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Medial Epicondyle Fractures in Adolescent Athletes: Two Cases where Conservative Treatment is Surgery

Introduction

The medial epicondyle is the origin of the flexor pronator musculature and the proximal attachment of the medial ulnar collateral ligament (UCL). The flexor pronator mass functions as a dynamic stabilizer of valgus stress to the elbow while the UCL acts as a stabilizer of static stress to the same region. The medial epicondyle is the third of six main ossification centers which usually develops between the ages of 4-6.¹ However, an open apophysis is often present until the age of 14 to 15. The apophyseal cartilage is relatively weaker than the ligaments that attach to it, and therefore, is a major determinant of possible injury to the medial epicondyle in a subpopulation of individuals.

Fractures of the medial humeral epicondyle account for approximately 12% of all pediatric elbow fractures, occurring most frequently in males ages 9 to 14.^{2,3} This injury can be due to excessive valgus stress placed on the elbow by the pronator mass that has a common point of origin at the medial epicondyle. It is especially common amongst youth baseball players and gymnasts. A recent trend in single-sport concentration and year-round participation renders these young athletes more susceptible to ulnar nerve dysfunction and avulsion fractures of the elbow.

The optimal method of treatment for medial humeral epicondyle fractures in pediatric patients is controversial. Non-operative as well as operative management have been reported to have positive outcomes so there is a lack of consensus when neither option is clearly indicated. Typically, avulsion fractures of the medial humeral epicondyle with more than 5mm of displacement, presence of significant instability, or containment of fragments incarcerated in the joint space, are treated with ORIF followed by range of motion and strength rehabilitation.^{2,4} For those fractures with minimal displacement or no instability, treatment consists of immobilization in a long arm cast at 90 degrees for 3-4 weeks followed by similar rehabilitation.²

This report outlines the injury of a 15-year-old baseball player who injured his elbow while pitching. The physical examination and x-rays of the baseball player confirmed a right-sided medial humeral epicondyle fracture and

treatment options were discussed. With the intention of a speedy return to sport and normal function, he opted for open reduction and internal fixation (ORIF).

Case Description

Case: *The Baseball Player*

A 15-year-old male, T.J., previously in good health, presented to an urgent care facility with a history of non-contact injury to his right elbow suffered earlier that day. A long-time baseball player, T.J. was throwing a pitch when he heard a loud pop immediately followed by intense pain. Plain anterior-posterior (AP) X-ray examination of the elbow showed a complete avulsion fracture with 2.7mm displacement of the medial epicondyle, and he was referred for consultation with a pediatric orthopedic surgeon (Figure 1).

Physical examination results revealed tenderness on the medial aspect of the right elbow and valgus laxity. Hoping to quickly return to baseball, T.J. elected to undergo open reduction and internal fixation (ORIF) of the fracture, which was performed 4 days after injury.

The patient's elbow was immobilized in a removable posterior splint 1-week post-operatively and converted to a sling after wound healing. Early protected active range-of-motion exercises were also started 1-week post-operatively. By 8 weeks T.J. had regained full strength and range of motion in the injured elbow and was cleared to participate in tryouts for his fall baseball team. His range of motion at 9 months is shown in Figure 2.



Figure 1. Pre-operative radiograph of distal humerus in baseball player with a medial epicondyle fracture.



Figure 2. Baseball player's range of motion 9-month postoperatively.

T.J.'s 9-month postoperative x-rays show appropriate bony union between the fracture fragment and the distal humerus (Figure 3). Despite having 2.7mm displacement based on AP plain films, he received surgical treatment allowing him to return to play faster. Non-operative management would have included 6 weeks of casting followed by further physical therapy.

Discussion

The management of medial epicondyle fractures in the pediatric population has remained controversial with some studies showing positive results for both operative and non-operative management.^{1, 4-6} Traditionally, indications for operative versus non-operative management are dependent upon the degree of displacement of the fracture fragment from the fracture bed with displacement <5mm managed non-operatively and those 5mm-15mm managed operatively.^{1,4-6}

With youth baseball pitchers playing for larger parts of the year, they are prone to developing avulsion fractures of the medial epicondyle depending on their degree of usage.^{1, 5, 6} The atmosphere is more competitive in youth sports and with the prospect of collegiate and professional success, athletes are opting for treatment that will allow quicker return to play. Despite the lack of high level evidence studies, there are a few lower level studies that show there is an earlier return to play in those athletes treated operatively.^{2, 5, 6} One study shows a 9.33 odds of union for operative management as compared to non-operative treatment.¹ Prolonged casting might result in stiffening of the elbow as well as inappropriate lengthening of the ulnar collateral ligament as a result of malalignment of the fracture fragment which can result in increased valgus instability at the elbow.⁷

Displacement is mainly determined by the use of anterior-posterior (AP) and lateral elbow X-rays. Disagreement on measurements of fracture displacement on an X-ray was defined as a reading greater than 2mm difference between observers. A study demonstrated that surgical team members were shown to disagree in 54%, 87% and 64% of cases on



Figure 3. 9-month postoperative x-rays showing appropriate bony union between the fracture fragment and the distal humerus.

AP, lateral and oblique X-ray views, respectively.³ Therefore, an oblique X-ray or computed tomography (CT) are better options for measurement.

Different types of ORIF can assure speedy return to full range of motion such as cannulated screw with washer fixation. Kirschner (K-wires) wires can also be used but should be removed 2 and 6 months after placement.⁸ A cannulated screw and washer inter-fragmentary compression construct was used for T.J.

There have been some documented cases of late ulnar nerve palsy after ORIF; however, this was absent in our patient. The ulnar nerve may be damaged during the initial trauma or via iatrogenic means, such as during surgery or compressive effects of casting on the nerve.⁹

Conclusion

Adolescent athletes who play year-round are opting for surgery to repair medial epicondyle fractures to return to play quicker. Though there is a place for non-operative management with some minimally displaced fractures, athletes faced with the decision between operative and non-operative treatment can be assured that operative management can reliably expedite return to function and sport.

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