ORIGINAL ARTICLE

Giant cell tumour of foot bones — 25 years experience in a tertiary care hospital

Muhammad Saeed Minhas, Kashif Mahmood Khan, Muhammad Muzzammil

Abstract

Objective: To determine the incidence of giant cell tumour in foot, its clinical features, stage of tumour, treatment and outcome of surgery.

Methods: This retrospective case series study was conducted at Jinnah Postgraduate Medical Centre, Karachi, and comprised cases of giant cell tumour of foot bones diagnosed between January 1990 and March 2015. Tumour Incidence, type of procedure and results were recorded on a proforma and analysed for function outcome and recurrence. Clinical and radiological follow-up was done for a maximum 6 years.

Results: There were 240 cases of giant cell tumour but only 13(5.4%) related to foot bones. Of them, 8 (3.3%) were females and 5(2.0%) males. The mean age was 25 years (SD 10.59) (range: 17-38 years). In 7 (2.9%) cases lesion was in metatarsals, 2(0.8%) cases in phalanges, 3(1.2%) cases in calcaneus and 1(0.4%) case in talus. Duration of symptoms ranged from 4 to 12 months. All presented with radiologically stage 2 or 3 lesions. Resection of tumour and reconstruction with fibular graft was performed in 5(2.0%) cases, excision/curettage and filling cavity with cancellous bone graft in 5(2.0%) cases, resection in 2(0.8%) cases and toe amputation in 1(0.4%) case. There was recurrence in 2(0.4%) cases. No other complication was noted on last follow-up.

Conclusion: Giant cell tumour in foot bones is a rare tumour and shows specific clinical and radiographic features with early involvement of entire bones, more aggressive behaviour with recurrence potential. The preferred treatment options are resection with reconstruction, curettage and filling cavity with bone graft/cement and amputation.

Keywords: Giant cell tumour, Bone, Foot, Aggressive, Recurrence, Curettage. (JPMA 65: S-67 (Suppl. 3); 2015)

Introduction

Giant cell tumours (GCTs) represent 5% of bone neoplasms[1] and only fraction of it occurs in foot. They occur in patients 20 to 40 years old, and there is a slight female predominance. These tumours frequently are more aggressive. Common sites are femur, tibia and distal radius. GCT of foot bones,[2] hand and spinal involvement is rare.[3] Any foot bone may be involved. Giant cell tumours of foot usually are solitary lesions, but 1% to 2% may be synchronously or metachronously multicentric. These tumours typically are benign. Foot GCTs are eccentrically located in the foot bones and usually about the subchondral bone of epiphysis, compressing cortex to a thin rim. Radiographically, the lesions are purely lytic. Foot lesions frequently expand and occupy mostly half of the bone or break through the cortex, but intra articular extension is rare.[4] Treatment options of foot lesions depend on the stage of the disease and include curettage/extended curettage with adjuvants and filling the defect with bone cement or bone graft,[5,6] resection arthrodesis, resection reconstruction and resection arthroplasty. In metastatic lesions, radiation[7] or embolization and chemotherapy options are used.

The current study was planned to determine the incidence of GCT in foot, its clinical features, stage of tumour, treatment and outcome of surgery.

Materials and Methods

Thirteen cases of Giant Cell Tumour of foot bones diagnosed in last 25 years were included. Tumours proved later to have other diagnosis, infection of foot and operated in other centers were excluded. Patients were admitted electively and operated on first elective list. Counselling for different issues about the procedures was discussed with them. Pros and cons of the study were explained and informed consent was taken. Ethical approval was taken from institutional review board of JPMC on 09-05-2015 with reference number F.2-81/2015-GENL/15240/JPMC. The procedures were done by consultants having more than 5 years' experience. Patients received preoperative antibiotic prophylaxis, one hour before surgery. They were operated under general/spinal anesthesia in supine position, using standard surgical protocols for locally aggressive tumours.[8] All the tumours were operated by standard dorso lateral or dorso medial longitudinal incision over each involved metatarsal and phalanx, lateral incision for calcaneus and anterior midline approach for talus.

Orthopedics and Trauma Surgery, Ward-17, Jinnah Postgraduate Medical Centre, Karachi, Pakistan.

