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Nonunion fracture of the sublime tubercle in a collegiate baseball pitcher: A case report

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Abstract

Introduction: Elbow pathology including fractures to the coronoid process are common in overhead throwing athletes such as baseball pitchers. Only four cases have been reported of sublime tubercle avulsion fractures in the literature. This case study investigates a novel treatment for such injuries.

Case Presentation: A 21-year-old collegiate baseball pitcher presented with medial elbow pain. Radiographic evaluation showed a nonunion fracture of the sublime tubercle of the coronoid process as well as medial epicondylitis and a partial ulnar collateral ligament (UCL) tear. The senior author performed platelet rich plasma injections into the origin of the flexor-pronator mass and UCL insertion. After an 8-week rehabilitation program, he was able to return to sport with no complications or drop in performance.

Conclusion: Platelet-rich plasma injection may be a viable treatment option for management of patients with delayed union fractures to the sublime tubercle, medial epicondylitis and partial UCL tear.

Keywords: Nonunion fracture, baseball pitcher, rehabilitation program

Introduction

Overhead throwing athletes, particularly baseball pitchers, are at increased risk of multiple medial elbow pathologies due to repetitive valgus stress during acceleration^[1]. Injury to the ulnar collateral ligament (UCL) of the elbow is increasingly common and may be managed nonoperatively or with surgical reconstruction^[1-3]. In addition, these athletes are at risk for other common throwing-related pathologies, including medial epicondylitis, osteochondral lesions and medial epicondylitis^[1, 4]. Fractures to the coronoid process of the ulna result from rotation with hyperflexion or hyperextension as is seen in overhead throwers^[5]. Regan and Morrey have classified coronoid fractures into three types according to fragment size^[6]. Type I fractures involve only the coronoid tip, type II involve 50% or less and type III involve greater than 50% of the coronoid height^[6]. Type III fractures that involve the base of the coronoid may extend into the sublime tubercle which is located at the medial aspect of the coronoid base. Less commonly, the sublime tubercle can fracture independently from the coronoid. Only four cases of a sublime tubercle avulsion fracture in an overhead throwing athlete have been reported in the literature^[4, 7-9]. Proposed management strategies for delayed unions include continued conservative treatment, bone fixation, UCL reconstruction, and shock wave therapy^[4, 8, 9].

The sublime tubercle of the ulna serves as the insertion for the brachialis muscle and attachment site for the anterior joint capsule and anterior bundle of the UCL (AUCL) (Figure 1)^[10]. Thus, the sublime tubercle has been cited as the most critical bony stabilizer of the elbow joint^[11]. We discuss a unique case in which a collegiate baseball pitcher suffered an avulsion of his sublime tubercle with a partial UCL tear which progressed to a nonunion and he subsequently developed medial epicondylitis who was treated successfully with platelet-rich-plasma (PRP) injection. (Figure 2).

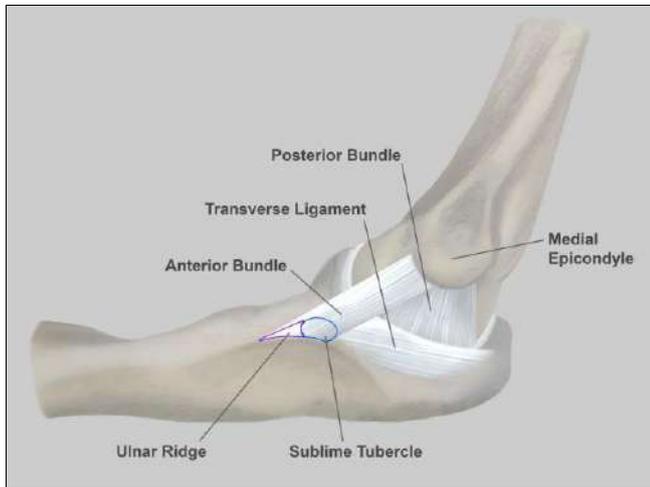


Fig 1: Anatomic illustration of the sublime tubercle and medial collateral ligament

