MANAGEMENT OF A RARE RECURRENCE OF DISTAL TIBIAL GIANT CELL TUMOUR BY SANDWICH TECHNIQUE

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ABSTRACT

INTRODUCTION

First described by Jaffe et al in 1940, giant cell tumour (GCT) constitutes 20% of all the skeletal neoplasms with a higher rate of recurrence after excision. Most common sites for the involvement are distal femur and proximal tibia followed by the distal end of radius. Ankle and foot involvement is rare <4%. Usually benign, they are locally aggressive and may occasionally undergo malignant transformation. The surgeon needs to strike a balance during treatment between being aggressive in order to reduce the incidence of local recurrence and being conservative in removing the normal bone to attain maximal function.

Current literature suggests that intralesional curettage strikes the best balance between controlling disease and preserving optimum function in the majority of the cases though there may be occasions where the extent of the disease mandates resection to ensure adequate disease clearance.

We report a case of Giant Cell Tumour of distal end of left Tibia in a 32-year-old female patient. Initially the condition was treated by curettage and bone grafting. But, due to recurrence of the condition within 9 months, she was treated with extended curettage using hydrogen peroxide, burr and bone cement as adjuvants and reconstruction using the "SANDWICH" Technique. At One year follow up there is no recurrence and reasonably good function around the ankle joint is maintained.

Primary Giant Cell Tumours have been traditionally treated with curettage of the lesion followed by bone grafts/bone cement. Recurrent cases often require aggressive management. The adjuvant treatment used in our case offered good stability and allowed early mobilization of the ankle joint. This case substantiates the use of bone cement in the treatment of recurrent Giant Cell Tumour of distal tibia whenever the articular integrity is intact with reasonably good functional outcomes. However, a periodic follow-up is still recommended to watch-out for late re-recurrences.

KEYWORDS

GCT, Distal tibia, Curettage, Bone cement, Recurrence.

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INTRODUCTION: First described by Jaffe et al in 1940, giant cell tumour constitutes 20% of all the skeletal neoplasms with a higher rate of recurrence [1,2,3,4,5] after excision. Most common sites for the involvement are distal femur[6] and proximal tibia followed by the distal end of radius. Ankle and foot involvement is rare <4%. It is more common in females with age group predominance of 20-55 years.[7,8] It is described typically as an expansile lesion involving the epiphysio-metaphyseal region of long bones. Typically the patient has pain in the affected site which is dull aching type and there is a history of trauma or pathological fractures that drives the attention of the patient to the condition.[9,10] Pathological fractures are seen in 12% of patients at the time of presentation. There can also be swelling and joint stiffness.

The diagnosis of giant cell tumour of bones depends mainly on clinical and radiological examination [9] (plain X-ray and Computerized Tomography scan) of the site of the lesion. The treatment of Giant Cell Tumour is directed towards local control without sacrificing joint function. This can be achieved by intralesional curettage[1,7,11,12,13] with autograft[6] reconstruction by packing the cavity of the excised tumour with morselised iliac corticocancellous bone or using bone cement as packaging material for the defect. Another modality is use of adjuvants like pulsatile lavage, hydrogen peroxide[14,15,16] phenol cauterization, Burr[2,17,18] and Liquid nitrogen.

CASE REPORT: A 32-year-old female patient daily waged labourer by occupation came to our hospital with the complaints of pain in the left ankle and swelling present in left distal tibia around the ankle joint since 5 months. She related the pain to the history of trauma which occurred to her 18 months ago with twisting injury to the left ankle with gradually increasing swelling around distal tibia. Pain was dull aching and aggravated by prolonged standing and

