GIANT CELL TUMOUR WITH VARIED PRESENTATION

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ABSTRACT

BACKGROUND

Giant Cell Tumour (GCT) of bone, one of the commonest bone tumours is usually benign are locally aggressive and may occasionally undergo malignant transformation. The surgeon needs to strike a balance during treatment between reducing the incidence of local recurrence while preserving maximum function.

The aim of the study is to clarify the clinicopathological correlation of tumour and its relevance in treatment and prognosis.

MATERIALS AND METHODS

This study is retrospective analysis of 16 patients of histopathologically-proven giant cell tumours of bone between 2014 to 2016 in private hospital of Patna. Information regarding patient's demography, tumour location, treatment and outcome was recorded and analysed.

RESULTS

Out of 16 patients of GCT, 8 (50%) patients belong to age range of 30-39 years. Females were affected more than males. Male-to-female ratio were 1:1.4. Majority of GCT were of grade I (68.7%), followed by grade II (25%) and grade III (6.2%). Most common sites of GCT were femur lower end (25%) and tibia upper end (25%), followed by radius lower end (12.5%). Other sites were humerus upper end (6.2%), clavicle (6.2%), fibula upper end (6.2%), ulna lower end (6.2%), metatarsal (6.2%) and patella (6.2%). Majority (93.7%) of the patients were treated by surgery, only one patient (6.2%) of malignant GCT, which was unresectable was treated by radiotherapy.

CONCLUSION

GCT is locally-aggressive tumour. Treatment decision should be made by multidisciplinary team consisting of dedicated experts in field of musculoskeletal oncology and should include radiography, MRI, histopathological assessment and planned surgery supplemented with systemic targeted therapy if indicated.

KEYWORDS

Curettage, Giant Cell Tumour, Bone Grafting, Wide Excision, Histological Grading.

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BACKGROUND

The term "giant cell tumour" was coined by Bloodgood Jaffe et al differentiated this tumour from other skeletal lesions consisting giant cells and histological grading was done. This tumour was also called "osteoclastoma" by Schajowicz. The giant cells found in this tumour were differentiated pathogenetically from normal osteoclasts by Lichtenstein. Giant Cell Tumour (GCT) of bone is one of the commonest benign bone tumours. The incidence of GCT in the oriental and Asian population is higher than that in the Caucasian population and may account for 20% of all skeletal neoplasm (Chakarun CJ et al 2013).[1] It is benign, but locally-aggressive tumour. It is a well-known propensity for local recurrence after surgical treatment. It represents 5% of primary bone tumour and 20% of benign bone tumour (Athanasou NA et al 2013)[2]. It has slight female preponderance with male-to-female ratio of 1:1.5 (Gupta R, 2008; Unni KK et al, 2010)[3,4] 80% GCT occurs between 30-50 years of age, peak incidence in third decade of life, less than 3% in children before 14 years and 13% of cases above 50 years.

Giant cell tumour are located in long bones in 75-80%, knee is the most common site in 50-65% cases, distal femur is single most common site 23-30%, proximal tibia 25%, distal radius 10-12%, sacrum 4-9%, proximal humerus 4-8%, it may occur in axial bone (10%) and bones of hands and feet (5%) (Balke M et al, 2008; Campanecci M et al, 1987).[5,6] GCT typically arises in epiphysis region and extends to metaphyseal region after epiphyseal closures. 5-10% giant cell tumour maybe malignant. It has malignant behaviour and metastasises to lung (Campanecci M et al, 1987; Siebenrock KA et al, 1998; Kay et al, 1994).[6,7,8] The radiographic appearance of GCT appears as eccentric lytic lesion with nonsclerotic and sharply-defined geographic border located in metaepiphysis of long bones extending to

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epiphysis in the subarticular region (Murphey MD et al, 2001; Chakarun CJ et al, 2013).[9,1]

In more aggressive lesion, zone of transition is wide, cortical breakdown and lesion extending into soft tissue. Magnetic Resonance Imaging (MRI) finding shows heterogenous high T2 signal with interspersed low signal areas or fluid levels in case of secondary aneurysmal bone cysts formation. It is useful in assessment of involvement of adjacent joint and extent of lesion and soft tissue extension. Computerised Tomography (CT) scan also gives idea about extent of bone involvement. The main problem with GCT is local recurrence after surgery, 27-65% after curettage (Balke M et al, 2008; Campanecci M et al, 1987),[5,6] 12-27% after curettage and adjuvant treatment like phenol using methyl methacrylate, liquid nitrogen (Balke M et al, 2008; Becker WT et al, 2008).[5,10] There is exothermic reaction of methyl methacrylate, which generates local hyperthermia and induces necrosis of any remaining neoplastic tissue. It does not extend to the normal tissues to result in local complications (Nelson DA et al 1997).[11]

