CURETTAGE VERSUS RESECTION IN RECURRENT GIANT CELL TUMOR OF BONE

A Systematic Review/Meta-Analysis

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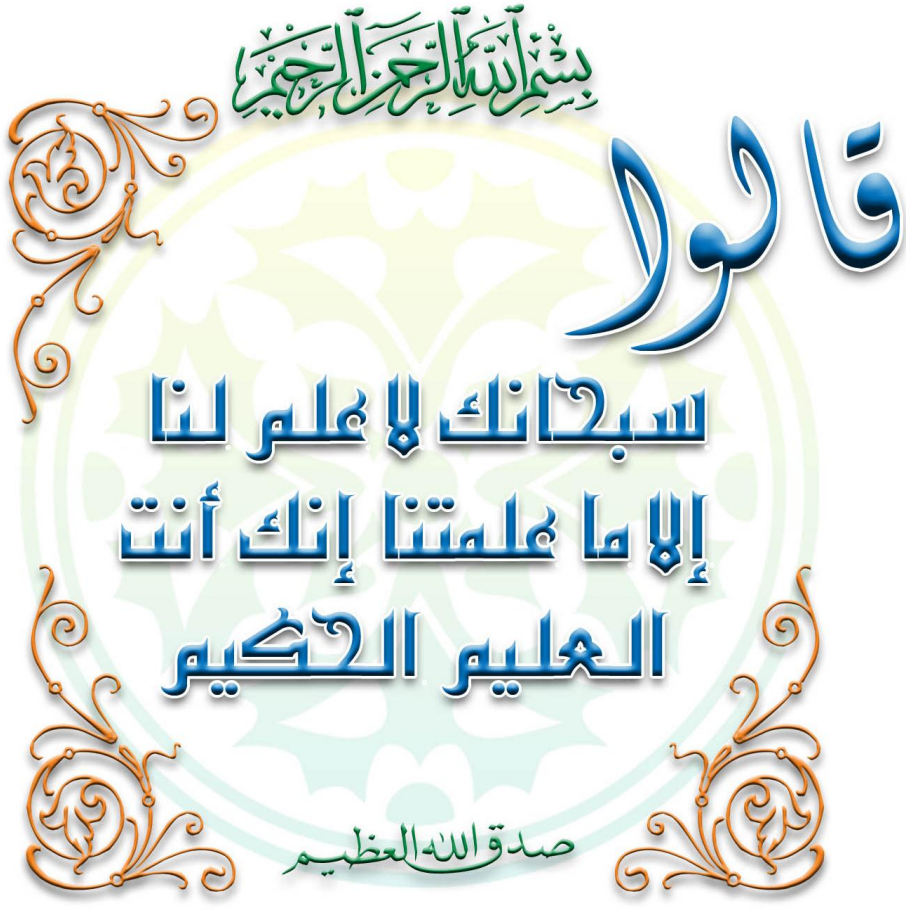

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List of Abbreviations

Abb.	Full term
AP	*Anteroposterior*
CT	*Computed Tomography*
EGFR	*Epidermal Growth Factor Receptor*
GCT	*Giant Cell Tumor*
GCTB	*Giant Cell Tumor of Bone*
HS	*Highly Significant*
M-CSF	*Macrophage Colony Stimulating Factor*
MRI	*Magnetic Resonance Imagine*
NS	*Nonsignificant*
PMMA	*Polymethyl Methacrylate*
PRISMA	*Preferred Reporting Items for Systematic Reviews and Meta-Analysis*
P-Value	*Probability Value*
RANK	*Receptor Activator of Nuclear Factor Kappa Beta*
RANKL	*Receptor Activator of Nuclear Factor Kappa Beta Ligand*
S	*Significant*

INTRODUCTION

Giant cell tumor of bone (GCTB) is a benign tumor that frequently occurs in the epiphyseal-metaphyseal region of long bones predominantly around the knee joint.[1] It arises after skeletal maturity with a peak incidence in the third and fourth decade of life and a slight female predilection.[2] It accounts for 4–5% of primary bone tumors and 20% of all benign tumors.[3] GCT of bone can present in either latent, active or locally aggressive forms. Campanacci classified GCTB into three grades based on the radiographic appearance. Grade I is rare (4 %) and represents a quiescent form in which the involvement of cortical bone is minimal. Grade II is the most common type (74 %), and shows a thin and moderately bulging cortical shell, whereas Grade III tumor severely destroys cortical bone and infiltrates into soft tissue and/or joint space.[4]

