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Reconstructive Prostheses in Bone Tumor Surgery

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Abstract

In the middle of the 20th century, the only treatment for a bone tumor was amputation. Currently, advances in prosthetic surgery have been improved the patient's prognosis and quality of life. The objective of our work is to study the contribution of reconstruction prostheses during tumor surgery in the improvement of the quality of life of patients, to list their indications, their interests, as the results operated, within our training. Our study focuses on eight cases of bone tumors treated with surgical reconstruction prosthesis, within the department of traumatology-orthopedics II, of the military hospital of Rabat between 2015 and 2021. These are three osteosarcomas, a Chondrosarcoma, a sarcoma of Ewing, two metastatic bone tumors, and a hemangio-endothelium-epithelium. The average age of our patients is 32 years; the knee was the most affected joint. Our patients benefited from conservative treatment combining carcinological resection and reconstruction by massive prosthesis. Immediate post-operative follow-up was very satisfactory with a satisfactory functional result in 87% of cases. The prognosis is still bleak, two of our patients became more complicated, the first patient was a victim of local recurrence, and the second died after a lung metastasis 4 years later. Advances in resection surgery and massive prosthetic joint reconstruction have improved the quality of life of often young patients, formerly were candidates for amputation. This support cannot be agreed outside a multidisciplinary approach and in reference centers.

Keywords: Surgery; Bone tumor; Prosthesis; Amputation

Introduction

Bone tumors are rare, accounting for less than 1% of all cancers [1], and require centralized multidisciplinary management in reference centers. Two types of bone tumors are distinguished: primary tumors, representing 6 to 10% of tumors in children and adolescents, and secondary or metastatic tumors, primarily found in the elderly [2]. Early diagnosis is the only guarantee of a good prognosis, based on a comprehensive clinical examination and appropriate imaging. This approach helps identify signs of malignancy, assess local and regional extension, detect skip metastases, and determine the most suitable site for a biopsy [3,4]. Histological diagnosis is challenging [5]. In the mid-20th century, the only treatment for a bone tumor was amputation [6]. Today, advances in chemotherapy, radiotherapy, and conservative surgery, particularly prosthetic surgery, have improved patient prognosis and quality of life.

Massive reconstruction prostheses help fill the bone defects resulting from tumor resection, thereby improving the functional outcome of the affected joint [7,8].

Materials and Methods

This study is a retrospective analysis of 8 cases of bone tumors treated with prosthetic surgery, collected from the archives of the Traumatology-Orthopedics II department at the Mohammed V Military Teaching Hospital in Rabat between 2015 and 2021. The analysis of medical records included epidemiological, clinical, and radiological data to demonstrate the value of megaprostheses in enhancing the functional prognosis of patients.

Case 1

A 50-year-old patient with no significant medical history presented with deep inflammatory knee pain. Radiological assessment revealed a suspicious lytic lesion on the external femoral condyle. Biopsy suggested a Grade 1 chondrosarcoma with no notable tumor extension (Figure 1 & Figure 2).

Case 2

A 16-year-old patient with no significant medical history pre-

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Figure 1: Placement of a reinforced cement spacer on a centromedullary nail.

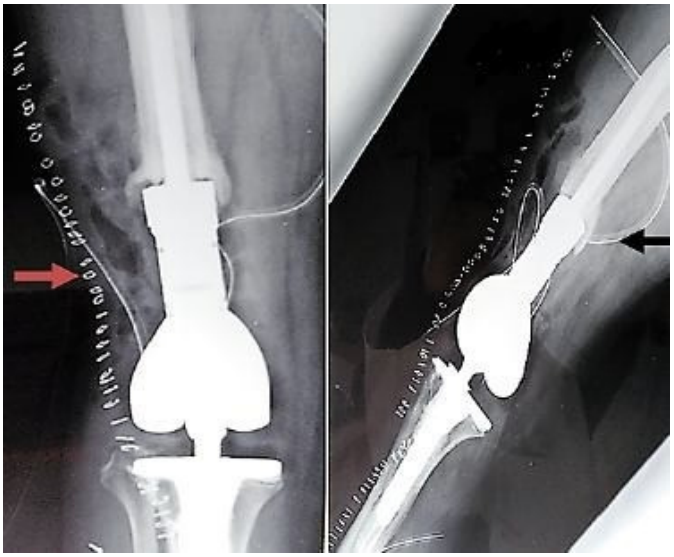

Figure 2: Control X-ray of the right knee seen from the front and from the side after the placement of the chondrosarcoma megaprosthesis.

sented with inflammatory knee pain. Radiological assessment showed a suspicious lesion on the external femoral condyle. Biopsy confirmed the diagnosis of osteosarcoma .

Case 3

A 32-year-old patient with a history of rheumatic fever presented with chronic inflammatory knee pain. Radiological assessment indicated a suspicious lytic lesion in the upper third of the left tibia. Biopsy results suggested an epithelioid hemangioendothelioma, Grade II, according to FNCLCC (Figure 3 & Figure 4).

Case 4

A 35-year-old patient with a family history of breast cancer was being followed since late 2018 for infiltrating ductal carcinoma of the left breast. She was admitted with a pathological left pertrochanteric fracture, and biopsy confirmed metastatic breast cancer (Figure 5).

