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Case Report

A rare case of giant cell tumor in navicular bone: a case report

Abhishek K. Taraviya*, Jyotish G. Patel, Ankit R. Patel

Department of Orthopaedics, GCS Medical College, Hospital and Research Centre, Ahmedabad, Gujarat, India

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***Correspondence:**
Dr. Abhishek K. Taraviya,
E-mail: abhishek.taraviya94@gmail.com

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ABSTRACT

Giant cell tumor (GCT) is a benign but locally aggressive lesion of the bone. They are common in skeletally mature individuals with a slight female preponderance. Rare unusual presentations can occur. This case report describes a rare case of GCT of bone in the right navicular bone in a 25-year-old male patient who presented with complaints of pain and swelling in right foot and difficulty in walking. The diagnosis was made with radiological investigations and was then confirmed with histopathological evaluation. The lesion was managed with extensive curettage and bone grafting. Patient had complete resolution of symptoms post-surgery with no signs of local recurrence at 18-months follow-up.

Keywords: Giant cell tumor, Bone, Navicular bone

INTRODUCTION

Giant cell tumour (GCT) is a relatively rare benign lytic lesion that accounts for 4% to 5% of primary bone tumours and almost 20% of benign bone tumours.[1] It is diagnosed with combined radiological and histological assessment.[2] The most common sites are the meta-epiphyseal regions of the long bones (85%), with more than 50% located in the distal femur, proximal tibia and distal radius.[3] GCT involving navicular bone is an extremely rare find with only a handful cases being recorded.[4] In this case report, we present a case of a 25-year-old male patient diagnosed with GCT in the right navicular bone.

CASE REPORT

A 25-year-old previously healthy male patient presented with the chief complaint of spontaneous, intermittent, non-traumatic right foot pain for 12 months. The pain was insidious in onset, dull-aching in nature, aggravated while walking and relieved with rest initially. Pain then increased in intensity for the last 4 months and a generalized swelling developed in the right foot medially over the dorsal aspect of the midfoot. Pain was initially managed with analgesics but for the last 4 months, pain was continuous and not relieved with analgesics.

On examination, skin overlying the right foot was normal with swelling over the medial aspect of the dorsum of foot. Tenderness was present medially in the right foot. Range of movement was restricted and painful.

On X-ray radiographic examination, an osteolytic lesion in the right navicular bone was noted which was expansive and locally aggressive causing extensive destruction (Figure 1). Chest radiograph showed no lesions. The MRI objectified a well defined lesion involving the entire navicular bone with expansile thinning of cortex with inferior bulging of soft tissue. Soft tissue causing cortical erosion of adjacent cuboid bone with bone marrow edema was noted (Figure 2).

Patient was advised to have a surgical biopsy before the definitive surgical intervention. A excision biopsy with curettage and resection was planned in the first stage. The navicular bone was found to be almost entirely cystic with

a breach in the dorsal cortex. Cystic material was present within the margins of the navicular bone. Soft tissue and bones surrounding the navicular bone were found to be normal. Gross intra-operative appearance was suggestive of fibrous dysplasia or GCT of bone.

