

Original Research Article

**Giant cell tumor (GCT) of bone recurrence rate at Moewardi Hospital Surakarta**

Rhyan Darma Saputra<sup>1</sup>, Mujaddid Idulhaq<sup>1</sup>, Dita Anggara Kusuma<sup>1</sup>, Fathih Kaldani<sup>2</sup>

<sup>1</sup>Orthopaedic and Traumatology Surgeon, Musculoskeletal Oncology Division,  
Faculty of Medicine Sebelas Maret University, Surakarta

<sup>2</sup>Orthopaedic and Traumatology Residency Student, Faculty of Medicine Sebelas Maret University, Surakarta

**ABSTRACT**

**Introduction:** GCT of bone comprises almost 20% of primary bone tumors in Asia, and has a high incidence of recurrence (20-60%) although complete surgical treatment had already been performed. Many strategies has been promoted to reduce the recurrence rate, but due to tumor characteristics, recurrence is yet to be a common issue. Since there is limited reference about recurrence rate of GCT in Indonesia, this study aims to discover the recurrence rate of GCT of bone in our department of orthopaedic and traumatology.

**Methods:** Retrospectively, we observed inward patients diagnosed with GCT and underwent surgical treatment at the department of orthopaedic of Moewardi Hospital, Surakarta, from January 2016 to February 2020 and evaluated the incidence of recurrence.

**Results:** Prevalence of GCT of bone is equal between male and female. There were 75% of patients aged 30-40 years. Recurrence after operation occurred in 6.25% of patients.

**Conclusion:** GCT of bone is one of the most frequent bone tumors, and has high incidence of recurrence. However, the incidence of recurrence in our study is quite low. Surgical treatment option in our study resulted in lower recurrence rate compared to other studies.

**Keywords:** bone tumor, giant cell tumor, recurrence rate

<https://doi.org/10.31282/joti.v4n1.70>

**Corresponding author :** Rhyan Darma Saputra, MD. Email : rhyands.dr.spot@gmail.com

## INTRODUCTION

Giant Cell tumors (GCTs) are benign tumors of bone with aggressive behavior and metastasize potential properties. They are rarely lethal, but these benign bone tumors may be associated with a substantial disturbance of the local bony architecture, and can be very disturbing as they commonly located in periarticular area. They are characterized by proliferation of mononuclear stromal cells and the presence of many multi-nucleated giant cells with homogenous distribution.<sup>1</sup>

In Western nations, GCT occurs in 3–8% of primary bone tumors, but it is more common in Asia, where it occurs in 20% of primary bone tumors.<sup>2</sup> It is mostly diagnosed in young adults between 20 and 40 years of age, with a slight female predominance.<sup>3</sup> Half of GCTs occur around the knee, but it could be located at many sites of the body. About 10% of GCTs transformed into malignancy, and pulmonary metastases occur in 1% to 4% of cases.<sup>2</sup>

GCTs were classified by Enneking and later by Campanacci based on radiographic appearance. They described three stages that correlate with tumor local aggressiveness and risk of local recurrence, Stage I – latent, Stage II – active, Stage III – aggressive. Campanacci attempted to grade the lesions based on radiological appearance. All tumors, both primary and recurrent, are graded radiographically using the designations Grade I, Grade II, Grade II with fracture, and Grade III.<sup>1</sup>

GCTs of bone data in Indonesia are limited. A study shows that GCT prevalence is 11.24 % among the primary bone tumors. GCT cases are mostly found in age group of 31 – 35 years old.<sup>9</sup> Kurniawan *et.al.* also reported the incidence of pulmonary metastasis after multiple surgeries of GCT of bone cases.<sup>10</sup> Data shows that GCT remains a complicated case to treat among primary bone tumors in Indonesia, despite its benign classification. Primary surgical intervention is the most common option of choice, followed by adjuvant therapy. Bisphosphonate therapy is suggested in many orthopedics centers.

