Rupture of the Long Head of the Triceps Muscle in a Child: Case Report and Review of the Literature

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According to the literature, rupture or avulsion of the triceps muscle at its tendo-osseous junction is uncommon, with rupture of the muscle being extremely rare. [1,2] Waugh et al. felt that the triceps is the least frequently ruptured muscle or tendon. [3] A thorough review of the literature found only six reported cases of ruptures of the triceps muscle, of which, none occurred in a skeletally immature individual. [1,2,4-6] This report describes a rupture in a 13-year-old boy, injured while waterskiing, whose growth plates had yet to fuse.

CASE REPORT

A 13-year-old previously healthy boy injured his upper extremity while waterskiing. In August of 1994, while waterskiing behind a boat traveling at approximately 25 miles per hour, the patient caught his ski edge in the boat's wake and was pulled forward into the water. While he was falling, the nylon tow rope became wrapped around his left, non-dominant arm, and he was dragged by the rope through the water.

The patient was seen at a nearby hospital after the incident occurred, and 1 week later by his pediatrician. He was found to have developed a severe hematoma of the left arm accompanied by a rope burn, and there was an associated numbness in the left elbow. Upon re-examination 1 week later, the patient revealed a healing abrasion of the upper left arm, full range of motion at the shoulder and the elbow, and a normal neurovascular status. His pediatrician noted constriction at the area of the rope injury and advised him to attend physiotherapy to rehabilitate the injury. The patient did not follow through with this advice and did not actively attempt any formal rehabilitation.

Approximately 9 months later, he returned for an examination by his pediatrician because of a sensation of ripping of the muscle in the left triceps area that had occurred when he had begun golfing. On examination, the left triceps muscle belly was found to protrude, particularly with extension. At this point, the patient was referred to the Winnipeg Children's Hospital Orthopedic Clinic for further assessment and management.

When the patient was first seen at the Children's Orthopedic Clinic, he stated that since the accident he had experienced continuous discomfort on extension of the left elbow and decreased strength in the upper left arm. Physical examination revealed a scar of the left upper arm and a step deformity in the belly of the triceps muscle. There was no palpable tenderness, and full function and range of motion were present along with a normal neurovascular status. On extension of the left elbow against resistance, an obvious deformity of the triceps muscle belly was visible (Figure 1). These signs and symptoms suggested that a rupture of the triceps muscle had occurred during the waterskiing incident.
An ultrasound was performed, with the long heads of both the right and left triceps being examined. Whereas the right long head appeared normal, there was marked thinning on the left approximately midway down the upper arm. This 2-3 cm region had lost its normal architecture and was quite echogenic. More distally, the muscle appeared to be slightly hypoplastic in comparison with the opposite side, but was otherwise reasonably normal in appearance. Discontinuity of the muscle could not be demonstrated even with vigorous contractions. The ultrasound was interpreted as an abnormally thin and fibrotic region measuring approximately 2-3 cm in the midportion of the long head of the left triceps. This was felt to be compatible with a healed focal rhabdomyolysis resulting from the waterskiing injury.

A magnetic resonance imaging scan demonstrated abnormal morphology isolated to the long head of the left triceps muscle (Figure 2). The muscle belly bulged posteriorly with a definite defect within the central portion of the muscle belly at a level slightly distal to the proximal humeral metaphysis. T2 weighted sequences showed decreased signal intensity most consistent with scarring and with no evidence of an intramuscular hematoma. The underlying bone and overlying deltoid muscle both appeared normal with no evidence of injury. The appearance was consistent with tearing and subsequent scarring of the proximal belly of the long head of the triceps muscle with the resultant deformity.
Cybex strength testing demonstrated a large left extension and pronation deficit at both 60 and 180 degrees per second. The patient was also slow to reach peak torque on extension of the left elbow. Finally, testing revealed decreased endurance on both flexion and extension of the left elbow. Despite the measured deficiencies on Cybex testing, the patient did not demonstrate any clinically significant functional weakness. Since the injury, he has remained physically active without any significant disability.

