JOINTS (Journal Orthopaedi and Traumatology Surabaya)
April 2021; 10(1): 22-27 , DOI: 10.20473/joints.v10i1.2021.22-27
Received: 17 December 2020/ Accepted: 5 April 2021

Case Report

Distal Tibial Reconstruction with Intramedullary Nail Combined with T-Plate Following En-Bloc-Excision of Giant Cell Tumor of Distal Tibia: Case-Report

Mujaddid Idulhaq[1,2], Fajar Baskoro Gardjito[2], Ibnu Yudistiro[1]

[1]Department of Orthopaedic and Traumatology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Prof. Dr. R. Soeharso Orthopaedic Hospital, Surakarta, Indonesia

Correspondence should be addressed to Fajar Baskoro Gardjito, Department of Orthopaedic and Traumatology, Prof. Dr. R. Soeharso Orthopaedic Hospital, Jl. Jend. A Yani, Pabelan, Surakarta 57162, Indonesia. e-mail: baskoro_laziale@yahoo.com

ABSTRACT

Background: Giant cell tumor is locally aggressive benign tumor that occur more common in distal femur, proximal tibia, and distal radius, and has tendency for recurrence and has capability for metastatize. Giant cell tumor in foot ankle are rare, and comprise less than four percent of giant cell tumor of the bone.
Case Report: A 33 years old man presented with complains of pain and swelling in right ankle since 6 months ago with no history of trauma. Physical examination revealed increasing swelling over the distal-posteromedial aspect of lower leg and limitation ankle movements due to pain. Routine blood investigations showed slight increase of alkaline phosphatase. X-ray and Magnetic Resonance Imaging showed the lesion with morphology suggestive of giant cell tumor. Histopathology examination showed multinucleated giant cells and spindle shaped of mononuclear cells suggestive of giant cell tumor. The patient was treated with en-bloc-excision followed with distal tibial reconstruction using reverse intramedullary tibial nail combined with T-plate (tibio-talar arthodesis).
Discussion: The main treatment of giant cell tumor of the bone is surgical removal to achieve tumor-free by eradication of the tumor, with various surgical techniques for reconstructing the cavity left. In this case we performed distal tibial reconstruction using reverse intramedullary tibial nail combined with T-plate.
Conclusion: The patient at 12-month follow up is doing well, walking comfortably without any pain, has no limitation in range of motion with no signs of recurrence and good MSTS score (90).

Keywords: Giant cell tumor; Giant cell tumor distal tibia; Reverse tibial nail

INTRODUCTION

Giant cell tumor was first described by Cooper in 1818.[1] Although considered to be benign tumor, Giant cell tumor had been shown having local aggressiveness, malignant potential and has relatively high recurrence rate. Giant cell tumor represents for five percents of all primary bone tumors approximately, and usually, the age patients ranges from 20-55 years old, with third decade of life peak age incidence.[2–4] Metastasis occured in one to nine percents of patients, and there was correlation between incidence of metastases with aggressive growth and local recurrence. Mostly, giant cell tumor occur in distal femur, proximal tibia, and distal radius. Occurrence in the foot and ankle, is rare and comprises less than four percents of all

Published online: 29 April 2021
Available at https://e-journal.unair.ac.id/index.php/JOINTS

giant cell tumor of the bone.[5–7] The diagnosis of giant cell tumor of bones depends mainly on clinical and radiological examination (plain X-rays and MRI) on the site of lesion, then biopsy was performed to establish the prompt diagnosis of giant cell tumor. The goals of treatment are to achieve tumor-free by eradication of the tumor, preserve limb function, prevent local recurrence and distant metastasis.[8,9]

CASE REPORT

A 33 years old man patient presented with complaints of pain and increasing swelling over distal and posteromedial aspect of the right lower leg. He felt pain since 6 months ago and followed by swelling 1 month after. The swelling increased in size with increasing pain which was aggravated by weightbearing. There was no history of trauma, fever, loss of weight or loss of appetite. There was history of message therapy by osteopath. Physical examination revealed swelling was present over distal and posteromedial aspect of the right lower leg, with normal skin over the swelling. Tenderness was present over distal tibia. There was slight pain in ankle movement. In X-ray examination of the anteroposterior and lateral view of the ankle, it showed lytic lesion of meta-epiphysis of distal tibia, geographic type, ill-defined margin, with cortical destruction of medial and posterior aspect of distal tibia, with thinning of anterior cortex of distal tibia, with absent of periosteal reaction, suggestive of giant cell tumor of distal end tibia with Campanacci grade III classification (Figure 1).