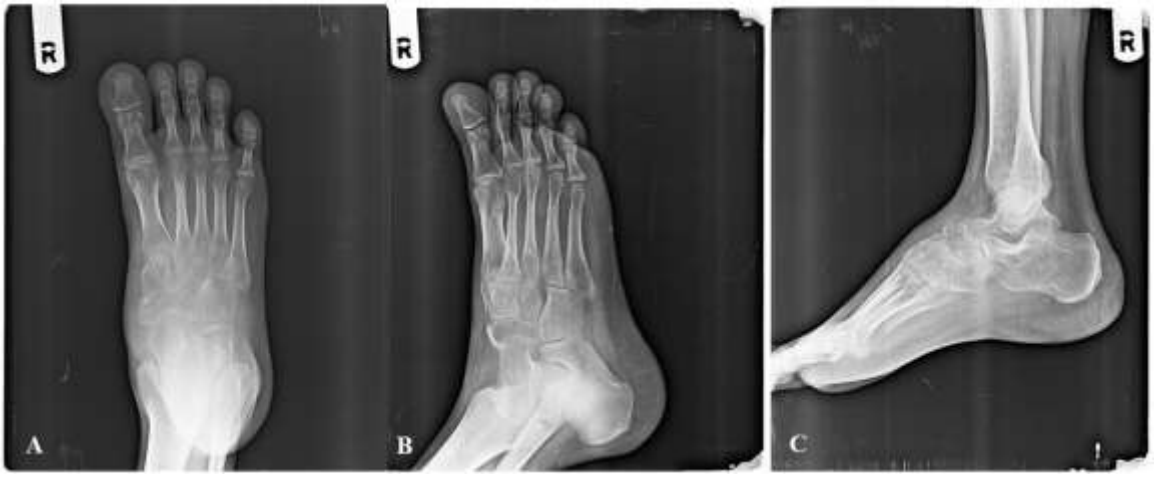

Figure 1 (A-C): Pre-operative radiographs of right foot showing an expansile lytic lesion with cortical thinning in right navicular bone.

