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THE ROLE OF RADIOTHERAPY IN SOFT TISSUE SARCOMAS

Retrospective study of 115 cases treated from 1979 to 1988

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SUMMARY

In this study was analysed the results of a group of patients with soft tissue sarcomas treated at the IPOFG Center of Lisbon from January 1979 to December 1988. All these cases were referred to the Radiotherapy Department for radiation treatment, which was given in 84% of the patients as a complement to sugery and in 16% was either combined with chemotherapy or given as exclusive therapy. The immediate results showed complete remission in 79% and partial remission in 7% of the cases. Seventeen per cent of the patients developed relapses and 28% distant metastases after a free interval of 27.7 and 19.6 months respectively. The five year survival rates were 73.3% for the patients without recurrences, 55,4% for the patients with relapses and 21.4% for disseminated disease. The long term results varied according to the localization of the tumor, the stage of the disease, the age of the patient, the extension of surgery, the histologic type and the radiation dose. Five year survival rates also varied with the type of treatment (63.8% for surgery followed by radiotherapy with or without chemotherapy and 50.8% for preoperative radiotherapy and surgery with or without adjuvant chemotherapy). Radiotherapy with or without chemotherapy, in inoperable patients, was generally useful because it improved the quality of life, saving about 25% of the inoperable cases. Treatment related complications were minimal.

INTRODUCTION

In recent years there has been considerable progress in the handling of soft tissue sarcomas (STS) not only in what concerns a greater definition of these tumours, thanks to the introduction of new techniques in the field of pathology and imaging, but also a multidisciplinary philosophy [1-3].

In actual fact, although the primary treatment of STS is surgery, radiotherapy (RT) in its different modalities, namely external RT and brachytherapy, has an increasingly important role in the sterilization of the tumour bed in view of the growing tendency, in recent years, towards less aggressive surgical interventions. With this combined radiosurgical intervention it has been possible, especially with STS of the extremities, to obtain results which are similar to those of amputation, with the advantage of a better quality of life due to functional preservation [4-15]. As regards inoperable STS, apart from the combination of hyperthermia with RT, there are potential radiobiological advantages in the application of high LET radiation, such as the neutron beam, although with higher morbidity in relation to conventional radiation [1,16].

On the other hand, in STS of high malignancy, due to its greater propensity for systemic dissemination, adjuvant chemotherapy should also be considered, with particular relevance to its administration through hyperthermic perfusion, with very promising results in combination with radiotherapy in the neoadjuvant therapy of voluminous tumours in the limbs [17,18].

It becomes important to develop randomized prospective trials which will only be possible by means of intergroup studies, in view of the rarity and great diversity of these neoplasias.

The objective of this work consists of the retrospective analysis of the results of 115 cases with STS treated at the Lisbon Center of the Francisco Gentil Portuguese Institute of Oncology, over a period of 10 years, according to the clinical situation, the nature of the operation and the irradiation performed.

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METHODS

From a group of 120 patients enrolled for treatment at the Radiotherapy Department, 115 were analyzed during the period of 1979 to 1988.

54 patients were males and 61 females with ages which varied from 12 months to 83 years, the average age was 44,5 years. The age distribution is presented in *Fig. 1*.

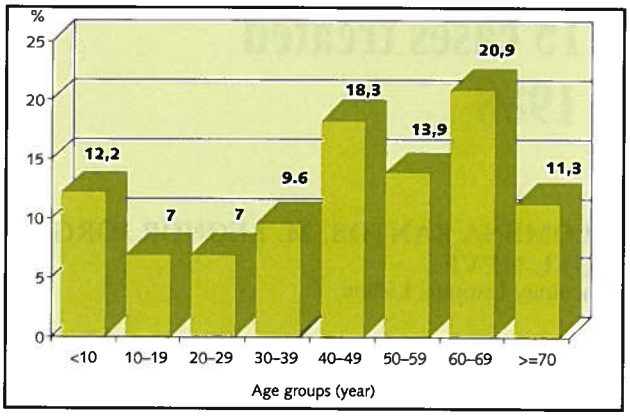

Fig. 1 – Soft Tissue Sarcomas, Age distribution

The evolution time of the disease varied between 1 and 120 months with an average of 15,9 months.

In the TNM distribution, we verified that the cases classified with T2 No and Mo were predominant *(Fig. 2)*.

In the clinical presentation, we verified the predominance of anatomical location of the extremities (48%), followed by the trunk (28%) and the head and neck (24%).

