

## Locally recurrent soft tissue sarcoma: outcomes with re-irradiation and/or surgical excision

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**Background:** The management of a local recurrence of a soft tissue sarcoma (STS) in a previously irradiated field presents a challenging treatment problem. Treatment decisions are very individualized and are dependent on the previous radiotherapy (RT) dose, the location of the local recurrence in relation to the previous RT volume and how amenable it is to surgical excision. The addition of radiotherapy (RT) allows less radical surgery, preserving patient function while maintaining a lower risk of local recurrence. However, normal tissue tolerance limits the total dose that can be delivered. Treatment with hyperfractionated RT, where smaller dose fractions are given twice daily, permits delivery of a biologically equivalent standard dose while potentially minimizing late tissue toxicity from the higher total RT dose delivered to the area.

**Purpose:** To examine the oncologic outcomes and complications of treatment for patients with local recurrence (LR) of soft tissue sarcoma (STS) within a previously irradiated area.

**Methods:** From 1990-2014, we identified 82 patients with STS from our prospectively collected database who developed a local recurrence within an irradiated area following limb preserving surgery combined with radiotherapy (RT) for primary management. Fourteen patients were re-irradiated with hyper-fractionated RT (10 preoperative, 44 Gy/40 fractions; 4 postoperative, 44-56 Gy/40-50 fractions) plus surgery (Group 1), 58 had surgery alone or no surgery (Group 2) and 10 had surgery combined with conventional RT (5 preoperative (50 Gy/25 fractions), 1 postoperative (66 Gy/33 fractions); 4 LDR brachytherapy alone) (Group 3).

**Results:** In *Group 1*, 6 tumors were located in the upper extremity (UE), 7 in the lower extremity (LE) and 1 chest wall. Surgery included primary excision (n=8), flap closure (n=5) and 1 amputation. Acute complications included delayed wound healing in 2 patients (1 of these patients required later vascular bypass) (14%). Two patients suffered radiation-induced fractures (14%). Two patients developed a further LR (14%). Limb salvage occurred in 12/13 (92%) extremity cases. Seven patients developed metastases; 5-year metastasis-free survival was 43.6%. 5-year overall survival was 70%.

*Group 2:* 21 were UE, 34 LE, 2 paraspinal, and 1 abdominal wall. 18 had primary closure and 15 flap closure; 18 an amputation; 7 had no surgery (all had synchronous metastases). Two patients developed wound healing complications (2/51, 4%). One other patient developed a late ischemic arm (2%). Fifteen had a further LR (29%); ultimate limb salvage was 22/49 (45%) for extremities that had surgery. 5-year metastasis-free survival was 63.7%. 5-year overall survival was 60%.

*Group 3:* There were 1 UE, 6 LE, 1 paraspinal and 2 chest wall tumors. 3 patients had excision and 7 required flap closure. Two patients had wound complications, 2 developed flap failures and 1 required amputation for pain and gross positive margins. One patient developed a late vascular occlusion. Two had further LR (20%); limb salvage occurred in 4/7 (57%) extremities. Two patients developed metastases; 5-year metastasis-free survival was 80%. 5-year overall survival was 77.8%.

**Conclusion:** Patients amenable to re-treatment of a STS LR within a previously irradiated area with hyper-fractionated RT and surgery had excellent rates of limb salvage, a low rate of further LR, comparable overall survival and acceptable morbidity. While the groups examined were highly selected, hyperfractionated re-

irradiation does not appear to increase acute complications. Patients treated with surgery alone or with conventional RT may benefit from this treatment schema.