

Gouty Tophi in Sinus Tarsi of Bilateral Feet Mimicking Synovial Sarcoma: A Case Report

Statement of Purpose

Gout is a form of inflammatory arthritis defined by the inability to metabolize purines. [1,2] It is characterized by deposition of monosodium urate (MSU) crystals in joints and periarticular soft tissue with the first metatarsophalangeal joint being a frequent site of tophus formation.[3] However, gouty tophus formation in the sinus tarsi of bilateral feet in a relatively young healthy patient has not been reported in the literature to the best of our knowledge. Tophaceous deposits have the tendency to resemble other pathological conditions such as pigmented villonodular synovitis (PVNS) and synovial sarcoma [4] and share a number of features with gout or with tophaceous deposits which makes definitive diagnosis challenging based on imaging alone [5]. Herein, we present a rare case of chronic tophaceous gout of the sinus tarsi in bilateral feet, in a relatively young healthy individual, with extensive bony erosions mimicking PVNS and synovial sarcoma.

Literature Review

Epidemiological studies have shown a higher prevalence of gout amongst US men at 5.9 % (6.1 million) compared to women at 2.2% (2.2 million). [6] Clinically, acute gout flares present with joint swelling and pain, versus chronic gout, which is defined as accumulation of MSU crystals in joints, cartilage, tendons, bursae, bone, and soft tissue. [7] Commonly, the first episode of gouty arthritis in men appears after the age of 40 [8] and the foot is the most common location for gout,[9] with the first metatarsophalangeal joint being a frequent site of tophus formation.[2] However, gouty tophus formation in the sinus tarsi of bilateral feet in a relatively young healthy patient has not been reported in the literature to the best of our knowledge. Typical imaging features of tophaceous gout have been well described in the literature. [10] Gout has been termed the “great mimicker” due to its tendency of mimicking other pathological conditions such as PVNS and synovial sarcoma. [11] However, there is a lack of studies in the literature where malignant neoplasm is a differential diagnosis in more challenging cases of gout. In more puzzling cases of gout where a malignant neoplasm is suspected based on imaging, performing an excisional or incisional biopsy to rule out any malignancy is recommended.

Figure 1



Figure 2



Figure 2: Linear 5 cm incision made over the mass at the sinus tarsi of left foot. EDB muscle belly reflected and retracted. Gouty tophi visible in the sinus tarsi and debrided using a rongeur.

Figure 1: Palpable mass to sinus tarsi of left foot measuring 5 cm x 6 cm outlined pre-operatively.

Case Study

•**HPI:** 23 year old non-diabetic male of Asian descent presented to our clinic with an intermittently painful and slow growing soft tissue mass at the level of the sinus tarsi of bilateral feet (Figure 1). Masses in both feet appeared over 7 years ago after the patient sustained a right ankle sprain while playing basketball. He relates 2/10 aching, cramping, and diffuse pain once or twice a year in both masses. He has a past medical history significant for gout to 1st MTPJ and MCPJ of bilateral upper and lower extremities. However, the patient states that the pain he experiences in the masses of both feet are not the same as his gout flares. He has been taking allopurinol 100 mg.

•**Physical Examination:** Masses were indurated, non-mobile, and did not transilluminate. There was no pain upon direct palpation to the masses. There was no pain with passive or active ROM to joints of the foot and ankle bilaterally.

•**Imaging:** Plain film radiograph and MRI of bilateral feet were obtained which showed masses measuring 2.4 cm x 2.4 cm x 1.9 cm in the right foot and 2.6 cm x 4.7 cm x 3.1 cm in the left foot were noted with extensive bony erosions. Given imaging characteristics and bilateral occurrence, PVNS or synovial sarcoma was favored. Chronic gouty tophus formation is possible but was felt to be less likely (Figure 3,4).

•**Treatment Plan:** Due to high suspicion of a malignant neoplasm, we recommended surgical excision and biopsy of the mass.

•**Surgical Procedure:** Intra-operatively, the EDB muscle was identified and reflected. A mass consisting of a chalky white tophaceous formation was identified in the sinus tarsi, which was consistent with gout (Figure 2). The white tophaceous mass was completely excised from the sinus tarsi and sent to pathology (Figure 5). Bone was debrided from the lateral aspect of the navicular and medial aspect of the cuboid and defect was filled with allogeneic crushed cancellous bone chips.

Results

•**Post-operatively,** the patient was allowed to weight-bear as tolerated to the right foot in a post operative shoe. His incision site healed successfully within 3 weeks with no complications. He then underwent a similar procedure on the left foot 1 month later. The incision site healed successfully with no post-operative complications. Histopathological examination confirmed the diagnosis of tophaceous gout to bilateral feet (Figure 6). At 3 month follow up, the patient related 0/10 pain on VAS scale to bilateral feet and did not experience any limitation in performing daily activities. Pt was followed up for one year.