Case 5

A 30-year-old patient with no significant medical history presented with pain and swelling in the proximal third of the right leg. Radiography revealed a tumorous process in the right knee. Biopsy confirmed osteosarcoma, and there was no evidence of metastasis (Figure 6).

Case 6

A 58-year-old patient with a history of cholecystectomy in 2011 and cystectomy for bladder cancer in 2014, followed by chemotherapy, presented with knee pain and swelling in the left knee. Radiography revealed a tumorous process in the external femoral condyle. Biopsy confirmed bone metastasis from bladder cancer, and pulmonary nodules and fatty liver were also observed.

Case 7

A 18-year-old patient with no significant medical history was admitted with knee pain and restricted mobility. Radiography showed a tumorous process in the tibia, and biopsy confirmed osteosarcoma, with no evidence of metastasis (Figure 7).

Figure 3: X-ray of the right and left knee from the front showing a lytic process at the upper 1/3 level of the left tibia.

Figure 4: Post-surgical X-ray of the left knee showing the cemented spacer.

Figure 5: Postoperative X-ray of the hip megaprosthesis.

Figure 6: Placement of the megaprosthesis.

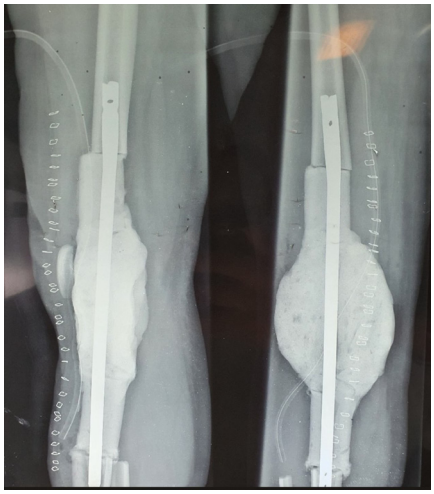

Figure 7: X-ray image of the face and profile of the cemented nail at the right knee.

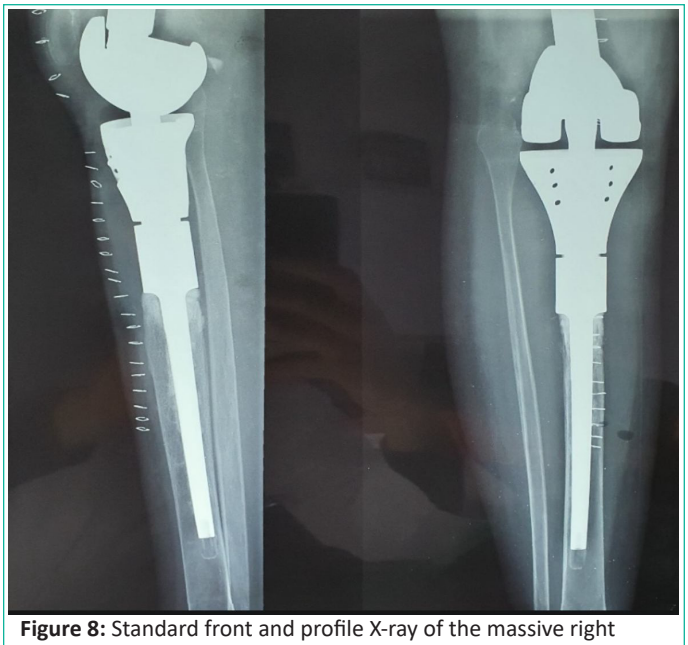

Figure 8: Standard front and profile X-ray of the massive right knee prosthesis.

Case 8

A 15-year-old patient with no significant medical history was admitted with knee pain and swelling in the right knee. Radiography revealed an osteolytic process in the tibia, and biopsy confirmed Ewing sarcoma, with no evidence of metastasis (Figure 8).

In cases of metastatic tumors of the femoral head, the multidisciplinary team opted for complete oncological surgery and the placement of a hip mega-prosthesis. For malignant knee tumors, most cases required a two-stage procedure. The first stage involved total oncological resection without breaching the tumor path, and the placement of a cemented spacer. The resected specimen was then sent to the pathology laboratory. The second stage involved the removal of the cemented spacer and the placement of a massive knee prosthesis.

Results

This study included 8 cases, with 3 patients under 20 years old, 3 between 20 and 40 years, and 2 over 40 years old. Four were female, and four were male. Seven out of eight cases had knee tumors. Histologically, there were 3 cases of osteosarcoma, 2 cases of bone metastasis, and one case each of Ewing sarcoma, chondrosarcoma, and epithelioid hemangioendothelioma.

Among the eight patients, three experienced complications. The first patient with Ewing sarcoma developed an infection and cutaneous necrosis near the spacer two days after the first-stage surgery, which was treated with antibiotics for 45 days. The second patient with osteosarcoma developed lung metastasis four years later and passed away. The third patient with chondrosarcoma experienced local recurrence two years later, leading to the amputation of the right leg. As of now, six out of eight patients have had a favorable outcome, with functional recovery allowing sufficient autonomy for daily activities.