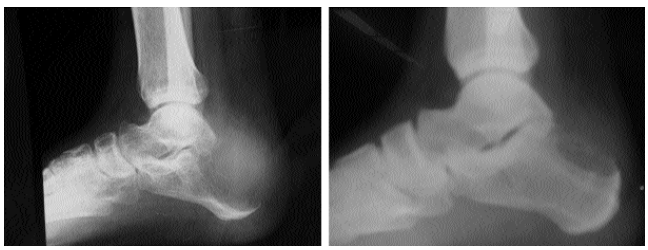
Correspondence: Muhammad Saeed Minhas. Email: orthominhas@hotmail.com

Surgical wounds were closed primarily. Post-operative antibiotics were given for 5 days.

Patient was mobilized on next day of surgery. Foot was kept on elevation to reduce swelling. Dressing was changed on second post-operative day. Patient was discharged on third post-operative day. Weight bearing was started on 7th post op day after swelling reduced. Sutures were removed on 14th post-operative day. Those patients who had K-wires, were removed after 6-8 weeks duration. Patients were walking independently 2-3 months after surgery. Patients were clinically and radiologically followed up for every month for 3 months, then every 3 months for one year and then every 6 months for maximum 6 years. All finding were recorded on a proforma containing age, sex, duration of symptoms, site, grade and type of surgery done. Incidence and relevance of the type of procedure to the stage of tumour was noted at final outcome.

Results

There were 240 cases of giant cell tumour but only 13(5.4%) related to foot bones. Of them, 8 (3.3%) were females and 5(2.0%) males. The mean age was 25 years (SD 10.59) (range: 17-38 years). In 7 (2.9%) cases lesion was in metatarsals, 2(0.8%) cases in phalanges, 3(1.2%) cases in calcaneus and 1(0.4%) case in talus (Figure-1 and 2). Duration of symptoms ranged from 4 to 12 months with a mean of 6.54 months (SD 4.08). All the tumours presented as expansile lesion, destroying cortex in 8(3.3%) cases. In all cases, lesion was more than half the diameter of the bone and thickness of sub-chondral bone in adjacent articular surface was less than 5mm to 0mm. All of them had extension into the soft tissue. Open biopsy was performed in 7(2.9%) cases. In 6(2.5%) cases, fine needle aspiration cytology (FNAC) was diagnostic, showing giant cell lesion. 1(0.4) calcaneal giant cell tumour was treated by extended curettage and filling the cavity with fibular head compact bone graft. Other 2(0.8%) cases of calcaneal giant cell tumour were treated by complete resection of calcaneus. 1(0.4%) case of talus GCT was treated by curettage and bone grafting. Out of 7(2.9%) cases of metatarsals, 4(1.6%) were in 1st



Figures-1, 2: Giant Cell Tumours of calcaneus.

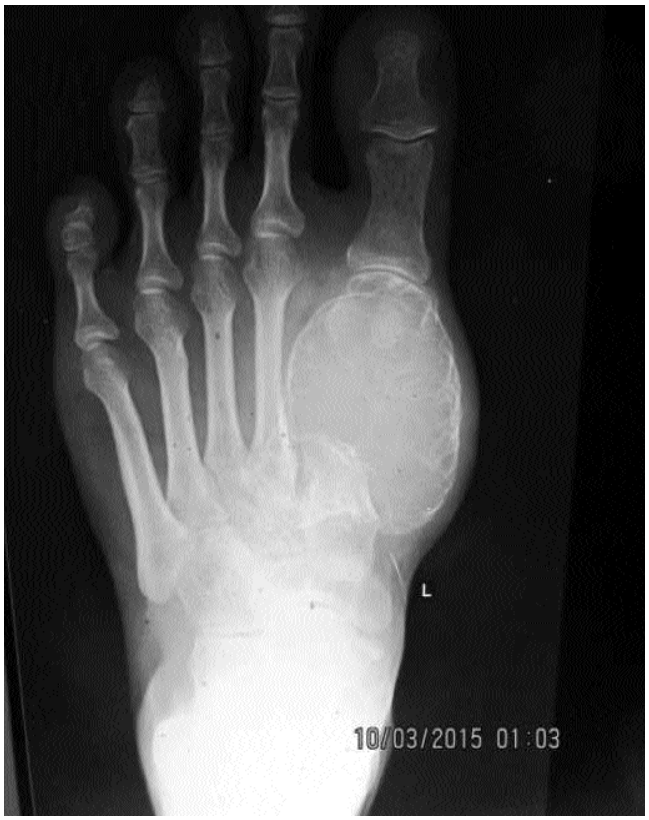


Figure-3: Giant Cell Tumour of 1st metatarsal.