Discussion

•**Tophaceous gout** can be challenging to diagnose by imaging, as it can mimic several entities. Perhaps the most important findings suggesting gout include juxta-articular osseous erosions with Martel’s sign. Most commonly, gout involves the 1st metatarsal phalangeal joint. However, it can also involve multiple joints simultaneously, usually in an oligo articular pattern and usually asymmetrically. Radiographs are usually sufficient for diagnosis but MRI may also be useful in less clear cases, as gout may be radiographically occult for up to 10 years [12], approximately only in 40% of cases of tophaceous gout [4]. In severe cases or in late stages, intraosseous calcifications may occur and extent of the erosions and tophi deposition may mimic entities such as hyperparathyroidism, PVNS, amyloid deposition, synovial osteochondromatosis, and rarely synovial sarcoma.

Figure 3



Figure 3: AP and oblique radiographs of the right and left foot. Note the “cloudy” dense tophus (red arrows) and osseous erosions (green arrows). The latter are more readily apparent radiographically in the left foot. Overall mineralization is maintained and joint spaces are relatively preserved.

Figure 4

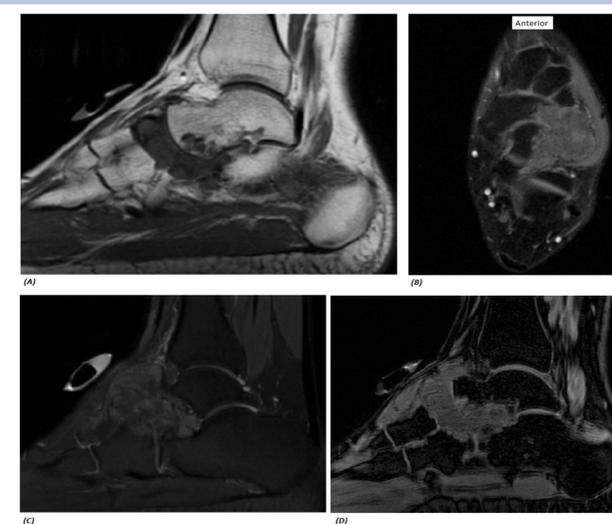


Figure 4: Left foot. Soft tissue representing gouty tophus extending from the anterior/middle subtalar joint dorsolaterally. Note osseous erosions best seen on T1W image (A) with avid enhancement on T1W post-contrast image (B). Also note the relatively homogeneous low signal on T1 (A) and heterogeneous iso- to hyperintense signal on PD image (C). No significant blooming artifacts are seen on GRE sequence (D).

Discussion (continued)

Synovial sarcoma commonly presents in young adults between ages 20 and 40 with majority (80-95%) [13] of tumors occurring primarily in extremities, two-thirds being located specifically in the lower limbs, and arise in the para-articular region of large joints [14]. It is more closely related to tendons, tendon sheaths, bursa, and synovial sheath, which are some of the common locations for uric acid deposition. MRI may be particularly helpful in these cases. Multiple common different imaging characteristics exist between the above mentioned entities as demonstrated in the table below.

	Gout	Synovial Sarcoma	PVNS
Radiograph	1. Martels sign. 2. Bone mineralization maintained. 3. Cloudy appearance with occasional calcifications.[5]	1. Bone erosions with intraosseous calcifications.[7]	1. Bone erosions with intraosseous calcifications[7]
CT	Helpful in evaluating the extent of the disease and for monitoring response to therapy.[16]		
MRI	1. Displaces soft tissue structures 2. Low to intermediate signal on T1 3. Heterogeneous signal on T2, STIR, or PD.	1. May invade soft tissue structures. 2. Oedema-like signals.[15]	1. Displaces soft tissue structures. 2. Oedema-like signals.[15] 3. Low signal on T1.[17] 4. Blooming artifact on gradient echo.

Tophaceous gout was not considered as the provisional diagnosis in this case because of the following reasons: 1. Age; patient was relative young as first flare of gout in men is reported to be after 40 years. 2. The patient complained of a dull/aching/diffuse 2/10 pain, 1-2 times a year to the area of the mass which is atypical presentation for gout flare ups. 3. Location; bilateral sinus tarsi. 4. Extensive erosions in the tarsal bones, mimicking a neoplasm. 5. No intraosseous calcification seen on the radiographs. In more challenging cases of gout where a malignant neoplasm is suspected based on imaging, we recommend performing an excisional or incisional biopsy to rule out any malignancy.

Figure 5



Figure 5: Multiple clumps of gouty tophi extracted from the sinus tarsi.

Figure 6

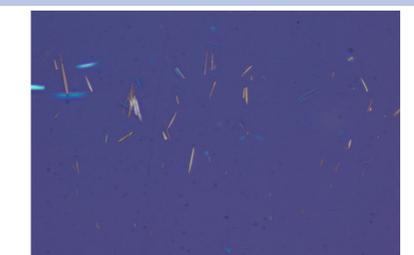


Figure 6: Blue needle shaped negatively bi-refringent urate crystal seen consistent with gout.

References

Available upon request.