Biopsy technique in the treatment of osteosarcoma

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SUMMARY

Seventy-eight consecutive patients with Stage IIB osteosarcoma of the appendicular skeleton, treated between 1982 and 1992, were studied to determine whether the technique of biopsy affected the prognosis for long term survival. The risk of local recurrence was significant ($p < 0.02$) after opera biopsy, as was the poor response to chemotherapy ($p < 0.05$) after percutaneous biopsy. We recommend percutaneous biopsy, if possible, when an osteosarcoma is suspected.

RÉSUMÉ

Étude de 78 malades atteints d'ostéosarcome des membres de stade II-B, traités de 1982 à 1991. Le but de ce travail est de savoir si le type de biopsie réalisé a une influence sur le pronostic vital. Le risque de récidive locale est significativement plus élevé ($p < 0.02$) en cas de biopsie ouverte. Une mauvaise réponse à la chimiothérapie est plus fréquente ($p < 0.05$) en cas de biopsie per-cutanée. Néanmoins, en cas de soupçon d'ostéo-sarcome, nous conseillons de réaliser; chaque fois que possible, une biopsie percutanée.

INTRODUCTION

Many reports attempt to identify the factors which may affect the prognosis in osteosarcoma [2, 4, 7, 11, 12, 13, 16, 18, 20, 23, 25, 26, 31, 35, 38].

We wanted to estimate the long term prognosis in a series of patients with osteosarcoma receiving adjuvant chemotherapy in a single institution, and to determine whether the technique of biopsy was a prognostic factor in the long term survival, and also to estimate the magnitude of the effect of this factor on survival.

MATERIALS AND METHODS

The records of all the 128 patients who presented at our hospital with the diagnosis of osteosarcoma between 1982 and 1992 were reviewed. The current series was restricted to patients with primary high grade nonmetastatic osteogenic sarcoma of the appendicular skeleton who had their definitive surgical treatment in the Department of Orthopaedic Surgery. Exclusions are shown in Table 1.

The follow up ranged from 12 to 156 months (median 48.9 months). The combined population experience of this study included more than 350 patient-years of observation. Every patient was included in a chemotherapy protocol [36].

The patients were treated either by amputation or limb-sparing surgery. Selection was based on the site of the primary tumour or neurovascular involvement.

Statistical analysis

Time zero in all analyses was taken as the date of definitive diagnosis by biopsy. The univariate survival analysis was performed following the Kaplan-Meier product-limit estimate [21]. One patient, who was free of disease, died of complications related to treatment while receiving postoperative chemotherapy and was excluded from the study. We have used a Macintosh Classic and StatviewTM programme.

RESULTS

Eighty-six patients were within the inclusion criteria. Of these, 8 (9.3%) had metastatic disease (stage III). The remaining 78 had localised disease and received comprehensive treatment in our hospital; they comprise the case series in this study.

There were 38 boys and men with a mean age of 18 ± 8 years (range 5 to 45 years), and 44 girls and women with a mean age of 16 ± 6 years, (range 4 to 40 years) (Fig. 1). The sites of the lesions are shown in Table 2.

The definitive surgery was amputation in 2 patients (2.6%) and limb-sparing excision in 76 (97.4%). Table 3 describes the treatment according to the site of the lesion. The margins of surgery, as defined by the Musculoskeletal Tumour Society [9], were wide in 38 patients (49.9%), radical in 2 (2.6%), marginal in 33 (42.9%) and intralesional in 5 (6.5%).

Percutaneous biopsy was carried out in 25 patients and open biopsy in 52; these procedures were all undertaken in other hospitals.

Survival

Data from all the patients was analysed. Of the 78 observed, 12 died from local recurrence, 11 from metastases and one from toxicity.

Out of all the patients, 10 (12.8%) had a local recurrence and 17 (21.8%) had metastases. The site of the metastasis was lung in 16 cases, and bone in one case. Seven patients had both lung metastases and local recurrence.

The disease-free survival was 74.36% at 5 years and 70.27% at 10 years (Kaplan-Meier) (Fig. 2). All those with local recurrence (10 cases) had had an open biopsy ($p < 0.02$). The response to chemotherapy was better in the those with an open biopsy ($p < 0.05$) (Table 4).

