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Case Report

Case of giant cell tumour of proximal tibia treated with intra-lesion curettage with adjuvant therapy and reconstruction with the sandwich technique fixation

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ABSTRACT

Giant cell tumour (GCT) of bone is a benign but locally aggressive tumour with the potential of malignant transformation that mostly involves the meta-epiphyseal region of long bones. A 34-year-old female was presented to our institute with progressive pain and swelling in her right knee and was radiologically and histologically found to have a GCT of proximal tibia. She was treated with extended curettage with power burr, intra-lesion phenol application and internal fixation using the sandwich technique. No recurrence was found and the procedure led to a good functional outcome. A GCT of proximal tibia treated with joint preserving surgery with extended curettage and the sandwich technique fixation gives optimal results leading to a good functional outcome.

Keywords: GCT, Sandwich technique, Curettage, Bone cement, Autologous bone graft

INTRODUCTION

Giant cell tumour (GCT) of bone is a benign but locally aggressive tumour with the potential of malignant transformation that mostly involves the meta-epiphyseal region of long bones, most commonly the distal femur and proximal tibia. It was defined as an entity by Jaffe et al and accounts for approximately 15% of all benign tumours of bone.[1] It typically affects young adults between the ages of 20 to 40 years, with several authors reporting a slight predominance of women over men.[2,3] GCT is related to the mechanical insufficiency resulting from bone destruction and predisposes patients to fracture. Pathologic fracture is seen in about 12% of patients at the time of diagnosis.[4,5] This tumour shows a strong correlation between surgical margins and rate of recurrence, dependent on whether intra-lesion curettage, wide or marginal resection is used.[6] To reduce the risk for local recurrence, various local adjuvants such as cryosurgery, phenol, zoledronic acid, bone cement, hydrogen peroxide (H_2O_2) and argon beam, and systemic treatments such as bisphosphonates, interferon alpha (IFN-a), and denosumab have been reported, producing variable results regarding the outcome, function, and complications.[7,8] Here we report a case of GCT of proximal tibia which was treated with curettage with adjuvant therapy and reconstruction using the sandwich technique.

CASE REPORT

A 34-year female was presented with complaints of pain, swelling and restricted movement of the right knee for the past 10 years, with the complaints being aggravated since the last one month. There was history of trauma over right knee 11 years ago for which she was diagnosed with un-displaced proximal tibia fracture and which was managed conservatively on long leg cast. There was no history of any constitutional symptoms/ any history of recent trauma.

On examination of the right knee joint the proximal tibia swelling was tender, hard, and immobile with restricted joint movements without crepitus. The surrounding skin appeared normal.

Plain radiograph of the right knee was suggestive of large lytic lesion in meta-epiphyseal region with subchondral involvement of proximal tibia (Figure 1). An MRI of the right knee joint reported as lytic lesion in proximal tibia with cortical breach suggestive of neoplastic aetiology, which was likely GCT or aneurysmal bone cyst (Figure 2). Histopathological examination of the biopsy was reported as GCT tumour (Figure 3).

The tumour was treated with joint preserving surgery with intra-lesion curettage and reconstruction using the sandwich technique. Margins were curetted thoroughly with a power burr. Tumour tissue was completely removed. Local application of phenol followed by multiple washes of cavity with H_2O_2 was carried out. Subsequently, the bone cavity beginning from the subchondral zone was filled with layers of bone graft, gel foam and cement (sandwich technique) and internal fixation was done using a locking plate. Biopsy material was sent for histopathological examination and was reported as GCT. The post-operative period was uneventful and the patient was discharged after suture removal on long knee brace.

On six month follow-up there were no signs of local recurrence or failure of fixation and the patient is on complete weight bearing with full range of movement of knee joint.

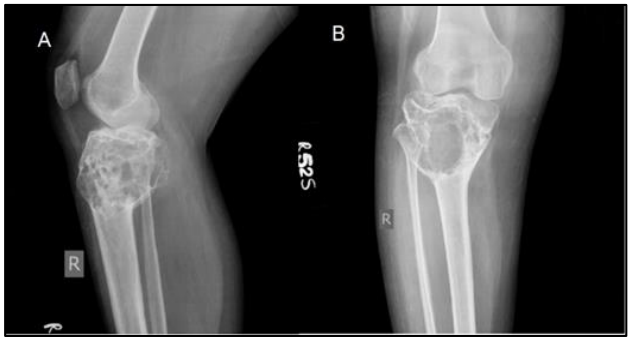

Figure 1 (A and B): Right knee lateral radiograph, right knee AP radiograph showing lytic lesion in proximal tibia.

