Treatment of local recurrences of giant cell tumour in long bones after curettage and cementing

A SCANDINAVIAN SARCOMA GROUP STUDY

We retrospectively studied local recurrence of giant cell tumour in long bones following treatment with curettage and cementing in 137 patients. The median follow-up time was 60 months (3 to 166). A total of 19 patients (14%) had at least one local recurrence, the first was diagnosed at a median of 17 months (3 to 29) after treatment of the primary tumour. There were 13 patients with a total of 15 local recurrences who were successfully treated by further curettage and cementing. Two patients with a second local recurrence were consequently treated twice. At the last follow-up, at a median of 53 months (3 to 128) after the most recent operation, all patients were free from disease and had good function.

We concluded that local recurrence of giant cell tumour after curettage and cementing in long bones can generally be successfully treated with further curettage and cementing, with only a minor risk of increased morbidity. This suggests that more extensive surgery for the primary tumour in an attempt to obtain wide margins is not the method of choice, since it leaves the patient with higher morbidity with no significant gain with respect to cure of the disease.

Giant cell tumour (GCT) of bone has been extensively studied but debate continues on the ideal treatment. Curettage followed by packing of the resultant cavity with polymethylmethacrylate, with or without further local adjuvants, has become one of the standard procedures in the treatment of GCT in long bones; with reported local recurrence rates of 0% to 25%. More radical surgery, such as en bloc resection, has been advocated by some in order to avoid local recurrence. However, this increases the morbidity, as a GCT is generally located in the epiphysis/metaphysis of long bones adjacent to a joint, so that en bloc resection regularly requires reconstruction of the joint.

There is no consensus on the treatment of a local recurrence, with opinions ranging from further intralesional curettage to more radical surgery.

We have investigated the outcome of 19 patients with local recurrences of GCT in long bones after curettage and cementing. The patients were identified through the Scandinavian Sarcoma Group Register which received data from tumour centres in Scandinavian countries.

Patients and Methods
The Scandinavian Sarcoma Group Register included 348 patients with GCT at January 2004. Patients with axial lesions, tumours treated with a wide excision and curettage not combined with cement packing were not included in this study. We identified 142 patients who were managed with primary curettage and cementing between March 1986 and December 2003. We excluded five patients because of incomplete information.

The patients were treated at seven centres and the method of treatment was chosen at the discretion of the surgeon. From the study group, 19 patients required further treatment for local recurrence, with nine having extraosseous extension, corresponding to Campanacci grades II and III (Table I and Fig. 1).

The mean age at diagnosis was 35 years (15 to 73) for the whole group and 31 years (15 to 73) for those patients who developed local recurrence. The tumours were distributed mainly in the distal femur (n = 53; 39%) and proximal tibia (n = 42; 31%), followed by the distal radius (n = 15; 11%).

The median follow-up time for the 137 patients was 60 months (3 to 166) and 53 months (3 to 128) after the most recent operation for those requiring treatment for a recurrence.

Excision of the primary tumour. A cortical window was made and the tumour mass was evac-
Table I. Description of the 19 patients with local recurrence

<table>
<thead>
<tr>
<th>Patient number</th>
<th>Age (yrs)</th>
<th>Gender</th>
<th>Location of the primary tumour</th>
<th>Size of tumour (cm), grade</th>
<th>Pathological fracture</th>
<th>Time to local recurrence (mths)</th>
<th>Treatment of local recurrence</th>
<th>Size of local recurrence (cm)</th>
<th>Follow-up after last surgery</th>
<th>State of follow-up</th>
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<tr>
<td>1</td>
<td>73</td>
<td>F</td>
<td>Radius, distal</td>
<td>4, IO</td>
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<td>20</td>
<td>Resection of distal radius, bone graft, arthrodesis</td>
<td>nd†</td>
<td>32</td>
<td>NED light pain</td>
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<td>52</td>
<td>F</td>
<td>Radius, distal</td>
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<td>Yes</td>
<td>11</td>
<td>Complete removal of cement, curettage and cementing</td>
<td>nd†</td>
<td>97</td>
<td>NED reduced ROM</td>
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<td>3</td>
<td>20</td>
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<td>Femur, proximal</td>
<td>5, IO</td>
<td>No</td>
<td>9</td>
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<td>2, bone 3, soft tissue</td>
<td>80</td>
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<td>4</td>
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<td>7, EO</td>
<td>No</td>
<td>11</td>
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<td>NED no pain</td>
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<td>3</td>
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<td>4</td>
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<td>83</td>
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<td>9</td>
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<td>21</td>
<td>M</td>
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<td>94</td>
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<td>Partial removal of cement, curettage and cementing</td>
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<td>128</td>
<td>NED normal ROM</td>
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<td>M</td>
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<td>6, EO</td>
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<td>29</td>
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<td>53</td>
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<td>1) nd 2) 5</td>
<td>39</td>
<td>Local NED, persistent pulmonary metastases</td>
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<td>F</td>
<td>Tibia, proximal</td>
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<td>F</td>
<td>Tibia, proximal</td>
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<td>No</td>
<td>29</td>
<td>1) Curettage and cementing 2) Complete removal of cement, curettage and cementing</td>
<td>1) 4 2) nd</td>
<td>41</td>
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<tr>
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<td>F</td>
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<td>No</td>
<td>27</td>
<td>Partial removal of cement, curettage and cementing</td>
<td>1</td>
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<td>NED, initial peroneal palsy, remission</td>
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<td>18</td>
<td>M</td>
<td>Femur, proximal</td>
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<td>10</td>
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<td>8</td>
<td>109</td>
<td>NED no pain</td>
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<tr>
<td>19</td>
<td>30</td>
<td>M</td>
<td>Tibia, proximal</td>
<td>4, EO</td>
<td>No</td>
<td>27</td>
<td>Curettage and cementing</td>
<td>6</td>
<td>24</td>
<td>NED normal ROM</td>
</tr>
</tbody>
</table>