DISCUSSION

We have identified that the technique used in biopsy is a factor that could predict the outcome in patients with osteosarcoma. The characteristics of our patients were similar to those in other series [8, 12, 27, 37], as were our survival rates [8, 12, 14, 20, 27] Table 5. No difference was found between the disease-free survival in patients treated by amputation or limb salvage [6, 12, 14, 24, 33].

Local recurrence after treatment of osteosarcoma carries a very bad prognosis. The incidence of local recurrence has been reported as 12% [17] and 16.1% [40], compared with 12.8% in our series.

We have found significant differences in local recurrence after biopsy, and all recurrences have followed an open technique. We do not know why open biopsy had a better chemotherapeutic response than percutaneous biopsy. An open biopsy can injure the circulation around the tumour.

We therefore propose that percutaneous biopsy under radiographic control should be carried out when osteosarcoma is suspected, and this is the policy of other surgeons [3, 5, 10, 16, 19, 28, 30, 34]. We only advise open biopsy when the result of percutaneous biopsy is not conclusive. Open biopsy should be performed carefully, bearing in mind the definitive surgery which may be necessary when planning the approach.

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Table 1. The cases excluded from the group studied	
Primary surgical treatment elsewhere	6
Axial site	10
Lesion secondary to Paget's disease or radiation	1
Metastatic disease on presentation	8
Refused our treatment	25
Total excluded	49
Total in the current series	78

Table 2. The skeletal site of the tumours		
Upper limb		5
Humerus	Proximal	0
	Middle	1
	Distal	1
Radius		
Lower limb		
Femur	Proximal	3
	Middle	6
	Distal	37
Tibia	Proximal	17
	Middle	2
	Distal	3
Fibula		2
Calcaneus		1
Total		78

Table 3. Brief details of the surgical treatment										
	Humerus		**Radius**	**Femur**			**Tibia**			**Fibula**
	Proximal	**Distal**		**Proximal**	**Middle**	**Distal**	**Proximal**	**Middle**	**Distal**	
Allografts	—	—	—	—	—	—	—	—	—	—
Knee prostheses	—	—	—	—	—	17	9	—	—	—
Hip prostheses	—	—	—	1	1	—	—	—	—	—
Osteoarticular	1	1	—	—	—	1	—	—	1	—
Intercalary	—	—	—	—	5	8	3	1	—	—
Arthrodesis	—	—	—	—	—	3	—	—	2	—
Autografts	—	—	—	—	—	—	—	—	—	—
Intercalary	—	—	1	—	—	3	—	1	—	—
Endoprostheses	—	—	—	—	—	—	—	—	—	—
Knee	—	—	—	—	—	4	4	—	—	—
Hip	—	—	—	2	—	—	—	—	—	—
Shoulder	4	—	—	—	—	—	—	—	—	—
Resection	—	—	—	—	—	—	—	—	—	2
Bone transplant	—	—	—	—	—	1	—	—	—	—

Table 4. Response to chemotherapy		
	Poor response (%)	Good response (%)
Biopsy type:		
Open	12 (29)	30 (71)
Percutaneous	9 (45)	10 (55) $p < 0,05$

Table 5. Disease-free survival – comparison with other series		
Centre	**Survival 5 years**	**10 years**
Rizzoli (Bologna) [1]	82%	(3 years)
Sloan-Kettering Memorial (New York) [12]	77%	74%
University Clinic of Vienna [22]	76%	(3 years)
AC Camargo Hospital (Sao Paulo) [31]	61%	(3 years)
MD Anderson (Houston) [14]	58%	58%
All-union Cancer Research Center (Moscow) [39]	58%	
Royal Prince Alfred Hospital (Sydney) [29]	58%	
Royal Orthopaedic Hospital (Birmingham) [6]	48%	