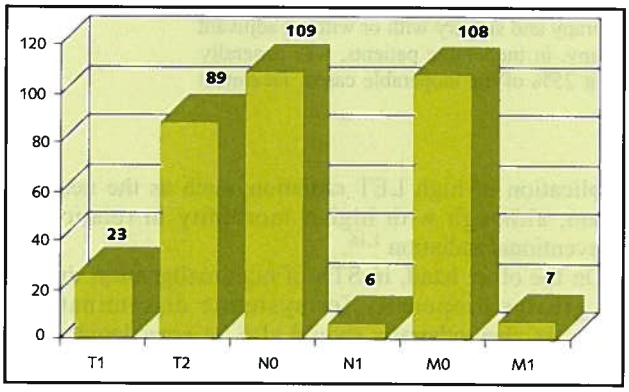

Fig. 2 – Soft Tissue Sarcomas

When admitted, sixty-three cases (55%) presented primary tumours while fifty-two (45%) showed relapse.

In the distribution of the histologic types we observed that there was a predominance of fibrosarcomas (27 cases), neurogenic sarcomas (23 cases) and rabdomyosarcomas (20 cases) *(Fig. 3)*

According to treatment, the majority of the cases treated (74%) were submitted to surgery followed by post-operative radiotherapy combined or not with chemotherapy.

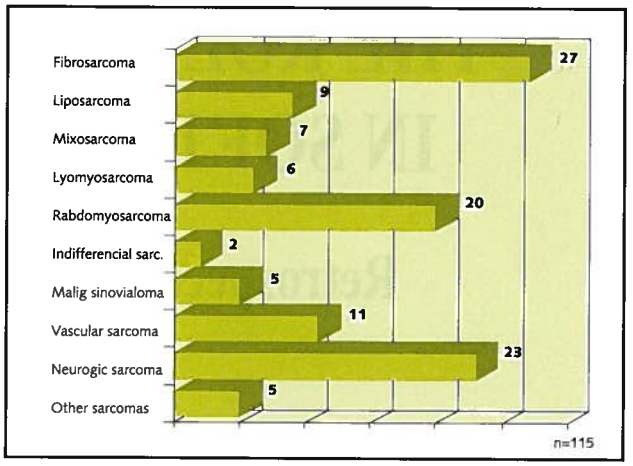

Fig. 3 – Soft Tissue Sarcomas Histologic Types

The distribution according to the extension of the surgery showed that 50% were submitted to wider resection; a limited resection was performed in 17%; 11% were operated outside the Francisco Gentil Portuguese Institute of Oncology and 22% were considered inoperable due to the advanced stage of the lesion, the overall condition or very advanced age.

In what concerns radiotherapy, all these patients were submitted to external irradiation.

In the cases considered operable, irradiation was combined with surgery, in the majority of the cases (74%) radiotherapy was post-operative and in 4% of the cases it was pre-operative for cytoreduction due to the tumour size. The remaining 22% were considered inoperable and were therefore submitted to intensive RT.

Telecobalt - 60 was used on the majority of patients (81%); in 14% a photon beam supplied by the Linear Accelerator and in 5% a combination of telecobalt therapy and electron therapy was used.

In the post-operative radiotherapy the determination of the target volume was established according to the total area encompassed by surgical manipulation with an adequate safety margin. In the inoperable cases, the target volume was established in relation to the clinically detectable tumour volume with a safety margin taking into account the potential extension of the subclinical lesion.

In general, either two parallel opposite fields or three to four entrance fields in cross focus were used according to the most adequate dose distribution of the clinical situation.

With all these patients, the conventional fractionation of 2 Gy per day was practiced.

The reduction of the fields was generally made after the dosage of 45 to 50 Gy. A boost with electron beam was administered up to 60 and 70 Gy in 6 or 7 weeks, of which the highest dose corresponds to exclusive intensive radiotherapy.

In this study we neither include the cases which were submitted to the flash techniques with a concentrated dose, nor the patients who, at an early stage, stopped radiotherapy for various reasons.

RESULTS

The immediate results showed complete remission in 79% and partial remission in 7%.

Seventeen percent of the patients treated developed relapses and 28% developed metastases after an average free interval of 27,7 and 19,6 months, respectively.

Pulmonary metastases were the most frequent (59%).

The actuarial life expectancy at five years of the cases without recurrences was of 73,3%, decreasing to 55,4% and 21,4% for the cases with relapses and with metastases, respectively *(Fig. 4)*.

