3, 10]. Nonoperative treatment of these injuries is not recommended due to the weakness in arm depression strength and the associated cosmetic deformity. We report a case with an acute traumatic latissimus dorsi avulsion injury in a professional wrestler with repair of the latissimus dorsi through two incisions.

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Case report

The patient is a 29-year-old professional wrestler, 2 weeks prior to his initial visit, who suffered a kick to his chest resulting in him flipping over the ropes of a wrestling ring and falling with an outstretched right arm onto the underlying concrete floor. He described an immediate hyperextension sensation associated with pain within the right arm and axilla. He reported painful movement and significant swelling. The patient returned to wrestling shortly after with increased pain, which was most severe while throwing punches. He reported that he had functional limitations with overhead activities, reaching behind his back, throwing, and night pain. He denied any neck pain or dysesthesias down his arm.

He had no significant medical history, and there was no prior injury to the affected shoulder. Physical examination revealed significant ecchymosis over the right medial proximal arm and axilla. His cervical spine and upper extremity neurologic exams were normal. His shoulder range of motion was normal bilaterally. He had no strength deficits in his right upper extremity for his biceps, triceps, deltoid, supraspinatus, and shoulder internal or external rotation. His right shoulder demonstrated an inability to

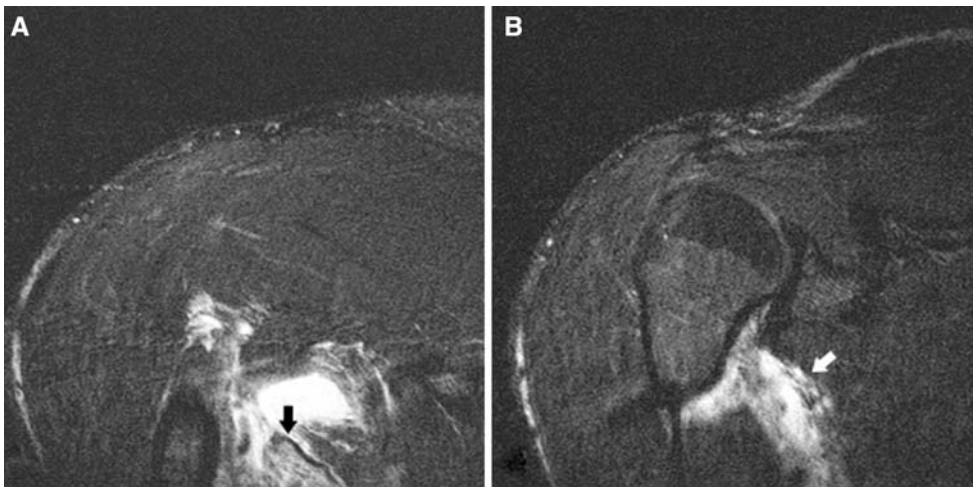

Fig. 1 Preoperative coronal MRI demonstrates a rupture and retraction of the latissimus dorsi tendon (*black arrow*) with marked surrounded edema (*white arrow*). His subscapularis tendon was intact and the remainder of the rotator cuff tendons were intact

Fig. 2 Preoperative positioning demonstrates extensive swelling inferiorly along his right shoulder and axillary crease

perform a lift off test. There was asymmetry noted within the right axilla with loss of a normal definition of the latissimus dorsi muscle in the axilla compared to the contralateral left side. He had mild scapular winging with fatigue, and had swelling posteriorly and inferior to the scapula. There were no signs of concomitant injuries.

Radiographs of the right shoulder were normal. Review of a right shoulder MRI demonstrated a rupture with retraction of the latissimus dorsi tendon and marked surrounding edema (Fig. 1). His subscapularis tendon was intact and the remainder of the rotator cuff tendons were also normal.

Surgery was performed in the semilateral beachchair position. A 5 cm incision was made in the lower portion of the axillary crease while the arm was positioned at 90° abduction, neutral flexion, and maximal external rotation (Fig. 2). Distal dissection was performed to identify the teres major tendon region and via blunt dissection, a large hematoma was evacuated and the torn end of the latissimus dorsi tendon identified. This had retracted distally

