Acta Scientific Orthopaedics (ISSN: 2581-8635)

Volume 7 Issue 11 November 2024

Case Report

Radium Giant Cell Tumor: Case Report

Vladimir Andrés Vásquez Encalada[1], Ragnar Calzado Calderon[2]*, José Enrique Pérez González[1], Alicia Tamayo Figueroa[2], Ingrid Quesada Villa[3] and Yanet Escalona Campos[4]

[1]First Degree Specialist in Orthopedics and Traumatology, Cuba

[2]Second Degree Specialist in Orthopedics and Traumatology, Cuba

[3]Specialist in First Degree in Comprehensive General Medicine and First Degree in Pathological Anatomy, Cuba

[4]First Degree Specialist in Comprehensive General Medicine and First Degree in Imaging, Cuba

***Corresponding Author:** Ragnar Calzado Calderon, Second Degree Specialist in Orthopedics and Traumatology, Cuba.

DOI: 10.31080/ASOR.2024.07.0999

Received: September 09, 2024

Published: October 30, 2024

Abstract

Giant cell tumor (GCT) is a bone neoplasm that has been known since the last century. It was described by Aslley Cooper in 1818 and redefined by Jaffe in 1940, who characterized it as a benign tumor, but locally aggressive, with a biphasic component of giant cells and a very vascularized fusocellular component, with frequent recurrences and a limited capacity to cause metastasis. We present a 17-year-old female patient with an apparent health history who reported an increase in volume in the distal area of the right forearm for 3 months, with progressive growth and pain that was relieved with the use of analgesics and difficulty in mobility of the right wrist. An excision of the distal third of the radius was performed, which was replaced by intramedullary and surgical cement. The presence of a benign giant cell tumor was confirmed.

Keywords: Giant Cell Tumor (GCT); Bone Tumors

Introduction

Giant cell tumor (GCT) is a bone neoplasm that has been known since the last century. It was described by Aslley Cooper in 1818 and redefined by Jaffe in 1940, who characterized it as a benign tumor, but locally aggressive, with a biphasic component of giant cells and a very vascularized fusocellular component, with frequent recurrences and a limited capacity to cause metastasis. GCT accounts for 5% of bone tumors and 20% of benign bone tumors [1-4], affecting almost any bone. Its most common location is at the ends of the long bones of the arms and legs, near a joint, for example: the knee, wrist, hip or shoulder [1].

It is characterized by being a highly vascularized tissue with proliferation of rounded, ovoid or fusiform mononuclear cells and the presence of multinucleated osteoclast-type giant cells dispersed uniformly in the stroma. In addition, its locally aggressive character stands out, with high recurrence if it is not completely removed [5].

It manifests itself between the second and fourth decade of life, with a predilection for the female sex (50-57%) [5]. Another author in his study reports that the GCT has a variable presentation in terms of gender, showing a female predominance in the Western population and a male predominance in the countries of China

and India [6]. The reported incidence in the immature skeleton is less than 10% [4]. Pregnancy can cause the accelerated growth of these tumors [5], although it is a pathology that is usually benign (1-3%) locally aggressive, it appears as a malignant primary tumor, undergoing a malignant transformation of 5 to 10% [1,5]. It involves the epiphyseal region of the long bones, including the proximal humerus, distal radius and knee, the latter joint corresponding to between 50 and 85% of all cases [2]. Other less frequent locations are the spine (5%) and pelvis (where it shows the highest recurrence rate), the bones of the hand, the foot and rarely in the skull [5].

The clinical manifestations are non-specific and consist of progressive local pain, functional impotence, increase in volume, neurological symptoms and pathological fracture, the latter being the first sign in 15% of cases. The duration of symptoms can vary between two and six months [5].

