Clinics in Surgery

Case Report
Published: 11 Oct, 2021

Pseudo Arthrodesis of Knee for Stage – III Giant Cell Tumor of Distal Femur

Walla Atchi[1], Kombate N Kanfitine[2] and Tsolenyanu K Senyo[3]*

[1]*Department of Orthopedics and Trauma, University of Lomé, Togo*

[2]*Department of Orthopedics, Afagnan Hospital, Togo*

[3]*Department of Orthopedics, Kpalimé Hospital, Togo*

Abstract

Historically, for giant cell tumors of bone tumors, large resections and reconstructions by mutilating surgery were common and reported recurrence rates were low and around 5%. Currently, Denosumab neoadjuvant therapy in these tumors facilitates complete resection and can avoid mutilating surgery. In low-income countries, the management of advanced giant cell tumors of bone remains challenge because of their sometimes very monstrous volume in patients unable to afford drug treatments by Denosumab. In this work, we present a case of large distal femur GCT managed temporarily by filling-pseudo-arthrodesis after large segmental resection.

Keywords: Giant cell tumor of bone; Distal femur; Resection; Filling-pseudo-arthrodesis

Introduction

Historically, for Giant Cell Tumors of Bone (GCTB), en bloc wide resections and reconstructions by mutilating surgery were common and maintained published local recurrence rates as low as 5% [1]. Currently, in northern countries, due to early diagnosis and management, large en bloc resection in the case of GCTB is generally reserved for multiple recurrent or locally advanced GCTB, impossible joint salvage, extensive cortex destruction and soft tissue involvement [2]. Since 2013, Denosumab has revolutionized the treatment of GCTB by its efficacy in resisting GCTB that were previously inoperable despite the cortical thickening it induces and the subsequent surgical imprecision [3-6]. Denosumab neoadjuvant therapy can then, prevent mutilating surgery [7]. In low-income countries like ours, the management of advanced GCTB remains a challenge because of the one hand, the diagnostic delay that leads to very large tumors with local destruction [8] and the inability of patients to pay for Denosumab drug treatment on the other hand. The challenge remains intact and the question arises between sacrificing the member or resects wide then try reconstruction in case of large GCTB. We present a case of large GCTBs of distal femur treated by pseudo-arthrodesis-filler after large segmental resection.

Case Presentation

A 22-year-old student was admitted in orthopedics department for knee pain and absolute functional impairment of the left pelvic limb following a fall in the bathroom. She had been hospitalized for management of left femoral lateral condylar GCTB diagnosed on a biopsy specimen at a regional hospital. In this center, curettage and filling with bone cement was planned. The patient's family requested permission to leave the hospital to raise the financial resources to face the intervention. The general examination was normal. The left pelvic limb was in lateral rotation position with the patella looking outside and shortened by 2 cm; there was a lateral parapatellar scar about 3.5 cm; the amyotrophy at 4 cm above the left patella was 2 cm; the left knee was large, shiny, painful, a little warm with healthy skin Figure 1. Soft mobilization was painful above the left knee joint. There were no abnormal distal signs. There was no left inguinal ganglion. The rest of the exam was normal. This was clearly an intra-articular pathological fracture of the left distal femur Figure 2. She had been put under traction. The CT scan of the knee showed that the femoral and popliteal vessels and knee around soft tissue were intact Figure 3. MRI wasn't done because of lack of financial means of the patient. Radiographs of the pelvis and thorax were normal. The entire preoperative assessment was normal. In the absence of reconstruction prosthesis of the distal femur possibility, through lateral and medial approach, we opted for en bloc resection of the distal femur which measured about 8.5 cm Figure 4. After wide resection of distal femur, we have inserted cement in its

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Correspondence:
Walla Atchi, Department of Orthopedics and Trauma, Campus Medical Teaching Hospital of Lomé, University of Lomé, 03 BP 30090 Lomé 03, Togo, Tel: 00228 90 14 66 23; Fax: 00228 22 22 61 19;
E-mail: atchi.walla@yahoo.fr

Received Date: *07 Sep 2021*
Accepted Date: *05 Oct 2021*
Published Date: *11 Oct 2021*

Citation:
Atchi W, Kanfitine KN, Senyo TK. Pseudo Arthrodesis of Knee for Stage – III Giant Cell Tumor of Distal Femur. Clin Surg. 2021; 6: 3333.

Figure 1: Photographs left knee showing swelling (A) and lateral parapatellar scar (B).

Figure 2: Preoperative AP (A) lateral (B) left knee radiographs showing intra articular pathological fracture and destructive lesion of almost distal femur.

Figure 3: CT scan showing destruction lesion of distal femur, femoral and popliteal vessels seem intact (A, B) pathological fracture (C).

