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## Case Report

## Tophaceous gout with rare involvement of the patella

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## ABSTRACT

Gout arthritis is an inflammatory arthritis caused by hyperuricemia from various etiologies. It is typically a polyarticular arthritis with the most common joint involved being the first metatarsophalangeal joint. We present a case of gout of the knee with characteristic magnetic resonance imaging findings and rare involvement of the patella. Radiographic findings of gout are diagnostic; however, they manifest many years after the onset of the disease process. Control of symptoms and progression of the disease is possible with correct treatment made possible by early diagnosis.

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## Introduction

Gout is an inflammatory arthropathy caused by long-standing hyperuricemia. Patients are usually asymptomatic for many years before developing symptoms and before radiographic evidence of disease. The first metatarsophalangeal joint is the most commonly involved joint, although gout is often polyarticular. Involvement of the knee is not uncommon, but involvement of the patella is rare. The following is a case presentation of gout with involvement of the patella and characteristic magnetic resonance imaging (MRI) findings.

## Case report

A 52-year-old gentleman presented to our outpatient imaging center for a right knee MRI in September 2015. His chief complaint was pain and swelling to the medial aspect of his knee after a fall 2 weeks earlier. Pertinent medical history of our patient includes hypertension, hyperlipidemia, gout, secondary polycythemia, and coronary artery disease. The patient has a surgical history of coronary artery bypass graft and mitral valve repair.

He has a long-standing history of gout and excessive alcohol consumption for many years. His gout was diagnosed

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both on a clinical basis and radiographically. Before initiating treatment, his serum uric acid level was 13 mg/dL. Initially, he was started on 100 mg daily of allopurinol, which is a xanthine oxidase (XO) inhibitor that reduces the production of uric acid in the body. Unfortunately, he had a severe allergic reaction to allopurinol including rash and mucosal ulcers. Following this, he started 80 mg daily of febuxostat for the management of his hyperuricemia. Febuxostat is a new oral nonpurine XO inhibitor. While taking febuxostat, he continued to have multiple gout flares with large periarticular tophi involving his hands and elbow.

Earlier in February 2015, he had visited the emergency department for left hand pain not typical of his gout attacks. A left hand radiograph demonstrated findings consistent with tophaceous gout (Fig. 1). Photographs taken in June 2015 show the extent of tophi on physical examination (Figs 2 and 3).

With continued treatment, our patient's uric acid level dropped to 5.6 mg/dL. Because of his continued gout flares and his painful tophi, he discontinued febuxostat and was started on a new medication called pegloticase. Pegloticase is an enzyme that metabolizes uric acid into a harmless chemical that is eliminated from the body in urine. Pegloticase is administered intravenously at a dose of 8 mg every 2 weeks. His uric acid level has now dropped below 1 mg/dL, and he has experienced significant improvement in



**Fig. 1** – Single anteroposterior radiograph of the hand shows multiple periarticular calcified masses throughout the hand (solid curved arrow). Associated periarticular erosions are present (solid and dashed straight arrows). Also noted is calcification of the triangular fibrocartilage complex (curved dash arrow).



**Fig. 2** – Photograph of the dorsum of the hand taken June 4, 2015 showing large gout tophi of the 4th and 5th digits.

his tophi as evidenced by photographs taken in April 2016 (Figs 4 and 5).

A right knee MRI from September 2015 revealed an acute fracture of the tibial plateau (Fig. 6). In addition, the MRI demonstrated changes of gout arthritis including severe nodular thickening of the distal quadriceps tendon (Figs 7-9) and adjacent erosion of the superior aspect of the patella (Figs 8-10). There was also diffuse thickening of the prepatellar soft tissues (Fig. 10), patellar tendon (Fig. 11), and nodular thickening of the iliotibial band (Figs 12 and 13). Incidental anterior cruciate ligament ganglion cyst was also demonstrated (Fig. 14).

