[Orthopaedic Surgery]

Partial Triceps Disruption: A Case Report

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Partial triceps tendon disruptions are a rare injury that can lead to debilitating outcomes if misdiagnosed or managed inappropriately. The clinician should have a high index of suspicion when the mechanism involves a fall onto an outstretched arm and there is resultant elbow extension weakness along with pain and swelling. The most common location of rupture is at the tendon-osseous junction. This case report illustrates a partial triceps tendon disruption with involvement of, primarily, the medial head and the superficial expansion. Physical examination displayed weakness with resisted elbow extension in a flexed position over 90°. Radiographs revealed a tiny fleck of bone proximal to the olecranon, but this drastically underestimated the extent of injury upon surgical exploration. Magnetic resonance imaging is essential to ascertain the percentage involvement of the tendon; it can be used for patient education and subsequently to determine treatment recommendations. Although excellent at finding associated pathology, it may misjudge the size of the tear. As such, physicians must consider associated comorbidities and patient characteristics when formulating treatment plans.

Keywords: triceps, tendon, partial

Partial triceps tendon disruptions are a rare injury that can lead to unsatisfactory outcomes in an athletic population.[4,6,8,14,22,23] The clinician should have a high index of suspicion when the mechanism involves a fall onto an outstretched arm and there is resultant elbow extension weakness along with pain and swelling. The most common location of rupture is at the tendon-osseous junction.[27] On physical examination, weakness in extension with the elbow flexed greater than 90° is an important clinical result that provides assistance with the diagnosis of a partial extensor mechanism disruption (specifically, medial head triceps). Inability to extend the elbow against gravity may represent a more significant injury to the triceps mechanism. Radiographs may reveal a small fleck of bone avulsed from the olecranon or an associated fracture; however, MRI is invaluable and provides the physician with the ability to delineate the extent of tendon involvement and the presence of retraction. Treatment is controversial and can range from conservative, with immobilization and subsequent range of motion, to acute surgical repair. Universal agreement does not exist on the percentage involvement to suggest surgical management, and further research is needed to enhance surgeons' judgment.

CASE EXAMPLE

A 16-year-old right-hand-dominant football player was seen day 1 postinjury for a chief complaint of left elbow pain. The mechanism of injury was a fall onto an outstretched/extended arm while being tackled. Thereafter, the patient complained of medial and posterior elbow pain, in addition to weakness and swelling. He denied any previous medical or musculoskeletal problems and any history of anabolic steroid use. Examination revealed moderate swelling medially over the cubital tunnel and posteriorly just proximal to his olecranon. He did not have numbness or tingling in his hand. Range of motion of the injured elbow was 10° to 120° but somewhat limited secondary to pain. There was no laxity with valgus stress at 25° of elbow flexion. Flexion strength was 5/5 at the elbow, but extension was weak (3+/5) with the arm flexed to 110°. Strength with the arm near full extension at 10 degrees was measurably affected (4/5). No appreciable triceps tendon defect was palpated, but examination was limited secondary to swelling. Anteroposterior and lateral radiographs of the elbow showed a small fleck of bone approximately 1 cm proximal to the tip of the olecranon (Figure 1). An MRI without contrast revealed a partial triceps tendon tear involving approximately 65% of the tendon width (Figure 2). Additionally, the medial portion of the tendon was retracted 1.2 cm, and the lateral portion remained associated with the olecranon.

The patient underwent repair of the triceps tendon disruption 5 days later. The triceps tendon was identified, and the triceps expansion, which inserts onto the posterior crest of the ulna,[13] was completely stripped off of the bone (Figure 3). The lateral portion of the triceps remained intact. The medial head of the

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Figure 1. Lateral radiograph showing fleck sign.

Figure 2. Sagittal view of T2-weighted MRI showing triceps tendon disruption.

triceps was torn and retracted approximately 1 cm. With No. 5 Fiberwire (Arthrex, Naples, Florida), a Kessler-type stitch was placed into the tendon, incorporating the medial head with

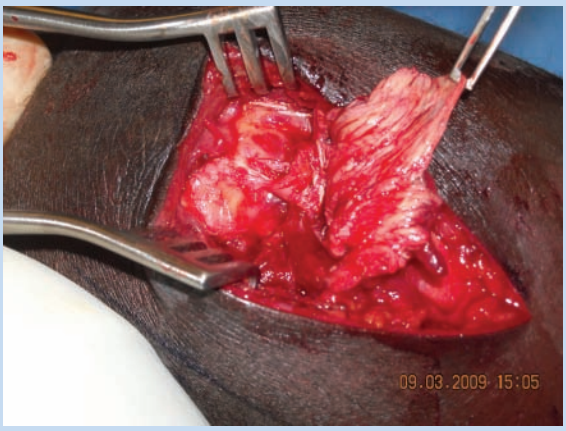

Figure 3. Intraoperative photograph displaying disruption of medial head and triceps expansion.