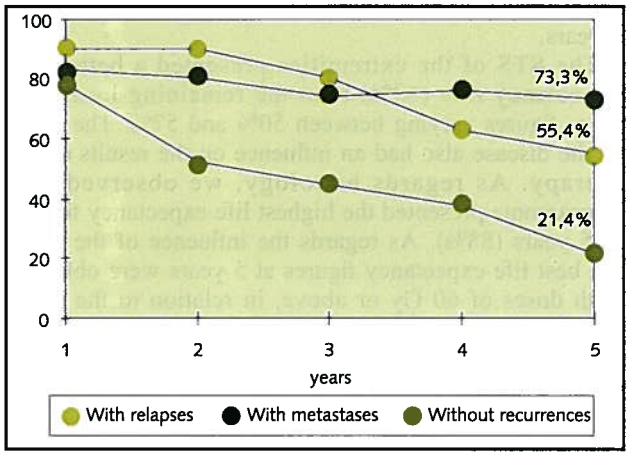

Fig. 4 – Soft Tissue Sarcomas Life expectancy by clinical situation

As regards the actuarial life expectancy at five years, according to the location, it was higher (63%) in STS of the extremities, lowering to about 50% in the remaining locations *(Fig. 5)*.

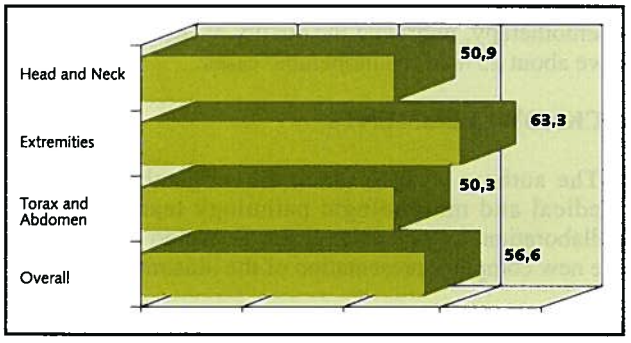

Fig. 5 – Soft Tissue Sarcomas Actuarial Expectancy at 5y by Location

As regards the actuarial life expectancy figures, according to the TNM, we observed that they varied between 74,7% and 51,4% for T1 and T2; 58,5% and 23,8% for No and N1 to 0% for M1 *(Fig. 6)*.

The actuarial life expectancy figures were superposable in what concerns both sexes.

Related to age, the figures were lower for the younger patients, the actuarial life expectancy was 46,1% at five years for the patients aged 16 years or below and 61,4% for the patients above 50 years of age and 55,4% for the intermediate ages.

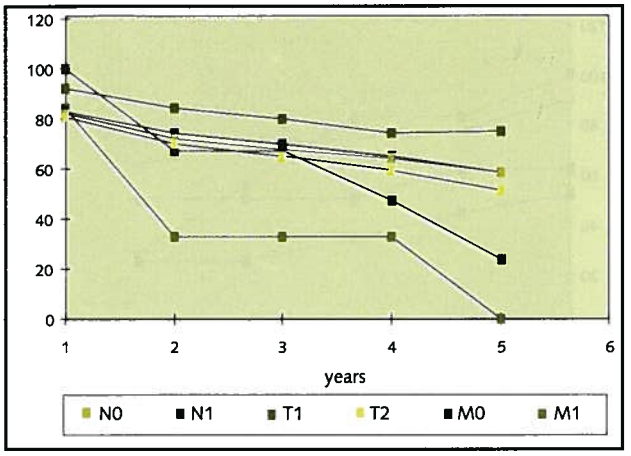

Fig. 6 – Soft Tissue Sarcomas actuarial life expectancy by TNM

The patients submitted to extensive surgery presented higher life expectancy figures than those who had more limited surgery with 64,2% and 50,9%, respectively, for actuarial life expectancy at 5 years.

In *table 1* we presented the results regarding the histologic type and it can be observed that the figures for actuarial life expectancy at five years were higher for liposarcoma with 88,2%, followed by neurogenous sarcomas and lyomyosarcomas with 65,2% and 63,6% respectively. The worst results were found in vascular sarcomas with only 27,5%. The remaining histologic types presented intermediate life expectancy rates.

Table 1 – Actuarial life expectancy at five years according to the histologic type.

Histology	Life expectancy 5 years
Fibrosarcoma	47,4%
Liposarcoma	88,2%
Lyomyosarcoma	63,6%
Rabdomyosarcoma	43,6%
Malignant sinovialoma	50,0%
Vascular sarcomas	27,5%
Neurogenic sarcomas	65,2%

Figure 7 shows the actuarial life expectancy curves according to the different types of treatment performed; the most favorable result was surgery followed by radiotherapy combined or not with chemotherapy, the respective life expectancy rate at five years was 63,8%. This was followed by the combination of pre-operative radiotherapy with surgery followed, or not, by chemotherapy (50,8%).