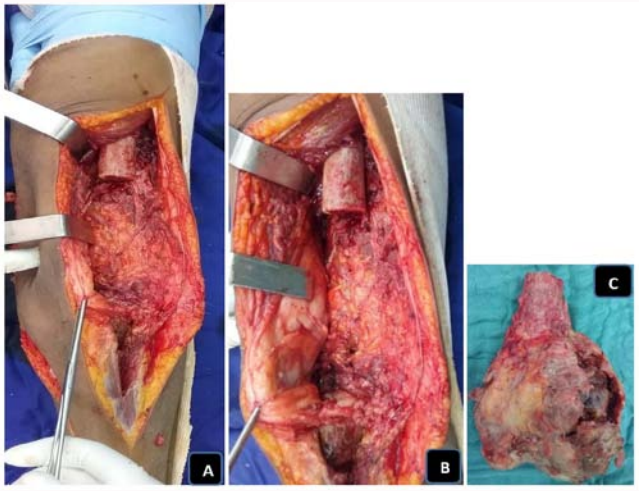

Figure 4: Photographs of intraoperative time. **A**, **B:** en bloc resection of distal femur. **C:** resected distal femur segment, measuring 8.5 cm.

Figure 5: Photographs of intra operative time. **A**. Allowing to visualize the medial DCP plate marrying the proximal tibia and bridging the knee. **B**. The two plates on either side of the cement filling the distal femur; the cement is traversed by the cortical screws coming from the 2 plates. **C**. The knee aspect after the cutaneous suture of the two operative wounds.

place and fixed femur, cement and upper tibia by a double 18-holes dynamic compression, 4.5-mm titanium plates (DCP). The plates were contoured so as to marry the morphology of knee and proximal tibia by bridging knee and were applied to the lateral and medial surface of the femur and the upper extremity of the tibia Figure 5. Four cortical screws fixed the plates on both sides of the femur, whereas at the cement level, three screws were placed on each side Figure 6. She began weight bearing on second postoperative day with crushes. Since 18 month, she walks without crutches. Clinical knee alignment is showed by photographs of Figure 7. The MSTS score was estimated at 20. She is hoping for a prosthetic reconstruction of her left knee one day.

Discussion

Advanced GCTB in African context are not uncommon due to either late consultation or the absence of specialized reference centers for tumor management that require patients to transit by regional surgical centers where resection most often result in recurrence [9]. According to publications on the management of stage III Campanacci GCTB and recurrence cases, there is no more places today for first intention surgery advocating serial embolization, Denosumab therapy, and other therapies by interferon or pegylated interferon and radiotherapy [10]. All of these are still technically and financially above local possibilities in our resource-limited countries. Denosumab, which appears to be the most used adjuvant treatment, costs US $212 (3.6x minimum wage in Togo) for the single dose of 60 mg. The challenge still therefore, complete in the management of these tumors to avoid amputation which represents a huge sacrifice even if sometimes the patient himself apply for it. In femoral distal part GCTB cases, for more advanced lesions, en bloc resection and total knee replacement have been reported as a good option in primary treatment for limb salvage [5,6]. In our environment where no adjuvant treatment seemed to be possible, the option that remains seems to be segmental resection to treat at the same time, the joint fracture and the tumor while avoiding recurrence. If necessary, this mutilating surgery can be conducted in two stages, in order to reduce

Figure 6: Immediate postoperative anteroposterior (A) and lateral (B) radiographs demonstrating the cement filling the resected distal femur and the two DCP plates solidified by cortical screws that cross the cement zone.

Figure 7: Twenty six-month postoperative anteroposterior **(A)** and lateral **(B)** photographs demonstrating clinical knee alignment with around 8° of flexion and 5° of valgus.

intraoperative blood loss and to achieve a good resection margin as suggested by Eyesan SU [9]. After the wide resection, the question of reconstruction strategy of the distal femur will arise. The options for reconstruction after the resection of bone tumor around the knee have included the use of a custom total knee arthroplasty, osteoarticular allograft, allograft– prosthetic composite, and arthrodesis [10]. All these reconstruction options, apart from arthrodesis, cannot be done in our country for reasons already mentioned in the first lines of the discussion; then, surgeons have to make choice between two artifices for arthrodesing the knee: One using the principle of Juvara [11] whose disadvantage is the loss of bone capital of the proximal tibia in the perspective of a subsequent prosthesis, and the another making use of the cement to fill the defect resulting from segmental resection and to make the pseudo-arthrodesis by double plate. This last artifice that we performed on this patient, although it carries a risk of plate fracture even higher than the patient is young, has the advantage of preserving the proximal tibial bone capital and all the soft tissue around that may later admit prosthetic knee surgery in osteoarthritis stage. In this logic, Alejandro Zylberberg [12] has shown through his clinical case that total knee arthroplasty was possible 20 years after GCTB treatment of the distal femur by cementing.

Conclusion

In Campanacci stage III lesions, hope surgery should always be considered, even in our practice conditions marked by the unavailability of adjuvant treatments and prosthetic replacements after wide resection. Not yet benefiting from the sub specializations and resources of North countries, we must optimize the indications by widening the circle of consultation between expert practitioners, even foreigners if necessary. In the distal femur, large segmental resection followed by pseudo-arthrodesis-filling could be an acceptable temporary solution. This would reduce the number of amputations performed in our environments for large tumors in patients in whom evidence of the local disease was made.

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