

## Tophaceous Gout Mimicking an Edematous Anconeus Epitrochlearis

Michelle L. Dorsey, Catherine C. Roberts

We report the case of a 31-year-old male whose initial imaging presentation was considered highly suspicious for an edematous accessory muscle, the anconeus epitrochlearis. Operative excision led to the diagnosis of tophaceous gout. If this etiology had been considered earlier in the patient's clinical course, his diagnostic evaluation may have been less involved. When faced with a soft tissue mass in the setting of gout, a soft tissue tophus should always be considered.

### Introduction

There are many causes of a soft tissue mass in the region of the cubital tunnel. An accessory anconeus epitrochlearis muscle is a well described variant in this location that can be a rare cause of a focal soft tissue mass. The muscle can vary in size and shape from very small and fusiform to a thick, rectangular structure, which can be palpated on physical examination [1]. When a mass is present at the medial epicondyle of the humerus, the differential can include prior post-traumatic deformity, foreign body, osteophyte, myositis ossificans, synovial proliferation as seen in rheumatoid arthritis, bursal enlargement, or a variety of soft tissue tumors, including most commonly a ganglion but also an epidermoid cyst, lipoma/fibrolipoma [1]. As demonstrated in this case, in the setting of gout, soft tissue tophi can also mimic an accessory muscle.

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**Abbreviations:** MR, magnetic resonance.

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### Case Report

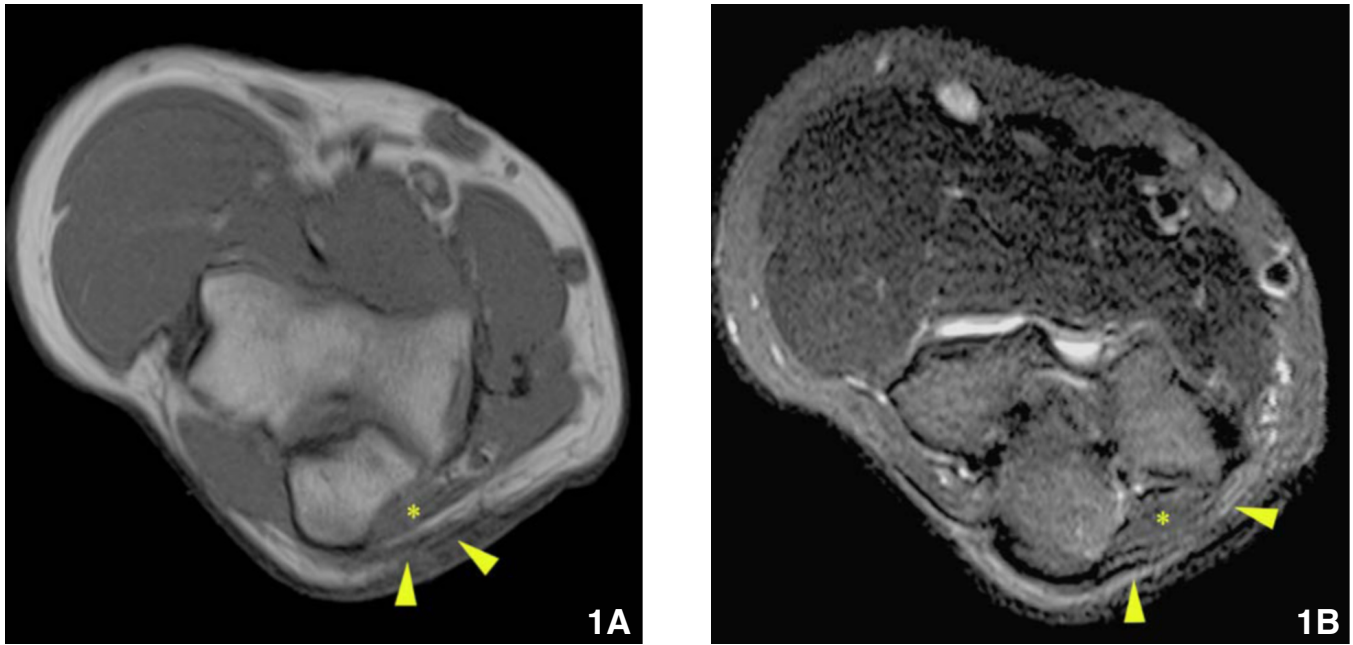
A 31-year-old male presented for a second opinion regarding a right elbow mass. He had been having problems with intermittent locking and catching of his elbow for several years. The last episode of locking, approximately 1 year prior, terminated with a sudden extension which was accompanied by the development of a nodular soft tissue mass in the medial aspect of his elbow. Since that episode, his locking symptoms have disappeared. The mass increased in size a minimal amount over the following year. The patient reported no pain at the elbow. He denied any history of trauma to the area, fever, chills, night sweats, or weight loss. His past medical history was significant for gout. He was currently taking Indocin and allopurinol.