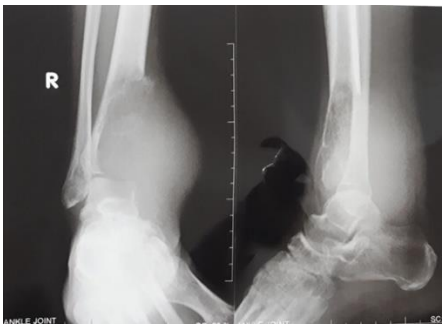

Figure 1. Plain Radiograph showed lytic lesion of meta-epiphysis of the distal tibia, geographic type, with cortical destruction, and thinning of the anterior cortex of distal tibia, suggestive for giant cell tumor

In routine chest X-ray examination, there was no appearance of a metastatic lesion. In MRI examination, it showed 5.7 x 7 x 5.8 cm mass, in meta-epiphysis of the distal tibia, with thinning and destruction of the distal tibia cortex, with intralesional characteristic suggestive for giant cell tumor (Figure 2). Then we performed the biopsy, which confirmed the histopathology of the giant cell tumor of the bone.

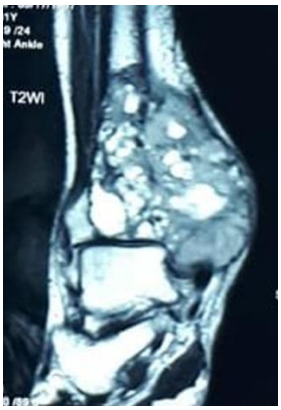

Figure 2. Magnetic Resonance Imaging showed distal tibia mass with thinning and destruction of the cortex, with intralesional characteristics suggestive for giant cell tumor

Within the surgery, we performed an anteromedial incision. The incision began at the distal tibial crest proximally, then continued with a slightly posterior curve to the medial

malleolus level distally. A previous biopsy scar was involved in the incision. During the surgery, first, we must find and protect the neurovascular bundle (i.e., posterior tibial artery and vein; and tibial nerve) that placed posterior to posterior tibial tendon and flexor digitorum longus tendon. The right distal tibia was exposed extra-periosteally, and we performed an osteotomy of the distal tibia with around 2 cm from the margin of the tumor (Figure 3 and 4). A thorough wash was performed, and we added hydrogen peroxide as an adjunct. Then we constructed the defect using a reverse tibial nail, conventional T-plate, and bone cement (tibiotalar arthrodesis technique). We also added one tibiofibular transfixing screw to increase the ankle joint stability, but unfortunately, it wasn't properly placed into the tibia. The wound was closed over a suction drain. Post-operatively (Figure 5), the patient had regular physical exercise. The patient was allowed for non-weight bearing for three months, then started with partial weight-bearing after that, with gradually full weight-bearing. The specimen which had been sent for histopathological examination showed the histopathology appearance for giant cell tumor of the bone. At a 12-month follow-up, the patient was walking comfortably without any pain and had full range of motion of the subtalar, hindfoot, midfoot, and forefoot, without any signs of recurrence, with MSTS score showed 90 (Figure 6 and 7).

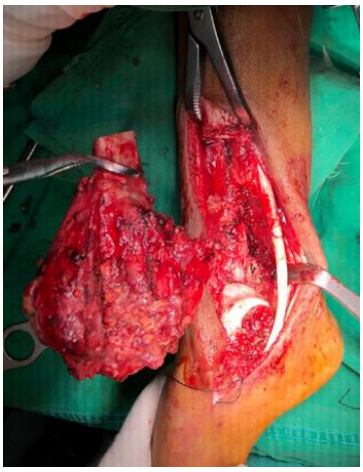

Figure 3. Clinical picture during surgery, after en-bloc resection of the distal tibia