Current literature suggests that intralesional curettage strikes the best balance between controlling disease and preserving optimum function in the majority of the cases though there maybe occasions where the extent of the disease mandates resection to ensure adequate disease clearance. Soft tissue involvement increase the risk of local recurrence (Klenke FM et al, 2011; Van der Heijden et al, 2012).[12,13] Pathological fractures are also seen in 15-20%, it render curettage more difficult. The main aim of this present study is to evaluate clinicopathological correlation of tumour and its relevance in treatment and prognosis.

MATERIALS AND METHODS

This study is a retrospective analysis of sixteen patients of histopathologically-proven giant cell tumours of bone between 2014 to 2016 in a private hospital in Patna, Bihar. Information regarding patient's demography, tumour location, treatment and outcome was recorded and analysed.

Management Protocol

In all patients, first local and systemic staging was done. For local examination, radiograph and MRI scan was done and for systemic examination workup for lab investigation like complete blood counts, kidney function test, liver function test, blood sugar and CT scan of chest to rule out lung metastasis. Histology was confirmed by incisional biopsy. Definitive treatment like extended curettage or en bloc resection was done. Extended intralesional excision with local adjuvant 80% phenol, Polymethyl Methacrylate (PMMA) and locking plate. Extensive soft tissue involvement if resectable were treated by en bloc resection and modular endoprosthetic replacement.

Only one patient of malignant GCT with extensive soft tissue involvement, which was unresectable treated by external beam radiotherapy, dose of 40 Gy/15# @ 2.66 Gy/#. Patients were followed up clinically and radiologically three monthly during first two years postoperatively and then 6 monthly.

RESULTS

Out of 16 patients of GCT, 8 (50%) patients belongs to age range of 30-39 years (Table 1). Females were affected more than males. Male-to-female ratio were 1:1.4 (Table 2). Majority of GCT were of grade I (68.7%), followed by grade II (25%) and grade III (6.2%) (Table 3). Most common site of GCT were femur lower end (25%) and tibia upper end (25%) followed by radius lower end (12.5%) (Table 4, Figure 4,6). Other site were humerus upper end (6.2%, Figure 1, 2), clavicle (6.2%, Figure 5), fibula upper end (6.2%), ulna lower end (6.2%, Figure 3), metatarsal (6.2%) and patella (6.2%). Majority (93.7%) of the patients were treated by surgery. Only one patient (6.2%) of malignant GCT, which was unresectable treated by radiotherapy (Table 5). Out of 15 patients, 8 (53.3%) patients underwent extended curettage with autograft and PMMC, 5 (33.3%) patients en bloc resection, 1 (6.6%) patient patellectomy and 1 (6.6%) patient excision with autograft.

Years	Numbers	Percentage
0-9	0	0
10-19	3	18.7
20-29	3	18.7
30-39	8	50
40-49	2	12.5
Table 1. Age of Patients (p = 0.3329)		

	Numbers	Percentage
Males	7	43.7
Females	9	56.2
Table 2. Sex of Patients (p = 0.7031)		

	Numbers	%
Gr I	11	68.7
Gr II	4	25
Gr III	1	6.2
Table 3. Grade of Tumour (p = 0.0521)		

Site	Numbers	Percentage
Humerus upper end	1	6.2
Humerus lower end	0	0
Clavicle	1	6.2
Radius upper end	0	0
Radius lower end	2	12.5
Ulna upper end	0	0
Ulna lower end	1	6.2
Metacarpal	0	0
Femur upper end	0	0
Femur lower end	4	25
Tibia upper end	4	25
Tibia lower end	0	0
Fibula upper end	1	6.2
Fibula lower end	0	0
Metatarsal	1	6.2
Patella	1	6.2
Table 4. Site of Origin (p = 0.9175)		

	Numbers	Percentage
Surgery	15	93.7
Radiotherapy	1	6.2
Table 5. Treatment Received (p = 0.0410)		

	Site	Numbers	%
En bloc resection	Fibula upper end-1 Radius lower end-2 Ulna lower end-1 Clavicle-1	5	33.3
Extended curettage with autograft, PMMA	Femur lower end-4, Tibia upper end-4	8	53.3
Patellectomy	Patella	1	6.6
Excision with graft	Metatarsals	1	6.6
Table 6. Types of Surgery (n = 15) (p = 0.2274)			