Physical examination revealed a full range of motion at the elbow, wrist, and hand. Pronation and supination were normal. A nodular firm mass could be palpated in the subcutaneous tissues along the medial aspect of the elbow.

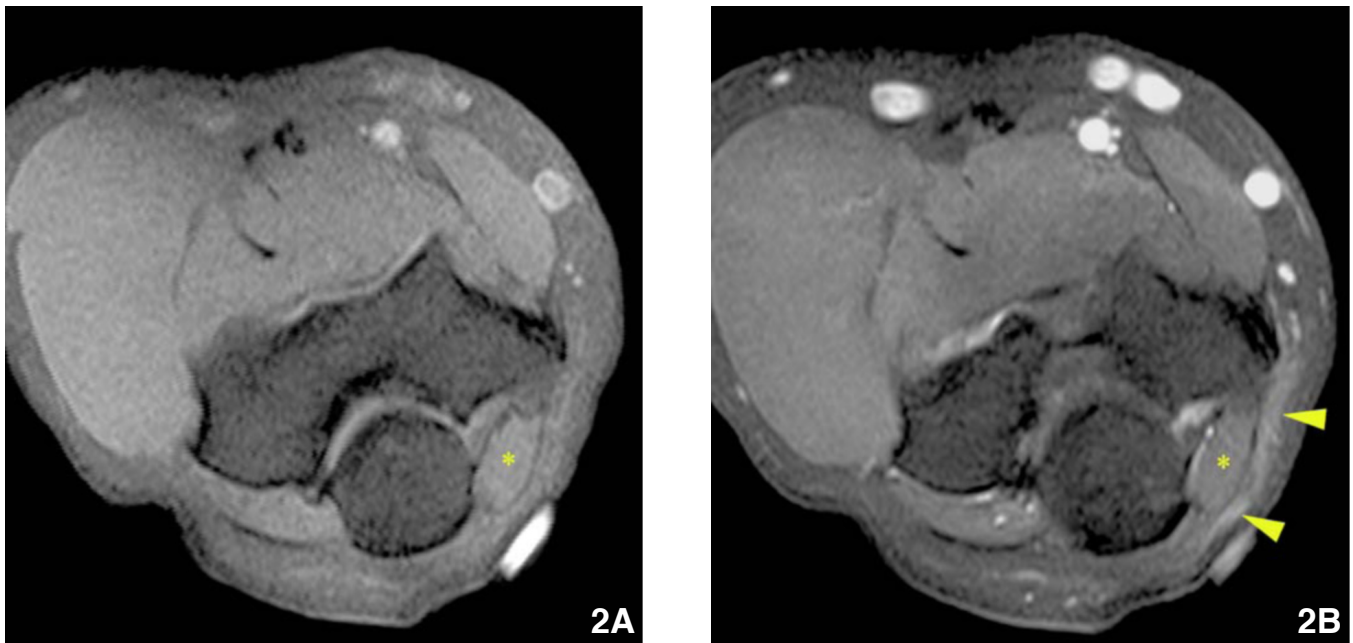
Review of outside magnetic resonance (MR) imaging demonstrated a soft tissue mass adjacent to the medial epicondyle, which followed muscle signal intensity on all sequences (Fig. 1). Enhancement of the mass was similar to adjacent muscle (Fig. 2). A mild amount of edema and enhancement was present in the subcutaneous fat surrounding the mass. The appearance favored an edematous anconeus epitrochlearis accessory muscle. The patient's clinical history of gout was not available at the time of interpretation and there were no osseous erosions on MR exam to suggest underlying gout.

