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# Anconeus Epitrochlearis as a Source of Medial Elbow Pain in Baseball Pitchers

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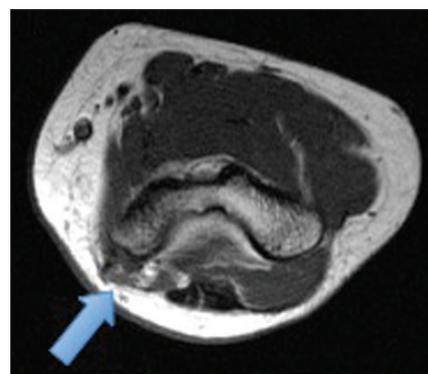
## abstract

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Medial elbow pain is reported in 18% to 69% of baseball players aged of 9 and 19 years. This is due to the large valgus stresses focused on the medial side of the elbow during overhead activities. In overhead throwers and pitchers, pain can be attributed to valgus extension overload with resultant posteromedial impingement, overuse of the flexor-pronator musculature resulting in medial epicondylitis, or occasional muscle tears or ruptures. The anconeus epitrochlearis is a known cause of cubital tunnel syndrome and has been postulated as a source of medial elbow pain in overhead athletes.

This article describes the cases of 3 right-handed baseball pitchers with persistent right-sided medial elbow pain during throwing despite a prolonged period of rest, physical therapy, and nonsteroidal anti-inflammatory drugs. Two patients had symptoms of cubital tunnel syndrome as diagnosed by electromyogram and nerve conduction studies and the presence of the anconeus epitrochlearis muscle per magnetic resonance imaging. All patients underwent isolated release of the anconeus muscle without ulnar nerve transposition and returned to their previous levels of activity.

The diagnosis and treatment of pitchers who present with medial-sided elbow pain can be complex. The differential should include an enlarged or inflamed anconeus epitrochlearis muscle as a possible cause. Conservative management should be the first modality. However, surgical excision with isolated release of the muscle can be successful in returning patients with persistent pain despite a trial of conservative management to their previous levels of function.



**Figure:** Axial T1-weighted magnetic resonance image showing the anconeus epitrochlearis muscle (arrow) attaching from the inferior surface of the medial epicondyle to the medial olecranon.

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Medial elbow pain in overhead athletes is common, with a reported incidence in 18% to 69% of baseball players aged 9 to 19 years.<sup>1</sup> The pain can be due to the large valgus stresses focused on the medial side of the elbow during overhead activities. As a result, pitchers are at an increased risk of injury to the medial elbow structures. Pain can be attributed to valgus extension overload with resultant posteromedial impingement, overuse of the flexor-pronator musculature resulting in medial epicondylitis, or occasional muscle tear or rupture, particularly in overhead throwers and pitchers.<sup>2-4</sup> Ulnar neuropathy is another common cause of medial elbow pain and can result from traction, compression, or friction on the nerve throughout its anatomic course.<sup>2,5,6</sup>

The anconeus epitrochlearis is a known cause of cubital tunnel syndrome<sup>5-10</sup> and has been postulated as a source of medial elbow pain in overhead athletes.<sup>2</sup> Its incidence in the general population varies from 4% to 34% as reported by several cadaveric studies.<sup>8,10</sup> This muscle overlies the ulnar nerve posteriorly, becomes more taut in flexion, and is a potential source of compression.<sup>8</sup> Several cases have been reported of cubital tunnel syndrome causing medial-sided elbow pain in adolescent baseball pitchers.<sup>11</sup> However,

no cases have been reported of anconeus epitrochlearis muscle compression on the ulnar nerve as a source of pain in this patient population. This article describes 3 baseball pitchers with medial elbow pain caused by the anconeus epitrochlearis muscle who were able to return to overhead athletics after surgical excision and release.

