Wide resection versus curettage with adjuvant therapy for giant cell tumour of bone

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ABSTRACT

Purpose. To determine the association between type of surgery (wide resection versus curettage with adjuvant therapy) and outcome in patients with giant cell tumour (GCT) of bone.

Methods. Records of 30 male and 52 female consecutive patients aged 10 to 62 years who underwent wide resection (n=57) or curettage with adjuvant therapy (n=25) for primary GCT of bone were reviewed. The surgical decision was based on patient age, tumour location, functional demand, and patient preference. The median tumour size was 8.5 cm. Tumours were classified as stage 1 (n=4), stage 2 (n=60), and stage 3 (n=18), and 25%, 68.3%, and 83.3% of them were treated with wide resection, respectively. Functional outcome was assessed using the Musculoskeletal Tumor Society (MSTS) score; the maximum score was 30.

Results. The wide resection and curettage with adjuvant therapy groups were comparable in terms of patient age, gender, tumour size, location, symptoms, tumour stage, type of biopsy, and MSTS score. The MSTS score was excellent in 50.2% of patients, good in 38.7% of patients, and fair and poor in the remaining patients. The MSTS score was not associated with tumour stage or type of surgery. Four patients in the wide resection group had metastasis to the lung. They also had lower haemoglobin level (10.6 vs. 12.7 g/dl, p=0.020) and higher percentage of stage-3 tumour (100% vs. 17.9%, p=0.001) but had no recurrence (0% vs. 6.4%, p=0.774), compared with those without metastasis. All died from massive haemoptysis and respiratory failure. Eight patients died; their haemoglobin level was lower than that of patients who were still living (11.2 vs. 12.7 g/dl, p=0.032). Mortality was associated with metastasis (100% vs 5.2%, p<0.001) but not recurrence or complication. Two patients in each group had recurrence; recurrence was not associated with type of surgery.

Conclusion. There was no association between type of surgery and tumour recurrence, metastasis, or outcome. Curettage with adjuvant therapy was more commonly performed for stage 1 and 2 tumours, whereas wide resection was more for stage 3 tumours. Metastasis was associated with stage 3 tumour and mortality but not recurrence.

Key words: curettage; giant cell tumor of bone
INTRODUCTION

Giant cell tumour (GCT) of bone usually occurs in the epiphyses of long bones (such as the proximal tibia, distal femur, and distal radius) and in those aged 30 to 40 years. It rarely occurs in persons aged <15 years. Clinical manifestations include pain, swelling, joint effusion, and limited range of movement. Despite being benign in origin, 1 to 4% of GCT of bone metastasise to lungs. Long-term follow-up is important, as malignant transformation may occur 40 years after treatment. Intralesional curettage with adjuvant therapy is the primary treatment. <20% of patients develop local recurrence, for which secondary intralesional curettage is often adequate if diagnosed early. Wide resection with or without reconstruction (using bone graft, methylmethacrylate, internal fixation, or endoprosthesis) is recommended in patients with an aggressive lesion with cortical breach and considerable soft tissue involvement. Radiation is indicated for inoperable lesions in the pelvis or vertebrae, incompletely resected lesions, or recurrence (after definitive therapy). This study aimed to determine the association between type of surgery (wide resection versus curettage with adjuvant therapy) and outcome in patients with GCT of bone.

MATERIAL AND METHODS

Records of 30 male and 52 female consecutive patients aged 10 to 62 years who underwent wide resection (n=57) or curettage with adjuvant therapy (n=25) for primary GCT of bone in our hospital from 1995 to 2014 were reviewed. The surgical decision was based on patient age, tumour location, functional demand, and patient preference. Patients with GCT of bone in the spine or pelvic region or with <2 years of follow-up were excluded.

The most common tumour location was the distal femur (26.8%), followed by the proximal tibia (24.4%) and the distal radius (20.7%). The median tumour size was 8.5 (interquartile range, 6.0) cm; tumours were ≤8 cm in 41 patients and >8 cm in 41 patients. According to the Enneking staging, tumours were classified as stage 1 (n=4), stage 2 (n=60), and stage 3 (n=18), and 25%, 68.3%, and 83.3% of them were treated with wide resection, respectively. Of 34 patients who underwent reconstruction, 21 had an auto or allograft, 8 an endoprosthesis, and 5 a free vascularised fibular graft.

Functional outcome was assessed at the latest follow-up using the Musculoskeletal Tumor Society (MSTS) score; the maximum score was 30.

The 2 groups were compared using the Pearson Chi-squared test or Fisher’s exact test for proportion or Mann-Whitney U test for continuous variables. Chi-squared test was used to determine the association between tumour/patient characteristics and recurrence, metastasis, complications, or mortality. A p value of <0.05 was considered statistically significant.

RESULTS

The wide resection and curettage with adjuvant therapy groups were comparable in terms of patient age, gender, tumour size, location, symptoms, tumour stage, type of biopsy, and MSTS score (Table 1). The mean follow-up period was 51.6 (range, 24–216) months.

The MSTS score was excellent in 50.2% of patients, good in 38.7% of patients, and fair or poor in the remaining patients. The MSTS score was not associated with tumour stage (p=0.524) or type of surgery (p=0.920).

Four patients in wide resection group had metastasis to the lung. They also had lower haemoglobin level (10.6 vs. 12.7 g/dl, p=0.020) and higher percentage of stage-3 tumour (100% vs. 17.9%, p=0.001) but had no recurrence (0% vs. 6.4%, p=0.774), compared with those without metastasis. All died from massive haemoptysis and respiratory failure.

Eight patients died; their haemoglobin level was lower than that of patients who were still living (11.2 vs. 12.7 g/dl, p=0.032). Mortality was associated with metastasis (100% vs 5.2%, p<0.001) but not recurrence or complication (Table 2).