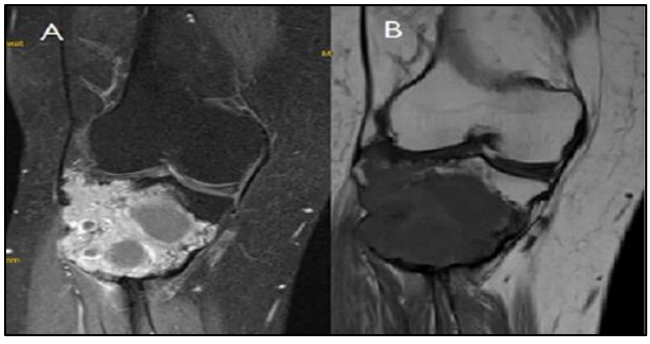

Figure 2 (A and B): MRI knee T1 contrast-enhancement of solid component with multiple cyst within T1 image-hypointense solid area with multiple cyst within.

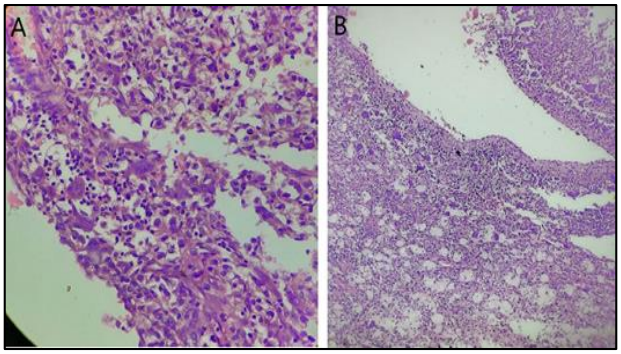

Figure 3 (A and B): Uniform and regular distribution of stromal and giant cells in 40X and 10X with arrow showing gaint cells.

DISCUSSION

GCT accounts for 8.6% of all bone tumours.[9] Most of the lesion occurred in the 20-40 years of age demographic with a female predominance. Similarly, our patient fits in this classical age range. The most frequent site of tumour is the distal femur and proximal tibia. Approximately 50% of cases occur around the knee joint.[2,9]

The treatment for GCTs around the knee can be done using curettage alone, curettage with adjuvant therapy (phenol, hydrogen peroxide, argon laser photocoagulation, liquid nitrogen, bone cement, or bone graft), and marginal/wide resection, followed by reconstruction with plates, arthrodesis or mega-prosthetic joint replacement. There is a high risk of recurrence rate seen with intralesional curettage alone, whereas marginal/wide resection is associated with functional disability. Intralesional curettage has an advantage of joint preservation as compared to wide resection.[10]

In our case, intralesional curettage with adjuvant therapy and reconstruction using the sandwich technique resulted in a very good functional outcome. Adequate exposure through wide cortical window followed by breaking of bony ridges of the tumour using a high-power burr ensures thorough curettage (Figure 4). The rate of recurrence after the use of 5% phenol is reported to be very less, since phenol causes protein coagulation, necrosis and damages DNA.[11,12] A comparative study conducted by Durr et al concluded that the group of patients for whom phenol was used showed a recurrence of 9% while group of patients for whom phenol was not used showed recurrence of 42%.[13] Likewise, after curettage with a burr we used 5% phenol for 10 min to avoid recurrence by killing residual tumour cells in crevice. The phenol carries risk of injuring the neurovascular structures around the joint, and hence needs to be used cautiously. Any breach in cortex should be evaluated to avoid spillage of phenol in surrounding tissue. Posterior periosteum of tibia acts as the biological barrier that prevents the escape of cement and bone graft in the posterior compartment of tibia, thereby preventing neurovascular damage. Care must therefore be taken to prevent the damage to this periosteum during curettage.[14]