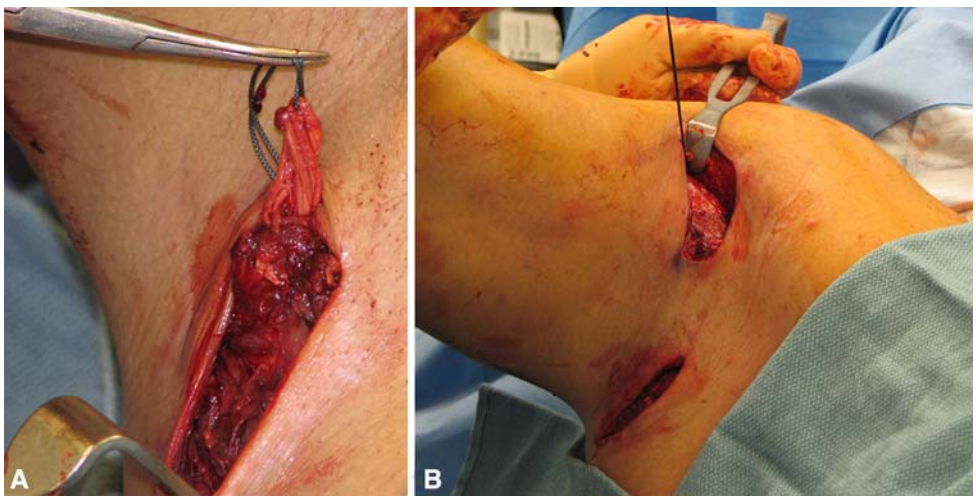

Fig. 3 Intraoperative photograph of right shoulder latissimus dorsi repair. **a** Inferior incision on the anterior axillary fold for the retrieval of the latissimus dorsi tendon, **b** a No. 5 retraction stitch placed to retrieve the torn tendon proximally from a superior incision for reattachment to the proximal humerus

Table 1 Summary of previously reported latissimus dorsi tendon tear cases

	Hiemstra et al. [7]	Lim et al. [9]	Burks et al. [3]	Butterwick et al. [4]	Livesey et al. [10]	Budoff et al. [2]	Henry et al. [6]	Spinner et al. [12]	Kwashima et al. [8]	Barnes et al. [1]	Current report
Age	27	38	33	35	39	29	42	38	28	–	29
Gender	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
Occupation	Steer wrestler	Competitive water skier	Police officer	Professional steer wrestler	Semi-pro. rock climber	Professional body builder	Competitive water ski racer	Golfer	Construction worker	Baseball player	Professional wrestler
Mechanism of injury	Fall with hyperabduction	Fall with pull-up from rope	Jump to grasp overhead bar	–	Pull-up on an over head handhold	Hyperabduction during fall	Pull-up with ski rope	Overuse in golf	Crush shoulder between two iron frames	–	Hyper abduction during fall
Time till surgery	10 days	8 days	4 weeks	–	30 months	4 weeks	1 week	–	–	–	2 weeks
Associated pain	Immediate pain	Immediate pain	Immediate with flexion or abduction	Burning pain at superior part of arm	Pain on resisted adduction	Immediate pain	Immediate pain	Delayed onset with resisted adduction, and internal rotation	Severe pain in the shoulder	–	Immediate pain
Function	–	–	Unable to compete or work	Unable to compete	No difficulty on daily living, unable to climb	–	Painful motion, weak adduction	–	–	–	Painful motion, limited overhead activities
ROM	–	Full	–	–	Full	–	Full	Full	–	–	Full
Strength deficit	Flexion, extension, abduction, and adduction	Slight weak resisted adduction	Adduction weakness	Internal rotation, and adduction	No weakness	–	Slight in internal rotation, moderate in adduction	–	Adduction, internal rotation, and posterior abduction	–	Unable to do lift off test
Diagnostic imaging results	MRI: complete tear of tendon	MRI: high grade disruption of tendon	MRI: fluid around tendons of teres major, latissimus dorsi	MRI: complete tear in myotendinous junction, partial tear of the teres major, long head of the triceps	–	MRI: complete avulsion of tendon	MRI: consistent with tendon avulsion	X-ray: cortical defect MRI: Avulsion of conjoined tendon of latissimus dorsi, teres major.	–	–	MRI: total rupture of the tendon
Approach, surgical procedure	Posterior axilla, suture anchors	Posterior axilla, suture anchors	–, suture anchors	Conservative	Posterior axilla, deltopectoral, suture drill holes	Axilla, suture anchors	Axilla, anterolateral, suture drill holes	Conservative	Vertical over coracoid, Catgut repair pectoralis major, latissimus	Repair (–,–)	Anterior axilla, suture anchors
Follow-up	12 months	10 months	17 weeks	4.5 months	16 months	4 months	6 months	36 months	11 months	–	24 months
Final result	Relative deficits in extension, and adduction	Asymptomatic, daily living, 5 months return to sports	Full ROM, return to work, % 92 strength of normal side	Subjective 85–90% strength, full ROM, still competing	Strength, climb ability continue to improve	Full strength training	Return to competition, full ROM, 11–14% concentric adduction deficits	Full ROM, normal strength	Full function of shoulder	Discontinued throwing less than a season	Full strength, and ROM. Return to work

