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Omar Yacob

*Aga Khan University*

masood umer

*Aga Khan University, masood.umer@aku.edu*

Marrium Gul

*Multan Medical and Dental College, Pakistan*

Irfan Qadir

*Aga Khan University, irfan.qadir@aku.edu*

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# Segmental excision versus intralesional curettage with adjuvant therapy for giant cell tumour of bone

Omar Yacob,<sup>1</sup> Masood Umer,<sup>1</sup> Marriam Gul,<sup>2</sup> Irfan Qadir<sup>1</sup>

<sup>1</sup> Aga Khan University Hospital, Karachi, Pakistan

<sup>2</sup> Multan Medical and Dental College, Multan, Pakistan

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## ABSTRACT

**Purpose.** To review the functional outcome and local recurrence rate of 29 patients who underwent segmental excision or intralesional curettage with adjuvant therapy for giant cell tumour (GCT) of bone.

**Methods.** Records of 17 men and 12 women (mean age, 30.17 years) who underwent segmental excision (n=18) or intralesional curettage followed by adjuvant therapy (n=11) for GCT of the femur (n=13), tibia (n=8), radius (n=6), or ulna (n=2) were reviewed. Nine of the patients had recurrent GCT of bone and had undergone segmental excision (n=6) or intralesional curettage (n=3) elsewhere. Functional outcome was evaluated using the Musculoskeletal Tumour Society (MSTS) scoring system.

**Results.** The mean follow-up period was 6.4 (range, 3–13.5) years. 14 patients were followed up for 3 to 5 years, 12 for 5 to 10 years, and 3 for >10 years. Of 20 patients with primary GCT of bone, 12 underwent segmental excision and had no recurrence, and 8 underwent intralesional curettage, 2 of whom

developed local recurrence. Of the remaining 9 patients with recurrent GCT of bone, there was one re-recurrence in each surgical option. Local recurrence was not associated with Campanacci grading or type of surgery. One of 18 patients with segmental excision and 3 of 11 patients with intralesional curettage had local recurrence (5.6% vs. 27.3%, p=0.139). The MSTS score was excellent in 7, good in 6, moderate in 2, fair in 2, and poor in one patient after segmental excision, whereas the score was excellent in 9 and good in 2 patients after intralesional curettage (p=0.206). The proportion of yielding an excellent outcome was higher after intralesional curettage (38.9% vs. 81.8%, p=0.0289). Nonetheless, the mean MSTS score of the 2 groups was comparable (74.17% vs. 86.36%, p=0.054).

**Conclusion.** Local recurrence of GCT was not associated with the surgical option. Nonetheless, intralesional curettage resulted in better functional outcome.

**Key words:** giant cell tumor of bone; neoplasm recurrence, local

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## INTRODUCTION

Giant cell tumour (GCT) of bone is benign but locally aggressive and usually occurs around the metaphyseal area of long bones in contact with joint cartilage.<sup>1</sup> It accounts for 4 to 5% of bone tumours and 21% of benign tumours of bone.<sup>2</sup> Surgical treatment options include segmental resection or intralesional curettage. The latter is associated with a higher local recurrence rate (18% to 50%).<sup>2-4</sup> Curettage followed by adjuvant therapy using liquid nitrogen, phenol, or cement can decrease the recurrence rate. Resection with wide margins minimises recurrence but is associated with poorer functional results or complications in reconstruction.<sup>3</sup> This study reviewed the functional outcome and local recurrence rate of 29 patients who underwent segmental excision or intralesional curettage with adjuvant therapy for GCT of bone.

## MATERIALS AND METHODS

Records of 17 men and 12 women (mean age, 30.17±10.98 years) who underwent segmental excision (n=18) or intralesional curettage followed by adjuvant therapy (n=11) for GCT of the femur (n=13), tibia (n=8), radius (n=6), or ulna (n=2) between 2000 and 2011 were reviewed. Nine of the patients had recurrent GCT of bone and had undergone segmental excision (n=6) or intralesional curettage (n=3) elsewhere. The mean tumour size was 12.7 (range, 4–21) cm.