## Discussion

Gout is an inflammatory arthritis caused by high-serum levels of uric acid, known as hyperuricemia. Hyperuricemia is defined as a serum urate level of approximately 6.8 mg/dL or higher, which is the upper limit of urate solubility at physiologic body temperature and pH [1,2]. There are various causes of hyperuricemia including genetic disorders of purine metabolism, purine-rich diets, decreased renal excretion of urate secondary to chronic renal disease, and certain



**Fig. 3** – Photograph taken June 4, 2015 showing large gout tophi of the 4th and 5th digits.

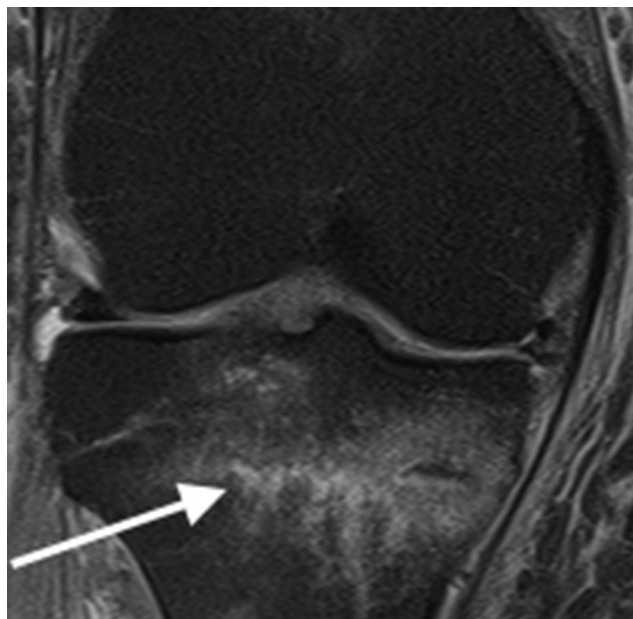


**Fig. 4** – Photograph of the dorsum of the hand taken April 1, 2016 showing near complete resolution of gout tophi following treatment with pegloticase.



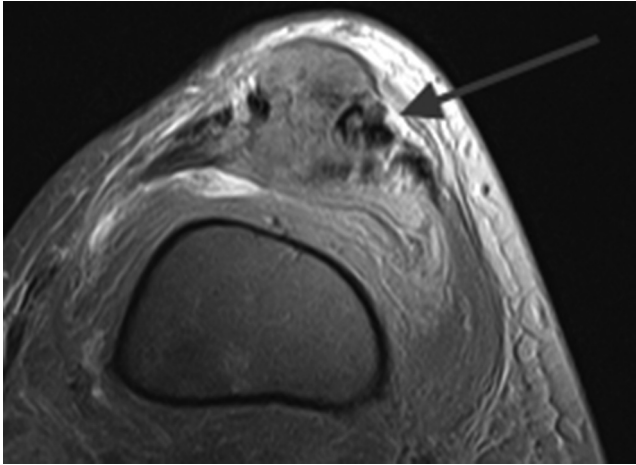
**Fig. 5** – Photograph taken April 1, 2016 showing near complete resolution of gout tophi following treatment with pegloticase.

medications. There is also an association with the male gender and metabolic syndrome [3]. Patients generally have asymptomatic hyperuricemia for years before developing gout. High levels of urate in the bloodstream lead to a high concentration of sodium urate crystals, which can deposit in



