Preservation of the extremity in bone and soft tissue sarcomas with multidisciplinary treatment

I. Henriquez, J. Cañadell, O. Abuchaibe, L. Sierrasesúmaga, L. Aguilella, F.A. Calvo

Clínica Universitaria de Navarra, Pamplona, Spain

Extremity conservation is a major achievement of our decade in the management of bone and soft tissue sarcomas.[1] Multidisciplinary treatment approaches have made possible to consider an important proportion of patients for extremity preservation programs from the initial diagnosis of the disease. Conservative surgery and radiotherapy is accepted as the conventional treatment of soft tissue sarcomas.[2] Neoadjuvant chemotherapy has changed radically the local treatment of ostesarcoma.[3] Radiotherapy and chemotherapy manage adequately Ewing sarcoma of the extremities, but surgery is recently gaining place in advanced lesions.[4,5]

This report analyzes the experience obtained in the extremity preservation approaches in a single Institution, using intensive local and systemic treatment programs, depending upon the histological type of the tumor. A special mention ought to be made to the incorporation of intraoperative radiotherapy and intra-arterial chemotherapy as promising developmental therapeutic modalities.[6,7]

Materials and methods

From 1982 to 1989 all patients diagnosed and fully treated in our Institution with extremity sarcomas entered in this analysis. Histological types were: 42 osteosarcomas, 22 Ewing sarcomas, 19 soft tissue sarcomas and 5 bone malignant fibrous histiocytomas.

The presence of disseminated disease was established at the time of initial evaluation in 9 cases (8 osteosarcomas, 1 Ewing sarcoma).

Disease was locally recurrent to previous treatment in 21 cases (8 Ewing sarcomas, 13 soft tissue sarcomas) (Tab. I).

The treatment protocols by histologycal type were the following.

Osteosarcoma: neoadjuvant intra-arterial cisplatinum followed by resection, ± intraoperative radiotherapy to the tumor bed (20 Gy) and 10 months systemic adjuvant chemotherapy (modified T 10 Rosen protocol). In cases with disseminated disease thoracotomies were considered at the end of induction treatment.

Ewing sarcoma: neoadjuvant chemotherapy (T 11 protocol) with simultaneous preoperative radiotherapy (40-60 Gy) followed by bone removal and intraoperative radiotherapy (10-20 Gy). Adjuvant chemotherapy was given for 10 months or until progression in disseminated cases.

Soft tissue sarcomas: wide surgical resection plus intraoperative radiotherapy (10-20 Gy). Adjuvant chemotherapy was given to patients with high grade sarcomas or disseminated disease.

Other bone sarcomas: same approach as soft tissue sarcomas.

All patients were seen at periodic follow-up. Local failures were considered on individualized basis for extremity preservation treatment programs or amputation.

Results

Patterns of local failures

Five patients develped a local recurrence (6%). Local recurrences were seen at a follow-up ranging from 12 to 24 months since the surgical procedure. Distribution of local failures by histologies were: 4 osteosarcomas (10%) and 1 soft tissue sarcoma (5%). Condroblastic osteosarcoma (9 cases) subtype showed 3 local recurrences (33%). The incidence of local recurrences in patients treated with intraoperative radiotherapy was 2/67 (3%) and 3/21 (14%) in patients not treated with this modality.

Rescue of local failures: amputation data

Amputation was performed in 4 out of 5 patients with local recurrence. Two Ewing sarcomas patients were am-

Tab. I.
Disease status and histologycal distribution of the experience analyzed (extremity sarcoma patients in the period 1982-1989)

Tumor type	*Localized*	*Disseminated*
Osteosarcoma	34	8
Ewing	21*	1
STS	19**	0
BMFH	10	0
TOTAL	79	9

* 8 pts had local recurrence before first CUN treatment.
** 13 pts had local recurrence before first CUN treatment.
CUN: Clinica Universitaria de Navarra.
BMFM: Bone malignant fibrous histiocytoma.
STS: Soft tissue sarcomas.

putated due to soft tissue necrosis, as a long term radiotherapy sequelae at 24 months from diagnosis and as a primary treatment. Distribution of histologies in this group was: 3 osteosarcomas, 2 Ewing sarcomas, and 1 soft tissue sarcoma.