GCT has high local recurrence rate. A study reported that from 21.4% of all local recurrence, 24.3% in men and 18.3% in women, showed no significant difference in local recurrence rate between the two genders. Similar trend was also observed for the age group, with a local recurrence rate of 24.5% in those aged ≤ 40-year-olds and 14.7% in those aged > 40-year-olds.<sup>2</sup>

Surgical treatment options include intralesional excision or segmental resection. Curettage has a higher recurrence rate, but preserves the adjacent joint function. After curettage, filling the cavity with bone grafts or cement is a common practice in order to provide structural support and prevent collapse. The use of local adjuvants, such as liquid nitrogen, phenol, or cement to decrease the recurrence rate is still controversial. Although resection with wide margin minimizes tumor recurrence, it is associated with worse functional results, and usually with some possible complications in reconstruction.<sup>5</sup>

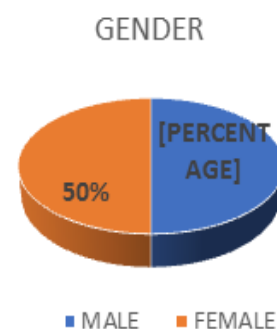
## METHODS

The study was carried out retrospectively on patients at the orthopaedic department of Moewardi General Hospital, Surakarta, who were diagnosed with GCT in January 2016-February 2020. Our inclusion criteria were patients diagnosed with GCT of bone and had completed the treatment at orthopaedic ward of Moewardi General Hospital, Surakarta, between January 2016 and February 2020. We excluded patients who did not complete the treatment and patients who had not received bisphosphonates therapy as adjuvant.

Data for postoperative recurrence were evaluated at minimum 1 year after surgery, which was in March 2020. The data taken includes gender, age, location of GCT, surgical procedure and incidence of recurrence.

## RESULTS AND DISCUSSION

The number of patients diagnosed with GCT in Dr. Moewardi General Hospital, Surakarta, between January 2016 and February 2020 were 16 patients, 8 patients (50%) male and 8 patients (50%) female.



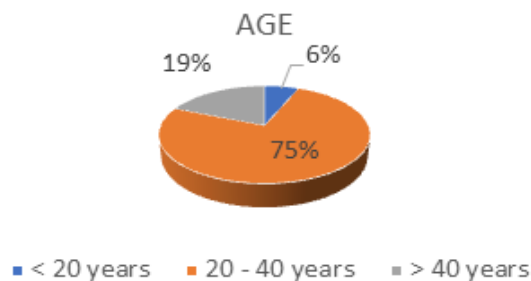
**Diagram 1.** Distribution of patients by gender

It is shown in several studies that women have a slightly

higher risk to have GCT than men <sup>1,3</sup> (Han Wang, 2012; Anshul Sobti, 2016). Andreas Mavrogenis *et.al.* (2017) reported that the female to male predilection ratio ranges from 1:1.1 to 1:1.5.<sup>4</sup> However, Errani (2010) reported that there was no difference in predilection by gender. This is corresponded with Campanacci (1999).<sup>5</sup>

The mean age of patients with GCT in Dr. Moewardi Hospital during January 2016 – February 2020 is 34 years old. There was 1 patient below 20 years (6%), 12 patients at the age group between 20 to 40 years (n:12, 75%) ( $p<0.05$ ), and 3 patients at the age group of over 40 years (19 %), the distribution of which is as shown in Diagram 2.

Significantly, age group of 20 to 40 years is a predilection for the occurrence of GCT. Lin Fensong (2016) reported almost similar result<sup>2</sup>, as well as various other studies showing that young adults are age predilection for the incidence of GCT (Han Wang, 2012; Anshul Sobti, 2016; Andreas Mavrogenis, 2016).<sup>1,3,4</sup>

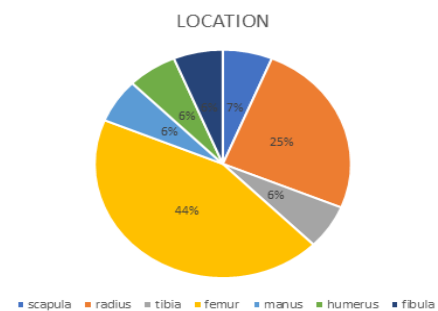


**Diagram 2.** Distribution of patients by age group

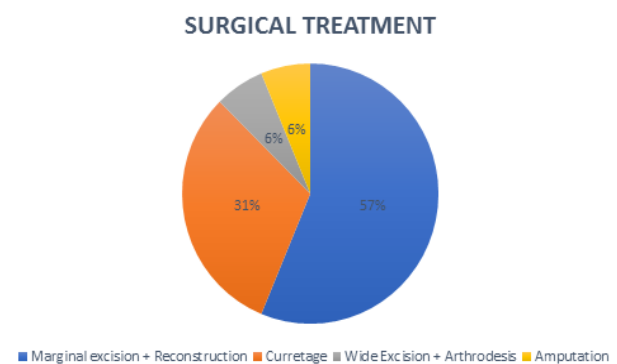
The patients were also classified according to the location of the GCT. The results showed that 7 patients had GCT on the femur, 4 patients on the radius, and the other 5 patients each on the tibia, scapula, manus, humerus, and fibula (see Diagram 3). This is in line with the study of Bridge Julia (1992), who reported that the predilection for the occurrence of GCT is on the femur, tibia, and radius.<sup>6</sup>

The treatment for GCT of bone in our hospital during January 2016 – March 2019 was divided into curettage only, marginal excision followed by limb salvage surgery and reconstruction of the extremities, wide excision followed by limb salvage procedure and arthrodesis, and amputation of the extremities. Each accompanied by an anatomical pathology examination (See Diagram 4). Most of the cases are followed by adjuvant therapy using

bisphosphonate.