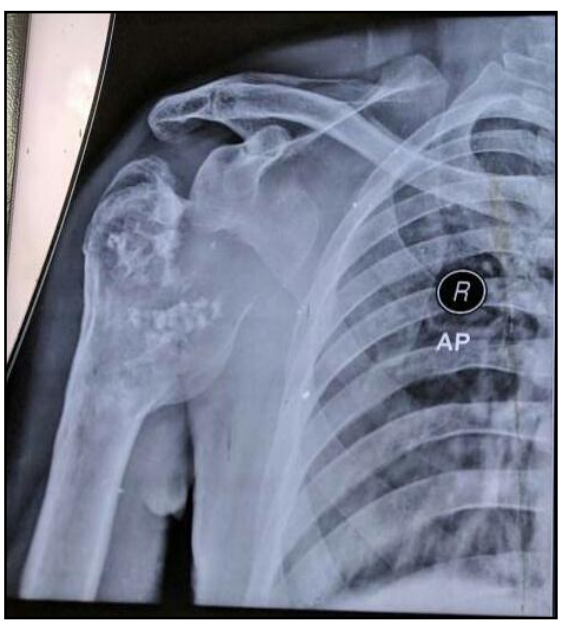

Figure 1. X-Ray AP View Shoulder

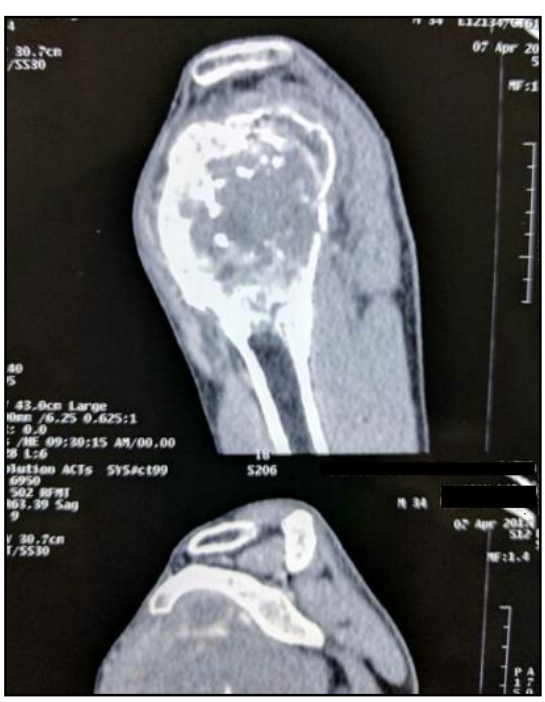

Figure 2. CT Scan Sagittal View Shoulder

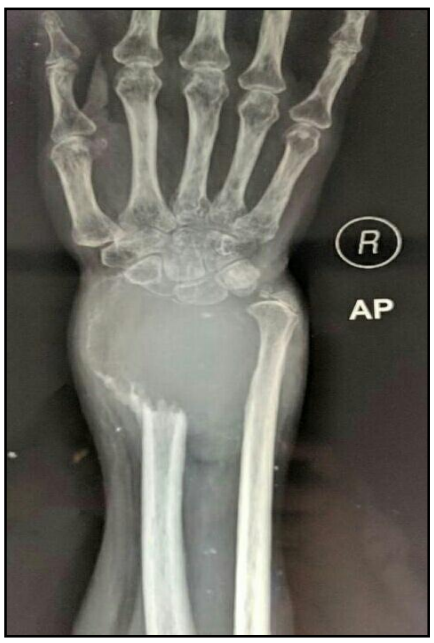

Figure 3. X-Ray AP View Wrist

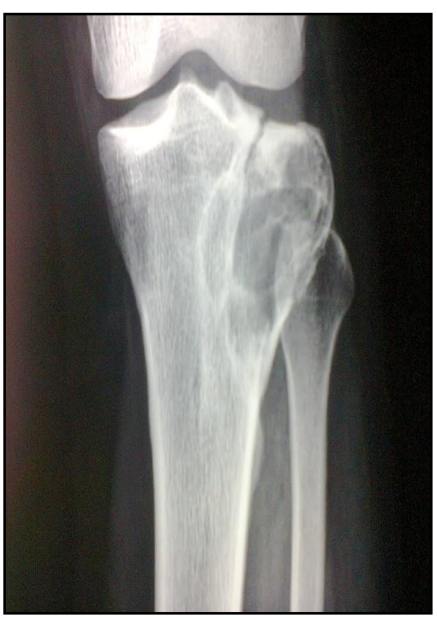

Figure 4. X-Ray AP View Knee

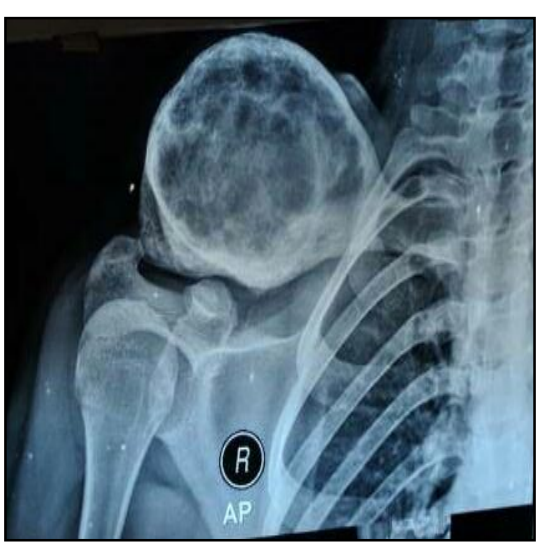

Figure 5. X-Ray AP View Clavicle

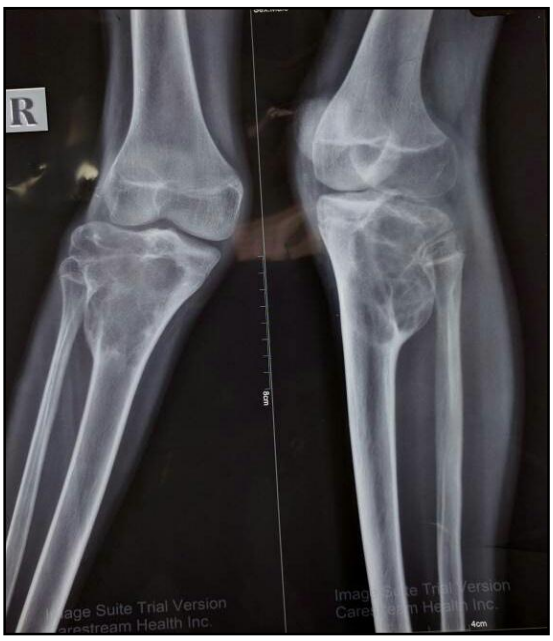

Figure 6. X-Ray AP View Knee

DISCUSSION

Giant cell tumour of the bone is tumour of unknown histogenesis with distinct morphology. The present study documents the demographic information, tumour location, treatment and outcome of 16 patients diagnosed clinically and histologically as GCT of bone. GCT represent 5% of primary bone tumours and 20% of benign bone tumours. It occurs mostly between 20-50 years of age and rarely arises in immature bone (Gupta R et al, 2008).[3] In our study, 86.6% cases belongs to 20-50 years of age. No cases seen above 50 years of age. International literature shows female preponderance (Balke M et al 2008).[5] In our study, females were more affected than males. Male-to-female ratio was 1:1.4. Some categories GCT bone onto three grades, grade I conventional tumour, grade II borderline tumour and grade III malignant tumour (Schajowiez F, Goldenberg RR, 1970).[14,15] According to some author, GCT of bone is low-grade malignant neoplasm (Mirra JM, 1981).[16] Malignant GCT bone is a rare neoplasm (Dahlin D C et al, 1978).[17] In our study, GCT of bone grade I 68.7%, grade II 25% and grade III 6.2%.