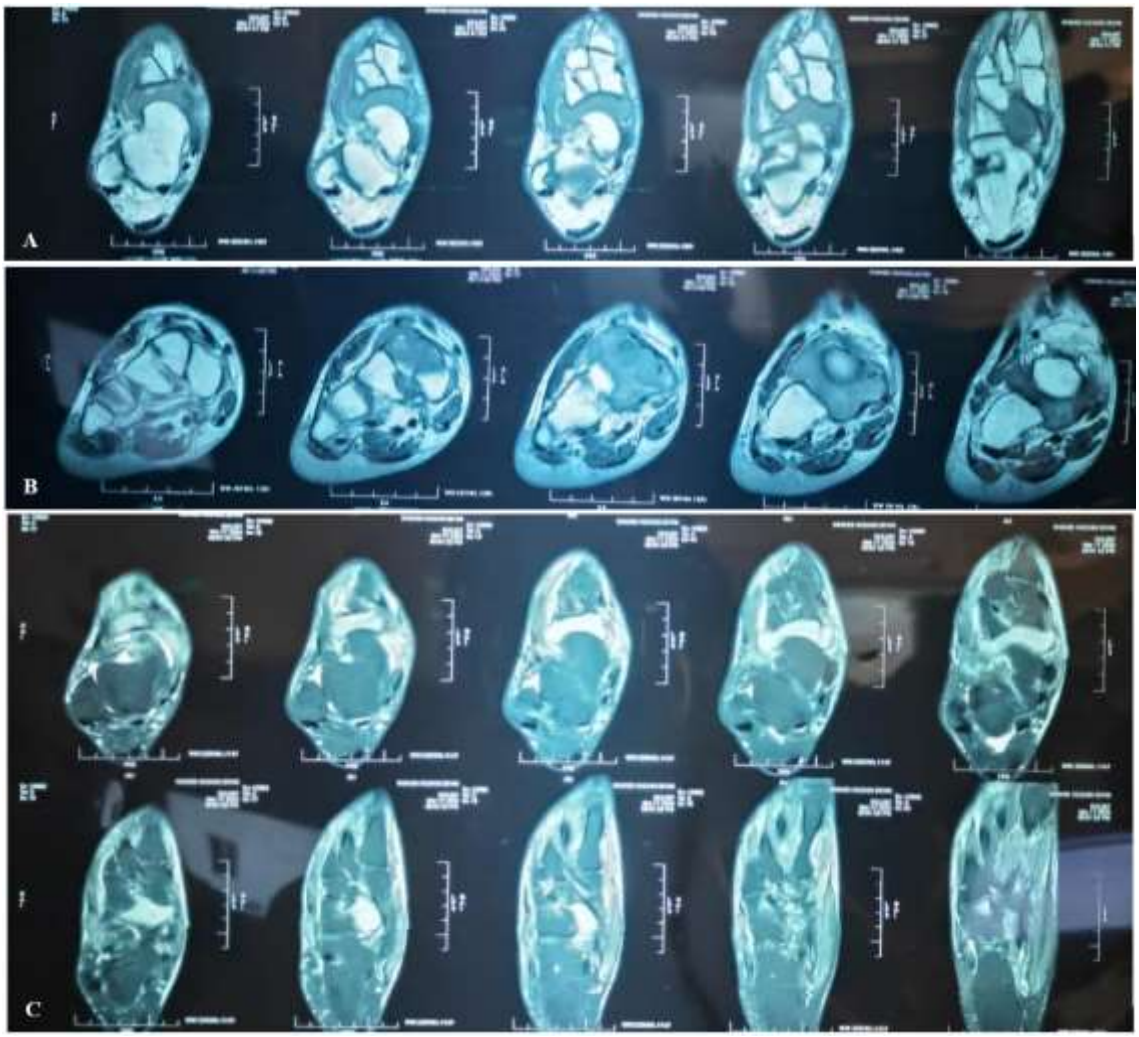

Figure 2 (A-C): MRI of right foot (T1WI and T2WI) showing a well defined expansile lytic lesion in the navicular bone which appears hypointense on T1 weighted images and heterogeneously hyperintense on T2 weighted images. No evidence of matrix mineralization or periosteal reaction.

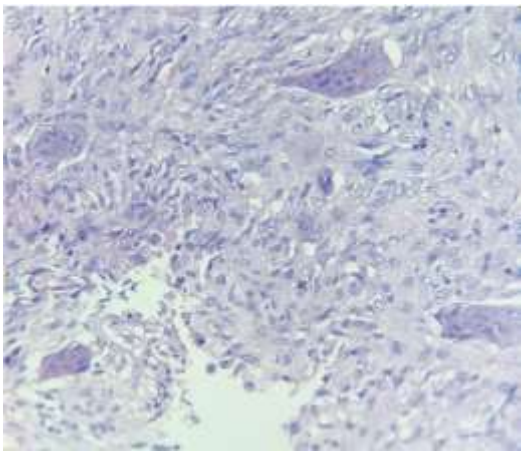

Figure 3: Histopathologic examination of the tissue showed cellular lesion composed of a large number of non-neoplastic osteoclast-like giant cells with stroma consisting of mononuclear cells. Mononuclear cells are round to oval and spindled with eosinophilic cytoplasm.

Gross histopathological examination showed multiple greyish white to greyish brown soft tissue bits. On microscopic examination, a large number of non-neoplastic osteoclast giant cells with stromal mononuclear cells were noted. The biopsy gave a definitive diagnosis of GCT of bone (Figure 3).

After the confirmation of the diagnosis, the definitive surgery of bone grafting with talo-naviculo-cuboid arthrodesis was performed using a miniplate and a cannulated cancellous screw, followed by an uneventful post-op recovery (Figure 4).

At one- and three-month's clinical follow-ups, the patient reported complete resolution of his symptoms, regaining painless full range of motion.

At 18 months, the functional recovery of our patient is total, with no pain. Radiographic evaluation showed fusion of bone graft with talus in right foot and no signs of local recurrence (Figure 5). No lesions were noted in the chest.

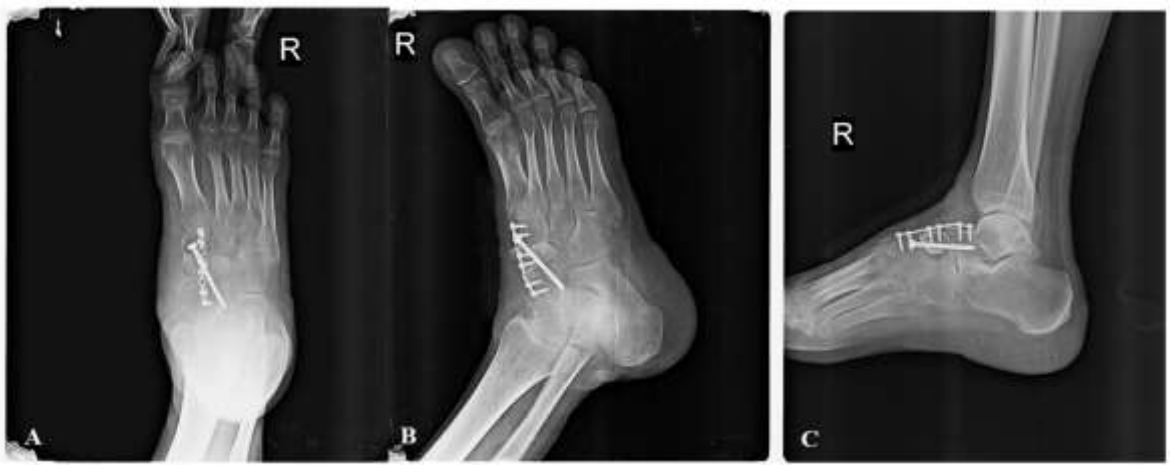

Figure 4 (A-C): Immediate post-op radiograph showing bone graft and osteosynthesis and stabilization with a 4 mm cannulated cancellous screw and a mini-fragment plate.