* F, female; M, male
† IO, interosseous; EO, extraosseous
‡ NED, no evidence of disease; ROM, range of movement
§ nd, not determined
uated. Several lesions involved the subchondral bone, or even exposed the joint cartilage in the cavity. Bone surfaces were then thoroughly curetted. In the earlier series of operations, the techniques varied slightly between the centres. Some routinely used a high-speed burr for removal of a thin layer of bone and others used curettes of different sizes. All centres today use a high-speed burr. After curettage, the cavity was rinsed with either saline, distilled water or hydrogen peroxide. In one of the centres, phenol was routinely used as an adjuvant treatment. The bone cavity was then filled with polymethylmethacrylate cement containing gentamycin.

The recurrent lesions were managed with curettage and further cementing, in the same way as for the primary tumour after partial or complete removal of the previous cement, depending on the size and extension of the local recurrence.

Results
Of the 19 patients who required further treatment, 14 had one local recurrence, four had two and one patient had four (Table I). Local recurrence was diagnosed at a median of 17 months (3 to 29) after treatment of the primary tumour and was generally identified by conventional radiography at routine follow-up, or because the patient had symptoms such as pain and local swelling that prompted radiographical examination. The distribution of the recurrences matched the distribution of the primary tumours.

A total of 13 patients with a local recurrence underwent successful further surgery with curettage and cementing of the lesion (Table I). At latest follow-up they were all free from disease and 11 had a normal pain-free range of movement. A reduced range of movement, but no pain was seen in one patient, while one had pain as well as a reduced range of movement. The latter developed patellofemoral arthritis and a meniscal lesion which were not necessarily attributable to the treatment of the GCT.

Of the patients who had their local recurrence treated with curettage and cement, two had a second local recurrence which was successfully treated with a repeated curettage and cementing. They had a full range of movement, no pain and no evidence of disease at latest follow-up, 30 and 41 months after the last operation. Altogether, 13 patients with local recurrences were successfully treated with further curettage and cementing. One patient had the cement removed 16 months after primary surgery and replaced by bone graft because it was believed that the cement, being in such close proximity to the joint, would eventually result in secondary osteoarthritis. There were no signs of local recurrence at that time but the patient went on to develop her first local recurrence one year later.

There were three patients for whom local management was unsuccessful. Of these, one with a GCT in the proximal femur had a further four operations after the initial treatment because of three local recurrences in bone and one in the soft tissue. The patient had a slight limp and radiographic signs of degenerative osteoarthritis of the hip and eventually had a total hip replacement. At follow-up, 80 months after the last local recurrence there was no evidence of disease.

In another patient, the surgeons managing care were not confident that the first local recurrence could be treated by
further curettage and cementing. The primary tumour had been large and was located in the lateral tibial condyle with extraosseous extension, leaving a very thin layer of subchondral bone after curettage. The treated area was stabilised with a plate, but the patient mobilised unsatisfactorily and experienced more pain. A local recurrence was suspected 11 months after the primary treatment. At re-operation a recurrence was found close to the articular cartilage which was damaged during the earlier surgery. His pain was not controlled effectively and four months after treatment of the local recurrence an en bloc resection and reconstruction with an endoprosthesis was undertaken. During this operation, more tumour tissue was found. At follow-up 49 months later he was free of disease.