Long-term and survival: In this study, seven patients are still alive, while one patient passed away due to lung metastasis.

Discussion

Primary Malignant Bone Tumors (PMBTs) arise from abnormal and uncontrolled proliferation of various cell populations

within bone or cartilage and can extend to destroy neighboring tissues or invade other parts of the body [9]. PMBTs are rare, being more common in children and adolescents, and representing less than 1% of cancers [1].

The analysis of the SEER program data base [10] constitutes the largest series of histologically confirmed primary malignant bone tumors, with 2627 cases. It confirms that osteosarcoma is the most common PMBT, accounting for 35.1%, followed by chondrosarcoma at 25.8%, Ewing sarcoma at 16%, chondroma at 8.4%, and malignant fibrous histiocytoma at 5.6%. Malignancy in giant cell tumors is unusual and rarely confirmed.

Dedicated to replacing the entire epiphyso-metaphyseal-diaphyseal region, reconstruction prostheses were gradually developed in Europe from the 19th century and gained momentum in the second half of the 20th century, running parallel to conventional arthroplasty. Today, they represent the most commonly used materials in osteoarticular reconstruction surgery [11].

Complications following resection and reconstruction in tumor surgery are four times more likely than those following amputations and 10 to 20 times more likely than those observed in prosthetic surgery for osteoarthritis [12,13]. The rate of complications after limb-sparing surgery ranges from 9.2% to 92.3% [14]. The knee is the most prone to complications during limb-sparing procedures. Studies report that one-third of patients experience early complications requiring reoperation [15]. Pelvic resections and reconstructions can lead to various complications, with scar and infection problems being the most common. Chemotherapy increases the rates of infectious complications and hematomas after limb-sparing surgery [12]. The more complex the reconstruction, the higher the risk of infection. Neurological and vascular complications can sometimes be due to the reconstruction technique.

Conclusion

Bone tumors are rare in our orthopedics and traumatology services and require multidisciplinary management. Advances in chemotherapy, radiotherapy, and conservative surgery, particularly prosthetic surgery, have improved patient prognosis and quality of life while avoiding amputation. In terms of mechanical outcomes, surgical prostheses have allowed most patients to achieve a favorable outcome, enabling sufficient autonomy for daily activities.

References

1. Rod Fleury T, Miozzari HH, Hoffmeyer PJ. Prise en charge des tumeurs osseuses malignes autour du genou. Rev Med. 2014; 10: 24038.
2. Journeau P, Dautel G, Lascombes P. Surgical management of paediatric malignant bone tumours. Ann Fr Anesth Reanim. 2006; 25: 432-9.
3. Bloem JL, Bluemm RG, Taminiau AH, van Oosterom AT, Stolk J, Doornbos J. Magnetic resonance imaging of primary malignant bone tumors. RadioGraphics. 1987; 7: 425-45.
4. THOMINE JM. La biopsie osseuse Cahiers Enseignement de la SO.F.CO.T. – Expansion Scientifique Française. 1985; 197-21.
5. Dr Zoubir Kara service d'orthopédie CHU de Blida- Algérie Traitement conservateur des tumeurs osseuses malignes primitives des members. 2009; 2-93.
6. Evans S, et al. Megaprostheses in the management of trauma of the knee, J Orthop. 2015.
7. Melican MC, Zimmerman MC, Dhillon MS, Ponnambalam AR, Curodeau A, Parsons JR. Three-dimensional printing and porous metallic surfaces: a neworthopedic application. J Biomed Mater Res. 2001; 55: 194-202.
8. Canadian Cancer Society. [En ligne]. What is bone cancer? [cité le avr 23 2019]. Available from: http://www.cancer.ca/frca/cancerinformation/cancer-type/bone/bonecancer/? région=on5.
9. Dorfman HD, Czerniak B. Bone cancers. Cancer. 1995; 75: 203-10.
10. CAREMIER E RESULTATS DES RECONSTRUCTIONS DU SQUELETTE PAR ALLOGREFFE OSSEUSE MASSIVE : A propos de 49cas. FACULTE DE MEDECINE DE NANCY THESE N°127 pour obtenir le grade de DOCTEUR EN MEDECINE. 2001.
11. Cottias P, Jeanrot C, Vinh TS, Tomeno B, Anract P. Complications and functional evaluation of 17 saddle prostheses for resection of periacetabular tumors. J Surg Oncol. 2001; 78: 90-100.
12. Damron TA, Rock MG, O'Connor MI, Johnson M, An KN, Pritchard DJ, et al. Functional laboratory assessment after oncologic shoulder joint resections. Clin Orthop Relat Res. 1998; 124-34.
13. Mascard E, Anract P, Touchene A, Pouillart P, Tomeno B. Complications from the hinged GUEPAR prosthesis after resection of knee tumor. 102 cases. Rev Chir Orthop Reparatrice Appar Mot. 1998; 84: 628-37.
14. Sim FH, Pritchard DJ, Ivins JC, Shives TC. Total joint arthroplasty. Applications in the management of bone tumors. Mayo Clin Proc. 1979; 54: 583-9.