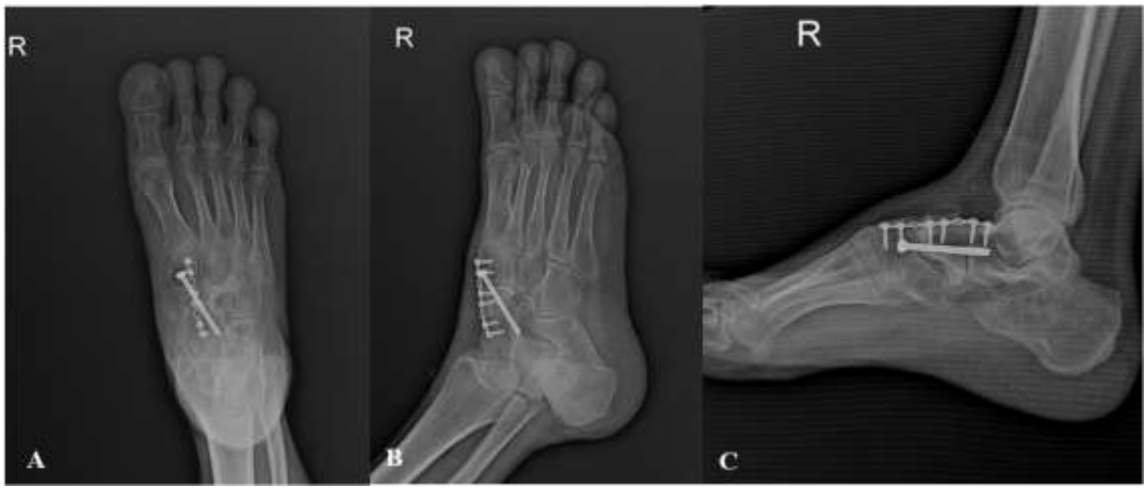

Figure 5 (A-C): One-and-half year's follow-up radiograph showing no signs of local recurrence with good fusion of the bone graft with the talus.

DISCUSSION

Giant cell tumor of bone (GCTB), also known as osteoclastoma, is a rare, typically benign but locally aggressive neoplasm. It was initially described by Cooper and Travers in the 19th century.[5] Later Nelaton showed their local aggressiveness, and Virchow revealed their malignant potential. GCT represents approximately 5% of all primary bone tumors.[6] GCTB commonly arises in young adults between the ages of 20 and 40, with a slight female predominance.[1] It predominantly affects the meta-epiphyseal region of long bones, particularly the distal femur, proximal tibia, and distal radius.[7] GCTs of small bones of hands and feet are rare with GCTs of the foot and ankle comprising less than 4% of all GCTs.[6,8-11]

The tumours generally develop slowly, metastasise in 1-3% of cases and do so most commonly to the lungs.[12] Varying degrees of local aggressiveness, like a simple cortical breakthrough, extension into surrounding soft tissues, and articular structures can cause severe and debilitating local complications.[13] Recurrence rates of between 0% and 63% have been published and depend largely on the type of treatment.[14] Malignant transformation occurs in 5-10% of cases and most commonly follows radiation therapy of the primary lesion.[15]

GCTs are evaluated by a combination of laboratory and radiological evaluation, followed by a biopsy for definitive diagnosis.[5] Radiograph evaluation typically reveals a characteristic radiolucent geographic appearance with a narrow transition zone at the lesion margin. Typical radiographic findings include lytic lesions located eccentrically in the epiphysis that do not penetrate the joint. The rim of the lesion is generally not sclerotic and can extend into the surrounding tissue, which indicates a poorer prognosis. Differential diagnoses based on radiological findings include aneurysmal bone cyst, non-ossifying fibroma, primary hyperparathyroidism with brown tumours, chondromyxoid fibroma, chondroblastoma, clear cell chondrosarcoma and telangiectatic osteosarcoma.[2]

Computed tomography (CT) scan and magnetic resonance imaging (MRI) help to confirm typical subchondral location of GCTs within the bone and also assess extent of soft tissue mass, either beyond the bone cortex or through the adjacent joint.[16,17] In the typical GCT, there is homogeneous signal intensity, and the lesion is well-circumscribed. They present with low signal intensity on T1-weighted images and intermediate signal intensity on T2-weighted images. Expansile hyper vascular mass with cystic changes and heterogeneous low to intermediate signal intensity on T1-weighted images and intermediate to high intensity on T2-weighted images are its characteristic findings on MRI.