According to the Enneking staging system,<sup>5</sup> tumour extension was intracompartmental in 22 patients and extracompartmental in 7 patients. According to the Campanacci grading system,<sup>2</sup> 7 tumours were classified as grade I (quiescent), 15 as grade II (active), and 7 as grade III (aggressive). Two grade I tumours, 9 grade II tumours, and all 7 grade III tumours were treated with segmental excision. Five grade I tumours and 6 grade II tumours were treated with intralesional curettage followed by adjuvant therapy (use of phenol and filling with polymethylmethacrylate). Surgical decision was based on whether the patient had prior surgery or recurrence as well as tumour size, soft tissue extension, and pathological fractures.

Functional outcome was evaluated using the Musculoskeletal Tumour Society (MSTS) scoring system.<sup>6</sup> For the lower extremity, this comprises categories of pain, function, emotional acceptance, supports, walking, and gait. For the upper extremity, the latter 3 categories are hand positioning, dexterity,

and lifting ability. Excellent was defined as 75% to 100%, good as 70% to 74%, moderate as 60% to 69%, fair as 50% to 59%, and poor as <50%. Local recurrence was confirmed by radiography and magnetic resonance imaging.

Functional outcomes of the 2 groups were compared using the Pearson Chi-squared test or Fisher's exact test whenever appropriate. A p value <0.05 was considered statistically significant.

## RESULTS

The mean follow-up period was 6.4 (range, 3–13.5) years. 14 patients were followed up for 3 to 5 years, 12 for 5 to 10 years, and 3 for >10 years. Of 20 patients with primary GCT of bone, 12 underwent segmental excision and had no recurrence, and 8 underwent intralesional curettage with adjuvant therapy, 2 of whom developed local recurrence. Of the remaining 9 patients with recurrent GCT of bone, there was one re-recurrence in each surgical option.

Local recurrence was not associated with Campanacci grading or type of surgery. One of 18 patients treated with segmental excision and 3 of 11 patients treated with intralesional curettage had local recurrence (5.6% vs. 27.3%, p=0.139). There were one recurrence in each of grades 1 and 3 tumours and 2 recurrences in grade 2 tumours (p=0.997).

The MSTS score was excellent in 7, good in 6, moderate in 2, fair in 2, and poor in one patient after segmental excision, whereas the score was excellent in 9 and good in 2 patients after intralesional curettage (p=0.206). The proportion of yielding an excellent outcome was higher after intralesional curettage (38.9% vs. 81.8%, p=0.0289). Nonetheless, the mean MSTS score of the 2 groups was comparable (74.17% vs. 86.36%, p=0.054).

## DISCUSSION

GCT of bone is one of the most common tumours encountered by orthopaedic surgeons. The ubiquitous presence of giant cells in other unrelated entities and the presence of osteoid makes its diagnosis challenging, particularly when a needle core biopsy is used. There are no clinical, radiographic, or histological aspects that can predict the trend for recurrence or metastasis. Treatment options are based on retrospective analysis of non-randomised series from single or multiple institutions.<sup>7,8</sup> The treatment goal is to balance adequate removal of tumour cells with function of the limb. Some studies consider

**Table**  
**Comparison of recurrence of giant cell tumour of bone after segmental excision or intralesional curettage**

