RESECTION AND RECONSTRUCTION OF GIANT TOPHUS OF THE FOOT : A CASE REPORT

Rhyan Darma Saputra[1], Bintang Soetjahjo[2], Bagus Jati Nugroho[3], Jiva Yori Anugrah[4]

[1-3] *Staff of Orthopaedic & Traumatology Department Faculty of Medicine Sebelas Maret University – dr. Moewardi General Hospital;*
[4] *Resident of Orthopaedic & Traumatology Faculty of Medicine Sebelas Maret University – dr. Moewardi General Hospital – Prof. DR. R. Soeharso Orthopaedic Hospital, Solo*
E-mail: jivayori@gmail.com

ABSTRACT

Background: *The first metatarsophalangeal joint is the most frequent site of gouty tophi (MTP1). With the incidence of MTP1 joint was 73 %. Treatment aims at control of serum uric acid levels which can cause regression of tophi and surgical excision of very large tophi. A case of a massive tophus at the first metatarsophalangeal joint was documented.*

Case presentation: *A 58-year-old man was diagnosed with and a huge tophus at MTP1,after a five-year history of the gout disease. The patient was referred to our hospital because of a developing mass. On examination of the left foot, there was a solid mass on the dorsal and plantar forefoot that was fixed and had an unclear margin. There was no discomfort on the lump. The 1st metatarsal and proximal phalanges bones were both destroyed on a plain radiograph of the left foot. A laboratory examination shown increased at uric acid level (11.3 mg/dl), increased at sedimentation rate (46 mm/h at first hour), and also increased lactate dehydrogenase (LDH). We performed Excision of tophi and continued with reconstruction and arthrodesis MTP1 & MTP2 using iliac auto bone graft then internally stabilized with Mini T-Plate and K-Wire*

Conclusion: *Patient with giant tophus at first metatarsophalangeal joint can be treated with excision and performed arthrodesis.*

Keywords: *First metatarsophalangeal, giant tophus, arthrodesis*

INTRODUCTION

Gout is one of the most common forms of inflammatory disease in adults. Initially, gout arthritis presents as self-limiting attacks of severe joint inflammation with the presence of persistent hyperuricaemia. While chronic gout can develop with recurrent flares, tophi and chronic synovitis.[1] After 10 years or more of recurrent polyarticular gout, chronic tophaceous gout might develop. [2]Gout affects between 1 to 2 % among adults people.[3] And the prevalence increase in women aged over 85 years old to 3 % and

to 7 % in men aged over 65 years old.[4] This diseased is caused by hyperuricemia and monosodium urate (MSU) crystal deposition in joints and soft tissues. Therapy of acute gout include corticosteroids, colchicine, and NSAIDs.[5] The treatment to lowering levels of serum urate like allopurinol or febuxostat are commonly used. If left untreated, gout can develop to persistent tophi production and joint surface erosion. Tophi is commonly found in people with gouty arthritis who have had it for more than ten years.[6]

Together with increasing knowledge of the mechanism of tophi development, association with hyperuricaemia, and treatment possibilities, surgical interventions' indications have shifted. They were published in the 1960s. They included impairment of the function of tendons and joints, skin ulceration or necrosis over the tophi, local infections or septicaemia caused by tophi, and nerve compression. [7]

Gout tophi can be treated with a variety of approaches, including proper nutrition, addressing the underlying reasons, and taking uric acid-lowering drugs. With intensive therapy, little tophi may dissolve. Giant tophi, on the other hand, are usually resistant to dietary changes and medications. Debridement or surgical debulking of the tophi is always an option when the huge tophi is accompanied by compression of neurovascular systems, massive limiting of joint motion, or skin infection.[3]

The arthroscopic shaver and open tophectomy were the most common procedures. The most common side effect was a delay in surgical wound healing, which was more common in patients with diabetes or peripheral vasculopathies. The operations had a positive outcome in terms of the joint's function being restored. [8]

Gout arthritis is well identified by its predilection to affect the first metatarsophalangeal joint (MTP1).[9] The MTP1 is very susceptible to tophi and acute gout arthritis. The incidence of MTP1 joint was 73 % in gout. And the incidence of tophi at MTP1 around 50 % to 100 %. The frequency of acute MTP1 arthritis as the initial manifestation of gout was not significantly different between men and women.[3]

