Intraoperative electron radiation therapy joined to external beam radiation therapy and limb sparing surgery in extremity soft tissue sarcoma: a retrospective study of 182 cases in a single specialized centre.

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1. Objective

Limb-sparing surgery together with Intraoperative Radiotherapy (IORT), in the treatment of soft tissue sarcomas (STS), allows the preservation of the extremity, the control disease and a lower impact on its functionality. To analyse oncological control, survival, and quality of life provided with a homogeneous treatment program, containing IORT as radiotherapy intensification, in sarcomas of the soft tissues of the extremity, analysing the volumetric impact of the tumour on limb preservation and the resulting final functionality.

2. Methods

A sample of 182 patients diagnosed with STS of the extremities who were treated at the Gregorio Marañón General University Hospital (Madrid) has been retrospectively analysed. All were evaluated for multimodal treatment that included surgery and radiotherapy (with an intensification component through intraoperative radiotherapy – IORT-), EBRT (pre or postoperative) and in some cases chemotherapy. Likewise, the data on tumour volume, among other variables, has been collected to see its impact on functionality (assessed by the TESS scale) and survival, estimated by the Kaplan-Meier method and the differences with the *Log Rank test* together with Cox Regression.

3. Results

Median follow-up of 60 months, the disease-free survival (DFS) at 5- and 10-year were 57% and 54%, the specific cancer survival (SCS) at 5- and 10-year were 76% and 71% and the overall survival (OS) at 5- and 10-year were 76% and 72%. Tumours with volumes < 100 cc obtained an OS (5 years) rate of 100%, those < 250 cc 71%, and in those > 350 cc, OS decreased until 66%. No major differences were observed between the use of preoperative or postoperative EBRT, except in tumours with a volume < 250 cc, where oncological results are better with doses of EBRT ≤ 45 Gy, while in those ≥ 250 cc, better results are offered with preoperative EBRT. On the other hand, tumours < 120 cc obtained excellent functionality on the TESS scale (> 75), while those > 300 cc presented greater functional deficit with an impact on quality of life (TESS < 75). Acute and/or chronic toxicity occurred in 15.9% and 15.4% in the form of grade 1 or 2 radiodermatitis and peripheral neuropathy, respectively.

4. Conclusion

This retrospective observational study ensures that tumours with a volume < 250 cc have high OS rates at 5 and 10 years, with a very subtle impact on the functionality of the treated limb, also reporting low ratios of acute and/or chronic toxicity, which warrant adequate tolerance and safety of multimodal treatment. Of marked relevance is the significant negative impact on survival of factors such as: surgical resection margins ≤ 5 mm; histological grade 3; stages III and IV of TNM; the degree of mitosis; recurrent presentation sarcoma; a Ki-67 index > 40% and the appearance of metastasis. To

achieve acceptable toxicity figures, and in accordance with the afore mentioned studies, it is recommended to administer an overprint of IORT doses in the order of 12.5 Gy. Finally, omitting complementary RT could be considered in patients with superficial tumours, < 5 cm and low histological grade.