Grossly, GCT of bone appears brownish in color and is usually solid; however, some tumors may have a hemorrhagic, cystic component. On histological examination, abundant giant cells with a benign spindle cell background are observed.[17]

The standard treatment of lesions in the long bones is intralesional curettage and curettage with bone grafting, often with local adjuvants such as phenol, liquid nitrogen (cryosurgery) and/or polymethylmethacrylate (PMMA) to reduce the recurrence rate, which has been reported from 12% to 34%.[18-22] More aggressive lesions of the long bones with soft-tissue extension, pathological fracture or involvement of joints may be treated by en-bloc resection.[20,22]

This patient, a 25-year-old male, has an unusual/ rare case of bone GCT. Since GCTs have no characteristic imaging features and such unusual site of lesion, many different diagnoses were considered. Based on the osteolytic lesion in navicular bone with locally aggressive features on radiography, diagnosis of GCT of bone, fibrous dysplasia, eosinophilic granuloma, enchondroma, metastasis, and osteomyelitis were taken into consideration. Intra-operative gross appearance of cystic, greyish to brownish tissue within the cortical margins of navicular bone was highly suggestive of GCT of bone. Histopathologic examination showed a clear picture of non-neoplastic osteoclastic giant cells which proved the diagnosis of GCT of bone. Thus, even in the setting of such an unusual site of lesion, the gross and microscopic features were typical to GCT of bone.

Since the patient was a young adult who required good functional outcome, we decided to perform extended curettage and burring of the lesion and further supplementing it by chemical cauterisation with hydrogen peroxide to limit recurrence.[23] The void was then filled with a tricortical bone graft from anterior superior iliac spine after removing all cortical margins and cartilage of the navicular bone and burring the talar head to facilitate fusion of the graft. The midfoot was then stabilized with a 4.0 mm cannulated cancellous screw passing from the medial cuneiform through the bone graft and into the talus and further supplemented with a mini-fragment plate.

At 1.5 year's follow-up, no clinical or radiographic evidence of local recurrence was found with fusion of the graft with the talar head. We continue to follow him up, as a minimum of three years' follow-up is suggested in GCT as most recurrence is seen within this period.[24]

Navicular bone is a rare site of GCT with only a few cases described in literature. One such case report published by Khan and Moore described a case of aggressive navicular bone GCT presenting with pulmonary metastasis in a 14-year-old male patient who was treated with en-bloc resection of navicular with lower pole of medial cuneiform and chemotherapy for pulmonary lesions initially.[25] Patient later developed recurrence of pulmonary lesions after three years, but no local bony recurrence was noted.

Another case of navicular bone GCT was reported by Zacharia et al in a 31-year-old female. The lesion was locally aggressive and also involved medial cuneiform.[26] She was treated with curettage and bone grafting, however, she had a recurrence later.

CONCLUSION

This case report describes a rare occurrence of GCT of bone in the navicular bone. A high degree of clinical suspicion supported by radiographic examination direct towards the diagnosis of GCT when such rare sites are involved. Biopsy remains gold standard from confirmation of the diagnosis. Extensive curettage with supplementation with chemical cauterisation is an effective mode of treatment with reduced chances of recurrence.

