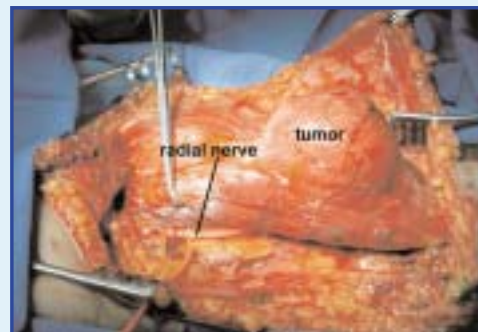


# Close Surgical Margins in Soft Tissue Sarcoma Resection Do Not Predict Local Recurrence When Induction (Neoadjuvant) Chemotherapy is Used in the Treatment of High Grade Extremity Soft Tissue Sarcoma

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## INTRODUCTION:

Surgical resection with “wide” margins, i.e. with a rim of normal tissue, is the mainstay of local control for high grade soft tissue sarcoma. The objective of this study is to assess whether the presence of close or microscopically positive surgical margins contributes to local recurrence and what role, if any, induction chemotherapy without pre-operative radiation plays in prevention of local recurrence after limb-sparing resection of high grade soft tissue sarcomas.



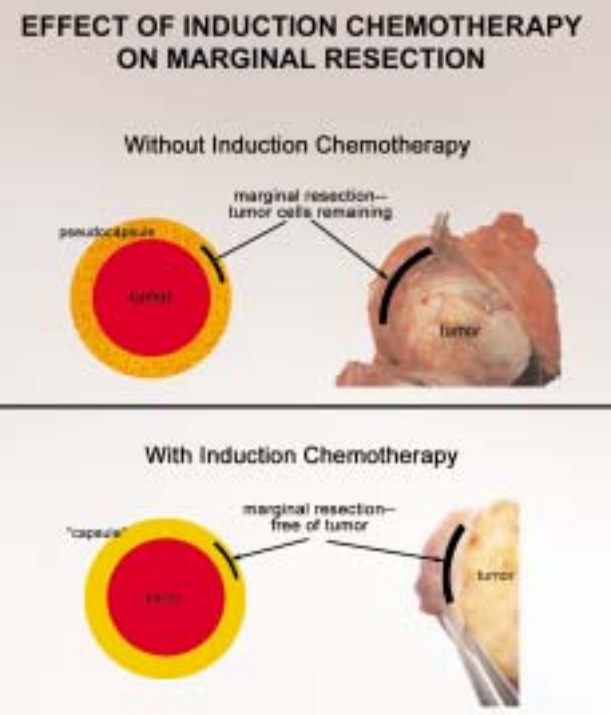
**FIGURE 1:** Limb-sparing resections for soft-tissue sarcomas often require close margins to critical neurovascular structures.



**FIGURE 2:** Before preoperative treatment was routinely used, high-grade extra-compartmental soft tissue sarcomas were often treated by amputation.



[www.sarcoma.org](http://www.sarcoma.org)



## METHODS:

During the period of 1988 to the present, over 100 resections for high-grade soft tissue sarcomas were performed by the same surgical team. Of these, 58 whose tumors were deep, large (more than 5 cm) and high grade were eligible for enrollment into a chemotherapy protocol consisting of neoadjuvant plus adjuvant doxorubicin, intra-arterial cisplatin and, after 1996, ifosfamide. Patients did not undergo preoperative radiation, but those with poor chemotherapeutic response and close surgical margins also underwent adjuvant external beam radiotherapy. Twenty nine patients who underwent their first surgery after induction chemotherapy and have follow-up of two years or more form the basis of this report. Pathology reports from 15 of these cases specify a margin depth in centimeters.

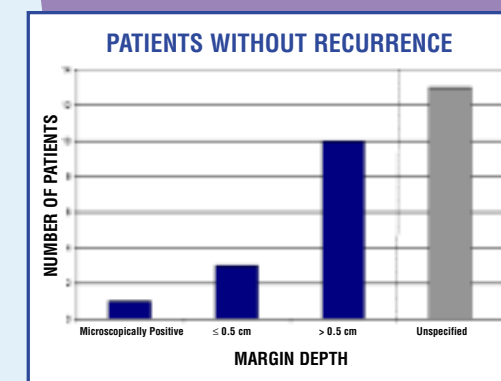
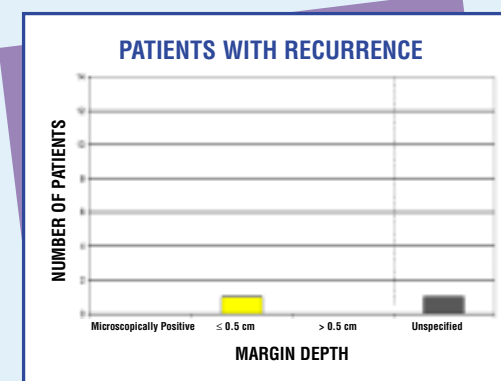


**FIGURE 3:** Induction chemotherapy allows for successful limb sparing resection without requiring compartmental resections.

## RESULTS:

The overall local recurrence rate was 6.9% (2/29). For the 27 patients without local recurrence, 14 (52%) have pathology reports specifying margin depth. Of these, 10/14 (71%) had a minimum distance of less than or equal to 5 mm from the tumor to the inked margin, whereas 1/14 (7%) had a “positive” margin, where tumor is focally present at the inked margin. Among the 2 patients with local recurrence, 1 (50%) has a pathology report specifying the margin depth, which was less than or equal to 5 mm. Pathology reports not specifying margin depth stated generally that the margins were “free of tumor”. Adjuvant radiotherapy was administered to 1 (50%) patient with local recurrence (margin depth not specified) and 3 (11%) patients without local recurrence all of whom had 20% or less tumor necrosis (one margin less than 5 mm, one margin unspecified). The maximum tumor diameter in non-recurring and recurring patients averaged 11.2 cm and 15.8 cm, respectively.

## DISTRIBUTION OF SURGICAL MARGINS IN PATIENTS WITH AND WITHOUT LOCAL RECURRENCE



**FIGURE 4:** Smaller margin depths (< 0.5 cm) do not appear to be more common in patients who experienced local recurrence.

## DISCUSSION

- Several recent large reviews have reported 20% - 25% local recurrence rates with the most important risk factor being the surgical margins of the resection specimen.
- There was only a 7% local recurrence rate in our study; of the patients without local recurrence who had exact margins recorded, nearly 80% had a surgical margin of 5mm or less.
- The presence of microscopically close or positive resection margins in our series did not correlate with local recurrence.
- Radiation did not significantly contribute to the low recurrence rate in this study. Only 4/29 (14%) patients underwent postoperative radiotherapy, and no patients underwent pre-operative radiotherapy, suggesting that radiation did not significantly contribute to this low recurrence rate.
- The killing of malignant cells in the periphery of tumors with induction chemotherapy can improve local control and postoperative function by allowing for the removal of a minimum amount of normal tissue with an acceptable rate of local recurrence.



**FIGURE 5:** Patient outcome, even after resection of very large soft tissue tumors, can be excellent.