Case

A 17-year-old female patient with an apparent health history reported an increase in volume in the distal area of the right forearm for 3 months, with progressive growth and pain that was relieved with the use of analgesics and difficulty in mobility of the right wrist. She went to the clinic where it was decided to admit her for study and surgical treatment aimed at excision of the distal end of the radius, which was replaced with intramedullary wire and surgical cement. See surgical process and final result: figure 1 to 5.

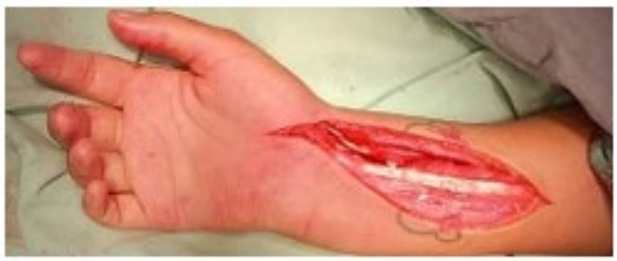

Figure 1: Anterior approach to the right forearm radius.

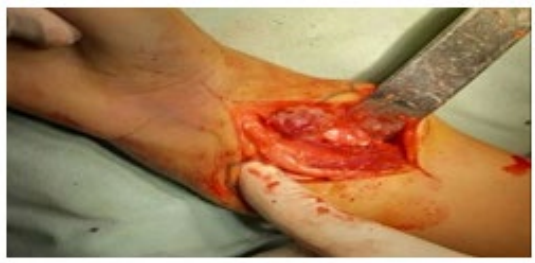

Figure 2: Surgical exposure of the right forearm tumor lesion.

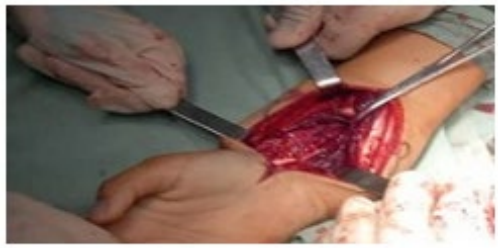

Figure 3: Surgical site after tumor excision of the right forearm.

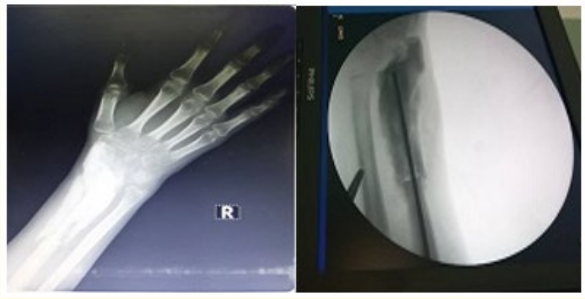

Figure 4: Radiology Antero-posterior view of the right forearm showing the intramedullary nail and bone cement.

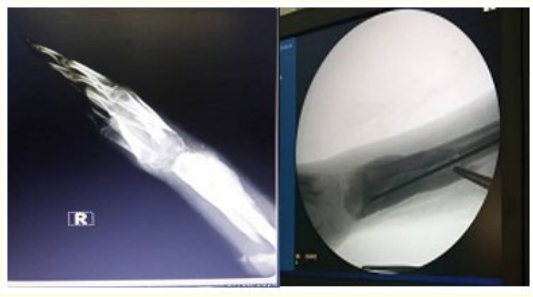

Figure 5: Radiology Lateral view of the right forearm showing the intramedullary nail and bone cement.

Imaging Results

The selective imagen of the topogram of the right wrist shows eccentric lytic lesion in the distal metaphysophyphyseal portion of the radius with thinning of the external cortex and loss of definition of the internal cortical associated with increased volume and density of soft tissues towards the interosseous space in relation to the giant cell tumor shown in Figure 6.