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walking and was relieved by rest. There was no history of any fever, night cries, loss of weight, and loss of appetite present. The family, occupational, recreational and drug histories were not significant. Patients preoperative x-ray findings of previous operation were- Lytic lesion in epiphysio-metaphyseal region with eccentric lesion within the confines of the cortex (figure 1). Patient's previous MRI features were suggestive of Giant Cell Tumours of distal end tibia (figure 2). Patient was treated 18 months ago in some private hospital with intralesional curettage of the swelling followed by the ipsilateral iliac corticocancellous bone grafting[6] procedure. Patient's histopathology report confirmed Giant Cell Tumours grade 1(figure 3). Patient was alright for 9 months when she again experienced the same clinical symptoms like increased in size of the swelling, tenderness and inability to walk due to pain with disturbances of her daily routine activities. Patient came to our hospital with these symptoms. The general physical and systemic examinations were within normal limits. On local examination, the attitude of the limb was neutral. There was diffuse swelling on the anterolateral border of the left distal tibia 8x8x4cmts with well-defined margins, smooth surface and bony deep swelling. Skin over the swelling was normal and localized tenderness was there without any signs of inflammation and raised temperature (figure 4). Crackling and crepitus was felt over the swelling. There were normal ankle movements and no neurological deficits in the foot with normal capillary filling and distal arterial pulsations. X-ray showed well-defined expansile lytic lesion at distal end of left tibia suggestive of giant cell tumour of distal end tibia (figure 5). Patients Computerized Tomography SCAN report revealed that lytic lesion of the lower end of tibia with lesion reaching up to sub articular location with thinning and scalloping of cortex seen and destruction of anterolateral cortex with lesion extending to the soft tissues (figure 6). These features were suggestive of the recurrence [1,2,3,4,5] of giant cell tumour of tibia. The condition and routine investigations done in preparation for operative procedure were explained to the patient and we proceeded with our treatment plan of "Sandwich"[17] technique. Through the anterolateral incision a large cortical window was made and the left distal tibia was approached and the incision was extended to see the joint involvement. There was no joint involvement seen. The tumour was greyish, non-vascularised, friable mass of approximately 8x8x4cmts (figure 7). The tumour was curetted[1,7,11,12,13] until normal appearing bone was seen and only a thin rim of subchondral bone was left intact. Thorough extended curettage of the cavity was done in all directions using a high-speed burr[2,18,19] (figure 8), with care to avoid contamination of the surrounding soft tissues and all the rough surfaces were made smooth and then a lavage was given with normal saline followed by hydrogen peroxide.[14,15,16] The material curetted[1,7,11,12,13] out was sent for histopathological examination. The defect created was filled with the bone graft[6] (contralateral iliac corticocancellous bone graft harvested) of 1 cms. thickness adjacent to the sub articular surface in the outer layer followed by the layer of foam gel and then the remaining cavity was filled with layer of polymethylmethacrylate Figure4. Preoperative picture of the patient's foot cement[6,19,20,21,22] (figure 9), (figure 10), figure (11). The wound was closed over a suction drain. Patients postoperatively x-ray showed tumour excised and graft in place (figure 12). Postoperatively partial-weight-bearing crutch walking was started immediately. The patient was advised physical therapy with ankle movements active and passive and was discharged on post op day 12 after suture removal. Her histopathology report stated giant cell tumour grade 1 (figure 13). Patient was followed up on 1st, 2nd, 3rd, 6 and 9th month. Follow up x-rays and pictures of patient (figure 14), (figure 15) and (figure 16).

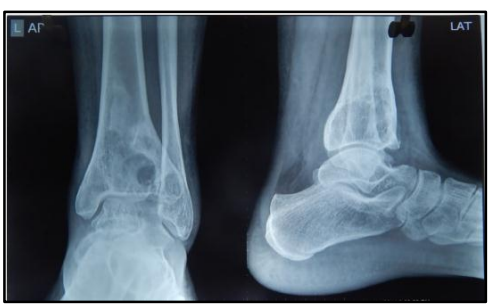


Fig. 1: Pre-Operative x-ray of previous operation done in private hospital

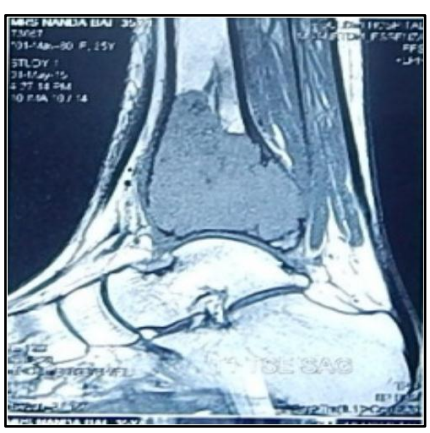


Fig. 2: Pre-Operative MRI SCAN of previous operative procedure in private hospital