The biological behavior of GCTB varies from indolent and static tumors to locally aggressive lesions with extensive bony destruction, penetration/destruction of the cortex and extensive soft-tissue expansion.[5] In standard X-rays GCTB presents as lucent lesions without matrix calcifications eccentrically located within the epiphyseal-metaphyseal region of the bone.[6] Imaging modalities such as computed tomography and magnetic resonance imaging, may be useful to confirm the typical subchondral location of these lesions within the bone

and the extent of a soft tissue mass, either beyond the bone cortex or into the adjacent joint.[7]

Grossly, GCT of bone appears brownish in color and is usually soft however, some tumors may have a hemorrhagic, cystic component. The typical histological appearance is that of abundant giant cells with a benign spindle cell background. The nuclei of the spindle cells are identical to those found in the giant cells. Despite a high degree of suspicion for GCT of bone a planned biopsy to confirm the diagnosis histologically, is needed. [8]

Surgical resection is the universal standard of care for treatment of GCT of bone. As most giant cell tumors are benign and are located near a joint in young adults, several authors favor an intralesional approach that preserves anatomy of bone as opposed to resection. Wide en bloc resection has been recommended for aggressive tumors.[9] Although complete removal of the lesion provides a low recurrence rate[10], wide resection requires complex reconstruction of the adjacent joints, including endoprosthetic replacement or structural bone grafting, which increase the rates of surgical complications and disability.[11] In recent years, intralesional curettage has been widely used in the treatment of primary GCT because it can ideally preserve the anatomical and functional integrity of the joint.[12] Intralesional curettage is the preferred treatment to maintain function, but it has a high risk of local recurrence.[13]

Aim of the Study

This study aims to compare the two main surgical methods for treating Recurrent Giant Cell Tumor of Bone in a systematic review with meta-analysis and evaluate the functional outcomes of each method. The objective is to perform a systematic review of overlapping meta-analysis regarding intralesional curettage versus wide excision in the management of Recurrent Giant Cell Tumor of Bone to assist the decision makers in selecting their decision and provide intervention recommendations by the best available evidence.

REVIEW OF LITERATURE

Epidemiology

Giant cell tumor accounts for 5% of the entirety of primary bone tumors worldwide [i]with this variable increasing in China and southern India where GCT accounts for 20% of all primary bone tumors. While several studies suggest no significant predominance in females over males, the majority have reported an increased prevalence among females. [7]

The peak years for the appearance of giant cell tumor of bone are those of the 3rd decade, with 80% of patients with giant cell tumor between ages 20 years and 50 years. Less than 3% of cases are reported to be under 19 years of age, and patients with giant cell tumor over 50 years of age sum up to only 13% of all cases. [14]

Most cases of Giant Cell Tumor of Bone (75-90%) occur in long bones, with up to 65% of cases are involved around the knee joint. The most common anatomical site of GCTB is the distal femur, with the second most common site being the proximal tibia, and the third most common site is the distal radius.[15] Around 15% of cases have been reported to have involvement in flat bones such as the ribs, spine, sacrum, and pelvis. Up to 2% of cases have been reported in bones of the hands and feet, while less then 1% of cases have been reported in the scapula. Giant Cell tumor of Bone may

also present itself along with Paget disease, commonly presenting in the pelvis, spine, skull, and facial bones.[16]

Giant Cell Tumor of Bone has been reported in pediatric cases also less common than in adults, reaching from 2% to 5%, and cases reported predominates from 13 years to 19 years of age. When it presents in children the most common site of presentation is the proximal tibia, and then comes axial skeleton lesions such as the pelvis and vertebrae.[17]

Radiology and Imaging

The presentation of GCTB is typically best portrayed in plain radiographs, and it is usually the first step in diagnosing a case of GCT whether primary or recurrent, with the main findings being a lytic lesion, with the well-defined borders being of a non-sclerotic nature. The common location is typically eccentric, in the epiphysis and/or the metaphysis often including subchondral bone involvement and patients with closed physis are the usual candidates. [18]