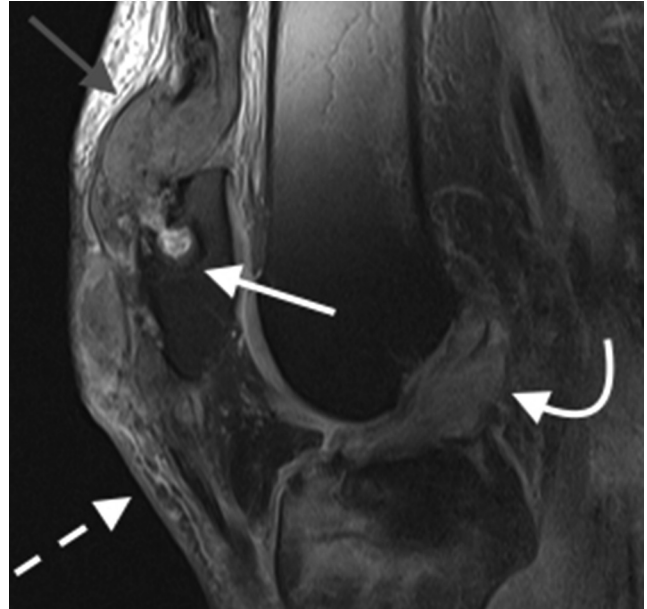
**Fig. 6** – MR coronal T2 image with fat suppression shows a transverse linear signal abnormality in the tibia consistent with an acute fracture (straight white arrow).



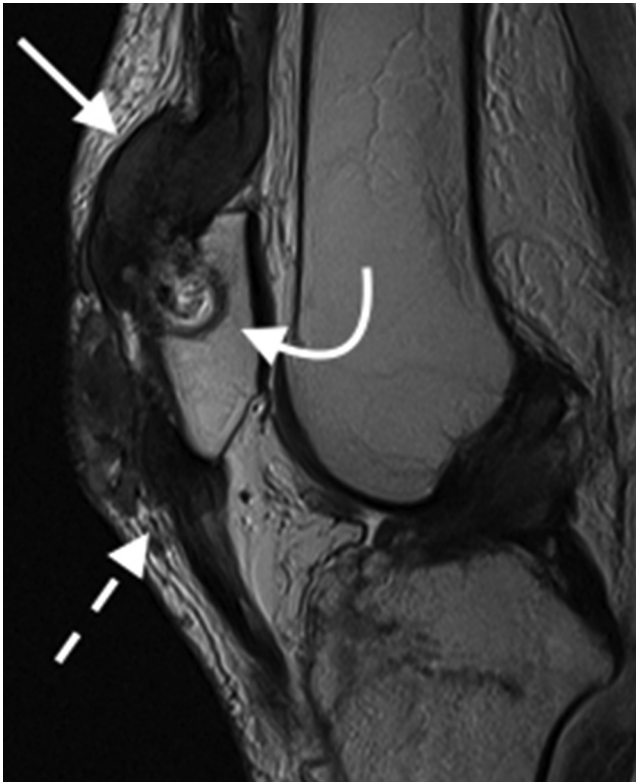


**Fig. 7 – MR axial proton density image with fat suppression shows the distal quadriceps tendon is thickened and edematous (gray arrow).**

cartilage, bone, and joint spaces causing an inflammatory reaction. A tophus forms from a conglomerate of urate crystals and inflammatory cells [1,3]. Most patients have hyperuricemia for many years before developing tophi. Gout arthritis is the most common in middle-aged men.

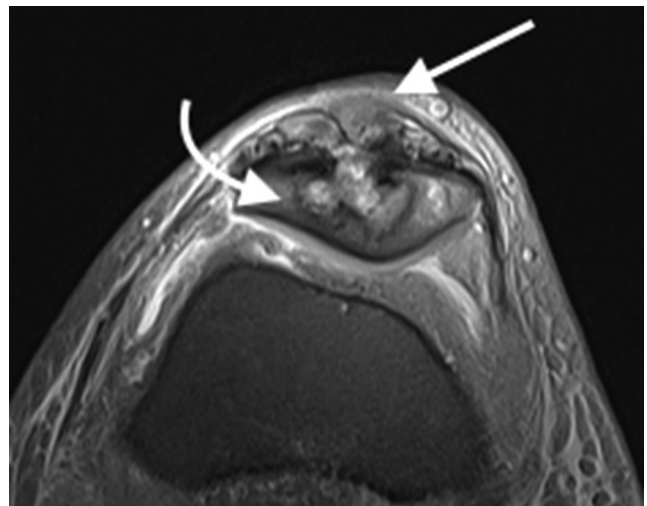


**Fig. 9 – MR sagittal proton density image with fat suppression shows irregular thickening and edema involving the quadriceps tendon (gray arrow), patellar erosion (straight white arrow), and thickening and edema within the patellar tendon and prepatellar soft tissues (dashed arrow). Incidental anterior cruciate ligament ganglion is noted (curved arrow).**

