IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 23, Issue 5 Ser. 1 (May. 2024), PP 12-13
www.iosrjournals.org

MEGAPROSTHESIS TREATMENT FOLLOWING UNSUCCESSFUL CURETTAGE AND INTERNAL FIXATION FOR PROXIMAL TIBIA GIANT CELL TUMOR- A RARE CASE STUDY

DR. CHAYAN KUMAR PAL[1],DR. NARRA MADHURI[2], DR. D.CHANDANA[3],DR.K. SATISH[4]

Date of Submission: 24-04-2024 Date of Acceptance: 04-05-2024

I. Introduction

Giant cell tumor (GCT) of bone was described by Cooper and Travers (1) in 1818.

Giant Cell Tumors (GCT) comprise 5% of all primary bone tumors and 20% of benign skeletal tumors. The prevalence of GCT typically peaks during the third decade of life.

Most lesions develop in long bones (75%–90%), with the majority of cases (50%–65%) occurring about the knee. The three most frequent locations for GCT are the distal femur, proximal tibia, and distal radius, in that order. Typically benign, the tumor is histologically characterized by multinucleated giant cells accompanied by a background of mononuclear stromal cells.

The multinucleated giant cells appear similar to osteoclasts, which led to the older term osteoclastoma (2). Despite being categorized as a benign lesion, GCT may be locally aggressive and recur after surgical resection. GCT usually has a well-defined but nonsclerotic margin, is eccentric in location, extends near the articular surface, and occurs in patients with closed physis (3). Nevertheless, it can exhibit aggressive features or fluid-fluid levels, sometimes mimicking other lesions both on radiological evaluation and histological analysis.

II. Case Details

A 24-year-old female presented to our institution with a history of progressive pain and swelling below her right knee for the last 1 year. The pain manifested insidiously at onset and gradually progressed over time. The pain and swelling occurred without any prior trauma. The swelling increased in size gradually, accompanied by exacerbated pain when standing or walking. The pain interferes with the patient's daily activities. The patient was advised to do some investigations such as X-rays (Figure-1), MRI(Figure-2), and Doppler and was diagnosed with a giant cell tumor(CAMPANACCI GRADE II) and was operated on for the same. Plan was extended curettage with power burr, intra-lesion phenol application, bone grafting, and internal fixation(Figure-3) with plating by anterolateral approach. But in follow-up x-rays(Figure-4) recurrence was seen. We did a custom mega prosthesis(figure 6) through an extended medial parapatellar approach.Special care is taken for posteriorly situated vessels. The patient recovered very well. No signs of infection, and recurrence till now. The patient is bending her knee without any difficulty and doing all activities.

III. Discussion

Giant cell tumor (GCT) stands as one of the most prevalent benign bone tumors, primarily afflicting young adults aged 20 to 40, often exhibiting a high recurrence rate and potential complications. Typically found at the metaphyseal or epiphyseal regions of the tibia or femur, GCT, despite its predominantly benign nature, exhibits a highly unpredictable spectrum of disease behaviorThe extent of local aggressiveness ranges from focal symptoms stemming from bony or cortical destruction and expansion of surrounding soft tissue to the rare incidence of metastasis. The pathogenesis of GCT seems to be notably influenced by the receptor activator of nuclear factor kappa B ligand (RANKL). Mutations in the H3F3A gene, found in over 90% of GCT, are implicated in driving tumorigenesis. Radiographic examination usually depicts a characteristic radiolucent geographic appearance with a narrow transition zone at the lesion margin. Unlike many benign lesions, GCT typically lacks a prominent sclerotic rim at the lesion margin. Calcification of the matrix, periosteal reaction, and new bone formation are typically absent(4). The lesion is typically eccentrically positioned in the epiphyseal portion and tends to extend up to a centimeter into the subchondral bone. Imaging modalities such as computed tomography (CT) scans and magnetic resonance imaging (MRI) can confirm the typical subchondral location of GCTs within the bone and evaluate the extent of any soft tissue mass, either beyond the bone cortex

or into the adjacent joint. Functional positron emission tomography (PET)(Figure 5) and bone scans are other modern imaging modalities that can determine the extent of disease involvement.Biopsy(Figure-7) samples undergo immunohistochemistry, and identifying the H3.3-G34W mutation is sensitive and specific for diagnosing GCT, helping differentiate it from other giant cell-rich tumors. Treatment options include curettage, extended curettage, bone grafting, curettage with polymethylmethacrylate (PMMA) insertion, primary resection, and Megaprostheticjoint replacement. Radiation therapy and embolization of feeding vessels are employed for pelvic and sacral tumors that are not surgically treatable. Radiotherapy is advised for spinal, sacral, or aggressive tumors when complete excision or curettage is impractical for functional or medical reasons. Denosumab, Sunitinib, and Cyclolinopeptide have emerged as a potential new drug for GCTs.

IV. Differential Diagnosis

- Lytic metastatic lesion (particularly a vascular metastasis from thyroid or renal cell carcinoma)
- Primary bone tumor
- Brown tumor of hyperparathyroidism
- -P.Nonossifying fibromaLLO0
- Aneurysmal bone cyst
- Fibrous metaphyseal defects
- Osteoblastoma
- Chondroblastoma
- Malignant fibrous histiocytoma
- Telangiectatic osteosarcoma

V. Conclusion

The ideal treatment approach for GCTs occurring around the knee remains a topic of debate. In case of recurrence of GCT after extended curettage, megaprosthesis is an option after en bloc excision.(Figure-8)Extended curettage and plating after bone cement application are sufficient to provide stability. But as there was a recurrence we had to do mega prosthetic fixation after excision of the proximal tibia. indications for endoprosthetic replacement are recurrent GCT, Campanacci stage-III tumors with extensive bone lysis, soft-tissue spill, and high-grade/malignant lesions with metastatic potential. There is a dilemma regarding the eradication of the tumor and saving the extremity's function using intralesional or wide excision,and the longevity of the prosthesis is the main concern. In malignant proximal tibia lesions, mega prostheses' longevity has been reported as fair to poor. There is even more debate about patients with a benign tumor-like GCT, as their life expectancy is long, and revision of the prosthesis may be necessary during their lifespan.

References

[1] Cooper As, Travers B. Surgical Essays. London, England: Cox Longman & Co, 1818; 178–179.
[2] Balke M, Schremper L, Gebert C, Et Al.. Giant Cell TumorOf Bone: Treatment And Outcome Of 214 Cases. J Cancer Res Clin Oncol 2008;134(9):969–978.
[3] Murphey Md, Nomikos Gc, Flemming Dj, Gannon Fh, Temple Ht, KransdorfMj. Imaging Of Giant Cell TumorAnd Giant Cell Reparative Granuloma Of Bone: Radiologic-Pathologic Correlation. Radiographics 2001;21(5):1283–1309.
[4] Steensma Mr, Tyler Wk, Shaber Ag, Goldring Sr, Ross Fp, Williams Bo, Healey Jh, Purdue Pe. Targeting The Giant Cell Tumor Stromal Cell: Functional Characterization And A Novel Therapeutic Strategy. Plos One. 2013;8(7):E69101.