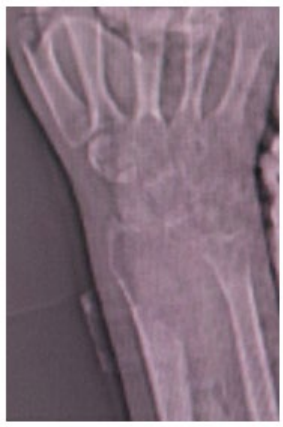

Figure 6: Selective image of the topogram of the right wrist with the presence of giant cell tumor at the distal end of the radius.

Computed tomography shows the presence of giant cell tumor with signs of aggressiveness due to expansive lytic lesion at the distal end of the radius associated with a soft tissue mass of 5.0 x 4.0 x 3.8 cm, heterogeneous with variable densities as shown in figures 7, 8.

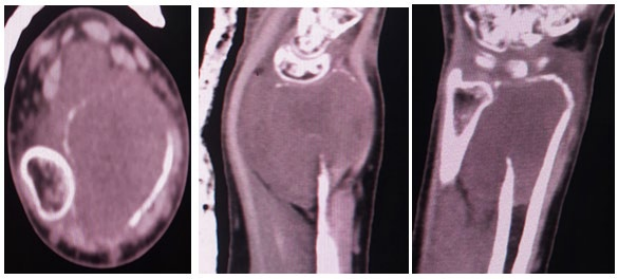

Figure 7: Volumetric reconstruction.

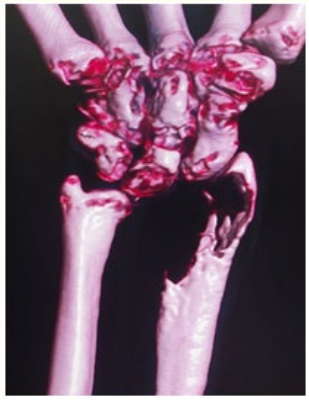

Figure 8: Shows section and tomographic reconstruction of the giant cell tumor with cortical destruction and soft tissue mass.

Anatomical pathological findings

MACRO

Several irregular tissue fragments, the largest being 5x3x2cm. On cut soft, grayish-brown consistency with areas of hemorrhages.

MICRO

A benign-looking tumor sample composed of a proliferation of mononucleated, oval, or spindle stromal cells, without cellular atypia, and the presence of multinucleated giant cells with an ostoeclastic appearance and areas of hemorrhage. Absence of atypical mitoses. So we are in the presence of a Benign Giant Cell Tumor.

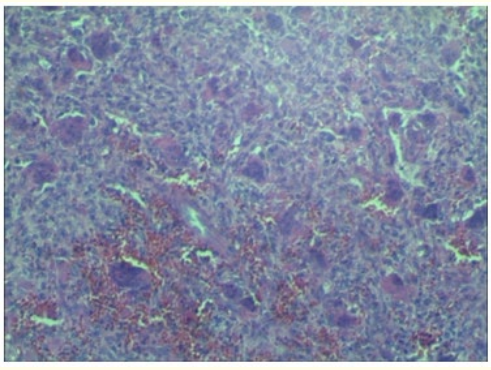

Photo 1: Panoramic view of mononuclear cells and multinucleated giants. (4x).

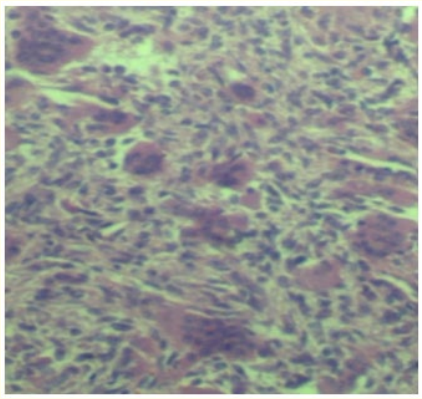

Photo 2: Giant cells scattered throughout the field. (10x).