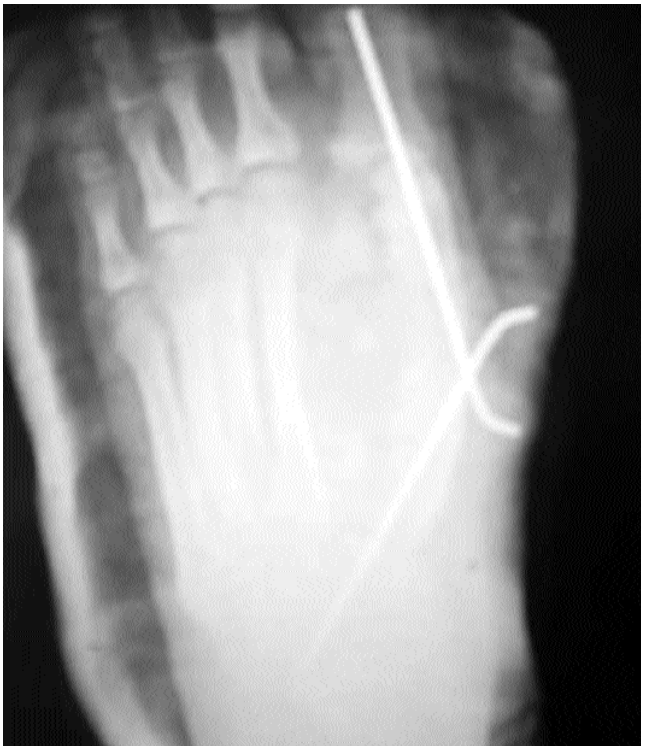


Figure-4: Treated by resection and reconstruction with Fibular graft and K-wire.

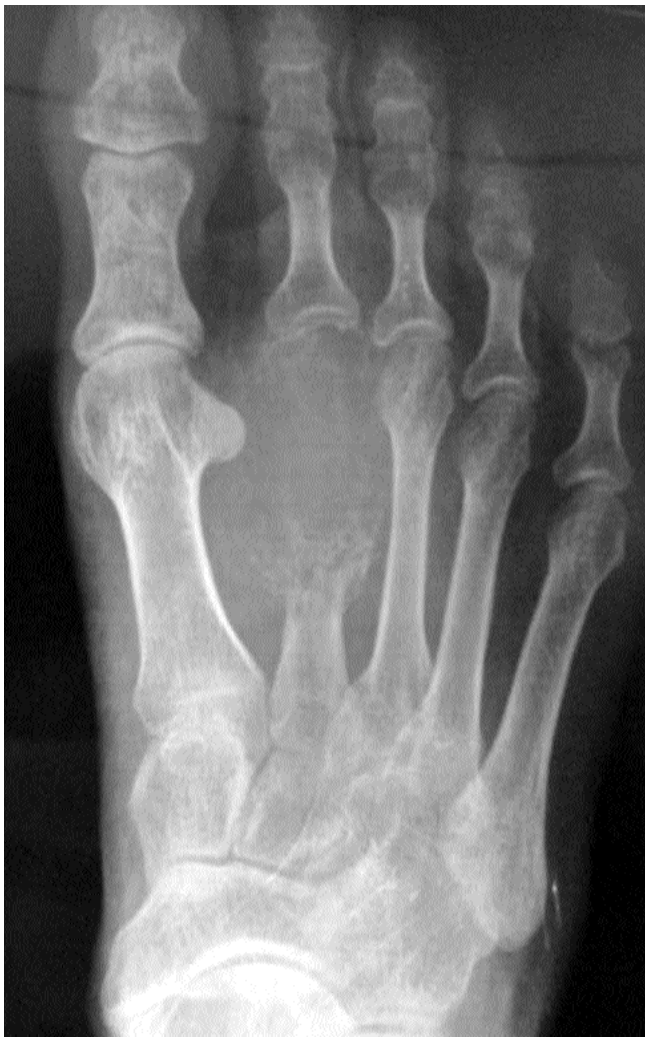


Figure-5: Giant Cell Tumour of 2nd metatarsal.