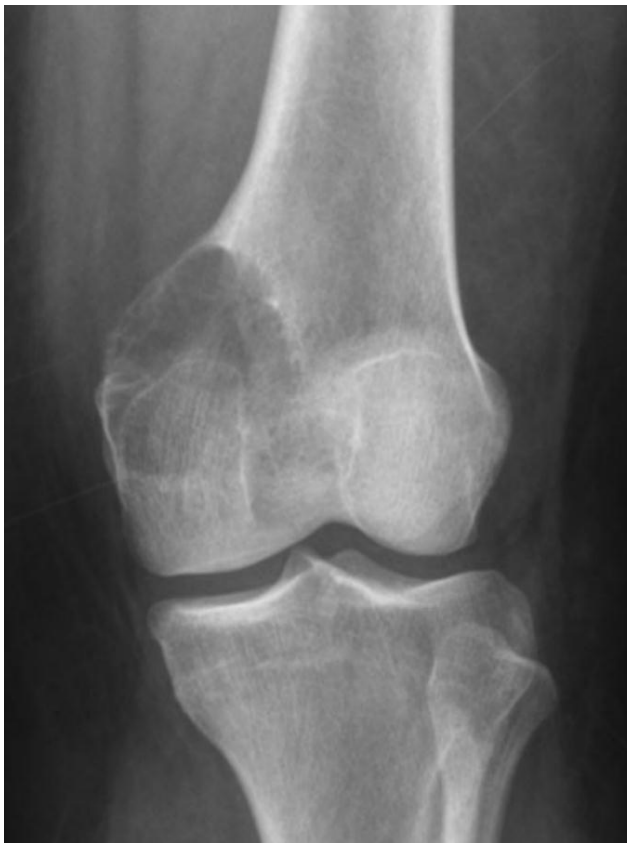

Figure (1): A typical appearance of Giant Cell Tumor of the distal femur with a well-defined lytic lesion with a non-sclerotic margin[19]

Giant Cell Tumor of Bone is also known to show aggressive features such as having a wide zone of transition, expansile remodeling, along with thinning of the cortex, and associated infiltration of the adjacent soft tissue (figures 2,3). These more aggressive findings can even be found in small caliber bones such as the ulna or fibula, and with complications such as pathological fractures or periosteal reactions often making it more difficult to diagnose the associated pathology.[15]

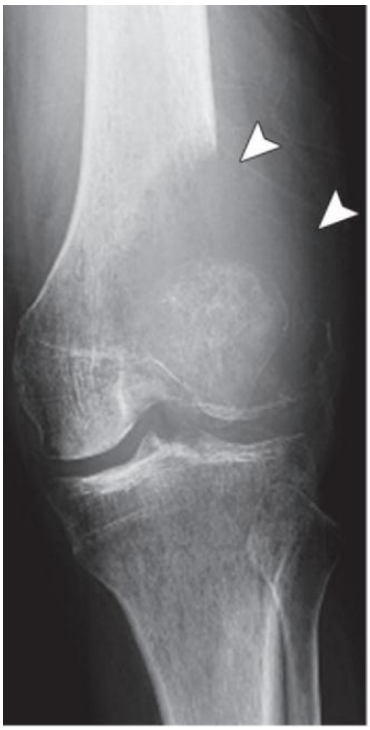

Figure (2): Aggressive features of GCT as there is extensive cortical destruction at the lateral margin of the distal femur.[20]

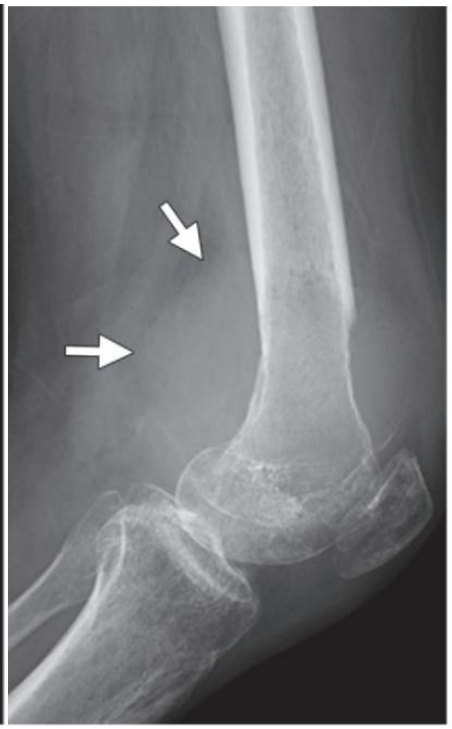

Figure (3): Extra cortical encroachment of the tumor in the adjacent soft tissue region. [20]

The radiographs of a case of GCTB can also present as a multiloculated cystic appearance which may be misleading as this can also be suggestive of a case of aneurysmal bone cyst. Giant Cell Tumor of Bone uncommonly arises in flat bones and apophysis such as the greater trochanter, when such a location is the target of GCT although extremely uncommon, the presentation mostly shows the typical features such as that of a well-defined non sclerotic margin of a lytic lesion. [20,21]