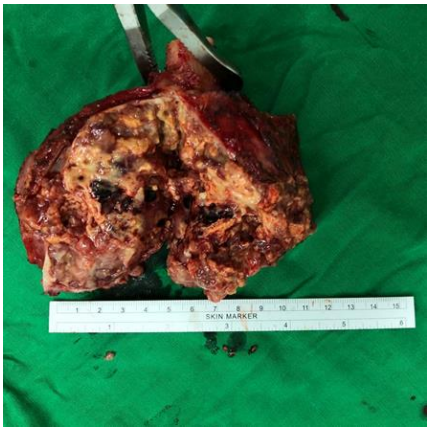

Figure 4. Macroscopic view of the mass after being divided

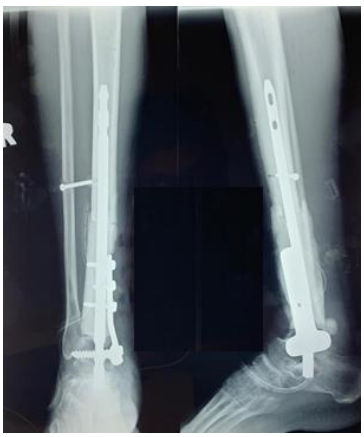

Figure 5. Immediate Post Op Plain Radiograph

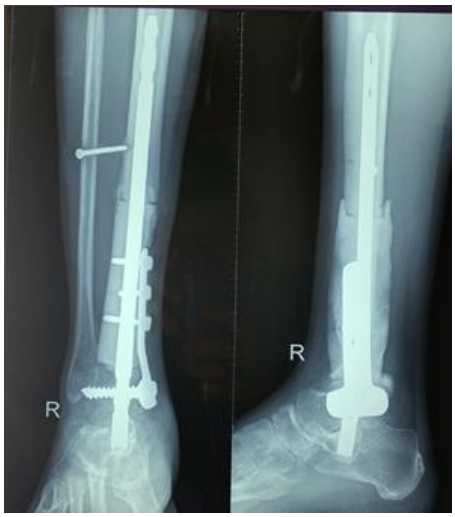

Figure 6. Plain radiograph after 12-month follow up

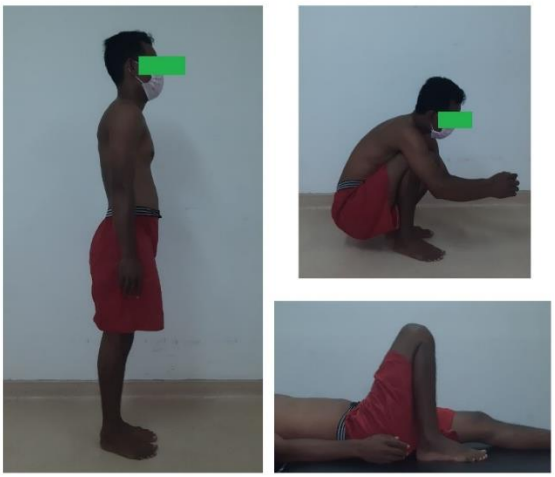

Figure 7. Clinical Picture after reconstruction

DISCUSSION

Giant cell tumors are rare and essentially benign tumors. Although considered benign, it may behave unexpectedly, regardless of the radiological or histological examinations.[10]

In establishing the diagnosis of giant cell tumors, imaging studies are essential. On plain radiographs, a giant cell tumor will be presented as a purely lytic eccentric lesion, with expansion and thinning of the cortex and the periosteal reaction usually absent. Giant cell tumor has been classified into three grades according to Campanacci[10]: grade 1 lesion has a well-defined margin and an intact cortex; grade 2 lesion presents a relatively well-defined margin, with thinned and moderately expanded cortex; and in grade 3, the lesion penetrates the cortex that causes a break of the cortex, and has a soft tissue component. Routine chest X-ray examination is required to determine any lung metastasis. Further imaging is needed to delineate the lesion and further staging. In cases of giant cell tumor with cortical destruction and soft-tissue tumor extension, MRI is superior to Computed Tomography (CT). In MRI examination, a giant cell tumor will appear as a lesion with non-homogenous signal characteristics, hypointense in T1-weighted images, and hyperintense in T2-weighted images.[11]

The main treatment of giant cell tumor of the bone is surgical removal to achieve tumor-free by eradicating the tumor, which prevent local recurrence and distant metastasis. In general, curettage of the bony cavity with "cleaning" of the walls with high-speed burr drill and the use of physical adjuvant will kill any cells remaining within the cavity wall. These adjuvants are phenol, hydrogen peroxide, liquid nitrogen, argon, helium, cement, or polymethylmethacrylate (PMMA).[8] Various advanced surgical techniques for giant cell tumor of the distal tibia have been described in the literature: extend curettage with a large window, high speed burring, and filling of the cavity with bone graft with or without bone

cement, massive allograft, vascularized or non-vascularized autografts, resection and ankle arthrodesis, resection and reconstruction with porous tantalum spacer, an endoprosthetic replacement.[11–13] Those techniques will permit the giant cell tumor's goal, i.e., early mobilization for the patient.

After performing curettage, if the defect was large enough and does not jeopardize the structural integrity of the bone, bone cement with bone graft methods can be used. The bone graft (autograft or allograft – for about 1 cm thick) was packed first to the adjacent subarticular surface. Then a layer of gel foam is put over this, and the remaining defect is filled with bone cement.[14] A study had been reported by Bami et al, with giant cell tumor of the distal tibia that had been treated with intralesional excision and curettage and the cavity was filled with cementation.[15] The polymerization of methylmethacrylate in cementation may generate a local chemical cytotoxic effect and hyperthermia effect that induces necrosis of neoplastic tissue, extends the boundary of tumor kill, radiographic detection of recurrence is easier, immediate structural support, and rapid weight-bearing ambulation.[14–16] This study showed good postoperative results without any recurrences and functional problems.