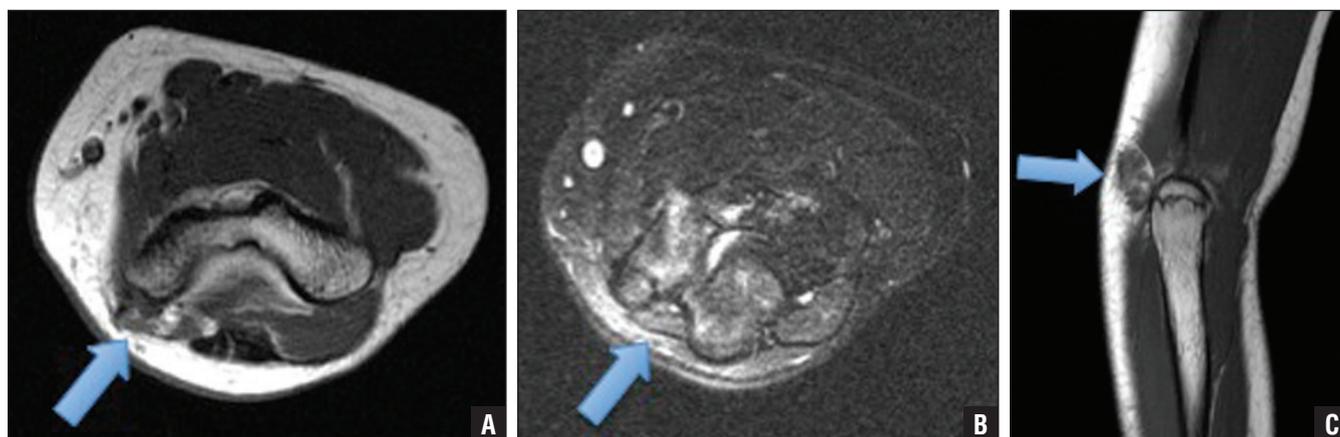
### CASE REPORTS

The 3 patients were right-handed male baseball players aged 17, 17, and 19 years (patients 1, 2, and 3, respectively) who presented with persistent right-sided medial elbow pain with throwing despite at least 3 months of rest, physical therapy, and nonsteroidal anti-inflammatory drugs. Patients 1 and 2 reported ulnar-sided numbness and tingling on the forearm radiating down to the hand that most notably occurred when throwing. They were diagnosed with cubital tunnel syndrome, and electromyogram and nerve conduction studies documented compression of the ulnar nerve across the elbow. Patient 3 was diagnosed with incompetence of the medial ulnar collateral ligament and had pain with valgus stress and milking maneuvers. All 3 patients had preoperative magnetic resonance imaging (MRI) scans, and patients 1 and 3 demonstrated the presence of the anconeus epitrochle-

aris muscle on MRI (Figure). Significant edema also existed in the anconeus epitrochlearis muscle on both MRI images.

Because all 3 patients had failed a period of nonoperative treatment (at least 3 months) and were unable to return to throwing without pain and neurologic symptoms, surgical intervention was advised. All 3 patients underwent surgical excision and release of the anconeus epitrochlearis muscle. No patients exhibited ulnar nerve instability intraoperatively when placed through range of motion after excision and release of the muscle. In patients 1 and 2, an ulnar nerve neurolysis was also completed, but no formal transposition of the nerve was completed. In patient 2, who had a diagnosis of cubital tunnel syndrome with negative preoperative MRI images, the anconeus epitrochlearis muscle was seen, released, and excised during surgical exploration. In addition to the accessory epitrochlearis release, patient 3 had an incompetent and degenerative medial ulnar collateral ligament and underwent concomitant ligament reconstruction using the figure-8 technique with gracilis autograft without ulnar nerve transposition.<sup>12</sup>

Patients 1 and 2 were able to return to throwing competitively at 7 and 8 weeks postoperatively, respectively. They returned to their previous levels of compe-



**Figure:** Axial T1-weighted magnetic resonance image showing the anconeus epitrochlearis muscle (arrow) attaching from the inferior surface of the medial epicondyle to the medial olecranon (A). Axial T2-weighted magnetic resonance image showing significant edema within the muscle (arrow) (B). Sagittal T1-weighted magnetic resonance image showing the enlarged anconeus epitrochlearis muscle medial to the olecranon (arrow) (C).

tion and had complete symptom resolution. At 1-year follow-up, both patients were doing well, with no recurring symptoms. Patient 3 began an interval-throwing program 4 months postoperatively and returned to his preinjury level of play 1 year postoperatively. All 3 patients had complete resolution of their medial-sided elbow pain and forearm numbness after surgical release of the anconeus epitrochlearis muscle.

## DISCUSSION

This article describes an uncommon cause of medial-sided elbow pain in throwing athletes. The anconeus epitrochlearis can compress the ulnar nerve, resulting in cubital tunnel syndrome.<sup>9</sup> Accurate diagnosis and surgical treatment can reliably return these athletes to their previous levels of play.

The anconeus epitrochlearis muscle is superficial to the ulnar nerve and attaches from the inferior surface of the medial epicondyle to the medial cortex of the olecranon.<sup>9</sup> It takes a similar anatomic course as the cubital tunnel retinaculum. Some authors postulate that the cubital tunnel retinaculum is the remnant of the anconeus epitrochlearis muscle.<sup>9,13</sup> This muscle protects the ulnar nerve and assists the triceps muscle in preventing ulnar nerve subluxation.