Age age at time of injury; *ROM* range of motion; *minus signs* (−) indicate the data were not available

approximately 8–10 cm from its humeral attachment. The muscle belly was then dissected from the overlying skin in order to mobilize it from its retracted position. The neurovascular pedicle was identified with a nerve stimulator. A No. 5 nonabsorbable suture was used to allow traction of the torn tendon proximally (Fig. 3).

The humerus was then approached. A low axillary incision was used and the distal aspect of the deltoid and the pectoralis major were identified. After identifying the short head of the biceps, the internervous plane between the short head of the biceps and the pectoralis major muscles was dissected. At this point, the humeral insertion site was identified just medial to the long head of the biceps and deep to the pectoralis major tendon. Some remnants of the original tendon fibers on the humerus were identified in this location. This area was then denuded of soft tissue to facilitate repair. Two 5.5 mm suture anchors with two No. 2 nonabsorbable polyester/polyethylene sutures (Bio-Corkscrew FT, Arthrex, Naples, FL, USA) were then placed and solid bony purchase was noted and further verified with postoperative MRI and radiographs.

After passing the tendon between the two incision locations, a modified Kessler stitch was sutured into the proximal end of the latissimus dorsi tendon. Placing traction on the sutures reduced the latissimus dorsi tendon back to its humeral attachment. All four sutures were tied with the use of the arthroscopic knot pusher to facilitate knot tying through the small incision. During repair, the arm was positioned in maximal external rotation. Not only did this bring the insertion site of the latissimus into the surgical field, but it also protected the neurovascular structures. The distance between the axillary nerve and radial nerve to the latissimus dorsi tendon is greater with external rotation when compared to internal rotation [5]. His initial postoperative therapy consisted of no active motion of his right shoulder for 6 weeks with full passive motion allowed out of a sling four times daily.

Five months postoperatively, he had excellent shoulder strength (5/5) and no functional limitations and he was cleared for full activities. His latissimus dorsi was firing well and there was no evidence of any discomfort with induced stress. His latissimus dorsae appeared symmetric bilaterally and there was no evidence of any weakness. His incisions were well healed and within the skin folds and they are very difficult to visualize. Twenty-four months after the operation he had full strength and noted no problems with any activities.

Discussion

The most important finding of this report is that, to our knowledge, this is the first to describe the use of two small anterior axillary incisions to repair a traumatic avulsion of the latissimus dorsi. Earlier case reports have described the use of single incision approaches in two different locations, one posterior axillary incision to retrieve the retracted tendon, and one anterior incision (deltopectoral, anterolateral on humerus) to repair the avulsed tendon [6, 10]. In the present case, a single posterior incision would have been difficult because of the patient's large size. Additionally, two small incisions provided improved cosmesis.

Traumatic latissimus dorsi tendon injuries are very rare. In our literature review we found only ten prior reported cases of traumatic latissimus dorsi avulsions (Table 1). The usual mechanism of injury appears to be hyperabduction of the shoulder as noted in our patient who fell onto an outstretched arm.

Previous cases demonstrated frequent delays in treatment from time of injury because of late presentation and late diagnosis which are most likely due to the fact that shoulder range of motion was not usually affected and shoulder strength deficits varied [1–4, 6–10, 12]. Two cases were treated conservatively [4, 12]. However, it is difficult to make an appropriate comparison of the different treatment modalities due to differences in the described presentation in each case. Nonetheless, it seems to take a longer time to gain functional strength of the shoulder and return to preinjury levels, especially for highly competitive sports athletes, when treated conservatively [4].

Published reports support the conclusion that traumatic latissimus tendon avulsions can lead to functional disabilities, especially for athletes. Surgical intervention is indicated to promote early healing without prolonged strength deficits. In conclusion, we believe that our new surgical approach to acute repairs of latissimus dorsi humeral avulsions is an alternative treatment for highly competitive, muscular athletes, while taking the associated nerves and cosmetic appearance into consideration. We recommend that consideration be given to repairing acute latissimus dorsi avulsions through this approach in patients with these injuries.

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