

A rare case of neglected long-term pathologic fracture of the distal femur due to a giant cell tumor of bone

Luben Stokov¹, Ivelin Kostadinov¹, Alexandar Kostadinov² Georgi Manolov¹,
Georgi P. Georgiev³(✉), Luben L. Stokov⁴

¹Clinic of Orthopedics and Traumatology, UMHAT "St. Anna", Sofia, Bulgaria

²Clinic of Traumatology, UMHATEM "Pirogov", Sofia, Bulgaria

³Department of Orthopedics and Traumatology, University Hospital "Queen Giovanna - ISUL", Medical University of Sofia, Sofia, Bulgaria

⁴Clinic of Orthopedics and Traumatology, MHAT "St. Sofia", Sofia, Bulgaria
georgievgp@yahoo.com

Abstract— Giant cell tumor of bone is a histologically benign bone neoplasia that clinically has an aggressive course. In rare cases, it can give "benign" lung metastases or undergo malignant transformation. The World Health Organization defines this neoplasia as an "aggressive, potentially malignant lesion".

Herein, we present a rare case of a neglected long-term pathologic fracture of the distal femur in a 20-year-old female patient. After a biopsy, a giant cell tumor of bone was diagnosed. The patient was treated with intralesional curettage, osteoplasty and plate fixation of the fracture. Eight months postoperatively, no local recurrence or metastasis of the tumor was observed.

Keywords— giant cell tumor of bone, pathological fracture, operative treatment.

1 Introduction

Giant cell tumor of bone (GCTB) is a primary bone tumor commonly observed in the long tubular bones, with 50% affecting the distal femur, proximal tibia, and proximal end of the humerus. The aggressiveness of GCTB leads to pathological fractures in 12% of cases. By definition, this tumor has been presented by multinucleated giant osteoclast-like cells, mononuclear spindle-shaped stromal cells and monocytes^{1-8,11}. GCTCs account for 5% of all primary tumors and 20% of all bone tumors^{1-9,11}. This neoplasia affects individuals aged 20 to 45 years with a slight female predominance (1.5:1) and is relatively rare in childhood^{5,11,12}. Clinically, it presents with edema and pain because of mechanical instability due to bone resorption and subsequent destruction as the tumor progresses. GCTB around the joint could provoke limited range of motion, joint effusion and sometimes synovitis^{11,12}. In cases of pathological fracture, the possibility of recurrence or metastasis after surgical treatment increased^{10,11}.

2. Case report.

A 20-year-old female was admitted to our clinic, walking with two crutches due to a lack of support in the right knee joint from 6 months. Clinically, there is impaired congruence of the joint, swelling, pain and a fixed flexion contracture of approximately 30°. Before several months, she was treated conservatively due to a fracture in the distal part of the femur, without clarifying the cause and in the absence of trauma. Roentgenography (Figures 1 and 2) and subsequent MRI (Figure 3) revealed a pathological fracture in the pseudarthrosis stage. After a biopsy, GCTB was established. The options for surgical treatment were discussed: 1) excision of the tumor, filling of the cavity with bone substitutes and augmentation with an implant; 2) excision of the tumor and implantation of a custom made long intramedullary interlocking nail for knee arthrodesis; and 3) resection of the tumor with subsequent implantation of a reconstructive mega-endoprosthesis. Taking into account the young age of the patient and the positive and negative sides of the proposed treatment methods, after discussion with her, we chose the first of them. Eight months postoperatively, no recurrence was established (Figure 4). The patient walked without support on the right lower limb, without pain and with normal joint congruence. Nevertheless, despite rehabilitation, a flexion contracture of 15° persisted (Figure 5).

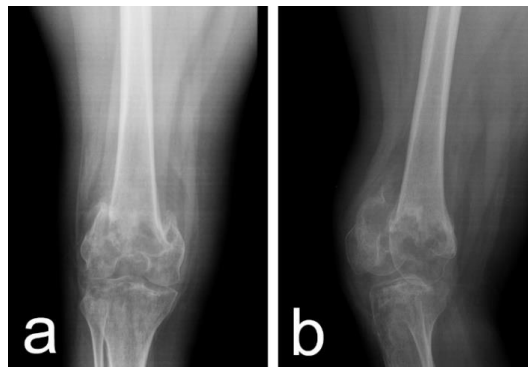


Figure 1. Preoperative roentgenography

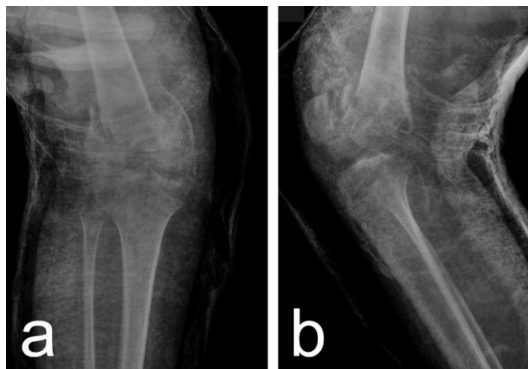


Figure 2. Preoperative roentgenography with cast immobilization

Article— A rare case of neglected long-term pathologic fracture of the distal femur due to a giant cell tumor of bone