The significant role of the MTP1 during normal gait is the forward transfer of body weight during propulsion. And it is still unclear to what extent the structure and function of the joint is compromised in people with gout arthritis.[9] As a result, in tophaceous gouty arthritis, surgeons must choose between preserving the affected joint and performing arthrodesis after tophi removal.[10]

CASE REPORT

We reported, a 58—years-old male diagnose with Mass at first left Metatarsophalangeal joint due to Giant Tophus. The patient presented to us with a lump in both of his foot that grow since 5 years ago. Patient was referred from

Magetan General Hospital to Moewardi General Hospital, Surakarta. He was complaining of mild to no pain when walking with his lump on both foot, but the lump is getting bigger over the time. Patient was still able to walk without any aids. Patient has been consumed several oral medication but there is no impairment after several years. There were no history of smoking, injuries, or another lump. There were no history of the similar condition in the family.

Patient also experiencing pain at night and chronic fever during last several months. There is no loss of bodyweight, no bloody urine or stool, and no chronic cough. Radiological examination (X-ray and CT-Scan) was performed.

The general physical and systemic examinations yielded normal results. A solid mass on the dorsal forefoot and plantar forefoot, with an unclear margin and fixation was discovered during a search of the left foot. There was no tenderness on the lump. **(Figure. 1).** A X-ray of the left foot showed a bone destruction of the 1st metatarsal and proximal phalanges bone **(Figure. 2).**

A laboratory examination shown increased at uric acid level (11.3 mg/dl), increased at sedimentation rate (46 mm/h at first hour), and also increased lactate dehydrogenase (LDH) level.

A clinical diagnosis of mass at first Left Metatarsophalangeal joint due to giant tophus, which later confirmed by histopathological examination post-operatively.

Figure 1. Clinical appearance lump in left foot

Figure 2. Pre-op AP/Oblique Radiograph of the left foot

Surgical decision is to excised of the tophus, then we continued with reconstruction of the MTP1 & MTP2. We decided to replace the bone with iliac graft then we stabilized the MTP1 & MTP2 and performed arthrodesis and rigid fixation with Mini T-Plate and Kirschner Wire at the level of metatarsophalangeal joint and tarsometatarsal joint of MTP1 and MTP2. **(Figure 3-5).**

For the first four weeks after surgery, Partial weight bearing was allowed without a considerable deal to the toe. The patient began active and passive range-of-motion exercises for the first MTP joint four weeks after surgery. For at least three months, sports and high-impact activities were prohibited. In our observation after 3 month post operation, the K-Wire has been removed and patient felt no pain when walked **(Figure 6 and 7).**