The reported prevalence of having an anconeus epitrochlearis muscle is 4% to 34% in cadaver studies,<sup>14,15</sup> and it exists in both elbows of approximately 25% of patients with cubital tunnel syndrome.<sup>8</sup> In the majority of people who have no anconeus epitrochlearis muscle, it may be replaced by a band of tissue called the epitrochleoanconeus ligament. This accessory muscle is a well described source of medial elbow pain in patients with cubital tunnel syndrome. Although 1 previous study reported baseball pitchers returning to throwing after cubital tunnel release,<sup>11</sup> no previous studies have reported the anconeus epitrochlearis muscle as a cause of medial-sided elbow pain in baseball pitch-

ers and their ability to return to throwing after surgical excision and release.

Diagnosis should be made on the basis of history, physical examination, and diagnostic imaging studies. If ulnar nerve symptoms predominate, electromyography and nerve conduction studies should be obtained to localize the compression to the elbow. Byun et al<sup>6</sup> reported a group of 15 patients with ulnar neuropathy caused by the anconeus epitrochlearis muscle and found that symptom duration tended to be shorter in this group of patients. Furthermore, these patients had lower motor amplitude and shorter segments of latency prolongation (between medial epicondyle and 2 cm above), and 27% had complete conduction block when compared with patients with isolated ulnar neuropathy.<sup>6</sup>

Magnetic resonance imaging can also be helpful in elucidating the cubital tunnel and surrounding structures, including the anconeus epitrochlearis muscle. The anconeus epitrochlearis muscle is best viewed on axial images, where the relationship of the ulnar nerve and adjacent soft tissue is clearly delineated. If edema exists in the muscle, it will be best appreciated with short T1 inversion recovery MRI.<sup>16</sup> Edema is abnormal in the anconeus accessory muscle on MRI. Jeon et al<sup>17</sup> reported 2 patients with edema seen in the anconeus epitrochlearis muscle reporting vague medial-sided elbow pain. One patient was managed conservatively with local steroid injection and nonsteroidal anti-inflammatory drugs, and the other patient underwent release with excision of the anconeus epitrochlearis muscle. Both patients recovered well, with a short-term follow-up of less than 1 year.

Recommendations for the surgical treatment of medial elbow pain caused by the anconeus epitrochlearis muscle have ranged from excision alone to excision followed by anterior transposition of the ulnar nerve.<sup>8,18</sup> Local decompression and resection of the muscle mass

yielded relief or substantial improvement in several reported cases.<sup>8</sup> Chalmers<sup>18</sup> reported subluxation of the ulnar nerve over the medial epicondyle after muscle excision in 7 of 8 patients. As a result, he believed that transposition of the ulnar nerve was a necessary stabilizing procedure.<sup>18</sup> Dahners and Wood<sup>7</sup> also advocated release and anterior subcutaneous transposition of the ulnar nerve. All patients treated by this modality have demonstrated improvement in symptoms and function. However, in the current 3 patients, the authors performed an isolated excision of the anconeus epitrochlearis muscle without transposition, and no patients showed evidence of ulnar nerve instability or persistent symptoms up to 1-year follow-up. No persistent symptoms of ulnar nerve subluxation occurred. In patients 1 and 2, all symptoms resolved after release of the anconeus epitrochlearis muscle without transposition. Jeon et al<sup>19</sup> also reported the isolated release of the anconeus epitrochlearis muscle without ulnar nerve transposition in an amateur weight lifter with cubital tunnel syndrome. The patient had complete resolution of his symptoms, with no residual ulnar nerve instability.<sup>19</sup>

Masear et al<sup>8</sup> reported that excision of the accessory anconeus epitrochlearis muscle with ulnar nerve decompression without transposition was successful in alleviating symptoms in 5 patients; however, none of those patients were overhead athletes. Other authors have recommended medial epicondylectomy and excision of the anconeus epitrochlearis muscle.<sup>20</sup> The current authors' experience suggests that muscle release and neurolysis are appropriate initial surgical measures in overhead athletes, including baseball pitchers. Ulnar nerve transposition should be reserved for cases with persistent neurologic symptoms. Consequently, the thrower should be made aware of the potential for recurrent subluxation of the ulnar nerve after translocation, which may lead to subsequent transposition surgery.

## CONCLUSION

This article examines the accessory anconeus epitrochlearis muscle as a contributor to medial elbow pain in overhead athletes. Nonoperative modalities and avoidance of throwing should remain the mainstay of initial treatment. Recalcitrant cases are candidates for surgical intervention. Release of the anconeus epitrochlearis muscle without ulnar nerve transposition was successful in the management of the current 3 patients, who were baseball pitchers with medial-sided elbow pain with and without cubital tunnel syndrome. Overhead athletes are expected to return to their previous levels of throwing postoperatively. 

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