FOREQUARTER AMPUTATION FOR HIGH-GRADE MALIGNANT TUMOURS OF THE SHOULDER GIRdle

S. M. BHAGIA, E. M. ELEK, R. J. GRIMER, S. R. CARTER, R. M. TILLMAN

From the Royal Orthopaedic Hospital, Birmingham, England

We reviewed 20 patients after forequarter amputation performed for high-grade malignant tumours of the shoulder girdle (Enneking grades IIb to III). The operations were classified as palliative or curative according to the resection margins and the presence of disseminated disease at the time of the surgery. There were five palliative and 15 curative procedures. Two patients died from unrelated causes, septicaemia and suicide. Eight died in the first two years, four of whom had had a palliative operation. Four died between two and five years after surgery, one after a palliative operation. Five patients are alive, at a mean of 89.4 months after surgery, four of whom are free from disease. The median survival after a palliative amputation was 20.6 months. Our overall five-year survival (palliative and curative cases) was 21.2%, for curative cases it was 30.2%. None of the patients use an artificial prosthesis. Despite the disfigurement which results from this operation, it still has a useful role to play in the management of high-grade malignant tumours of the upper limb.

Received 14 March 1997; Accepted after revision 1 July 1997

Since malignant tumours of the shoulder girdle are usually more difficult to manage than those which occur more distally they have a poorer prognosis. Forequarter amputation or interscapulothoracic resection is an extensive, radical procedure to remove the upper limb and shoulder girdle.

It was used in the early 19th century for injury and 40 years later for malignant tumours. The indications in malignancy have not altered; it may be considered for tumours of the shoulder girdle or surrounding soft tissues which invade the glenohumeral joint, the brachial plexus or axillary vasculature, making limb salvage or shoulder disarticulation impossible (Fig. 1).

In most cases this procedure is used to resect primary bone or soft-tissue sarcomas in an attempt to remove the entire tumour and to achieve a cure. Occasionally, in carefully selected patients with metastatic disease, the procedure is palliative, especially for huge, painful or ulcerating lesions. The life expectancy of such patients is very poor.

We reviewed amputations performed for high-grade musculoskeletal tumours at the Royal Orthopaedic Hospital Oncology Service, Birmingham, UK over a 15-year period and assessed the results.

PATIENTS AND METHODS

Between 1979 and 1994 we have treated 138 patients with primary or secondary high-grade malignant disease of the shoulder girdle presented at the Royal Orthopaedic Hospital Oncology Service, Birmingham, UK. In 20 patients limb-preserving surgery or shoulder disarticulation was not possible because of the extent of involvement, and they had a forequarter amputation. Eighteen had primary bone or soft-tissue tumours and two had metastatic tumours from bronchial and renal carcinomas. Three amputations were performed for local recurrence after excision of the primary tumour or endoprosthetic replacement of the proximal humerus.

The mean age of the patients at presentation was 39 years (13 to 77). There were 11 males and 9 females. Both sides were equally involved. The mean duration of symptoms was 22 weeks (2 weeks to 2 years). The most common presenting symptoms were pain, swelling and a reduced range of movement. Four patients had pathological fractures of the proximal humerus and two had a moderate distal neurological deficit. The proximal humerus was involved in 15 cases, the scapula in two and predominantly soft tissues in three. Before surgery all patients had extensive clinical and radiological investigations for staging of
the tumour. These included routine radiography, CT (recently MRI) of the shoulder, CT of the chest, bone scanning (in skeletal tumours) and biopsy of the lesion. Table I gives the histological diagnoses. All patients had high-grade malignant tumours; 15 were classed as stage IIIB and five as stage III (Enneking). Thirteen patients had preoperative chemotherapy and five had preoperative radiotherapy. For all of these, the staging studies were repeated before surgery.

All patients had prophylactic antibiotic cover, most commonly with cefuroxime. The mean duration of surgery was 2.2 hours (1.5 to 3.5). The mean blood loss was 1.44 l (0.45 to 3.25). The operative technique was as described by Littlewood. We considered the operation to be palliative when the patient had metastases at the time of surgery or where the resection margins were not free from tumour. The latter were classified according to Enneking. Two of the three patients who had amputation for recurrence received postoperative radiotherapy.