GCT of bone are typically located at the end of long bones (Chakarun CJ et al, 2013; Hoch B, 2007).[1,18] The distal femur and proximal tibia are involved in 50% to 65% cases. Distal radius affected in 10% cases (Thomas DM, 2009; Miller MD, 2004).[19,20] Proximal humerus, femur affected in less than 10% (Oda Y, 1998; Stiepen FE, 1994).[21,22] Our results mostly similar with these results. 50% of tumour occurring around knee. Distal radius in 12.5% cases, other sites were proximal humerus, clavicle, proximal fibula, patella, metatarsal bone and distal ulna, each were 6.2% in incidence. Mainstay of treatment of GCT is surgery. This usually involves extended curettage with adjuvant in the form of liquid nitrogen, phenol followed by filling of tumour cavity with PMMA bone cement. Patients with unresectable tumour are treated by external beam radiotherapy. Recently, monoclonal antibody denosumab has successfully been used in the treatment of GCT. Out of 15 patients, 8 (53.3%) patients underwent extended curettage with autograft and PMMC, 5 (33.3%) patients en bloc resection, 1 (6.6%) patient patellectomy, 1 (6.6%) patient of metatarsal excision with autograft. All patients were kept on regular follow up, disease was controlled. Only one cases of malignant GCT, which was unrespectable treated by external beam radiotherapy with dose of 40 Gy/15#. On follow up, residual disease was left.

