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COMPREHENSIVE STUDY OF GIANT CELL TUMOR OF BONE IN MAJOR HOSPITALS IN AND AROUND MANGALORE, KARNATAKA

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Abstract:

Even after so many years of research studies using modern imaging techniques and histopathological diagnosing methods, when we describe a giant cell tumor of bone everything revolves around a word 'most common'. Present study aims to correlate the clinical, radiological, and histological features with final result.The relative efficiency of various surgical procedures and complication rates are compared.The various reconstruction procedures and the extent to which they are successful in maintaining a functionally useful limb along with eradication of disease are studied.

30 Patients were studied staging, involvement, recurrence rate and functional outcome. The results showed that histological grading has little or no clinical correlation. Patients with cortical breach had more recurrence rate. Curettage with bone grafting is still the most accepted and effective mode of treatment.

Key words: *Giant cell tumor of bone, FNAC, Histopathology, Curettage and bone grafting.*

Introduction

Although, giant cell tumor was described by Cooper and Travers way back in 1818, the mystery behind exact clinical behavior, aggressiveness, radiological and histological characteristics still seems to be persisting. Giant cell tumour (GCT) of bone is classified by the World Health Organisation (WHO) as a benign but locally aggressive tumour that usually involves the end of a long bone.[1]

The results of various types of treatment of G.C.T. of bone are not uniformly successful. At one end is the commonly practiced relatively simple method of curettage and bone grafting which has a high rate of recurrence, at the other extreme is an elaborate operation of enbloc resection with reconstruction which has the disadvantages of causing loss of function of the joint.

Present study aims to correlate the clinical, radiological, and histological features with final result. The relative efficiency of various surgical procedures and complication rates are compared. The various reconstruction procedures and the extent to which they are successful in maintaining a functionally useful limb along with eradication of disease are studied.

Materials and methods

This a comprehensive clinical study comprising of 30 patients from the Orthopedic Departments of Yenepoya Medical College and other major hospitals in and around Mangalore.

The following inclusion criteria were followed:

I Giant Cell tumor confirmed by FNAC or histopathology.

II Adequate follow up (minimum 10 months)

III Well maintained and documented clinical and radiographic records.

Name, age, postal address, I.P, number, and dates of admission, surgery and discharge were noted for authenticity and to facilitate review of patients and records when needed. Detailed clinical history, presenting complaints, associated constitutional symptoms, weight loss and symptoms were meticulously noted, detailed and documented. Details of previous surgery, biopsy, aspiration studies, irradiation, pain relieving medication, massage, splinting etc., were also given importance.

Clinical examination in general with special attention to the affected area was done. Site, size, shape and surface of the swelling, any local rise of temperature, consistency, skin condition, joint, neuro - vascular structures, clinical evidence of any lymphatic or hematogenous spread were noted.

Radiological appearances, site of involvement, size of the lesion, subchondral extent and presence of any pathological fracture were documented. Radiological grading as per Campanacci et al[5] was done.

Results of fine needle aspiration cytology and histopathological examination along with histological grading as per Jafee et al[7] have been included.

Treatment details including surgical procedures, their complications and management and outcome were noted. Surgical margins achieved are classified according to Enneking et al.[6]

Statistics

The results were analysed using Kaplan–Meier survival analysis, Student *t* tests, univariate analysis and ANOVA, with the limit of significance set with $\alpha=0.05$.

Results

Age incidence

Age incidence of tumor varied from 22 years to 55 years. Mean age was 34.3 years and median age 32 years. Maximum incidence occurred in the third decade. (Table 1)

Table – 1

Age Group	Cases	%
11-20	0	0
21-30	17	56.66
31-40	6	20.00
41-50	6	20.00
51-60	01	3.33
61-70	0	0
Total	30	99.99

Sex incidence

Our study revealed an equal Male: Female incidence with 15 male and 15 female patients.

