



## Bioscientia Medicina: Journal of Biomedicine & Translational Research

Journal Homepage: [www.bioscmed.com](http://www.bioscmed.com)

### Complex Case: Acute-on-Chronic Gouty Arthritis, Septic Arthritis, and Severe Joint Deformities in a Young Adult Patient

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#### ARTICLE INFO

##### Keywords:

Debridement  
Gout  
Septic arthritis  
Tophus

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All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/bsm.v8i5.981>

#### ABSTRACT

**Background:** Gout is the most prevalent type of inflammatory arthritis, which can lead to inflammation in the joints. However, septic arthritis is unusual in gout. **Case presentation:** A 34-year-old male presented with lumps on the right ankle with cloudy white fluid discharge for 5 days prior to admission. The patient also has lumps observed on the left pedis, and manus bilateral. The patient regularly takes Allopurinol daily and Piroxicam prior to admission. The physical examination had a limited range of movement. Laboratory examinations found elevated uric acid, impaired renal function, elevated white blood cells, and elevated erythrocyte sedimentation rate. The patient was then referred for surgical debridement. **Conclusion:** Chronic gout marked by persistent polyarticular engagement and the formation of tophi. In individuals left untreated, septic arthritis and gout may manifest, followed by deformities of joints, which need further diagnosis and management.

#### 1. Introduction

Gout is a progressive disease caused by the deposition of monosodium urate (MSU) crystals in the joints, kidneys, and other connective tissues.<sup>1</sup> This is a result of chronic hyperuricemia. Without effective management, this condition will progress to chronic gouty arthritis and may lead to the formation of tophi, severe kidney disorders, and a decline in the patient's quality of life.<sup>2</sup> Recent findings on the prevalence and occurrence of gout exhibit considerable variability based on the demographics under investigation and the methodologies utilized, spanning a prevalence rate ranging from less than 1% to 6.8% and an incidence rate of 0.58 to 2.89 per 1,000 person-years.<sup>3</sup> On the other hand, septic arthritis represents a critical

emergency scenario that could culminate in cartilage degradation, significant disability, and elevated mortality rates.<sup>4-6</sup> The concurrent occurrence of gouty arthritis and septic arthritis is an uncommon medical phenomenon that often presents diagnostic challenges, potentially resulting in unfavorable outcomes.<sup>6</sup>

In this study, we discuss the case of a 34-year-old male who was suspected to have gout flare and was ultimately diagnosed with septic arthritis complicating gout. We conduct a literature review focusing on the simultaneous occurrence of these two conditions, emphasizing potential challenges in their diagnosis and treatment.

## 2. Case Presentation

A 34-year-old male presented with chief complaints of lumps on the bilateral ankle. The lump on the right ankle was observed with cloudy white fluid discharge for 5 days prior to admission to the hospital. The lumps on the left ankle and pedis were also observed, with excoriation on the lump. The patient also has lumps observed on both manus. These lumps have been present for more than 5 years. This condition has caused difficulty for the patient in wearing shoes, walking, and performing daily activities. The patient also complains of pain with 5-6 points on the visual analog scale (VAS) pain scale on the lumps that occur sometimes. The patient routinely undergoes treatment at the Community Health Center for their complaint. Previously, the patient was diagnosed with gout arthritis and has been regularly taking allopurinol 100 mg once daily. Additionally, the patient is prescribed piroxicam 7.5 once daily when the pain occurs.

During the physical examination, multiple tophi were found on bilateral hands, bilateral feet, and bilateral ankles (Figure 1-2). The lumps were firm and immobile upon palpation and also felt warm on the lumps. The range of movements was also limited due to the presence of lumps on the joints. Laboratory examinations revealed elevated levels of serum uric

acid at 11.5 mg/dL. Renal function tests showed elevated blood urea nitrogen (BUN) at 56.5 mg/dL and serum creatinine at 1.4 mg/dL, with an estimated glomerular filtration rate (GFR) calculated using CKD-EPI creatinine 2021 equation at 68 mL/min/1.73m<sup>2</sup>, indicating stage II chronic kidney disease (CKD). White blood cell count (WBC) was significantly elevated at 28.3 x 10<sup>3</sup>/μL. The erythrocyte sedimentation rate (ESR) was also markedly elevated at 95 mm/hour. Radiographic examination revealed multiple tophi with osteopenia and without narrowing of joint spaces on plain x-rays of the feet in both anterior-posterior (AP) and oblique views (Figure 3).

The patient was administered corticosteroid injections in the form of 500 mg IV Fartison® twice daily and analgesics in the form of 50 mg Dexketoprofen Trometamol twice daily, and intravenous Ibuprofen 400 mg thrice daily. Subsequently, the patient was referred to the surgical department for planning surgical debridement and excision of necrotic tissues (Figure 4). Post-debridement of the lump, the pain has significantly decreased, and uric acid serum also decreased at 10.5 mg/dL. Overall, symptoms also significantly decreased, and the patient was able to use shoes.