There are various options to fill the bone defect created by the tumour and curettage. The most popular ones are the use of bone graft, bone cement or calcium phosphate. The advantage that bone graft has over the others is that it gets completely incorporated in the bone, maintains joint function and prevent articular degeneration. But this leads to difficulties in detecting recurrence and requirements of bone bank (huge lesions), which is its major disadvantage. The benefits seen with the use of bone cement is that it enables immediate weight bearing and its cytotoxic and thermal effects to reduce the risk of recurrence. But it also, carries the risk of damaging the surrounding neurovascular tissue and subchondral cartilage.[14-16] In our case, we used bone cement and iliac crest auto graft to fill the defect (Figure 5). Iliac crest bone graft, in the form of longitudinal strips was laid in the subchondral region and overloaded with a layer of gel foam, and the rest of the cavity was filled with polymethylmethacrylate bone cement (Figure 6). This construct was stabilized with a titanium raft tibia plate with proximal locking screws passing through the cement (Figure 7).

In follow up, there were no signs of recurrence seen clinically and radiologically (Figure 8). Patient complete range of movement with full weight bearing in operated knee. She put on post-operative oral bisphosphonates. Risk of recurrence is observed to be less with use of bisphosphonates.[17,18] Bisphosphonate induces apoptosis of osteoclast and neoplastic stromal cells. In addition, they also possess direct anti-tumour and anti-angiogenesis.[19]

Figure 4: Curettage using power burr through wide cortical window.

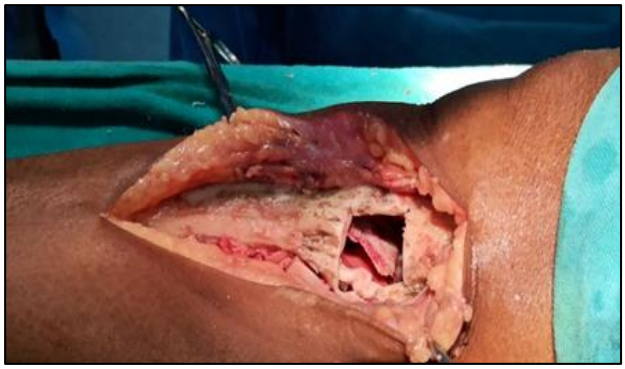

Figure 5: Bone cavity filled with iliac crest bone graft.

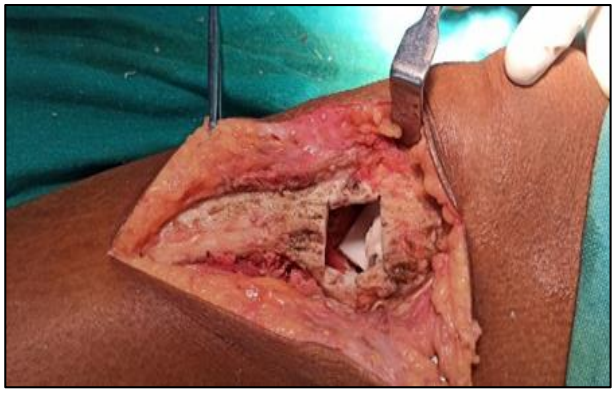

Figure 6: Bone graft overloaded with gel foam.

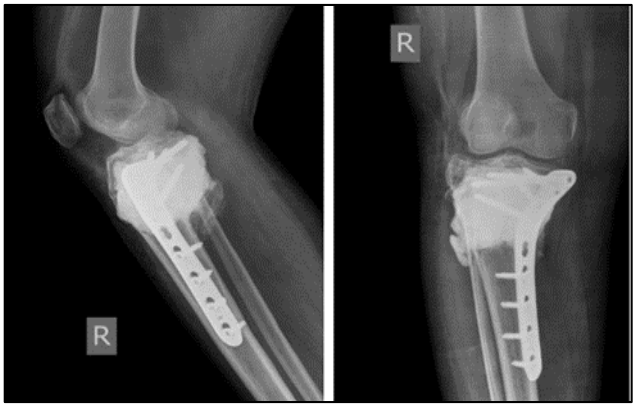

Figure 8: Post operative x-ray right knee lateral and AP view.

CONCLUSION

In the case of GCT of proximal tibia, treatment with intralesional curettage with phenol, H_2O_2 and reconstruction using bone graft and cement (sandwich technique) gives optimal results with minimal recurrence.

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Ethical approval: Not required

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