In one patient individualized treatment program was designed in a new effort to preserve the extremity. This consisted, in 1 osteosarcoma patient, in maximal surgical debulking, intraoperative and external beam radiotherapy. This patient is alive and free of local recurrence at 18 months from the treatment of his recurrence.

Tab. II.
Patterns of failures

Tumor type	*Patterns of recurrences*		
	LF	*LF + DM*	*DM*
Osteosarcoma	1	3	3
Ewing	0	0	2
STS	1	0	2
BMFH	0	0	1
TOTAL	2 (3%)	3 (5%)	8 (12%)

LF: local failure.
DM: distant metastasis.

Tab. III.
Rescue to local recurrences: amputation data

Tumor type	*Rescue of local failure*		
	Amputation	*S + RT*	*S + RT + IORT*
Osteosarcoma	3	0	1
Ewing	0	0	8*
STS	1	0	13**
BMFH	0	0	0
TOTAL	4	0	22

* Recurrence patients.
** Recurrence patients.

Discussion

A wide consensus is accepted with regards to the efforts that ougth to be made for extremity preservation in these patients. Nevertheless, local recurrences will still present in high risk patients with locally advanced lesions and/or poor responders to local induction treatment.[8,9]

Multidisciplinary approaches are mandatory to offer reasonable results. Modalities such as intraoperative radiotherapy and intra-arterial chemotherapy are attractive techniques to be incorporated as research efforts for local intensification programs.

In our experience individualized designs for local recurrences might be attempted. Condroblastic osteosarcoma have shown to be a particularly resistant tumor to handle conservatively.

REFERENCES

1. Eilber F.R., Mirra J.J., Grant T.T. et al.: *Is amputation necessary for sarcomas? A seven year experience with limb salvage.*

2. Rosemberg S.A., Tepper J., Glatstein E.J. et al.: *The treatment of soft tissue sarcomas of the extremities. Prospective randomized evaluations of (1) limb-sparing surgery plus radiation therapy compared with amputation and (2) the role of adjuvant chemotherapy*, Ann. Surg. 1982; 196:305.

3. Jaffe N., Knapp J., Chuang V.P. et al.: *Osteosarcoma intra-arterial treatment of the primary tumor with Cis-diammine-dichloro platinum II. Angiographic pathologic and pharmacologic studies*, Cancer, 1983; 51:402-407.

4. Perez C.A., Tefft M., Nesbit M.F. et al.: *Radiation therapy in the multimodal management of Ewing's sarcoma of the bone. Report of the IESS*, Natl. Cancer Inst. Monogr. 1981; 56:263-271.

5. Jurgens H., Exner U. Gadner H., et al.: *Multidisciplinary treatment of primary Ewing's sarcoma of the bone. A 6 year experience of European cooperative trial*, Cancer, 1988; 61:23-32.

6. Calvo F.A., Sierrasesumaga L., Martin I. et al.: *Intraoperative radiotherapy in the multidisciplinary treatment of pediatric tumors*, Acta Oncol., 1989; 28:257-260.

7. Mavligit G.M., Benjamin R.S., Patt V.Z. et al.: *Intra-arterial Cisplatinum for patients with inoperable skeletal tumors*, Cancer, 1981; 48:1-4.

8. Lack E.E., Steinberg S.M., Withe D.E., et al.: *Extremity soft tissue sarcomas: analysis of prognostic variables in 300 cases and evalutation of sumer necrosis as a factor stratifying higher-grade sarcomas, J Surg. Oncol., 1989; 41:263-273.*

9. Picci P., Bacci G., Campanacci M., et al.: *Histologic evaluation of necrosis in osteosarcoma induced by chemotherapy*, Cancer, 1985; 56:1515-1521.