The final patient had an 8 cm primary tumour in the distal femur with extraosseous extension. A local recurrence with soft-tissue involvement was diagnosed seven months after primary surgery and was treated with further curettage and cementing. Another local recurrence occurred four months later and a transfemoral amputation was performed, as another curettage and cementing or reconstruction was not considered to be possible for local tumour control. Subsequently, pulmonary metastases were observed and chemotherapy was given. At last follow-up, three years after amputation, there were no signs of local recurrence but the pulmonary metastases persisted.

The remaining three patients of the 19 who had local recurrence had more extensive surgery, with resection of involved bone and reconstruction because curettage was considered inadequate for local tumour control or preservation of the associated joint.

One patient had a tumour in the distal radius which had destroyed approximately half of the radiocarpal joint and there was soft-tissue extension. Cement had been used to reconstitute the distal radius at primary surgery. The patient had a local recurrence after 20 months which expanded rapidly and extended into the soft tissue during the month between diagnosis and planned surgery for further curettage and cementing. The operative strategy was changed and the distal radius was resected and reconstructed with an iliac bone graft and arthrodesis of the wrist. At latest follow-up, 32 months after the last operation, there was no local recurrence but the patient had reduced grip and strength.

Another patient had a 10 cm primary tumour with a pathological fracture and soft-tissue extension in the proximal humerus, which was treated with curettage and cementing. A local recurrence, involving bone and soft tissue, was confirmed four months after the primary treatment. The local recurrence was treated by resection of the proximal humerus and reconstruction with an endoprosthesis. At latest follow-up, seven years later, the patient was free of disease. There was a reduced range of movement of the shoulder, but no pain.

The final patient had a large primary tumour in the proximal femur involving the greater trochanter and femoral neck, with periosteal destruction and soft-tissue involvement. The tumour was initially treated by curettage, cementing and stabilisation with a sliding-screw and plate. The patient mobilised poorly and had a local recurrence after ten months with a soft-tissue component. Further treatment required resection of the proximal femur and a total hip replacement. The patient was free of disease at latest follow-up, nine years after the most recent operation.

Discussion

We found that local recurrence of GCT in long bones after treatment with curettage and cementing is not associated with a high morbidity or a great risk of recurrence. Most of the patients who had a local recurrence were successfully treated with further curettage and cementing with a good outcome. Of the 19 patients, five were treated with more extensive surgery, including endoprosthetic replacement, because it was considered impossible to eradicate the tumour and preserve the associated joint with curettage and cementing. One further patient had a total hip replacement because of persistent pain, but was free of disease.

It is generally accepted that the incidence of local recurrence after treatment with curettage and by either cementing or bone grafting is higher than after treatment with en bloc resection. However, curettage and cementing usually results in normal, or almost normal function, whilst en bloc resection followed by arthroplasty or arthrodesis does not. The cement provides reliable support to the remaining bone cavity after curettage and allows immediate full-weight-bearing. Moreover, the use of polymethylmethacrylate has been observed to reduce the rate of local recurrence, suggesting an adjuvant tumouridical effect. The basis for such an assumption has been the presence of a radiolucent zone observed around the cement, thought to be due to heat necrosis. Another possible advantage with using cement is that the marked contrast between the cement and the bone may facilitate early detection of local recurrence.

The management of local recurrences after curettage and cementing has not previously been specifically addressed. O’Donnell et al. investigated the incidence of local recurrence after curettage and cementing in long bones and described the treatment of these local recurrences. They studied 15 patients, five of whom with local recurrence underwent further curettage and cementing while ten had a resection. In their study the post-operative function was not mentioned and the reason for choosing either of the options was not given. In our series, 13 of 19 patients with local recurrence after primary curettage and cementing were successfully treated with further curettage and cementing and had good to excellent function. Of these 13 patients, two had a second local recurrence, which was successfully treated with further curettage and cementing. Resection and reconstruction were finally used in five patients and it may be argued that these patients were not suitable for curettage and cementing initially. However, the choice of
curettage and cementing as the primary treatment did not compromise the final outcome even if further surgery was necessary.

Metastases occur in 1% to 9% of patients with GCT and some earlier studies have correlated the incidence of metastases with aggressive growth and local recurrence.\textsuperscript{15,16} In a recent report\textsuperscript{17} on the treatment using intralesional curettage and cementing of grade II and III GCTs, which may be regarded as aggressive lesions, a local recurrence rate of 6% and a distal metastatic rate of 3% was found. This implies the risk for these events when treating aggressive GCTs with intralesional curettage and cementing is not increased. In our primary series of 137 patients, metastases occurred in two patients, of whom one also had a local recurrence. We believe that a more aggressive treatment of local recurrence would not decrease the risk for metastatic disease.

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References