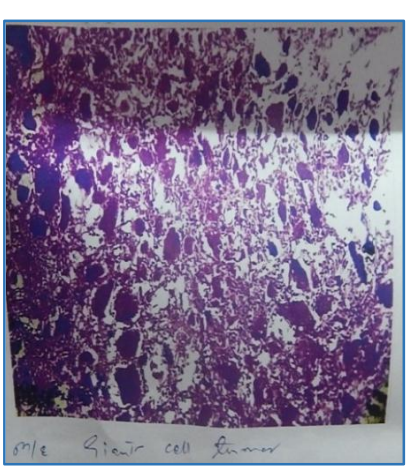


Fig. 3: Histopathology report of previous operation done in private hospital

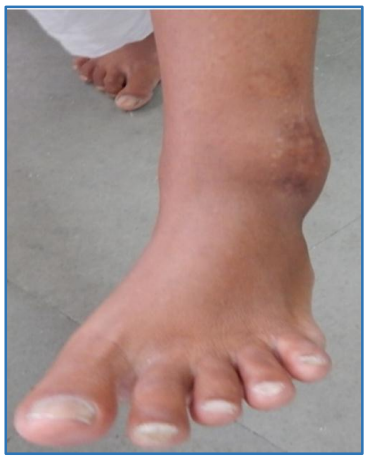


Fig. 4: Pre-Operative picture of the patient's foot

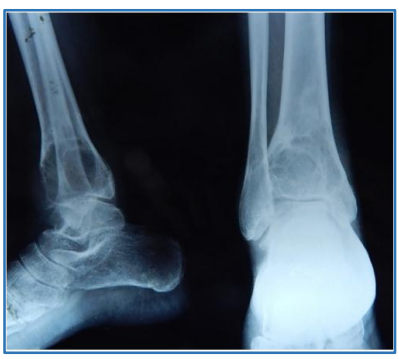


Fig. 5: Pre-Operative x-ray of the patient after recurrence of tumour

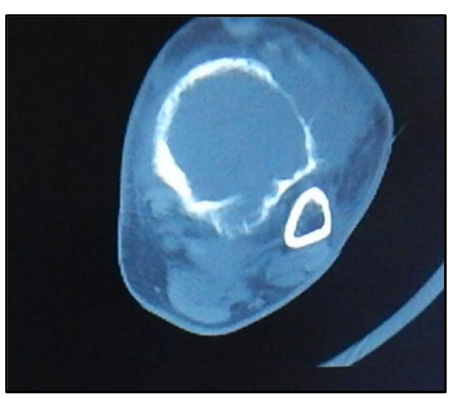


Fig. 6: Pre-Operative CT scan of the patient after the recurrence of tumour

Fig. 7: Intra operative picture showing large cortical window created

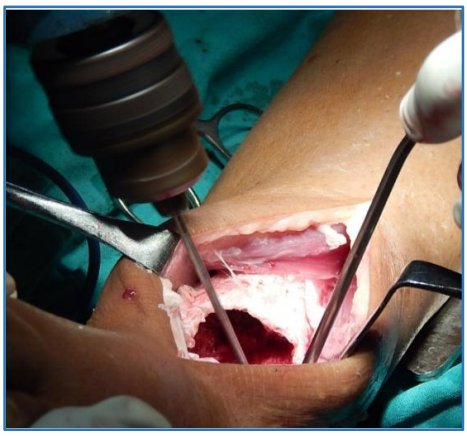


Fig. 8: Intra-operative picture showing the use of burr

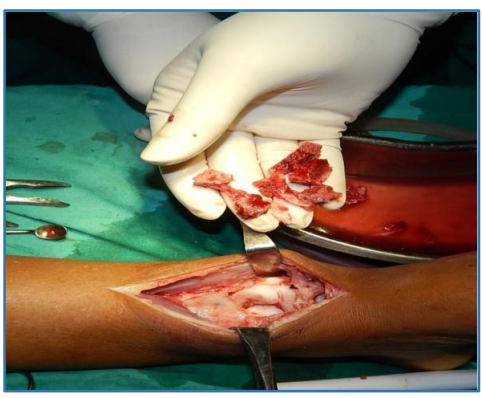


Fig. 9: Intra-operative picture showing the placement of the graft

Fig. 10: Intra-operative picture showing the placement of the gel foam layer

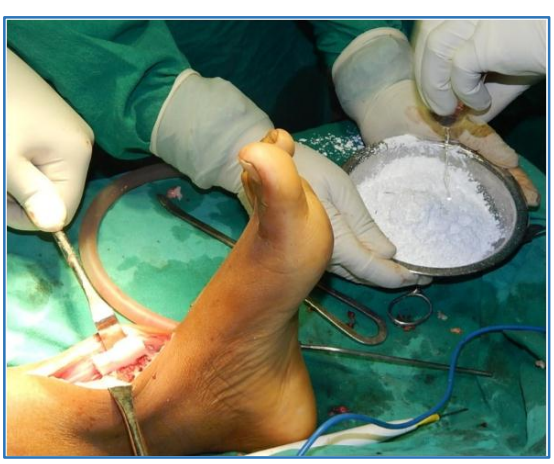


Fig. 11: Intra-operative picture showing the placement of the cement

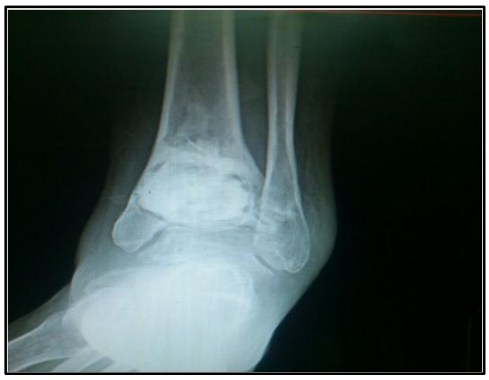
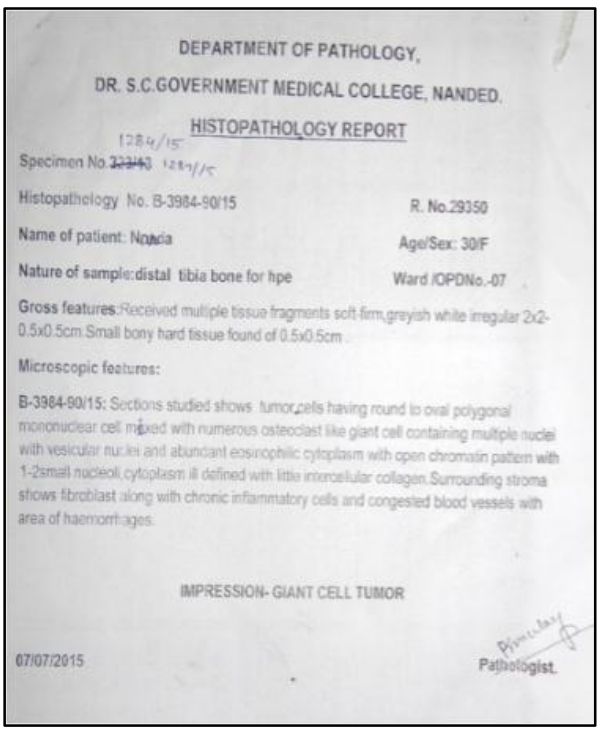


Fig. 12: Immediate post-Operative x-ray of the patient



DEPARTMENT OF PATHOLOGY,

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HISTOPATHOLOGY REPORT

1284/15

Specimen No. 1284/15

Histopathology No. B-3984-90/15 R. No.29350

Name of patient: Nanda Age/Sex: 30/F

Nature of sample:distal tibia bone for hpe Ward /OPDNo.-07

Gross features:Received multiple tissue fragments soft-firm,greyish white irregular 2x2-0.5x0.5cm.Small bony hard tissue found of 0.5x0.5cm.

Microscopic features:

B-3984-90/15: Sections studied shows tumor cells having round to oval polygonal mononuclear cell mixed with numerous osteoclast like giant cell containing multiple nuclei with vesicular nuclei and abundant eosinophilic cytoplasm with open chromatin pattern with 1-2small nucleoli,cytoplasm ill defined with little intercellular collagen.Surrounding stroma shows fibroblast along with chronic inflammatory cells and congested blood vessels with area of haemorrhages.