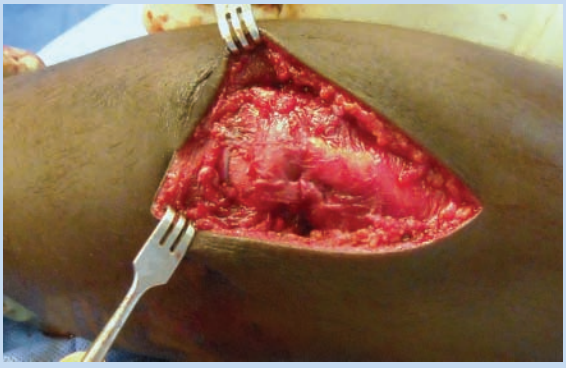

Figure 4. Triceps tendon after repair.

the repair. Two drill holes were placed into the olecranon and crossed at their midpoint. A Hewson suture passer was used to shuttle the sutures through the drill holes, and the suture was tied with the elbow held in 30° of flexion (Figure 4). A posterior splint at 90° of flexion was used for 7 days and then changed to a long arm cast for 2 weeks. Range of motion commenced after cast removal, with the avoidance of active extension. Active extension was allowed after 6 weeks and resistance activities after approximately 12 weeks. The patient regained full range of normal motion (lacked 5° of terminal extension, symmetric to the contralateral arm). The patient recovered 5/5 strength at 4 months. Radiographs did not show heterotopic ossification at follow-up. The patient returned to light weight training after 4 months. A Biodex strength test (Biodex System 3, Biodex Medical Systems, Shirley, New York) at 11 months postinjury demonstrated a 6% peak torque:body weight deficit in extension at a speed of 60° per second. At 120° per second, a 2.1% peak torque:body weight deficit was seen.

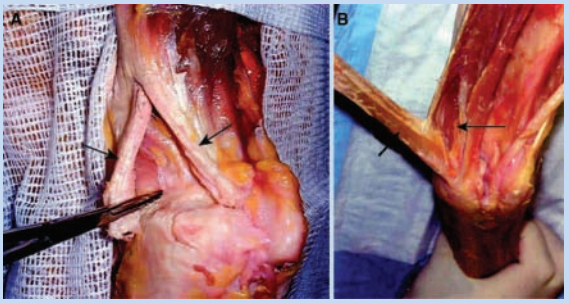

Figure 5. Anatomy of the triceps brachii.

DISCUSSION

Triceps tendon disruptions are uncommon and represent less than 1% of tendon injuries.[1] Mair et al[14] reported 21 triceps injuries in National Football League offensive linemen over a 6-year period, 5 of which had a steroid injection for presumed olecranon bursitis before injury. Medical conditions that may increase the propensity to tendon disruption include hyperparathyroidism,[17] chronic renal failure and hemodialysis, metabolic bone disease, olecranon bursitis,[3,4] and systemic steroid and anabolic steroid use.[12,26] Anabolic steroid treatment in mice flexor tendons reduces the cross-sectional area and number of collagen fibrils and decreases collagen fibril organization.[15] Additionally, local steroid injection is associated with spontaneous tendon rupture.[21]

The most common injury mechanism for the triceps tendon is a fall onto an outstretched arm with eccentric triceps contraction.[3,23,24] Other mechanisms have been reported and generally involve forced resistance to triceps activation.[5,6,9,14,18-21,25]

Anatomically, the triceps is composed of the long, lateral, and medial heads. The long head originates from the infraglenoid tuberosity on the scapula, and the lateral head, from the posterior-lateral portion of the humerus and the lateral intramuscular septum. The medial head extends from distal to the spiral groove to within 2.5 cm of the trochlea on the posterior aspect of the humerus.[3] All 3 heads insert into the olecranon (Figure 5). Madsen et al[13] described a distinct insertion of the medial head on the olecranon, located deep to the central tendon; in contrast, Keener et al[10] described a well-developed medial head, confluent with the central tendon at its insertion onto the olecranon. In the majority of cases, the triceps is disrupted at the osseous insertion; however, other anatomic locations may be injured.[2,7,11,16,27]

The diagnosis of an elbow extensor mechanism disruption is primarily clinical. Pain and swelling are present along the posterior elbow with weakness of elbow extension. Partial triceps disruptions may be more difficult to diagnose because a partial defect may not be palpable and weakness near extension not appreciated. A differentiating finding for partial triceps tendon tears (specifically, the medial head triceps tendon) is weakness with resisted elbow extension in a flexed position (> 90°).[13]

The treatment of choice for active individuals with complete triceps tendon injuries is surgical repair; however, each case must be individualized with treatment based on the functional strength of the extremity and the patient's general medical status and goals.[23,27] Acute surgical repair is favored within 3 weeks from injury.[22] With partial disruptions, there is no consensus, because results have varied. Farrar and Lippert,[6] Bos et al,[4] and Harris et al[8] each reported a successful outcome with conservative management of 1 partial rupture. Mair et al[14] recommended nonsurgical treatment for partial tears with up to 75% disruption: In their study, only 6 of 9 professional football players were able to return to play without loss of strength, pain, or limitation of motion; 3 later required surgical repair. Strauch[22] recommended repair for partial tears if the patient has extension weakness and > 50% involvement on MRI evaluation. For surgical treatment, Yeh et al[28] recommended anatomic reconstruction of the triceps insertion using a transosseous equivalent. This configuration showed anatomic restoration of the footprint and a statistically significant decrease in repair site gaping during biomechanic testing.

In conclusion, this case reinforces the need for a thorough physical examination and diagnostic testing with elbow injuries. Treatment for partial disruption of the triceps tendon is controversial. Nonsurgical management may not return athletes to their desired levels of play. Because of the rarity of this injury, there are no conclusive data to guide the surgeon in the decision-making process.

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