Figure 3. Excision of Tophi intra operative picture

Figure 4. Giant Tophus after excision

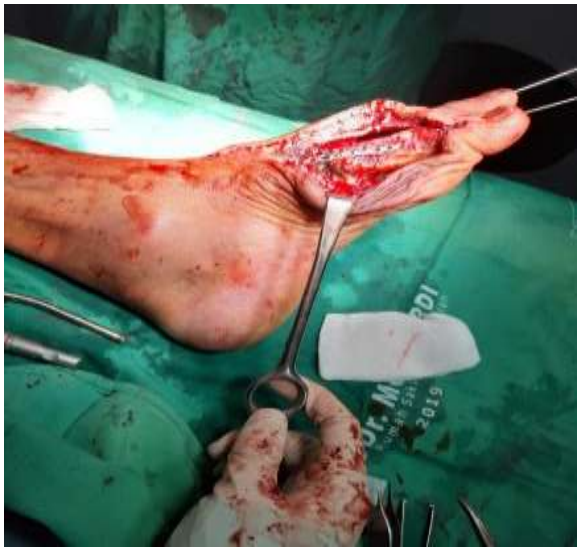

Figure 5. Arthrodesis of 1st MTP using Mini T-plate and K-wire

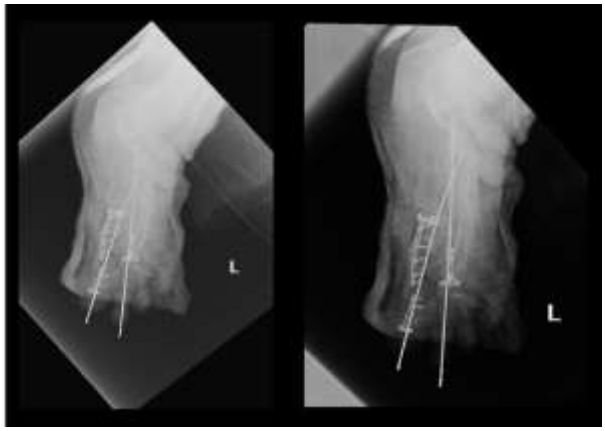

Figure 6. Post-op AP/Oblique Radiograph of the left foot

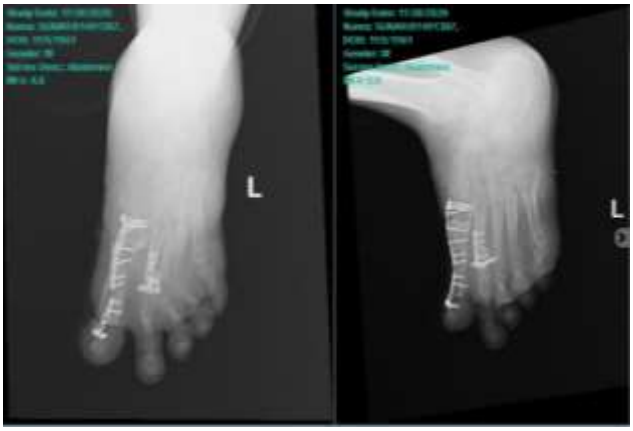

Figure 7. Evaluation X-ray and clinical picture after 3 month operation

DISCUSSION

Tophi are frequently related with tissue destruction of cartilage and bone. [11] Increased osteoclastogenesis has been found to be a marker for tophaceous gout. MSU crystals can contribute to bone lesions by limiting the healing process of erosions by lowering the activity of osteoblasts. Furthermore, as joints affected by gout, it also will be affected by the osteoarthritis. [9]

Monosodium urate (MSU) crystal deposition at individual joint sites is associated to the onset of osteoarthritis at that joint, especially the first MTP joint, according to Roddy et al, implying that osteoarthritis may predispose to localized MSU crystal deposition.[9]

It has been hypothesized that the predilection for MSU deposition and patient symptoms in the foot and ankle may be attributed to the biomechanical loading or physical stress during the normal gait cycle. [12] Gout arthritis patients walk slower and have gait patterns that are consistent with 1st MTP pain-avoidance techniques. Biomechanical strain caused by MSU deposition inside the 1st MTP flexor and extensor tendons may increase abnormal 1st MTP loading at toe-off in gout patients.[1]

To diagnose the tophaceus gout, X-ray can be an option to see any signs, including soft- tissue opacifications with densities between soft tissue and bone representing urate deposits, also articular and periarticular well-marginated bone erosions, signs of arthrosis, and osteophytes at the margins of tophi or erosions.[13] Other modalities that can be used is Ultrasonography (US), It is useful to diagnose gout, monitor inflammatory status, and detect complications such as subtle bone erosion and tophus formation. [12] One of the modalities that can be used is high-resolution ultrasonography (HRUS). Wright et al reported that HRUS is more sensitive than conventional x ray in detecting erosions. [14]

Surgical intervention for tophaceous gout has several indications, including removing large tophaceous deposits and

improving cosmesis, skin ulceration or necrosis over the tophi, local infections or septicaemia caused by tophi, alleviating symptomatic discomfort, restoring or improving joint function, and removing draining sinuses. In these respects, tophaceous deposits that are located intra-articularly should be removed to salvage the joint from degenerative osteoarthritis.[10]

The surgical method is generally defined by the consistency of the tophus and the degree of joint involvement. Sharp debridement and curettage are preferable for infiltrative tophi involving the joints or tendons. [8]

There seems to be usually no need to be concerned about a significant void left behind in the most commonly affected first metatarsal phalangeal joint (MTP). Wunschel, et al. describe a case in which a four centimeter defect in length was encountered after curettage and resection of the first MTP and an inter-positional arthroplasty with Kirschner wire fixation was performed. Occasionally, the void may require bone grafting or a filling. Morino, et al. described a case involving an intra-osseous gouty tophus of the talus that required calcium phosphate cement filling after curettage since the lesion laid on the superior surface of the talus, was part of the tibiotalar joint and was large in size. In comparison to arthroplasty, arthrodesis of the joint is a more complicated, time-consuming treatment that necessitates fixation. It is rarely used in the surgical treatment of gout and is usually reserved for patients in which arthroplasty has failed and a revision is required.[8]