Figure 1. Clinical presentation of the right and left manus.



Figure 2. Clinical presentation of the right and left pedis.



Figure 3. Plain X-ray AP/oblique right pedis.



Figure 4. Intraoperative surgical debridement of the lump on the right pedis.

### 3. Discussion

Global incidence of gout arthritis increased between 1990 and 2019 in individuals aged 15-39 years. In 2019, individuals aged 35-39 years, 30-34 years, and 25-29 years accounted for 41.7%, 31.4%, and 18.1%, respectively.<sup>7</sup> In Indonesia, the incidence of gout arthritis in men ranged 30-40 years, and in women ranged 55-70 years, especially after menopause, and the prevalence of gout arthritis increases as people get older.<sup>8</sup> Early onset gout was defined as gout before age 40 years, and late-onset is at age  $\geq 40$  years.<sup>9</sup> The patient in this case has had multiple lumps in both manus since 5 years ago. This suggests that this patient may have had a long hyperuricemia condition until tophus formed. Seeing that the patient's current age is 34 years, this case is an early onset of gout.

Gout, a disorder stemming from purine metabolism, arises from prolonged hyperuricemia, indicated by a serum urate level of  $\geq 6.8$  mg/dL. If left untreated, it can progress to chronic tophaceous gout, characterized by chronic polyarticular involvement and tophi formation. Typically, chronic tophaceous gout manifests after a decade or more of recurrent polyarticular gout, with tophi potentially appearing in

soft tissues, osseous tissues, ligaments, and various organs, either in conjunction with or without gouty arthritis. Tophi are commonly found on the helix of the ears, fingers, toes, wrists, knees, olecranon bursae, Achilles tendons, and rarely, on the sclerae and subconjunctivally.<sup>10</sup>

Inflammatory reactions triggered by MSU crystal deposition most frequently manifest in the first metatarsophalangeal joint but can also occur in other joints. Several risk factors contribute to the development of gout. Genetic mutations in the renal urate transporter system may result in under-excretion or overproduction of uric acid crystals, leading to the formation of gout nodules, known as tophi.<sup>11,12</sup> Additional risk factors include advanced age, familial or personal history of gout attacks, osteoarthritis, alcohol consumption, intake of purine-rich foods, and use of medications such as thiazide diuretics for hypertension, which can precipitate gout in susceptible individuals.<sup>13</sup>

Crystalline tophus should be differentially diagnosed from tumoral calcinosis and tophaceous pseudogout, both of which involve soft tissue calcification, rendering them radiopaque.<sup>14</sup> A definitive diagnosis of pseudogout entails identifying CPPD

(calcium pyrophosphate deposition) crystals in synovial fluid, which appear intensely basophilic and rhomboid-shaped.<sup>15</sup> Tumoral calcinosis, unlike gout and pseudogout, presents as an amorphous mass. An important distinguishing characteristic is that gout exhibits monosodium urate crystals, which demonstrate strong negative birefringence, as opposed to the weakly positive birefringence observed in pseudogout.<sup>16</sup>

In this case, the patients had multiple tophi, which is usually found in chronic gout. If this condition is left untreated, it can lead to complications such as nephrolithiasis, destruction and erosion of joints, and lower the patient's quality of life. Reducing serum urate levels through the administration of xanthine oxidase inhibitors or uricosuric agents helps prevent acute flares and the development of tophi.<sup>17</sup> Surgical intervention is rarely necessary for gout and is typically reserved for instances of recurrent attacks accompanied by deformities, severe pain, infection, and joint destruction.<sup>18</sup> One of the complications present in this patient was septic arthritis and deformities of the joint. Septic arthritis most commonly affects the knee joint, followed by the hip, ankle, and wrist, and often in oligoarticular distribution. In patients suspected of septic arthritis, empiric antibiotic treatment should be started immediately.<sup>19</sup>

The presence of specific symptoms and blood tests are the most helpful diagnostic tools. Moreover, the presence of MSU crystals in the synovial fluid does not definitively rule out septic arthritis. As the septic process progresses, it may lead to the release of crystals from the synovial membrane or cartilage.<sup>20</sup> Instances of concurrent gout and septic arthritis documented in the literature are infrequent and have predominantly surfaced in case series originating from Taiwan.<sup>21</sup> Distinguishing between septic arthritis and other types of arthritis, such as crystal-induced or rheumatoid arthritis, can pose significant challenges.<sup>6</sup> The clinical manifestations of gout and septic arthritis can often overlap, presenting with pronounced inflammation, fever, swelling, redness, pain, and

restricted range of motion in the affected joints.<sup>22</sup> In conclusion, we present a patient with septic arthritis and chronic gout; these two conditions require timely diagnosis and efficient management, frequently involving a combination of antibiotic treatment, surgical drainage, and anti-inflammatory medications.

#### 4. Conclusion

Treating physicians need to maintain a high index of suspicion for infection in patients with gout, as septic arthritis constitutes a medical emergency capable of inducing rapid joint destruction.

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