| Study                        | No. of patients | Recurrence (%) | Segmental excision |                |  | Intralesional curettage |                |  |
|------------------------------|-----------------|----------------|--------------------|----------------|--|-------------------------|----------------|--|
|                              |                 |                | No. of patients    | Recurrence (%) | Mean Musculoskeletal Tumor Society score (%) | No. of patients         | Recurrence (%) | Mean Musculoskeletal Tumor Society score (%) |
| Becker et al. <sup>3</sup>   | 384             | 25.5           | 78                 | 2              | -  | 306                     | 31.4           | -  |
| Errani et al. <sup>7</sup>   | 349             | 14.3           | 149                | 12             | 86.4   | 200                     | 16.0           | 91.7   |
| Oda et al. <sup>15</sup>     | 47              | 44.0           | 19                 | 0              | 90.3   | 28                      | 75.0           | 94.0   |
| Guo et al. <sup>16</sup>     | 27              | 14.8           | 14                 | 0              | 73.3   | 13                      | 30.8           | 80.0   |
| Rastogi et al. <sup>17</sup> | 49              | 2.04           | 19                 | 0              | 71.2   | 28                      | 3.5            | 84.7   |
| Our study                    | 29              | 13.8           | 18                 | 5.6            | 74.2   | 11                      | 27.3           | 86.4   |

intralesional excision as the treatment of choice.<sup>9,10</sup> Others recommend curettage followed by adjuvant therapy to reduce the risk of recurrence,<sup>11,12</sup> but adjuvant therapy has been considered unnecessary.<sup>9</sup> Adjuvants may remove remaining tumour cells after curettage by thermal (liquid nitrogen, methyl methacrylate) or chemical (phenol, hydrogen peroxide, alcohol) effects.<sup>7</sup> The cavity can be left unfilled or be filled with cement or bone grafting. In the Scandinavian Sarcoma Group study involving 294 patients, filling the cavity with cement after intralesional surgery resulted in a lower recurrence rate than no cementation (20% vs. 56%,  $p=0.001$ ).<sup>11</sup> In contrast, in the Canadian Sarcoma Group study involving 186 patients, the use of adjuvants or filling the cavity was not associated with the risk of recurrence.<sup>4</sup>

Resection with wide margins is usually reserved for aggressive stage 3 tumours when bone/joint destruction is too extensive or when sacrifice of bone results in better tumour control with minimal functional impairment (such as tumours located in the proximal fibula or distal ulna).<sup>7</sup>

The recurrence rate is usually higher in stage 3 tumours. However, in 327 patients at the Rizzoli Institute, radiological grading of tumours was not associated with treatment option or prognosis but was associated with the surgical margin.<sup>2</sup> In contrast, in a multicentre study, the recurrence rate was associated with both Campanacci and Enneking staging.<sup>13</sup>

Compared with joint resection, joint salvage has reported to achieve better functional outcome and a lower rate of non-oncological complications, but the difference is not significant).<sup>2,5,7,10</sup>

Recurrence of GCT is usually not fatal but can lead to severe functional disability and poor quality of life secondary to repeat and radical operations. The overall risk of local recurrence has been reported to be 25 to 35% in earlier series of patients and 10 to

20% in more recent series of patients at an institution.<sup>7</sup> In a review of 111 patients followed up for >2 years, the recurrence rate was 41% following curettage and bone grafting and 7.1% following wide excision.<sup>14</sup> One study reported a high recurrence of 75% after intralesional curettage without adjuvant therapy, but 0% recurrence after segmental excision.<sup>15</sup> Two studies also reported 0% recurrence after segmental excision,<sup>16,17</sup> but one of them reported 30.8% recurrence after intralesional curettage.<sup>16</sup> In our series, the recurrence rate was 5.6% after segmental excision and 27.3% after intralesional curettage and adjuvant therapy (Table).

For treatment of recurrence, resection with wide margins followed by reconstruction using modular prostheses is recommended.<sup>7</sup> Nonetheless, in GCT in long bones treated with curettage and cementing, local recurrence is not associated with higher morbidity or greater risk of recurrence.<sup>18</sup> Most cases of local recurrence can be successfully treated with further curettage and cementing, with a good outcome. In 183 patients treated with curettage for GCT, the recurrence rate was 25%.<sup>19</sup>

Limitations of our study included the retrospective nature and inclusion of patients treated by different surgeons over a 10-year period.

## CONCLUSION

Local recurrence of GCT was not associated with surgical option. Nonetheless, intralesional curettage resulted in better functional outcome.

## DISCLOSURE

No conflicts of interest were declared by the authors.

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