The patient subsequently underwent open excision of the mass. A piece of thickened, rubbery, yellow-tan tissue measuring 2.1 x 1.2 x 0.9 cm was excised (Fig. 3). Adherent to the tissue was white chalk-like material. The pathologic examination revealed urate crystal deposition with foreign

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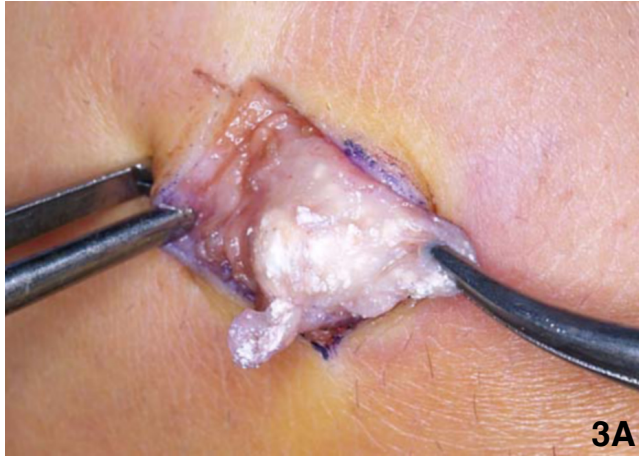


**Figure 1.** Axial **A.** T1-weighted image at the distal aspect of the mass and **B.** T2-weighted fat suppressed MR image at the mid portion of the mass (\*) demonstrate similar signal intensity to adjacent muscle and a mild amount of adjacent edema (arrowheads).

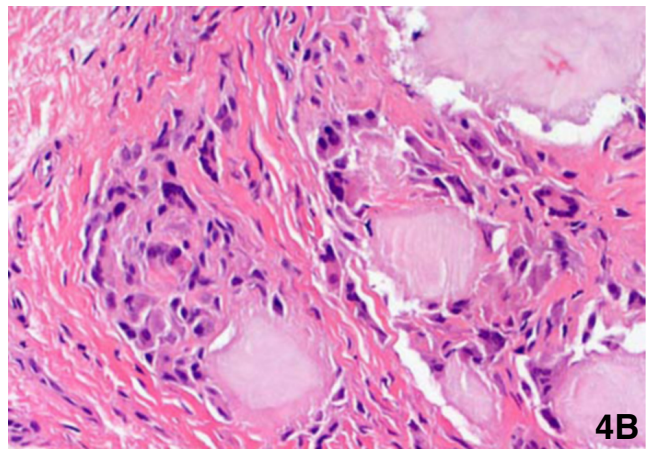
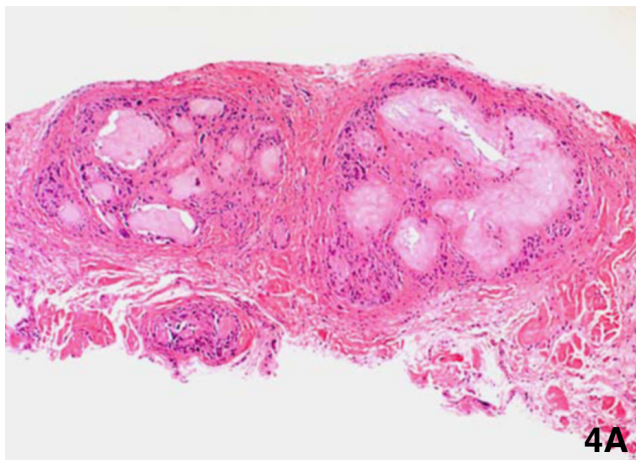


**Figure 2.** Axial T1-weighted fat suppressed MR image **A.** pre gadolinium shows the medially located mass (\*) to be isointense to muscle (marker overlies mass) and **B.** post gadolinium shows enhancement of the mass (\*) similar to adjacent muscle with a mild amount of enhancement in the adjacent fat (arrowheads). The patient moved slightly between sequences.

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**Figure 3.** Intraoperative photo **A.** and surgical specimen **B.** showing the excised rubbery, yellow-tan mass with adherent white chalk-like material.



**Figure 4.** Tophus on H&E stain, **A.** low power (40x magnification) and **B.** high power (200x magnification) demonstrating multinucleated giant cells and chronic inflammation.

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body giant cell reaction and chronic inflammation in connective tissue, consistent with a gouty tophus (Fig. 4). Direct visualization of the area revealed no evidence of an accessory muscle.