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REFERENCES

1. McGrath PJ. Giant-cell tumor of bone: an analysis of 52 cases. J Bone Joint Surg. 1972;548:216-29.
2. Tomlinson, M, Kubicek, GJ, Ferreira, N, & Marais, LC. Case report: A typical presentation of giant cell tumour (GCT) of bone in the distal humerus of a child. SA Orthopaedic J. 2016;15(1):29-32.
3. Purohit S, Pardiwala DN. Imaging of giant cell tumor of bone. Indian J Orthop. 2007;41(2):91-6.
4. Balke M, Henrichs M, Gosheger G, Helmut A, Arne S, Michael K, et al. Giant cell tumors of the axial skeleton. Sarcoma. 2012;2012:410973.
5. Turcotte RE. Giant cell tumor of bone. Orthop Clin North Am. 2006;37(1):35-51.
6. Campanacci M, Baldini N, Boriani S, Sudanese A. Giant-cell tumor of bone. J Bone Joint Surg Am. 1987;69:106-14.
7. Oliveira VC, Van der Heijden L, Van der Geest, Campanacci DA, Gibbons CMH, Sande VD, et al. Giant cell tumours of the small bones of the hands and feet. Bone Joint J. 2013;95(6):838-45.
8. Puri A, Agarwal MG, Shah M, Jambhekar NA, Anchan C, Behle S. Giant cell tumor of bone in children and adolescents. J Pediatr Orthop. 2007;27(6):635-9.
9. Dahlin DC, Cupps RE, Johnson EW. Giant-cell tumor: a study of 195 cases. Cancer. 1970;25:1061-70.
10. Goldenberg RR, Campbell CJ, Bonfiglio M. Giantcell tumor of bone. J Bone Joint Surg. 1970;52A:619-64.
11. Biscaglia R, Bacchini P, Bertoni F. Giant cell tumor of the bones of the hand and foot. Cancer. 2000;88:2022-32.
12. Sobti A, Agrawal P, Agarwala S, Agarwal M. Giant Cell Tumor of Bone - An Overview. Arch Bone Jt Surg. 2016;4(1):2-9.
13. Muscolo DL, Ayerza MA, Aponte-Tinao LA. Giant cell tumours of bone. Curr Orthop. 2001;15:41-50.
14. Hasan O, Ali M, Mustafa M, Ali A, Umer M. Treatment and recurrence of giant cell tumors of bone A retrospective cohort from a developing country. Ann Med Surg (Lond). 2019;48:29-34..
15. Schutte HE, Taconis WK. Giant cell tumor in children and adolescents. Skeletal Radiol. 1993;22(3):173-6.
16. Pereira HM, Marchiori E, Severo A. Magnetic resonance imaging aspects of giant-cell tumours of bone. J Med Imaging Radiat Oncol. 2014;58(6):674-8.
17. Cavanna L, Biasini C, Monfredo M, Maniscalco P, Mori M. Giant cell tumor of bone. Oncologist. 2014;19(11):1207.
18. Balke M, Schremper L, Gebert C, Helmut A, Arne S, Gabriele K, et al. Giant cell tumor of bone: treatment and outcome of 214 cases. J Cancer Res Clin Oncol. 2008;134(9):969-78.
19. Becker WT, Dohle J, Bernd L, Ludger B, Arnim B, Miklos C, et al. Local recurrence of giant cell tumor of bone after intralesional treatment with and without adjuvant therapy. J Bone Joint Surg Am. 2008;90(5):1060-7.
20. Errani C, Ruggieri P, Asenzio MA, Angelo T, Simone C, Eugenio R, et al. Giant cell tumor of the extremity: a review of 349 cases from a single institution. Cancer Treat Rev. 2010;36(1):1-7.
21. 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.
22. Kivioja AH, Blomqvist C, Hietaniemi K, Clement T, Anders W, Henrik CFB, et al. Cement is recommended in intralesional surgery of giant cell tumors: a Scandinavian Sarcoma Group study of 294 patients followed for a median time of 5 years. Acta Orthop. 2008;79(1):86-93.
23. Moon MS, Kim SS, Moon JL, Kim SS, Moon H. Treating giant cell tumours with curettage, electrocautery, burring, phenol irrigation, and cementation. J Orthop Surg. 2013;21(2):209-12.
24. Lim YW, Tan MH. Treatment of benign giant cell tumours of bone in Singapore. Ann Acad Med Singapore. 2005;34(3): 235-37.
25. Khan M. Metastatic Navicular Giant Cell Tumour (Osteoclastoma)- A Case Report With 16 Year Follow-Up. J Orthop. 2007;41(2):154-7.
26. Zacharia B, Pai PK, Paul M. Clinical and Radiological Profile of Ten Interesting Though Rare Presentations of Giant Cell Tumor of Bone. Indian J Surgical Oncol. 2020;11(3):527-37.

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