metatarsals, 2(0.8%) in 2nd metatarsal and 1(0.4%) in 3rd metatarsal. 2(0.8%) GCTs in 1st metatarsal (Figure-3 and 4) and 1(0.4%) in 2nd metatarsal were in stage3 (Figure 5 and 6), and were treated by en-bloc resection and reconstruction with free fibular graft. Fibular graft was held with intramedullary K-wire. Rest of the tumours in all metatarsals were stage 2 and were treated by curettage and autologous cancellous bone grafting. In 2(0.8%) cases of phalanges, 1(0.4%) in proximal phalanx of big toe was treated by resection and fibular bone grafting and 1(0.4%) was treated by amputation of 3rd toe. There was 1(0.4%) recurrence in calcaneus and 1(0.4%) in 1st metatarsal, both of which were initially treated by curettage and bone grafting. Calcaneus recurrence was treated by below-knee amputation and 1st metatarsal recurrence by resection and iliac crest cortico cancellous bone graft.

Mean follow-up was 3.5 years (SD 2.25) (range: 1.5-6 years). All patients were pain-free with good union and incorporation of graft at both ends. All the patients showed good stability and ambulation in 6 months. Overall, 11(2.4%) patients were satisfied with daily activities and had good emotional acceptance. 2(0.8) patients who had amputations were concerned about cosmetic appearance. All the patients had a fair functional outcome and cosmetically acceptable foot. Wound infection, stress fracture of the graft, non-union and further recurrence was not noted in any case after the initial two recurrences.

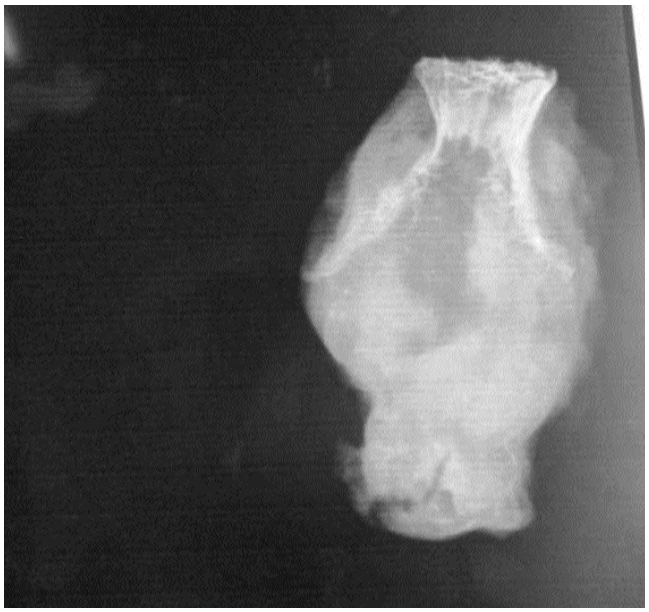


Figure-6: Treated by en-bloc resection.

Discussion

Giant Cell Tumour predominantly occurs in long bones in 75-90% cases and only a fraction is found in foot bones. This lesion represents 5% of all primary bone tumours in the West.[9] In the East, the reported incidence is about 20%.[10,11] Among the 240 cases of GCT encountered in 24 years, only 13 cases of GCT of foot bones were reported in our study, showing incidence of 5.41%. The incidence of GCT of bones of foot reported from West is 4%.[12] High incidence is reported in Japan 16%.[13] Another feature is young age of the patients of foot bones GCT. Biscaglia R et al[2] reported GCT of foot bones in relatively younger patients and female predominance. Yanagisawa M et al[13] showed 45% of their patients of GCT foot bones to be younger than 20. Casadie et al[14] showed average age to be 27 years. In our series, average age was 25 years. Reported clinical behaviour and presentation of GCT have varied in different studies. Most authors feel that there is a correlation between the radiological behaviour of the

tumour and the clinical presentation. The radiological atypicality as found in this series was also observed by other authors.