**Diagram 3.** Distribution of patients by location of GCT



**Diagram 4.** Distribution of patients based on the surgery performed.

In this study, we found one case of GCT recurrence locally at the previously treated tumor, or often called local recurrence. Thus, the local recurrence rate was 6.25% (n: 1). This one case of GTC recurrence occurred in the humeral region after *en bloc* excision of the tumor and reconstruction of the humerus.

We reported lower local recurrence rate than other studies. This probably because of the treatment of choice. Most of our procedures were excision and reconstruction (57%), and curettage only (31%). Curettage alone has been associated with high local recurrence rate, from 25 to 50%. Therefore, various adjuvants and high-speed drills are used to “extend” the curettage. However, there is no clear evidence of whether adjuvant therapy is effective.<sup>7</sup> Saikia *et al.* (2011) reported higher rate of local recurrence (34.47%) than that reported by most authors. They highlighted on their study that higher rate of recurrence happened in intralesional curettage and bone cementing in Grade III GCTs.<sup>8</sup>

The limited number of population in this study can provide a bias in the result, as well as the duration of follow-up in some patients, which was less than two years. Two-year time span is the most common onset of local

recurrence.

## CONCLUSION

Our evaluation study showed that recurrence rate among GCT of bone cases in our hospital is relatively low. Evaluation for recurrency is minimum one year after the surgical procedure. More aggressive procedure is commonly performed in our hospital, and it might have contributed to the low number of recurrences.

## REFERENCES

1. Sobti A, Agrawal P, Agarwala S, Agarwal M. Giant Cell Tumor of Bone - An Overview. *Arch Bone Jt Surg*. 2016;4(1):2-9.
2. Lin F, Hu Y, Zhao L, et al. The epidemiological and clinical features of primary giant cell tumor around the knee: A report from the multicenter retrospective study in china. *J Bone Oncol*. 2016;5(1):38-42. Published 2016 Feb 11. doi:10.1016/j.jbo.2016.02.001
3. Wang H, Wan N, Hu Y. Giant cell tumour of bone: a new evaluating system is necessary. *Int Orthop*. 2012;36(12):2521-2527. doi:10.1007/s00264-012-1664-9
4. Mavrogenis, Andraeas., et all. Giant Cell Tumor of Bone Revisited. *SICOT J*2017, 3, 54.
5. Errani C., Ruggieri P., Asenzio M.A., Toscano A., Colangeli S., Rimondi E. Giant cell tumor of the extremity: a review of 349 cases from a single institution. *Cancer Treat. Rev*. 2010;36:1–7.
6. Bridge JA, Neff JR, Mouron BJ. Giant cell tumor of bone. Chromosomal analysis of 48 specimens and review of the literature. *Cancer Genet Cytogenet*. 1992 Jan; 58(1):2-13.
7. Yu XC, Xu M, Song RX, Fu ZH, Liu XP. Long-term outcome of giant cell tumors of bone around the knee treated by en bloc resection of tumor and reconstruction with prosthesis. *Orthop Surg*. 2010 Aug; 2(3):211-7.
8. Saikia KC, Bhattacharyya TD, Bhuyan SK, Bordoloi B, Durgia B, Ahmed F. Local recurrences after curettage and cementing in long bone giant cell tumor. *Indian J Orthop*. 2011;45(2):168-173. doi:10.4103/0019-5413.77138
9. Salsabila J, Farida A, Marwoto J. Prevalence and Clinical Characteristics of Giant Cell Tumor of Bone at dr Mohammad Hoesin Hospital Palembang for The Period of January 2 2105 – December 31 2019. *Faculty of Medicine; Sriwijaya University*. 2020
10. Kurniawan A, Idulhaq M, Utomo P, et.al. Pulmonary Metastasis of Recurrent Giant-Cell Tumor in Proximal Humerus: a Case Report. *Indonesian Journal of Medicine and Health*.2019; DOI : 10.20885/JKKI.Vol10.Iss2.art12