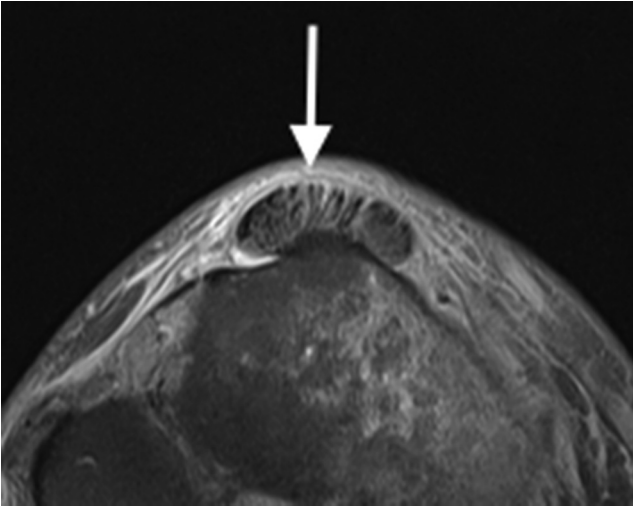


**Fig. 8 – MR sagittal T2 image shows thickening of the quadriceps tendon (straight arrow), patellar erosion (curved arrow), and thickened prepatellar soft tissues and patellar tendon thickening (dashed arrow).**

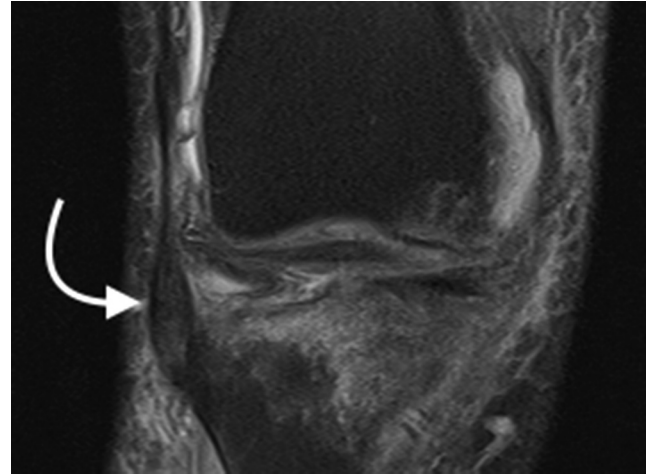
Any joint can be involved in gout, but the first metatarsophalangeal joint is the most common. It is typically an oligoarticular or polyarticular arthritis involving joints in an asymmetric pattern. Sudden onset of pain, swelling, and erythema are characteristic of an acute gout attack. Joint



**Fig. 10 – MR axial proton density image with fat suppression shows abnormally thickened and nodular appearance of the distal quadriceps tendon (straight arrow) and patellar erosion (curved arrow).**



**Fig. 11** – MR axial proton density image with fat suppression shows the patellar tendon is abnormally thickened and edematous (white arrow).

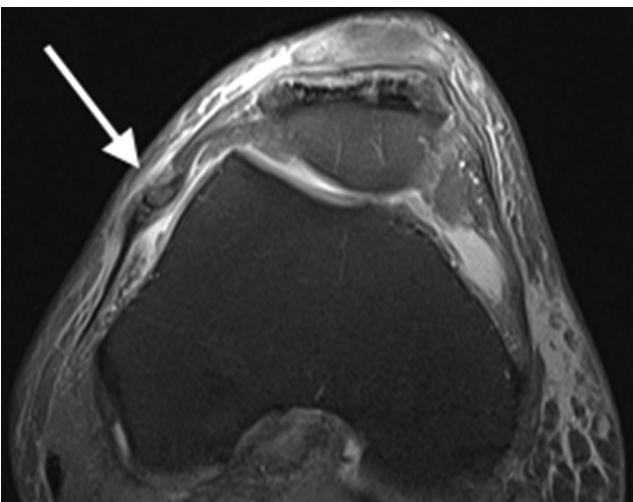


**Fig. 13** – MR coronal proton density image with fat suppression shows nodular thickening and edema involving the distal portion of the iliotibial band (curved white arrow).