RESULTS

One patient died after three weeks due to sepsicaemia. The patients were discharged at about seven to ten days after surgery, except for two who developed wound infection and wound necrosis. The wound infection settled with antibiotic therapy, but the wound necrosis necessitated regular debridement and later skin grafting. One patient developed a postoperative pleural effusion which did not require drainage and resolved spontaneously.

Histologically, the resection margins in all cases were free from tumour, and considered to be wide. Five patients were classed as having had palliative amputations, because distant metastases were detected during preoperative staging. Of these, two had metastatic carcinomas from the bronchus and kidney, respectively.

The surviving patients were reviewed regularly at either the Royal Orthopaedic Hospital or the referring hospital. One patient committed suicide after seven months and was not included in the final analysis of results. She did not have any evidence of disease at the time of her death. Of the 18 patients studied, eight had died in less than two years from metastatic disease. Of these eight, four had had palliative surgery and four were considered to have had a curative procedure, with wide margins and no evidence of distant metastases on preoperative staging. Four patients died at between two and five years (one palliative and three curative). Five remain alive at a mean of 89.4 months (29 to 177). All had curative procedures and four are free from disease.

Figure 2 provides a survival analysis curve of patients after palliative and curative forequarter amputations.

DISCUSSION

Since the early 19th century, several series of forequarter amputations for musculoskeletal tumours have been reported. The overall five-year survival for such patients

Table I. Histological diagnoses in 20 patients who had forequarter amputation

<table>
<thead>
<tr>
<th>Tumour</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteosarcoma</td>
<td>11</td>
</tr>
<tr>
<td>Chondrosarcoma</td>
<td>3</td>
</tr>
<tr>
<td>Liposarcoma</td>
<td>1</td>
</tr>
<tr>
<td>Malignant fibrous histiocytoma</td>
<td>1</td>
</tr>
<tr>
<td>Metastatic carcinoma</td>
<td>2</td>
</tr>
<tr>
<td>Fibrosarcoma</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

Fig. 1
Coronal oblique T1-weighted MRI showing an extensive tumour of the proximal humerus with large lobules extending into the axilla, making limb salvage impossible. Histological examination showed this to be a Ewing's sarcoma.

Fig. 2
Survival analyses comparing the results of palliative with curative amputation for high-grade malignant tumours of the shoulder girdle.
after forequarter amputation ranges from 0% to 50%. Levine et al 13 in their series of ten patients with soft-tissue tumours reported a 100% ten-year survival rate, but they included patients with locally aggressive non-metastatic conditions such as fibromatosis. In our series, all patients had high-grade tumours and our results indicate a 21% overall five-year survival (30% in curative cases) which is comparable to that reported by Sim et al 4 (20%) and Fanous et al 12 (25%).

In spite of the relatively poor overall five-year survival we believe that forequarter amputation still has a role in the treatment of malignant tumours of the shoulder girdle. The indications have become narrower with improvements in chemotherapy, radiotherapy and limb-salvage procedures. Only about 15% of all our patients with primary and secondary malignant tumours of the shoulder girdle were considered unsuitable for limb salvage. It is imperative that all patients with high-grade tumours should be referred to specialised oncology units. Only these have the experience to determine the suitability of cases for limb-salvage surgery or amputation.

Patients requiring amputation of a limb usually have large tumours with a high incidence of distant metastases. These have a poor prognosis, 13,14 as confirmed by our overall survival rate of 21%. Primary amputations have a better overall outcome than amputations for local recurrence after excision of a previous tumour or endoprosthetic replacement. 1,5,11

The benefit of forequarter amputation as palliation will always be questioned. In our series all five patients who had palliative procedures died within three years, as did those of Malawer et al. 15 Despite such short survival, we believe that the palliative amputations were justified because they gave relief of pain and allowed some independence. The benefit of any palliative procedure is difficult to quantify, but pain relief has the highest priority.

None of the patients liked the artificial limb which was supplied; none regularly used it, possibly due to the lack of proprioception and precise movement. All surviving patients use shoulder pads to maintain their shoulder contours (Fig. 3). There is an obvious need for further research to design a useful prosthesis. The disfigurement associated with such an amputation (Fig. 3) may give considerable psychological distress. This and the fact of suffering from a malignant disease with a poor prognosis may have contributed to the suicide of one of our patients. For these reasons, counselling is necessary before surgery and should include meeting other patients who have had a similar procedure. A good rehabilitation team is also essential.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES

THE JOURNAL OF BONE AND JOINT SURGERY