Sites of involvement

The maximum incidence was around the knee with 10 cases involving upper end of tibia and 5 cases involving lower end of femur indicating once again the predilection of bones around the knee for giant cell tumor.[8-10] Lower end of radius was the next common site. (Table 2)

Table – 2

Site	Cases	%
Lower end of femur	5	16.66
Upper end of tibia	10	33.33
Lower end of radius	7	23.33
Lower end of tibia	2	6.66
Upper end of humerus	2	6.66
Upper end of femur	2	6.66
Lower end of ulna	1	3.33
Ilium	1	3.33
Total	30	99.96

Clinical presentation

25 out of 30 patients presented with their chief complaint as pain. 20 patients complained of associated swellings and 10 patients gave history

of antecedent trauma. No patients complained of any constitutional symptoms. (Table 3)

Table – 3

	Cases	%
Pain as presenting complaint	25	83.33
Eccentric swelling at end of long bone	20	66.66
History of antecedent trauma	15	50
Pathological fracture at diagnosis	2	6.66

Diagnosis

The diagnosis was made based on clinical and radiological features. Wherever feasible diagnosis was confirmed by core needle biopsy. Resected tumor tissue was subjected to histopathological analysis for final confirmation. (Table 4)

Table – 4

Core Needle Biopsy	Cases	%
Positive	20	66.66

Radiological distribution of tumor

Most of the lesions were epiphyseo-metaphyseal. There were no lesions involving metaphysic or diahysis. One patient had involvement of ILIAC bone. (Table 5)

Table – 5

	Cases	%
Epiphyseal	7	23.33
Epiphyseo-metaphyseal	22	73.33
Metaphyseal	0	0
Diaphyseal	0	0
Flat bones	1	3.33
Total	30	99.99

Attempts have been made to classify GCT histological findings into a grading system[2]

Radiological grading

Table – 6

	Cases	%
Grade I	05	16.67
Grade II	20	66.66
Grade III	05	16.67
Total	30	100

Histological grading: (Table 7)

Table – 7

	Cases	%
Grade I	24	80
Grade II	06	20
Grade III	00	0
Total	30	100

Treatment

Each case was studied carefully and during this patients age, occupation, site of involvement adjacent vital structures and functional demands were taken in to account.

Following are the surgical procedures followed in this study: (Table 8)

Table – 8

Procedure	Cases
Curettage and bone grafting	16
Curettage and bone cementing	02
Excision and fibular grafting	07
Excision only	01
Resection reconstruction	05
Amputations	0
Total	32

Recurrences and management

A total of 5 cases recurred in our study. Range varied from 6 months to 10 months. Maximum number of recurrences were encountered with curettage and bone grafting. One recurrence each occurred with curettage and bone cementing.

There were no instantce of pulmonary or bony metastasis in our study.

Functional assessment

This is based on the musculoskeletal Tumor Society Scoring System. All patients were asked to answer the questionnaire during follow-up.

Patients who were treated with curettage and grafting scored high where as the patients that underwent resection and reconstruction procedures scored low.

Discussion

As per our study, giant cell tumor is most commonly involves bones around the knee. Patients commonly affected are in the third decade of their age. There is equal male female sex incidence ratio compared with other studies showing slight female predominance.[3,4] One interesting feature of our study is occurrence of GCT within the siblings of the same family. Our study revealed that histological grading has little or no clinical correlation. Though there were five cases of recurrence none of them were malignant. Recurrences were found to be the same grade or of a higher grade than the primary lesion and required more aggressive treatment.

Radiological system based on Campanacci system[5] is found to be a better prognostic indicator. Patients with lesion having cortical breakthrough had greater recurrence rate. Core needle biopsy has a high diagnostic accuracy and wherever possible it should be done. C.T. Scans and MRI has helped in deciding on the surgical margins chosen. There is no significant changes in blood levels of calcium, phosphorous or alkaline phosphatase.

The mean period of recurrence was 7.6 months. We recommend all patients to be followed up for a minimum of 3 years of treatment. Curettage and bone grafting is commonly followed and most accepted. It also has an unacceptably high risk of recurrence rate. Resection and reconstruction procedures had no recurrence but did have loss of joint function. One patient developed iatrogenic foot drop. Patients treated with resection and prosthesis replacement showed good recovery and range of movements. None of our patients had to undergo

amputation nor had metastasis.

Conclusion

Though rare, since giant cell tumor of bone affects younger individuals, who are often the future hope of their families and occurs in the vicinity of either weight bearing or those that are functionally important and may lead to impairment in joint function and their management should be given due thought and proper planning. The surgeons are advised to use their clinical judgment along with both radiological and histological data in deciding the surgical margins. Reconstruction option chosen should be feasible within the available setup, cost effective and functionally competent. The possibility of recurrence should always be kept in mind and all patients should be followed up for a minimum of three years with periodic clinical and radiological evaluation. If curetting through a large cortical window with aid of mechanical burrs and use of intraoperative adjuvants is mandatory. However there is no doubt that the best option of treatment is total excision and reconstruction which would give both stability and ability. The functional outcome and emotional acceptance of treatment in this age group has to be given importance.

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