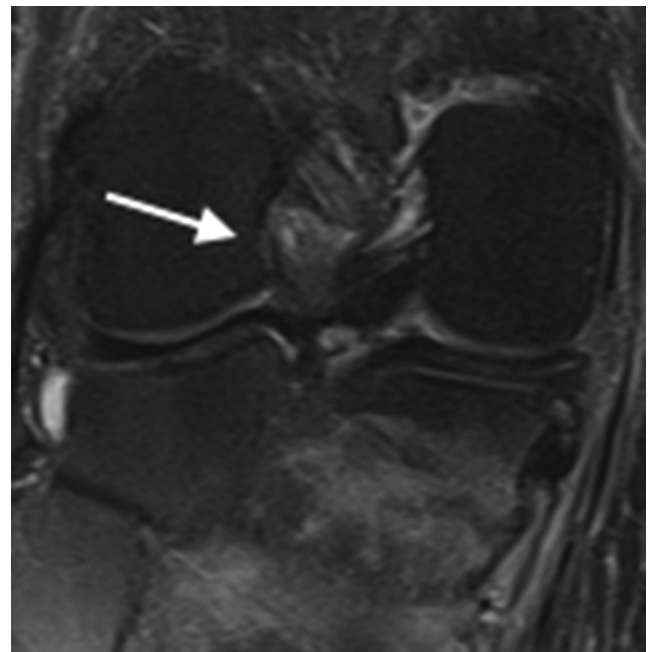
aspiration can help distinguish from other types of arthritis and demonstrates needle-shaped crystals with negative birefringence under polarized light. Since imaging characteristics of gout are often diagnostic, joint aspiration is not always necessary.

Classic radiographic findings of gout include juxta-articular and intra-articular erosions with sclerotic margins and overhanging edges. Bone mineralization is normal; however, pathologic fractures can occur from bone weakening. In chronic gout, tophi can be seen as soft-tissue dense masses adjacent to the joints. In patients with normal radiographs, MRI may show occult gout arthropathy with small bone erosions, synovial pannus, bone marrow

edema, and soft-tissue edema. MRI characteristics of tophi include homogeneous hypointense or isointense T1 signal, variable T2 signal depending on calcium content, and homogeneous enhancement with intravenous contrast [4]. Tophi involving the knee are most commonly intra-articular with common locations including the infrapatellar fat pad and anterior joint recess, lateral rim of the lateral femoral condyle, and the intercondylar fossa. Bone erosions typically occur at the sites of tophi formation [4].



**Fig. 12** – MR axial proton density image with fat suppression shows nodular thickening of the iliotibial band (white arrow).



**Fig. 14** – MR coronal T2 image with fat suppression demonstrates thickening and fluid signal within the anterior cruciate ligament consistent with an incidental anterior cruciate ligament ganglion (white arrow).

Gout involvement of the extensor tendons of the knee is not uncommon, but involvement of the patella is rare [5,6].

Gout is a progressive arthritis but can be well controlled with medication and dietary modifications. If gout is not treated, patients may have recurrent episodes of pain and swelling in the involved joints. Acute attacks are treated with nonsteroidal anti-inflammatory medications. Treatment is aimed at reducing gout attacks by controlling urate levels. This can be achieved by dietary modifications and various medications. XO inhibitors decrease the production of uric acid, and probenecid increases the excretion of uric acid [2]. If left untreated, gout can lead to severe joint destruction.

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