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Intraoperative radiotherapy in soft tissue sarcomas of the extremity. Clinical outcomes and survival rates of 39 patients after more than 10 years of follow-up

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Introduction: Intraoperative electron-beam radiation therapy (IOERT) during limb-sparing surgery has the advantage of delivering a single high boost dose to sarcoma residues and surgical bed area near to radiosensitive structures with limited toxicity. It shortens the overall radiation treatment time and allows starting external beam radiation therapy (EBRT) early. A higher local dose is expected to increase the probability of local control and to reduce toxicity rates to the healthy surrounding tissues by moving them away from the path of the radiation beam. IOERT is an excellent method to make up for dose-reduced EBRT and its adverse effects. Retrospective studies have suggested that IOERT may improve local control compared to standard radiotherapy.

Objectives: The purpose of this prospective evaluation was to show that IOERT improves local control and long-term survival rates in extremity soft tissue sarcomas and reduces radiation toxicities.

Methods: From 1995 to 2003, 39 patients with extremity soft tissue sarcomas were treated with IOERT and postoperative radiotherapy (40-60Gy). The mean following time was 11 years (0.7-19). Six patients presented with locally recurrent and 33 with primary disease. The most common histological type was undifferentiated pleomorphic sarcoma (35.9%). The surgical procedure was wide removal in 72% and marginal in 12.8%.

Results: Actuarial local control was 82%. Eighty-eight percent of the patients with primary disease and 50% with recurrent tumors were controlled (p=0.01). Patients with negative margins had a 93% local control, compared to 50% for the positive margins group (p=0.002). Extremity preservation was achieved in 82%. Thirteen patients relapsed at metastatic sites. The overall survival rate from the fifth year to the end of follow-up was 64% (primary versus recurrent tumor did not show any statistically significant influence, p=0.939) (Fig.1). Fourteen patients developed wound complications (35.9%), 3 neuropathy (7.7%) and 2 pathological fractures (5.1%). Only 13% of patients had grade <3 acute toxicity and 12% developed grade ≥3 chronic toxicity.

Conclusions: IOERT used as a boost to EBRT provides high local control and extremity preservation rates in patients with soft tissue sarcoma of the extremities, with less toxicity than EBRT alone.

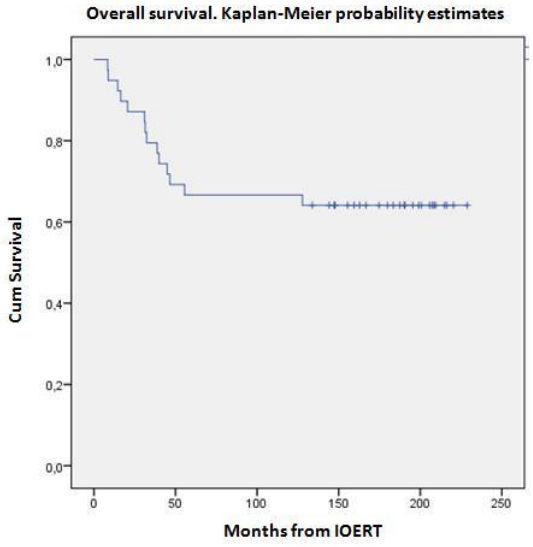

Figure 1