Primary GCTs of bones of the foot were characteristically eccentric in location, round and lytic. They were more aggressive with ill-defined edges. Aggressiveness was observed in majority of cases[12] and 70% of foot GCTs were stage 3.[14] They have higher rate of recurrence than other sites.[15] Some studies have shown no recurrence.[13] Our study showed two recurrences.

Different authors have recommended different treatment options for individual foot bones GCTs with different results like resection, excision intralesional or wide margin, curettage and amputation. Some procedures were supplemented by fibular or iliac crest bone grafts. Oliveira VC et al[16] and Xing R et al[17] recommended intralesional curettage with adjuvants for treatment of foot bone for stage 2 GCT. We did resection and curettage with fibular and cancellous bone graft for calcaneus stage 2 GCT. Khatoon Z et al[18] showed resection of calcaneus in stage 2 GCT. We did curettage and bone graft of stage 2 talus GCT. Song KS[19] did intralesional curettage and bone grafting of stage 2 GCT, while Ramdas A et al[20] did curettage of stage 2 talus GCT and Michael B et al[21] did excision of talus for stage 3 GCT. We did en bloc resection and curettage with fibular and cancellous bone grafting in metatarsal GCT. Siddiqui YS et al,[22] Mahajan S et al[23] and Yurdoglu C et al[24] did resection of stage 3 tumour of 1st and 2nd metatarsals respectively and did reconstruction of defect with fibular strut and iliac crest cancellous bone graft and K-wire fixation. Wang EH[25] did allograft reconstruction of first metatarsal stage 3 lesion. Yokouchi M et al[26] did amputation of toe for stage 3 GCT distal phalanx 4th toe. Bacchal V et al[27] and Dridi M et al[28] did en bloc resection of stage 3 GCT distal phalanx of big toe and proximal phalanx 3rd toe respectively. We did fibular bone graft of stage 3 GCT big toe proximal phalanx and amputation of 3rd toe.

Foot is a rare site of GCT of bone. Numbers of cases were limited in this series and no local comparative data was available. Surgical choices were also limited due to late presentation of cases and aggressiveness of tumour.

Conclusion

Primary GCTs involving bones of the foot are rare lesions which are generally diagnosed at an advanced stage. Accurate diagnosis requires clinical evaluation, imaging studies and histopathological assessment. Two recurrences after surgery in this small series of cases support a policy of aggressive primary surgery, including amputation, en bloc resection/reconstruction and extended curettage.