Discussion

GCT is one of the most common benign neoplasms; it is well known for its aggressive local behavior and tendency to relapse. The most common site of presentation is the distal femur and proximal tibia in 40% of cases, followed by the distal radius in 10% [7,8]. Lobo García., *et al*. report that it may represent 65% for presentation in the distal femur and proximal tibia, followed by around 12% in the distal radius and 9% when it affects the sacrum [9]. It occurs in the epiphysis in 90% of cases. It covers the subchondral articular surface or even adjoins the cartilage, although they do not usually invade the joint [10]. The presentation of GCT in short bones is uncommon; an incidence of 0.9% to 4% is reported. In the hands it is located almost exclusively in the metacarpal bones [11].

Recurrence is variable, ranging from 10%-65% of cases, being more frequent when the tumor invades the soft tissues. 10% malignant having between 1% and 4% of lung metastases. Those located at the distal radius level are more prone to local recurrence and metastasis [12].

It generally affects a single bone, but there is a variant with the ability to affect several, thus being called multicentric GCT, this occurs in 1% of cases. In these patients, it is necessary to rule out Paget's disease, as well as when it appears in atypical locations such as the calota, facial bones, ribs and pelvis [9]. Multicentricity can complicate diagnosis, treatment, and follow-up. The most common clinical manifestations are progressive pain and joint inflammation [13].

The treatment of giant cell tumours has evolved significantly, from amputation as a therapy for destructive joint injuries, through curettage and application of bone graft or cement as a substitute to the placement of tumour prostheses. The improvement of reconstruction techniques, implants and the ability of orthopedic surgeons have contributed to lifesaving surgery, offering a better quality of life. The probability of recurrence of giant cell tumor is minimal or practically nil when the entire tumor is resected with free histological margins [5].

Treatment options for GCTs in the radius include curettage with bone grafting or cementation, en bloc excision and reconstruction with pedicled or unpedicled fibula graft, osteoarticular allograft, ulnar translocation, or stenting [8]. Although amputation is curative, it is not justified in a tumor that rarely metastasizes [14].

Wide resection is recommended when sacrificing the affected bone offers a higher level of tumor control and is reserved for tumors with bone destruction, when advanced tumors exist and are unresectable, radiotherapy is effective as a treatment that adjuvants and even provides satisfactory results in these lesions [3].

In the case we present, we use bone cement in order to reduce the possibility of recurrence and it can be used as a definitive treatment or, in a second stage, evaluate the replacement by autologous fibula graft or other techniques.

The differential diagnosis must be made with the large group of giant cell tumors, such as: Brown Tumor of Hyperparathyroidism, Non-ossifying Fibroma, Chondroblastoma, Chondrosarcoma, Osteoblastoma, Osteosarcoma, Fibrosarcoma, Benign Fibrous Histiocytoma, Chondromyxoid Fibroma [8]. Differential aneurysmal bone cyst, hemophilic pseudotumor, metastasis of renal and thyroid cancer and lytic lesions in the context of multiple myeloma should also be used [9]. Sarcomas in this case are ruled out due to the absence of malignancy and the nature of the tumour, which does not show bone histology, cartilage or fibrous tissue. The rest of the benign cells are generally ruled out because of the spatial relationship between giant and stromal cells. The giant cells are regularly and uniformly distributed in our case, while in the other lesions they do so focally and abundantly, alternating with areas where they are totally absent.

During the follow-up of the patient in the outpatient clinic, pain was assessed according to the verbal pain assessment scale (RSV) [15] and the numerical pain classification scale (NRS) [16], and for function the upper extremity functional evolution scale (EESS) [17-19] and, if there was no improvement in pain and functional dissatisfaction, other treatment options should be assessed [5,8,14]. Imaging studies should be aware of the presence of radiolucencies at bone-cement interfaces, areas of osteolysis or newly appearing soft tissue masses, fracture lines, signs of osteomielitis [9].