IMPRESSION- GIANT CELL TUMOR

07/07/2015 Pathologist

Fig. 13: Post-Operative histopathology report of the patient

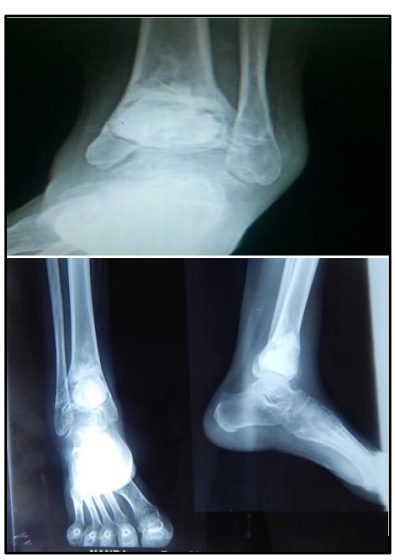

Fig. 14: Patients 3rd month x-ray showing the graft and cement with maintained articular margins

Fig. 15: 3rd month picture of the patient walking comfortably

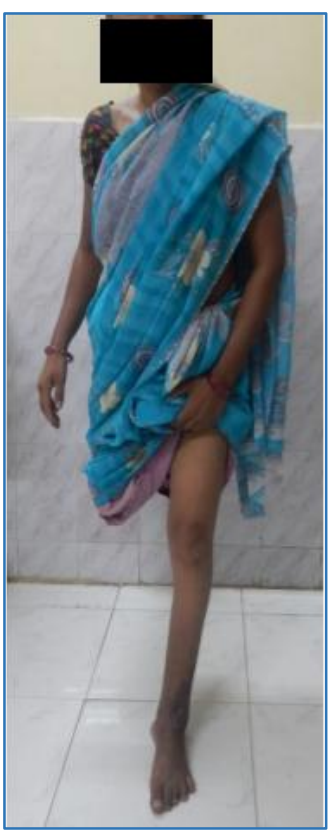

Fig. 16: 3rd month picture of the patient standing comfortably on the operated leg

DISCUSSION: The treatment of Giant Cell Tumour is directed towards local control without sacrificing joint function. This has traditionally been achieved by intralesional curettage[1,7,11,12,13] with autograft[6] reconstruction by packing the cavity of the excised tumour with morselised iliac cortico-cancellous bone graft. Regardless of how thoroughly performed, curettage leaves

microscopic disease in the bone and hence has a reported recurrence[1,2,3,4,5] rate as high as 60%. Bone graft is used as it undergoes remodelling along the stress lines and once it is incorporated the reconstruction is permanent. In our procedure we used the cement[6,19,20,21,22] as the cement has methylmethacrylate monomer which is cytotoxic and its thermal effect and hyperthermia produced after its setting helps extend the boundary of the tumour kill. It has also advantage of immediate structural support and rapid weight bearing. There is a problem of late articular degeneration in the sub articular lesions where the amount of residual bone after the curettage is less than 5 mm, a multilayer reconstruction technique is recommended. A layer of bone graft adjacent to the sub articular surface followed by layer of gel foam over this and finally the remaining cavity is packed with cement[6,19,20,21,22]. This helps to reduce the heat damage from the curing cement and the sub articular bone graft after consolidation should prevent articular degeneration.

The changing trends in the management of bone tumours are from limb sacrifice to limb salvage and currently preservation of limb functionality. Amputation surgeries have become only of historical significance. With each recurrence these tumours tend to get aggressive. Such aggressive lesions can also be treated with extended tumour resection followed by ankle arthrodesis or endoprosthetic replacement.[23,24,25,26,27] Ankle Arthrodesis following tumour excision can be achieved by vascularized autografts, non-vascularized autografts, allografts, or pasteurized autografts. Despite good functional outcomes, limitations for this procedure include stiff ankle, a long period of recovery, infection, and non-union. Similar to mega-prosthesis in the treatment of aggressive Giant Cell Tumours around the knee, ankle endoprosthesis have been introduced. Their side effects are deep infection, implant loosening and high cost. In our patient the distal tibial articular cartilage was intact so we decided to proceed with sandwich [17] technique.

CONCLUSION: Giant Cell Tumours affecting the distal tibia are rare to encounter. Bony defects can be filled with autografts with bone cement. However, when there is recurrence[1,2,3,4,5] there should be extended curettage[1,7,11,12,13] done with the use of adjuvants like phenol, hydrogen peroxide,[14,15,16] burr[2,18,19] and then the bone grafts and bone cement should be used as void fillers by sandwich technique to achieve local control of the disease. This modality of treatment offers chances of less recurrence, good stability and early ankle mobilization is possible.

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