CONCLUSION

GCT is locally-aggressive tumour. Treatment decision should be made by multidisciplinary team consisting of dedicated experts in field of musculoskeletal oncology and should include radiography, MRI, histopathological assessment and planned surgery supplemented with systemic targeted therapy if indicated. 10-20% of GCT still recurs in spite of our best efforts.

REFERENCES

[1] Chakarun CJ, Forrester DM, Gottsegen CJ, et al. Giant cell tumour of bone: review, Mimics, and new developments in treatment. Radiographics 2013;33(1):197-211.
[2] Athanasou NA, Bansal M, Forsyth R, et al. Giant cell tumour of bone. In: Fletcher CD, Bridge JA, Hogendoorn PC, eds. WHO Classification of tumour of soft tissues. Lyon, France: IARC Press 2013:321-324.
[3] Gupta R, Seethalakshmi V, Jambhekar NA, et al. Clinicopathologic profile of 470 giant cell tumours of bone from a cancer hospital in western India. Ann Diagn Pathol 2008;12(4):239-248.
[4] Unni KK, Inwards C. Dahlin's bone tumours: general aspects and data on 10,165 cases. 6th edn. Philadelphia, PA: Lippincott Williams & Wilkins 2010:225-242.
[5] Balke M, Schremper L, Gebert C, et al. Giant cell tumour of bone: treatment and outcome of 214 cases. J Cancer Res Clin Oncol 2008;134(9):969-978.
[6] Campancci M, Baldini N, Boriani S, et al. Giant-cell tumour of bone. J Bone Joint Surg Am 1987;69(1):106-114.
[7] Siebenrock KA, Unni KK, Rock MG. Giant-cell tumour of bone metastasizing to lungs. A long-term follow up. J Bone Joint Surg Br 1998;80(1):43-47.
[8] Kay RM, Eckardt JJ, Seeger LL, et al. Pulmonary metastasis of benign giant cell tumour of bone. Six histologically confirmed cases, including one of spontaneous regression. Clin Orthop Relat Res 1994;(302):219-230.
[9] Murphey MD, Nomikos GC, Flemming DJ, et al. From the archives of AFIP. Imaging of giant cell tumour and giant cell reparative granuloma of bone: radiologic-pathologic correlation. Radiographics 2001;21(5):1283-1309.

[10] Becker WT, Dohle J, Bernd L, et al. Local recurrence of giant cell tumour of bone after intralesional treatment with and without adjuvant therapy. J Bone Joint Surg Am 2008;90(5):1060-1067.
[11] Nelson DA, Barker ME, Hamlin BH. Thermal effects of acrylic cementation at bone tumour sites. Int J Hyperthermia 1997;13(3):287-306.
[12] Klenke FM, Wenger DE, Inwards CY, et al. Giant cell tumour of bone: risk factor for recurrence. Clin Orthop Relat Res 2011;469(2):591-599.
[13] Heijden VDL, Sande MAVD, Dijkstra PD. Soft tissues extension increases the risk of local recurrence after curettage with adjuvants for giant-cell tumour of the long bones. Acta Orthop 2012;83(4):401-405.
[14] Schajowiez F. Tumours and tumour like lesion of bone. 2nd edn. Heidelberg, New York: Springer 1994.
[15] Goldenberg RR, Campbell CJ, Bonfiglio M. Giant-cell tumour of bone. An analysis of 218 cases. J Bone Joint Surg Am 1970;52(4):619-663.
[16] Mirra JM. Bone tumour: diagnosis & treatment. Philadelphia: JB Lippincott 1980.
[17] Dahlin DC. Bone tumours: general aspects and data on 6,221 case. 3rd edn. Springfield: Charles C Thomes 1978:43-56.
[18] Hoch B, Hermann G, Klein MJ, et al. Giant cell tumour complicating Paget's disease of long bone. Skeletal Radiol 2007;36(10);1973-1978.
[19] Thomas DM, Skubitz KM. Giant cell tumour of bone. Curr Opin Oncol 2009;21(4):338-344.
[20] Miller MD, Thompson S, Hart J. Review of orthopaedics. 6th edn. Philadelphia PA: Saunders 2004:485-487.
[21] Oda Y, Miura H, Tsuneyoshi M, et al. Giant cell tumour of bone: oncological and functional results of long term follow up. Jpn J Clin Oncol 1998;28(5):323-328.
[22] Stiepan FE. Giant cell tumour of the head of humerus: with a case report. J Bone Joint Surg Am 1954;36(5):1014-1019.