Respectively in the wide resection and curettage with adjuvant therapy groups, 2 patients in each group had recurrence at 5, 6, 8, and 96 months; recurrence was not associated with type of surgery (3.5% vs. 8%, p=0.558). The 2 groups were comparable in the 2-year recurrence-free survival (50% vs. 60%) and cumulative 5-year survival (both <40%).

DISCUSSION

50 to 60% of GCT of bone occur around the knee (proximal tibia and distal femur). The recurrence rate has been reported to be <20%, 2–50%, and 25% for stage-3 GCT of the distal radius, 2.8% to <15% after curettage and adjuvant therapy, 45% after intralesional curettage and bone...
grafting, and 75% for stage-3 tumours. Gender is not a risk factor for recurrence, metastasis, and/or functional outcome. Symptom duration does not correlate with recurrence or metastasis. Gender, tumour location, grading, soft-tissue infiltration, and pathological fracture do not affect recurrence and metastasis. Recurrence usually occurs in aggressive tumours adjacent to an articular surface. Recurrence correlates with soft-tissue infiltration and pathological fracture. Recurrence tends to correlate with higher tumour stage. GCT of bone can metastasise to lung, brain, kidneys, adrenals, and skin. 1 to 9% of patients have metastasis to lung. Metastasis is not a predictor of poor outcome. Lesions in lungs are usually slow growing and resectable, but can also be multiple and unresectable. The risk of metastasis increases 6 fold from 1% to 6% in patients with recurrence. Risk factors for lung metastasis include aggressive (Enneking stage 3) lesion, the presence of Ki 70 antigen, and tumour location at the distal radius. Metastasis-related mortality has been reported to be 3% and 0–37%. Metastasectomy of lung nodules significantly increases survival. Radiation therapy is effective for unresectable lung metastasis, although it may cause pathological fracture, fibrosis, and neuritis, as well as malignant transformation. Although chemotherapy with cisplatin and doxorubicin may increase survival, more patients have been reported to die from the side effects of chemotherapy than the metastasis.

The risk of complications following resection depends on fracture complexity, soft-tissue infiltration, intra-articular fracture, proximity to joint, and type of surgery.

**CONCLUSION**

There was no association between type of surgery and tumour recurrence, metastasis, or outcome. Curettage with adjuvant therapy was more commonly performed for stage 1 and 2 tumours, whereas wide resection was more for stage 3 tumours. Metastasis was associated with stage 3 tumour and mortality but not recurrence.

**DISCLOSURE**

No conflicts of interest were declared by the authors.

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| Table 1 | Baseline characteristics of patients with giant cell tumour of bone |
|-----------------------|---------------------|-----------------------|
| Parameter              | No. of patients (%) | p Value |
|-----------------------|---------------------|---------|
| Parameter              | No. of patients (%) | p Value |
| No. of male:female     | 18:39               | 12:13               | 0.213   |
| Median (interquartile range) age (years) | 28 (8.25) | 30 (0) | 0.717 |
| Age groups (years)     | 0–10                | 00                  | 0.358   |
|                       | 11–20               | 13                 | 4       |
|                       | 21–30               | 20                 | 14      |
|                       | 31–40               | 12                 | 3       |
|                       | >40                 | 12                 | 4       |
| Symptom               |                      |                     | 0.131   |
| Lump                  | 44                  | 15                  |
| Pain                  | 6                   | 7                   |
| Lump and pain         | 7                   | 3                   |
| Tumor size (cm)       | 9                   | 8                   | 0.249   |
| ≤8                    | 27                  | 14                  |
| >8                    | 30                  | 11                  |
| Location              |                      |                     | 0.209   |
| Distal femur          | 14                  | 8                   |
| Proximal femur        | 5                   | 1                   |
| Distal tibia          | 1                   | 2                   |
| Proximal tibia        | 11                  | 9                   |
| Proximal fibula       | 1                   | 0                   |
| Distal humerus        | 1                   | 0                   |
| Proximal humerus      | 2                   | 1                   |
| Distal radius         | 16                  | 1                   |
| Distal ulna           | 3                   | 0                   |
| Patella               | 1                   | 2                   |
| Foot                  | 1                   | 1                   |
| Hand                  | 1                   | 0                   |
| Enneking tumour stage |                      |                     | 0.067   |
| Stage 1               | 1                   | 3                   |
| Stage 2               | 41                  | 19                  |
| Stage 3               | 15                  | 3                   |
| Biopsy type           |                      |                     | 0.817   |
| Fine-needle aspiration biopsy (FNAB) | 46 | 22 | |
| Open biopsy           | 6                   | 2                   |
| Core biopsy           | 2                   | 0                   |
| FNAB+open biopsy      | 1                   | 0                   |
| FNAB+core biopsy      | 2                   | 1                   |
| Mean Musculoskeletal Tumor Society score (% of maximum score of 30) | 20.03 | 20.53 | 0.920 |

| Table 2 | Association between mortality and recurrence, metastasis, or complication |
|-----------------------|---------------------|-----------------------|
| Parameter              | No. (%) of patients (%) | p Value |
|-----------------------|---------------------|---------|
| Recurrence             |                      |         |
| Yes                   | 0 (0)               | 4 (0)   | 1.000   |
| No                    | 8 (10.3)            | 70 (89.7)|   |
| Metastasis             |                      |         |
| Yes                   | 4 (100)             | 0 (0)   | <0.001  |
| No                    | 4 (5.2)             | 74 (94.8)|   |
| Complication           |                      |         |
| Yes                   | 0 (0)               | 9 (100) | 0.589   |
| No                    | 8 (11)              | 65 (89) |   |
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