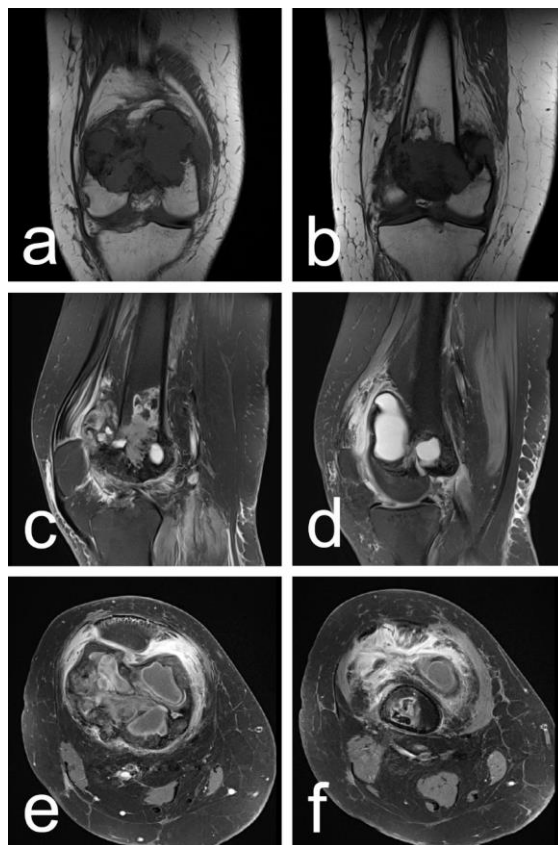


Figure 3. Preoperative MRI



Figure 4. Postoperative roentgenography on the eight month after operation

Article— A rare case of neglected long-term pathologic fracture of the distal femur due to a giant cell tumor of bone



Figure 5. Postoperative photography on the eight month after operation

3. Discussion and Conclusion

The used treatment seems to be the most physiological and provided no recurrence or metastasis of the tumor. A new possibility for future treatment options is reconstructive mega-endoprostheses after extensive tumor resection. Possible complications of this treatment are infection or aseptic loosening of the endoprosthesis. An alternative possibility was also the aforementioned resection with arthrodesis of the knee with a nail.

4. References

1. Андреев Ив, Райчев Р. Върху оперативното лечение на гигантоклетъчния тумор на костите. Ортоп травматол. 1973; 10:208.
2. Андреев Ив, Райчев Р. Тумори на костите. София, Медицина и физкултура, 1993: 97-113.
3. Георгиев ГП, Стоков Л, Цанков Л. Гигантоклетъчен тумор произлизащ от ребрата. Кратък обзор. Ортоп Травматол. 2021;58(3):116-120.
4. Георгиев ГП, Стоков Л. Гигантоклетъчен тумор на костта. Ортоп Травматол 2012; 49(1):34-39.
5. Георгиев ГП. Клинико-морфологично изследване на гигантоклетъчния тумор на костта. Дисертация, 2014, МУ София.
6. Гигов Хр, Ковачев М, Гигов С, Ковачев В. Гигантоклетъчен тумор ангажиращ тотално дисталната бедрена метафиза - клиничен случай. Ортоп Травматол. 2021;58(4):213-217.
7. Патриков К, Иванов И. Еволюцията на един остеокластом от кюретаж до mutars. Ортоп Травматол. 2021,58(4): 192-200.
8. Chakarun CJ, Forrester DM, Gottsegen CJ, Patel DB, White EA, Matcuk GR Jr. Giant cell tumor of bone: review, mimics, and new developments in treatment. Radiographics. 2013;33(1):197-211. doi: 10.1148/rg.331125089

Article— A rare case of neglected long-term pathologic fracture of the distal femur due to a giant cell tumor of bone

9. Cowan RW, Singh G. Giant cell tumor of bone: a basic science perspective. *Bone*. 2013;52(1):238-46. doi: 10.1016/j.bone.2012.10.002
10. Lewis VO, Wei A, Mendoza T, Primus F, Peabody T, Simon MA. Argon beam coagulation as an adjuvant for local control of giant cell tumor. *Clin Orthop Relat Res*. 2007;454:192-7. doi: 10.1097/01.blo.0000238784.98606.d4
11. Macwan AA, Nanda SN, Mishra D, Tuteja S, Sandeep B. A Giant cell tumor of the distal femur managed by excision and knee arthrodesis using a custom made long intramedullary interlocking nail: A case report and review of the literature. *Cureus*. 2021;13(5):e14810. doi: 10.7759/cureus.14810.
12. Turcotte RE. Giant cell tumor of bone. *Orthop Clin North Am*. 2006;37(1):35-51. doi: 10.1016/j.ocl.2005.08.005

Authors

Luben Stokov, M.D., Ph.D. is a member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an ortopaedic surgeon at Clinic of Orthopedics and Traumatology, UMHAT “St. Anna”, Sofia, Bulgaria. He is professor at the Department of Orthopedics and Traumatology, Medical University of Sofia, Sofia, Bulgaria. He is a member of the Editorial Board of the Journal of the Bulgarian Orthopaedics and Trauma Association (JBOTA).

Ivelin Kostadinov, M.D. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an ortopaedic surgeon at Clinic of Orthopedics and Traumatology, UMHAT “St. Anna”, Sofia, Bulgaria.

Alexandar Kostadinov, M.D. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an ortopaedic surgeon at Clinic of Traumatology, UMHATEM "Pirogov", Sofia, Bulgaria.

Georgi Manolov, M.D. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an ortopaedic surgeon at Clinic of Orthopedics and Traumatology, UMHAT “St. Anna”, Sofia, Bulgaria.

Georgi P. Georgiev, M.D., Ph.D., D.Sc. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an orthopaedic surgeon at the Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria. He is Assistant Professor at the Department of Orthopedics and Traumatology, Medical University of Sofia, Bulgaria. He is a member of the Editorial board of BMC Musculoskeletal Disorders and Clinical Anatomy.

Luben Lubenov Stokov, is a member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as volunteer at Clinic of Orthopedics and Traumatology, MHAT “St. Sofia”, Sofia, Bulgaria. He is medical student, Medical University of Sofia, Sofia, Bulgaria.