The use of exclusive radiotherapy or radiotherapy combined with chemotherapy in the cases with the worst prognosis provided a life expectancy rate at five years of 24,7% and 27,3% respectively, which is interesting to

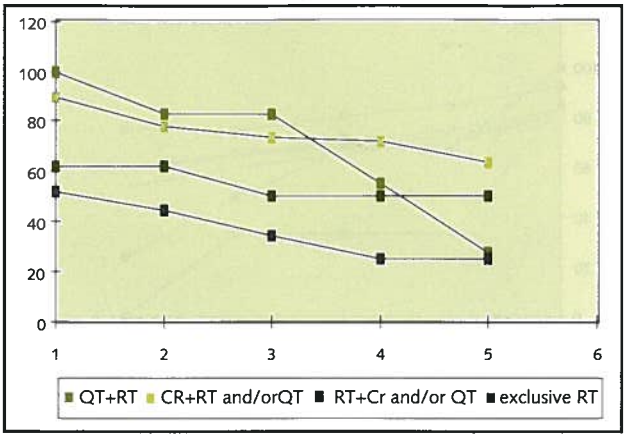

Fig. 7 – Soft Tissue Sarcomas actuarial life expectancy by Treatment

note that in this last group the respective curve had a more favourable trend up to three years of survival.

Finally, we conducted a study of the life expectancy, according to the dose administered, and observed an evident relationship with the highest expectancy figures for doses >60 Gy and the lowest for doses under 50 Gy, the respective life expectancy rates at 5 years were 72,2% and 30,9% respectively *(Fig. 8)*.

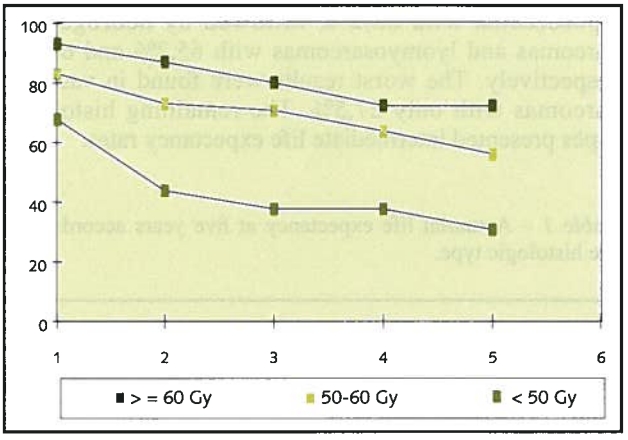

Fig. 8 – Soft Tissue Sarcomas actuarial life expectancy by dosage

Tolerance to treatment was good and complications were practically inexistent in this series of patients.

DISCUSSION

Soft tissue sarcomas represent a varied group of neoplasias, however they present a common characteristic which is the high capacity of relapsing even after radical treatment.

Radiotherapy, as an adjuvant of surgery, plays an important role as it helps prevent relapses by sterilizing the subclinical lesion in the tumour bed or by the possible destruction of the residual lesion occasionally left during the operating procedure [19,20].

The lower the residual volume of the lesion the higher the control with radiotherapy, thus depending on the type of surgery.

On the other hand, the lowest life expectancy rates at 5 years obtained by radiotherapy (RT) of the relapses either by exclusive RT or by RT after limited resection, regarding preventive RT after major resection, confirm the prognostic importance of the clinical situation.

In the present series, the patients without recurrences presented an actuarial life expectancy rate at 5 years of 73% the figures decreasing to 55% and 21%, respectively, for the cases with relapse and for patients with metastases. Of the patients submitted to exclusive radiotherapy, 24,8% presented life expectancy figures at 5 years.

The STS of the extremities presented a better life expectancy rate (63%) than the remaining locations, these figures varying between 50% and 57%. The stage of the disease also had an influence on the results of the therapy. As regards histology, we observed that liposarcoma presented the highest life expectancy figures at 5 years (88%). As regards the influence of the dose, the best life expectancy figures at 5 years were obtained with doses of 60 Gy or above, in relation to the cases treated with doses below 50 Gy (72% versus 31%).

CONCLUSION

Therefore, from our results, we may draw the following conclusions:

Radiotherapy proved to be quite effective in the prevention of relapses after surgery, in agreement with the results of the literature.

Therapeutic efficacy depends on various factors namely: clinical situation, histologic type, extension of the surgery and dose administered.

Exclusive radiotherapy or in combination with chemotherapy, improved the quality of life, being able to save about 25% of the inoperable cases.

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