References

1. Osman W, Jerbi M, Ben Abdelkrim S, Maaref K, Ben Maitigue M, Ben Ayèche ML. Giant cell tumor of the lower end of tibia. Curettage and cement reconstruction. Foot Ankle Surg 2015; 21: e16-20. doi: 10.1016/j.fas.2014.09.002.
2. Biscaglia R, Bacchini P, Bertoni F. Giant cell tumor of the bones of the hand and foot. Cancer 2000; 88: 2022-32.
3. Dang L, Liu X, Dang G, Jiang L, Wei F, Yu M, et al. Primary tumors of the spine: a review of clinical features in 438 patients. J Neurooncol 2015; 121: 513-20.
4. Campanacci M, Baldini N, Boriani S, Sudanese A. Giant-cell tumor of bone. J Bone Joint Surg Am 1987; 69: 106-14.
5. Blackley HR, Wunder JS, Davis AM, White LM, Kandel R, Bell RS. Treatment of giant-cell tumors of long bones with curettage and bone-grafting. J Bone Joint Surg Am 1999; 81: 811-20.
6. Saiz P, Virkus W, Piasecki P, Templeton A, Shott S, Gitelis S. Results of giant cell tumor of bone treated with intralesional excision. Clin Orthop Relat Res 2004; 424: 221-6.
7. Chakravarti A, Spiro IJ, Hug EB, Mankin HJ, Efird JT, Suit HD. Megavoltage radiation therapy for axial and inoperable giant-cell tumor of bone. J Bone Joint Surg Am 1999; 81: 1566-73.
8. Heck RK Jr. General principles of tumors. In: Canale ST, Beaty JH, eds. Campbell's Operative Orthopaedics. 11th ed. Philadelphia, PA: Mosby; 2007. pp. 775-854.
9. Dahlin DC, Cupps RE, Johnson EW Jr. Giant-cell tumor: a study of 195 cases. Cancer 1970; 25: 1061-70.
10. Sung HW, Kuo DP, Shu WP, Chai YB, Liu CC, Li SM. Giant-cell tumor of bone: analysis of two hundred and eight cases in Chinese patients. J Bone Joint Surg Am 1982; 64: 755-61.
11. Moore JR, Weiland AJ, Daniel RK. Use of free vascularized bone grafts in the treatment of bone tumors. Clin Orthop Relat Res 1983; 175: 37-44.
12. O'Keefe RJ, O'Donnell RJ, Temple HT, Scully SP, Mankin HJ. Giant cell tumor of bone in the foot and ankle. Foot Ankle Int 1995; 16: 617-23.
13. Yanagisawa M, Okada K, Tajino T, Torigoe T, Kawai A, Nishida J. A clinicopathological study of giant cell tumor of small bones. Ups J Med Sci 2011; 116: 265-8.
14. Casadei R, Ruggieri P, Moscato M, Ferraro A, Picci P. Aneurysmal bone cyst and giant cell tumor of the foot. Foot Ankle Int 1996; 17: 487-95.
15. Wold LE, Swee RG. Giant cell tumor of the small bones of the hands and feet. Semin Diagn Pathol 1984; 1: 173-84.
16. Oliveira VC, van der Heijden L, van der Geest IC, Campanacci DA, Gibbons CL, van de Sande MA, et al. Giant cell tumours of the small bones of the hands and feet: long-term results of 30 patients and a systematic literature review. Bone Joint J 2013; 95-B: 838-45.
17. Xing R, Yang J, Kong Q, Tu C, Zhou Y, Duan H. Giant cell tumour of bone in the appendicular skeleton: an analysis of 276 cases. Acta Orthop Belg 2013; 79: 731-737.
18. Khatoon Z, Tariq R, Kureshi SB, Ahmed R. Giant Cell Tumor. Rare Sites. PJR 2012; 22: 13-17.
19. Song KS, Park CH. Giant cell tumor of the talus: 19-Year follow-up of a patient. J Foot Ankle Surg 2015; 54: 958-61.
20. Ramdas A, Rao KR, Thomas A, Varghese RG, Gnanadoss JJ. Giant cell tumour of talus - a case report. J Indian Med Assoc 2007; 105: 96-8.
21. Mechlin MB, Kricun ME, Stead J, Schwamm HA. Giant cell tumor of tarsal bones. Skeletal Radiol 1984; 11: 266-270.
22. Siddiqui YS, Zahid M, Bin Sabir A, Julfiqar. Giant cell tumor of the first metatarsal. J Cancer Res Ther 2011; 7: 208-10.
23. Mahajan S, Shikari A, Habib M, Kuchey G, Sharma S. Giant cell tumor of the second metatarsal. The Internet Journal of Orthopedic Surgery 2008; 11. Available from URL:

http://ispub.com/IJOS/11/1/5167 [20th May 2015]
24. Yurdoglu C, Altan E, Tonbul M, Ozbaydar MU. Giant cell tumor of second and third metatarsals and a simplified surgical technique: report of two cases. J Foot Ankle Surg 2011; 50: 230-4.
25. Wang EH, Arbatin JJ. Allograft reconstruction of a large giant cell tumor of the first metatarsal: a case report. Foot Ankle Int 2008; 29: 97-100.
26. Yokouchi M, Arishima Y, Nagano S, Shimada H, Nakamura S, Setoguchi T, et al. Giant Cell Tumor of the Distal Phalanx of the Fourth Toe: A Case Report. J Foot Ankle Surg 2014; pii: S1067-2516(14)00452-9. doi: 10.1053/j.jfas.2014.09.023.
27. Bachhal V, Rangdal S, Saini U, Sament R. Giant cell tumor of distal phalanx of great toe. A case report. Foot (Edinb) 2011; 21: 198-200.
28. Dridi M, Annabi H, Ben Ghozlen R, Abdelkefi M, Trabelsi M. Giant cell tumour of a phalanx in the foot: a case report. Acta Orthop Belg 2008; 74: 273-5.