Conclusion

GCT is one of the most common benign neoplasms; It is well known for its aggressive local behavior and tendency to relapse. The most common site of presentation is the distal femur and proximal tibia followed by the distal radius. It occurs in the epiphysis in 90% of cases. It manifests between the second and fourth decade of life, with a predilection for the female sex in the Western population and a male predominance in the countries of China and India. There is a wide variety of benign and malignant tumor lesions as well as pseudotumor lesions with which it is necessary to make differential diagnoses.

Conflict of Interest

None to declare.

Bibliography

1. Junco-Gelpi D. "Giant cell tumors on the forearm". *MEDISAN* 22.9 (2018): 9.

2. Acosta Marín Marthelena., *et al*. "Bone giant cell tumor in the phalanx of the hand with pulmonary metastases: case report". *Venezuelan Journal of Oncology* 31.4 (2019): 11.

3. Valladares Vijil LD., *et al*. "Bone giant cell tumor: incidental diagnosis in a patient with long-standing arthralgia". *Archivos de Medicina* 1.4:1 (2015): 5.

4. Arbeláez Echeverri A P., *et al*. "Bone giant cell tumor in children and adolescents: 11 cases reported". *Revista Colombiana de ortopedia y traumatología* 31.4 (2017): 6.

5. Martínez-Estrada JG and Santamaría-Bahena O. "Joint replacement in giant cell tumor. Report of eight cases". *Acta Ortopédica Mexicana* 30.5 (2016): 5.

6. Aponte Barrios WO. "Clinical and radiological characterization of giant cell bone tumor [Thesis]". Bogotá: Universidad Nacional de Colombia, Facultad de Medicina (2014): 51.

7. García Luque R., *et al*. "Giant cell tumor. Case report". *Revista Información Científica* 70.2 (2011): 11.

8. Fernández Vázquez JM., *et al*. "Giant Cell Tumor at the distal end of the radius". *Anales Médicos de la Asociación Médica del Centro* 49.3 (2004): 13.

9. Lobo Garcia M., *et al*. "Giant cell tumor: imaging findings and key data for its diagnosis". *SERAM* (2018): 14.

10. Alejos-Gómez R., *et al*. "Giant cell tumor in the ulna of a post-trauma patient". *Cuban Journal of Orthopedics and Traumatology* 33.2 (2019): 11.

11. Nápoles-Pérez M., *et al*. "Giant cell tumor in the forearm". *Cuban Journal of Orthopedics and Traumatology* 33.2 (2020): 12.

12. Oteo JA., *et al*. "Giant cell tumor treated with ulnar translocation and wrist arthrodesis after curettage and cementation failure". *Ibero-American Journal of Hand Surgery* (2024): 6.

13. Alarcón Falces J. "Giant cell bone tumor About a clinical case and literature review". University of Zaragoza, Faculty of Medicine (2020): 45.

14. Souki F., *et al*. "Distal radius reconstruction for Giant Cell Tumor. Case report". *Revista Venezolana de Cirugía Ortopédica y Traumatología* 51.1 (2019): approx. 14.

15. Vicente-Herrero MT., *et al*. "Valuation of pain. Comparative review of scales and questionnaires". *Revista de la Sociedad Española del Dolor: RESED* 25.4 (2018): 228-236.

16. Ferreira Valente MA., *et al*. "Validity of four pain intensity rating scales". *Pain* 152.10 (2011): 2399-2404.

17. Steffensen B., *et al*. "Validity of the EK scale: a functional assessment of non-ambulatory individuals with Duchenne muscular dystrophy or spinal muscular atrophy". *Physiotherapy Research International* 6.3 (2001): 119-134.

18. Lord JP., *et al*. "Upper extremity functional rating for patients with Duchenne muscular dystrophy". *Archives of Physical Medicine and Rehabilitation* 68.3 (1987): 151-154.

19. Uchikawa K., *et al*. "Functional status and muscle strength in people with Duchenne muscular dystrophy living in the community". *Journal of Rehabilitation Medicine* 36.3 (2004): 124-129.