Intraosseous Tophus Deposits in the Os Trigonum

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abstract

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High levels of uric acid cause accumulation of monosodium urate crystals. This formation of masses is called tophus. Intraosseous tophus deposits are rare, even for patients with gout. We report an unusual case of intraosseous tophus deposits in the os trigonum. The patient presented with ankle pain with no previous history of gout. On examination, tenderness on the posterior aspect of his ankle and limitation of plantarflexion was noted. Laboratory values were normal, except for an elevated serum uric acid value. Radiographs of the right ankle showed the presence of a large os trigonum with osteosclerotic changes, whereas magnetic resonance imaging showed intraosseous tophus deposits in the os trigonum. Conservative therapy failed, and the patient was admitted for an endoscopic resection of the os trigonum.

Intraosseous chalky crystals were detected during endoscopic resection of the os trigonum. The histological diagnosis was tophaceous gout. The underlying pathological mechanism of intraosseous tophi is uncertain. Penetration of urate crystals from the joint due to hyperuricemia may be the mechanism of deposition in this patient.

When a patient with hyperuricemia presents with posterior ankle impingement symptoms, intraosseous tophus deposits should be included in the differential diagnosis. Posterior endoscopic excision may be an option for treating intraosseous lesions of the os trigonum because of good visualization, satisfactory excision, and rapid recovery time.

Figure: Chalky crystals in the os trigonum.
Out is a metabolic disorder in which either an increase in production or a decrease in the excretion of uric acid occurs, leading to hyperuricemia. Long-lasting hyperuricemia causes the deposition of monosodium urate crystals in the joints and soft tissues, triggering gouty arthritis and, if not properly treated, the formation of gouty tophi. Tophi have been found in 9% to 10% of patients with gout, and the most frequent sites of deposition are the external ears and the first metatarsophalangeal joint. Intraosseous tophus deposits have been reported in the clavicula, the vertebral body, the patella, the talus, and the hallux. One report describing a lesion in the os trigonum was available. This article reports a rare case in which the patient presented with ankle pain with no previous history of gout.

**Case Report**

A 22-year-old man presented with a 2-year history of ankle pain after a sprain. He reported persistent posterior ankle pain, especially when he walked down stairs. He had previously been treated with a course of anti-inflammatory medication, which provided short periods of relief.

On examination, no swelling or redness was present in his right ankle; tenderness occurred on palpation on the posterior aspect of his ankle, posterior to the lateral malleolus. The pain was more intense when plantarflexing the ankle. Ankle range of motion (ROM) was limited to 20° of plantarflexion. The patient had no history of systemic disease, alcoholism, or malignancy. On admission, the laboratory values were normal, except for a serum uric acid value of 12 mg/dL (normal range, 3.6-8.2 mg/dL).

Radiographs of the right ankle showed the presence of an os trigonum with expansive and osteosclerotic changes (Figure 1). Magnetic resonance imaging (MRI) showed intraosseous deposits in the os trigonum (Figure 2). Conservative therapy, including a nonsteroidal anti-inflammatory drug, a urate-lowering therapy, and rest, failed. The patient was admitted for an endoscopic resection of the os trigonum.

We used a 2-portal endoscopic approach for diagnosis and treatment of the os trigonum. The patient was placed in the prone position. A tourniquet was applied around the thigh. We drew a line from the tip of the lateral malleolus to the Achilles tendon, parallel with the foot sole. The posterolateral portal is made just above this line, lateral to the Achilles tendon. Blunt dissection with a clamp to the anterior direction was performed. The posteromedial portal was established at the same level medial to the Achilles tendon. After soft tissue debridement and extensive curettage of the os trigonum, intraosseous chalky crystals were detected (Figure 3).

Full resection of the os trigonum was performed. The histological diagnosis was gouty synovitis with eosin-like materials surrounded by epithelioid cells and inflammatory reactions by giant cells (Figure 4). No plaster cast or splint was applied to the foot. Two weeks postoperatively, full ROM of the ankle and weight bearing were restored.

**Discussion**

Posterior ankle impingement is characterized by tenderness on the posterior ankle with palpation, pain by plantarflexion of the ankle, and possible limitation of plantarflexion. Many causes of posterior ankle impingement exist, including soft tissue and osseous abnormalities.

Many osseous pathologies have been cited to cause posterior ankle impingement: malformed callus of the posterior malleolus, malunion of joint depressed type calcaneal fracture, and downward-sloping posterior tibial plafond. One of the most studied causes is the os trigonum. The os trigonum is the most common accessory bone of the foot and is located posterolateral to the talus. It appears between the ages of 8 and 11 years as a secondary ossification center and usually fuses to the talus within 1 year of its appearance. When this ossification center remains separate from the talus, it is referred to as the os trigonum.
High levels of uric acid cause accumulation of monosodium urate crystals. This formation of masses is called tophus. Although tophi have been found in 9% to 10% of patients with gout intraosseous occurrence is rare. The large tophus can cause local ischemia to the surrounding skin and lead to wound complications after open resection.\(^{20,21}\) Kumar and Gow\(^ {22}\) found a high rate of complications after surgical resection of tophus; wound complications were more common with foot surgery. A minimally invasive approach to resect the tophus has the advantage of decreased risk of wound complications.

We present the first report on the endoscopic findings of tophus in os trigonum. The characteristic pathologic findings of gouty tophus are monosodium urate crystals surrounded by fibrous tissue and inflammatory reaction. Pathological findings in this patient were identical to the typical characteristics of gouty tophus previously reported.\(^ {5,23,24}\) The underlying pathological mechanism of intraosseous tophi is uncertain. Penetration of urate crystals from the joint may be the reason of intraosseous accumulation in this unusual case.

**CONCLUSION**

This article describes a patient with hyperuricemia complicated with a gouty intraosseous tophus deposit in the os trigonum, causing posterior ankle impingement. No systemic disease or predisposing factors were discovered related to the patient’s hyperuricemia. Posterior endoscopic excision is a good choice for intraosseous lesions of the os trigonum because of good visualization, satisfactory excision, and rapid recovery time. When a patient presents with posterior ankle impingement symptoms, the possibility of intraosseous tophus deposits should be included among the differential diagnoses.

**REFERENCES**