### Discussion

The anconeus epitrochlearis is an accessory muscle that, when present, originates from the medial border of the olecranon, crosses the ulnar nerve and inserts on to the medial epicondyle of the humerus [1-4]. Originally described in human anatomic dissections by LeDouble [5] in 1897, it is more commonly seen in amphibians, reptiles and most mammals; especially in those who move their elbow sideways [1,4]. In humans, the muscle is often replaced by a band which also extends from the medial epicondyle to the olecranon and is called the epitrochleoanconeus ligament [6]. This ligament, variably called the cubital tunnel retinaculum, transverse ligament or arcuate ligament of Osborne [7], helps form the roof of the cubital tunnel which functions to constrain the ulnar nerve, preventing its dislocation [8]. Just distal to the arcuate ligament, and sometimes blending with it, is the aponeurosis which joins the humeral and ulnar heads of the flexor carpi ulnaris. Thus the ulnar nerve is confined by the combination of the arcuate ligament and flexor carpi ulnaris aponeurosis. The variant anconeus epitrochlearis, when present, can contribute to the roof of the cubital tunnel and be a rare cause of cubital tunnel syndrome [1-4,8-10]. Edema within an anconeus epitrochlearis was reported by Jeon et al, on MR imaging of two patients with medial elbow pain [11]. The edema was thought to be due to muscle strain in one case and an adjacent capsular defect in the second. Treatment of cubital tunnel syndrome in the setting of an anconeus epitrochlearis consists of surgical decompression with local excision of the anconeus epitrochlearis muscle, with or without anterior subcutaneous transposition of the ulnar nerve [1].

Although the MR appearance of this case mimicked an edematous anconeus epitrochlearis, final pathology proved a gouty tophus. Subcutaneous tophaceous deposits of monosodium urate may occasionally occur as the initial manifestation of gout [12]. The term gout nodulosis has been suggested as an entity to describe patients in whom soft tissue tophi develop in the absence of arthritis [13]. Generally, soft tissue tophi are more common in patients with longstanding disease or who have responded poorly to treatment. In the elbow, soft tissue swelling is often caused by extra-articular tophi in the olecranon bursa, or in the soft tissues. Pressure from tophi can produce mass effect on adjacent neurovascular structures, which in some cases has resulted in carpal tunnel syndrome [14] or paraplegia [15].

Diagnosis of gout is based on the presence of hyperuricemia (although the concentration of serum uric acid may be within normal limits) [16-17], clinical history, radiographic findings, monosodium urate crystal identification, or rapid symptom resolution after colchicine therapy.

### *Pathogenesis*

The etiology of soft tissue tophi is an extracellular urate supersaturation that results in the deposition of monosodium urate crystals in the tissues. Crystal deposition incites a complex inflammatory response [18] that causes damage to the tissue. Accumulation of crystals may be idiopathic, due to enzyme deficiencies, or the consequence of a variety of disease states (renal disease, hyperparathyroidism, hypoparathyroidism, myeloproliferative disorders, or diuretic use). A diet rich in red meat, seafood, liquor, and wine also increases the incidence of gout [19]. "Saturnine" gout is caused by chronic ingestion of homemade liquor (moonshine) contaminated with lead [20].

### *Pathology*

Monosodium urate forms needle-shaped crystals that exhibit strong negative birefringence under polarized light microscopy. When oriented parallel to the compensator, the crystals appear yellow, whereas they appear blue when oriented perpendicularly. The crystals may be intracellular (within the neutrophils) or extracellular.

### *Imaging*

The MR appearance of soft tissue tophi is usually nonspecific, and can mimic an infectious or neoplastic process [21]. Characteristically, tophi have homogeneous low signal intensity similar to muscle on T1-weighted images [21], as demonstrated in this case. Soft tissue tophi have a variable low to high signal on T2-weighted images. The variability on T2-weighted images may be due to differences in calcium concentration within the tophus [21]. Tophi may show homogeneous, heterogeneous, or only peripheral enhancement [21-22]. The peripheral pattern of enhancement, when present, is likely due to hypervascular granulation tissue surrounding the tophus [21], as seen in this case. Some tophi may contain focal fluid collections [23].

### *Treatment*

Acute gouty attacks are commonly treated with colchicine or nonsteroidal anti-inflammatory medications. Long-term therapy can include uricosuric agents or xanthine oxidase inhibitors [24]. For treatment of hyperuricemia and chronic gouty arthritis, allopurinol is the preferred urate-lowering drug [12].

### *Conclusion*

MR imaging of gouty tophi can be nonspecific and can mimic an accessory muscle, as demonstrated by this case. When faced with a mass near the cubital tunnel, it is important to consider a differential diagnosis which includes an anconeus epitrochlearis. One should also entertain the possibility of a soft tissue tophus, especially if there is clinical, laboratory or imaging evidence of gout, and even as the initial presentation of gout.



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