Kim studied 15 individuals with tophaceous illness involving the first MTP, which resulted in discomfort and functional disability. Excision of Tophus was compared to excision plus arthrodesis. In the excision/arthrodesis group, pain scores, the American Orthopaedic Foot and Ankle Society (AOFAS) score, and patient satisfaction scores improved more than in the excision-only group.[10]

Surgical treatment for tophaceous gout is associated with a high rate of complications. Debridement of tophaceous lesions incorrectly might cause delayed wound healing or skin necrosis. The current authors considered that inadequate soft tissue coverage is an absolute contraindication of fusion, they prepared the local rotational or free flap to provide soft tissue coverage at the time of fusion.[10]

Surgery for the giant tophi in this case was operated by several method. After complete excision of tophi, we irrigate with perhidrol and alcohol. Then we continued with reconstruction and arthrodesis MTP1 & MTP2 using iliac auto bone graft then internally stabilized with Mini T-Plate and K-Wire.

This case study had various flaws. It's unusual to come across a giant tophi with severe gouty arthritis. This report's surgical method may not be appropriate for all patients. Second, the past medical history of this patient was limited because of the loss of past medical records. We could not

evaluate the intact timeline of the development of giant tophi. [3]

reduce pain, improve the life quality and restore the 1st toe function.

CONCLUSION

Surgical excision of giant tophi, bone grafting and arthrodesis of MTP1 can

REFERENCES

1. *Rome, K. et al. Clinical Biomechanics Functional and biomechanical characteristics of foot disease in chronic gout : A case-control study. JCLB **26**, 90–94 (2011).*
2. *Access, O. Case report Chronic tophaceous gout with unusual large tophi : case report. **8688**, 1–5 (2015).*
3. *Zhou, C. et al. Amputation of the fi rst metatarsophalangeal joint due to a giant gouty tophi. **43**, 0–4 (2017).*
4. *Zhang, W. et al. EULAR evidence based recommendations for gout. Part I: Diagnosis. Report of a task force of the standing committee for international clinical studies including therapeutics (ESCISIT). Ann. Rheum. Dis. **65**, 1301–1311 (2006).*
5. *Neogi, T. Gout. N. Engl. J. Med. **364**, 443–452 (2011).*
6. *Mittag, F. & Wuenschel, M. Giant gouty tophi of the hand and wrist. Orthopedics **34**, 790–792 (2011).*
7. *Słowińska, I., Słowiński, R. & Rutkowska-Sak, L. Tophi - Surgical treatment. Reumatologia **54**, 267–272 (2016).*
8. *Kasper, I. R., Juriga, M. D., Giurini, J. M. & Shmerling, R. H. Treatment of tophaceous gout: When medication is not enough. Semin. Arthritis Rheum. **45**, 669–674 (2016).*
9. *Stewart, S., Dalbeth, N., Vandal, A. C. & Rome, K. The first metatarsophalangeal joint in gout : a systematic review and meta-analysis. BMC Musculoskelet. Disord. (2016) doi:10.1186/s12891-016-0919-9.*
10. *Article, F. First Metatarsophalangeal Joint Arthrodesis. **37**, 141–147 (2014).*
11. *Dirken-heukensfeldt, K. J. M. J. & Teunissen, T. A. M. " Clinical features of women with gout arthritis . " A systematic review. 575–582 (2010) doi:10.1007/s10067-009-1362-1.*
12. *Kang, M. H., Moon, K. W., Jeon, Y. H. & Cho, S. W. Sonography of the First Metatarsophalangeal Joint and Sonographically Guided Intraarticular Injection of Corticosteroid in. **43**, 179–186 (2015).*
13. *Rettenbacher, T. & Hartig, F. Diagnostic imaging of gout : comparison of high-resolution US versus conventional X-ray. 621–630 (2008) doi:10.1007/s00330-007-0802-z.*
14. *Wright, S. A. et al. phalangeal joint in gout : a controlled study. 859–865 (2007) doi:10.1136/ard.2006.062802.*