If the bone and joint surface's structural integrity had been compromised severely due to the massive extent of the giant cell tumor, reconstruction technique options such as arthrodesis of the ankle (tibiotalar arthrodesis) had been reported.[14] There were a few studies reported which similar to our case. Economopoulos et al described a case that reported reconstruction using tantalum spacer after resection of giant cell tumor of the distal tibia.[14] At a 5-years follow-up, the patient had painless and unlimited ambulation. Georgiev et al described a case that reported a giant cell tumor of the distal tibia that had been performed en-block resection of the distal tibia, reconstruction with a structural tibial allograft and ankle arthrodesis.[11] At a 2-years follow-up, the patient had a pain-free stable ankle and unlimited ambulation.

CONCLUSION

In conclusion, a giant cell tumor of the foot and ankle is a rare lesion. The results of the treatment directly depend on early prompt diagnosis and adequate therapy. In this report, we present case of a giant cell tumor of the distal tibia treated with en-bloc excision and distal tibial reconstruction using a reverse tibial nail, combined with conventional T-plate and bone cement (tibiotalar arthrodesis) that showed good results in MSTS score.

REFERENCES

1. Kevin AR, Joseph HS, Henry JM, Dempsey SS, Francis JH. Giant cell tumor of bone. J Am Acad Orthop Surg. 2013;21(2):118-126.
2. Cowan RW, Singh G. Giant cell tumor of bone: a basic science perspective. Bone. 2013;52(1):238-46.
3. Klenke FM, Wenger DE, Inwards CY, Rose PS, Sim FH. Giant cell tumor of bone: risk factors for recurrence. Clin Orthop Relat Res. 2011;469(2):591–9.
4. Errani C, Tsukamoto S, Ciani G, Donati DM. Present day controversies and consensus in curettage for giant cell tumor

of bone. J Clin Orthop Trauma. 2019;10(6):1015–20.
5. Cribb GL, Cool P, Hill SO, Mangham DC. Distal tibial giant cell tumour treated with curettage and stabilisation with an Ilizarov frame. Foot Ankle Surg. 2009;15(1):28–32.
6. Yacob O, Umer M, Gul M, Qadir I. Segmental excision versus intralesional curretage with adjuvant therapy for giant cell tumour of bone. J Orthop Surg. 2016;24(1):88-91.
7. Al A, Madi S, Vijayan S, Naik M, Rao S. Recurrent giant cell tumour of distal Tibia: Case report and review of the literature. Ann Med Biomed Sci. 2015;1:4–7.
8. Mavrogenis AF, Igoumenou VG, Megaloikonomos PD, Panagopoulos GN, Papagelopoulos PJ, Soucacos PN. Giant cell tumor of bone revisited. SICOT-J. 2017;3:54.
9. Montgomery C, Couch C, Emory CL, Nicholas R. Giant Cell Tumor of Bone: Review of Current Literature, Evaluation, and Treatment Options. J Knee Surg. 2019;32(04):331–6.
10. Campanacci M, Baldini N, Boriani S, Sudanese A. Giant-cell tumor of bone. J Bone Joint Surg Am. 1987;69(1):106–14.
11. Georgiev GP, Slavchev SA. Giant cell tumor of the distal tibia: Report of a rare case. J Clin Exp Investig. 2013;4(4).
12. Shekkeris AS, Hanna SA, Sewell MD, Spiegelberg BGI, Aston WJS, Blunn GW, et al. Endoprosthetic reconstruction of the distal tibia and ankle joint after resection of primary bone tumours. J Bone Joint Surg Br. 2009;91(10):1378–82.
13. Ajit Singh V, Nasirudin N, Bernatt M. Endoprosthetic reconstruction for giant cell tumors of the distal tibia: A short term review. Asia Pac J Clin Oncol. 2013;9(2):182–9.
14. Sobti A, Agrawal P, Agarwala S, Agarwal M. Giant Cell Tumor of Bone - An Overview. Arch bone Jt Surg. 2016;4(1):2–9.
15. Bami M, Nayak AR, Kulkarni S, Kulkarni A, Gupta R. Giant Cell Tumor of Lower End of Tibia. Case Rep Orthop. 2013;2013:1–3.
16. Mohapatra AR, Choudhury P, Patel PS, Malhotra RS, Patil AB. An Unusual Case of Giant Cell Tumor of the Distal Tibia. J Orthop Case Rep. 2018;8(4):29–31.