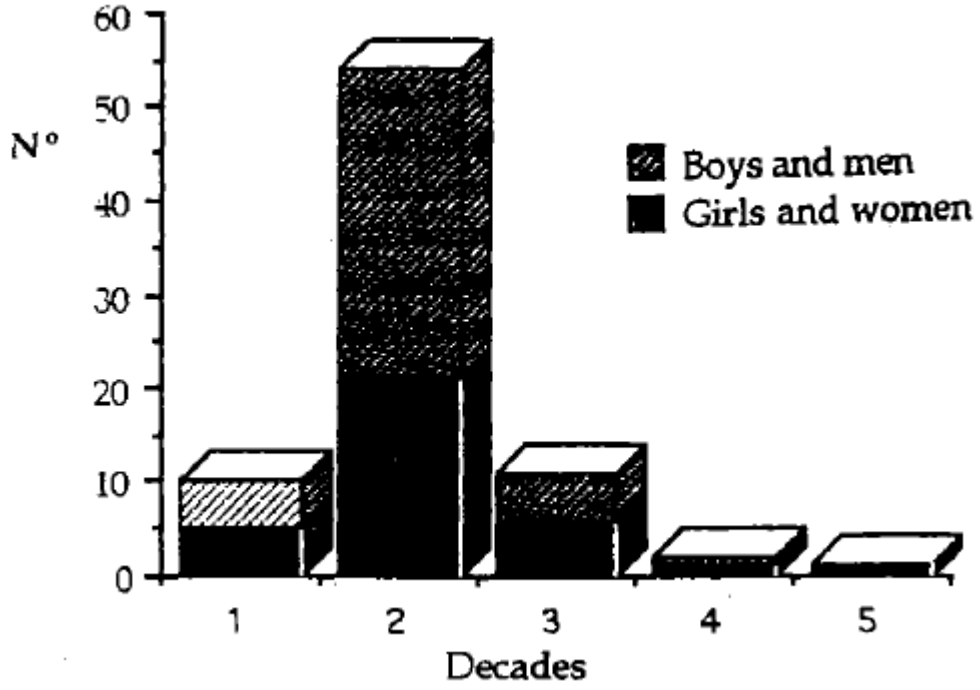

Figure 1. Age and gender of the patients

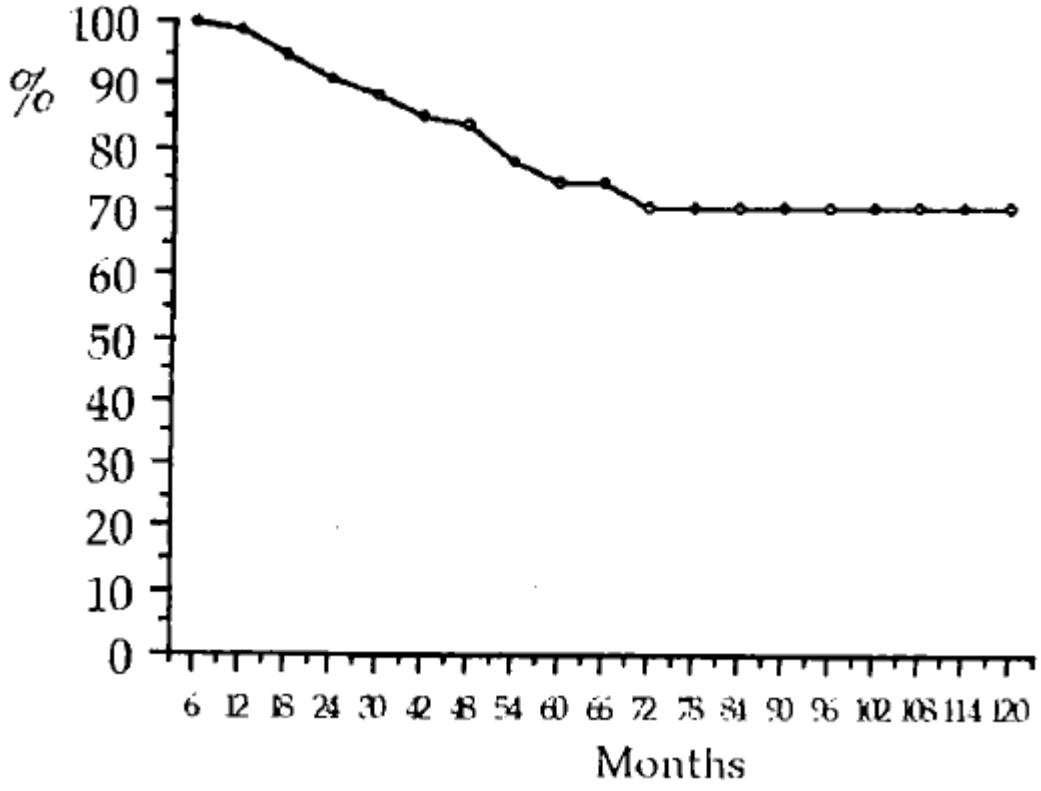

Figure 2. Disease-free survival (Kaplan-Meier)