Treatment in this case was nonsurgical because the patient did not demonstrate any clinically functional weakness secondary to the tear. Despite Cybex testing indicating a large extension and pronation deficit, he was able to carry out his activities of daily living without any significant disability. At the time, a repair could not be justified based on cosmetic reasons alone. To this date, surgical exploration of the tear has not been performed.

DISCUSSION

According to Gray, the triceps arises anatomically from the dorsal arm and consists of three heads forming a trienninate structure. The long head arises from the infraglenoid tuberosity of the scapula, the lateral head from the upper half of the posterior surface of the shaft of the humerus above the spiral groove, and the medial head from the posterior surface of the lower half of the shaft of the humerus below the spiral groove. The common tendon, a bilaminated aponeurotic structure beginning at the middle of the muscle, inserts into the upper surface of the olecranon with a small band of fibers continuing distally and laterally over the anconeus to join with the deep fascia.

Ruptures and avulsions of the triceps have been noted to occur in a number of anatomic locations, including the tendo-osseous insertion, the tendon itself, the musculotendinous junction, and the muscle belly. Most disruptions of the triceps occur as avulsion fractures of the olecranon process. This finding is due to a strong contraction of the triceps muscle overcoming the tensile strength of its osseous insertion into the proximal part of the ulna. Least common of these injuries is the rupture of the muscle belly. In these cases, the rupture is either due to direct trauma to the muscle or an indirect stress, such as elbow flexion, occurring against an already contracted triceps muscle.

The diagnosis of triceps muscle rupture can usually be made in patients who present with a characteristic history. Features commonly associated include a ripping or tearing sensation experienced by the patient, pain and/or tenderness and swelling of the posterior compartment of the arm, weakness of extension of elbow, and the presence of a palpable gap in the muscle or the appearance of a mass with contraction of the muscle.

In general, Farrar and Lippert state the importance of determining whether the tear was complete or partial. The literature suggests that significant loss of elbow motion and triceps power reflects a complete tear that is unlikely to improve with nonoperative therapy. However, the literature has also shown that in those individuals with partial tears, conservative, nonoperative treatment is effective, with good long-term results.

Of the six previously documented cases of triceps muscle belly rupture, only Brumback reported such a rupture in the younger age group. However, skeletal maturity with fusion of the ossification centers is generally reached by age 15. In Brumback's case, the patient, a 16-year-old boy, was skeletally mature (Brumback, RJ: personal communication, 1996). The injury, which occurred as a result of a throwing motion, did not affect the epiphyseal growth plates because they had matured to the point of fusion (Brumback, RJ: personal communication, 1996).
In our case, the patient, being only 13 years of age, was not skeletally mature and did have open growth plates. McMaster, in his study on tendon and muscle ruptures, noted that injuries involving muscle contractions most frequently result in fractures, particularly if they occur before the epiphyses are closed. [21] Viegas reported two cases of skeletally immature boys who, after sustaining a traumatic or stress injury of a contracted triceps muscle, presented with avulsions of the olecranon. Viegas felt that the unique characteristics of the maturing olecranon predispose adolescents to a particular pattern of avulsion fracture. [20] Thus, in those rare cases where a rupture of the triceps occurs in a skeletally immature individual, it is most likely that the injury will result in an avulsion at the tendo-osseous insertion.

CONCLUSION

This case, the first report of which we are aware of a triceps muscle rupture in a skeletally immature individual, identifies the possibility, although rare, of such an injury occurring in pediatric patients. It also reinforces the constellation of signs and symptoms that may accompany an injury of this type. Other authors have suggested that nonsurgical management is appropriate in incomplete tears of the triceps muscle. Although, Cybex testing would suggest otherwise, the patients clinical outcome indicates that such management is indeed appropriate. Whether or not surgical repair, performed for cosmetic reasons, would improve strength testing results or clinical function, is unknown.

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