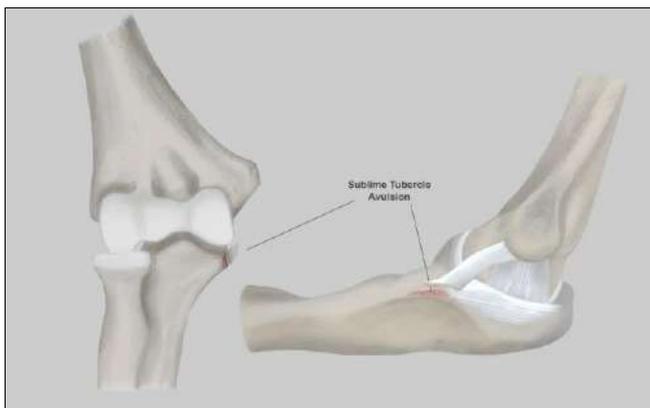


Fig 2: Illustration of a sublime tubercle avulsion

Case Report

A 21-year-old collegiate baseball pitcher presented with three months of focal medial elbow pain in his dominant pitching arm. At age 13, he suffered a coronoid fracture and was casted for 6 weeks before he was able to make a full return to sport. He was pain free throughout his high school career and two years at the collegiate level. During his third season, he developed non-radicular pain in the medial elbow without a decrease in throwing velocity or performance. Physical examination revealed full range of motion in all planes, tenderness at the medial epicondyle, and pain with moving valgus stress of the elbow. Radiographs revealed a fibrous nonunion of the sublime tubercle of the coronoid (Figure 3) and an elbow MRI demonstrating medial epicondylitis and a partial UCL tear (Figures 4). His symptoms did not affect his performance, so he did not miss any games during the season. He was treated conservatively with intermittent anti-inflammatories, ice, an institution-specific throwing rehabilitation, and decreased pitch count during practices. At the conclusion of the season, the team physician performed a PRP injection into the origin of the flexor-pronator mass as well as the UCL ligament. After the injection, he completed two weeks of rest followed by 6 weeks of strength rehabilitation to the elbow and a return to throw program. He was then allowed to fully return to sport in time for the fall season. He completed the entire following season without pain and returned fully to his previous level of performance. We obtained written informed consent from our patient to author this manuscript.



Fig 3: Anteroposterior (A), oblique (B) and lateral (C) elbow radiographs demonstrating a fibrous nonunion of the sublime tubercle, best seen on the oblique view

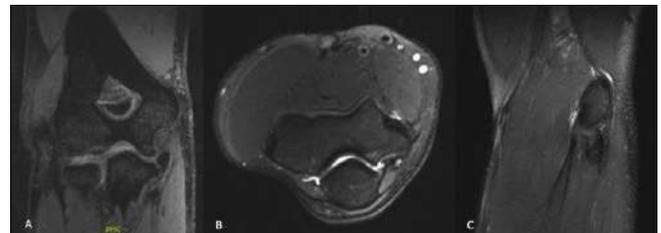


Fig 4: T2-weighted elbow MRI demonstrating the fibrous nonunion of the sublime tubercle and hyperintense signal along deep and proximal portion of the common flexor origin

Discussion

Multiple treatment options were considered for the management of this patient. UCL reconstruction and open reduction with internal fixation are both surgical options for patients when a sublime tubercle avulsion does not achieve union after conservative management [8, 9]. However, both surgical options require prolonged rehabilitation ranging from 4-15 months [8, 9]. Electrical bone stimulation is a common treatment method for delayed union of long bones [12-16]. Recent case reports have shown efficacy of electric stimulation in fractures of the coronoid process, including two case reports of successful treatment in baseball pitchers [4, 17]. However, the electrical stimulation required one month of immobilization. Nonsurgical rehabilitation has been shown to be effective in management of coronoid process fractures not effecting the sublime tubercle [18, 19]. Given the location of this specific fracture at the sublime tubercle and prolonged 6 month return to sport time reported by Hetling, we decided against these sport specific rehabilitation programs [18].

PRP injection leads to an increased concentration of growth factors and bioactive proteins which can increase the healing response in tendons, ligaments, muscle, and bone [20]. However, its role in fracture nonunion is unclear. Preclinical evidence suggests PRP may enhance bone healing [21-24]. A systematic review of clinical evidence found 3 randomized controlled trials which showed no benefit in functional outcome of nonunion fractures following PRP and 2 which showed superior outcomes [25]. Current clinical recommendations are unable to recommend PRP in fracture care at this time [25, 26]. Likewise, the benefit of PRP in the management of medial epicondylitis is uncertain. Varshney *et al.* showed PRP to be more effective than corticosteroid injections in the treatment of elbow epicondylitis but the breakdown between medial and lateral epicondylitis is unclear [27]. Current guidelines for the management of elbow tendinopathy acknowledge the potential of PRP but do not mention it as a treatment option due to lack of clinical evidence [28, 29].

Management of partial UCL tears with PRP therapy have been more successful. Dines *et al.* showed 32 of 44 baseball players to have a good or excellent outcome with a mean return to sport time of 12 weeks^[30]. Another study found 88% of overhead throwing athletes treated with PRP for partial UCL tear were able to return to sport at 12 weeks^[31]. Deal *et al.* utilized a series of 2 PRP injections but found 96% of athletes showed stability at 2 weeks and all showed some degree of reconstitution of the ligament on MRI^[32]. I Given the multifaceted nature of the injury, the pain generator may have been from the fracture, partial ligament tear, or epicondylitis specifically or a combination of all three sources. It was determined that PRP injection was the best course of treatment for this patient. PRP has some clinical evidence in favor of its use in partial UCL tears and it offers rapid rehabilitation and return to play. The patient was able to return to play without pain and did not have follow up imaging. While short term outcomes are promising, long term follow up is needed. Despite these limitations, this case may provide an additional conservative option in the treatment of throwing athletes with similar elbow injuries.

Conclusion

Platelet-rich plasma injections to the medial elbow may be an effective treatment option in the management of an overhead athlete presenting with a triad of a sublime tubercle nonunion, partial UCL tear, and medial epicondylitis.

Data Availability

The data used in this paper to support the findings of this study are included within the article.

Consent

The athlete has given his informed consent for this case report to be published.

Disclosure

The authors declare that they have no disclosures.

Funding

No funding was required for this study.

Conflicts of interest

The authors declare that they have no competing interests.

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