

Title: Planned preservation surgery for soft tissue sarcomas adjacent to critical structures.

## Abstract

**Background** Whether to preserve or sacrifice critical structures (bone, major vessels and major nerves) adjacent to soft tissue sarcomas is still controversial. Referring to characteristic imaging and intraoperative findings, we perform planned preservation surgery for these critical structures. The aim of this study was to investigate local control of non-small round cell soft tissue sarcomas adjacent to critical structures and to validate this procedure.

**Methods** From a single-institution, prospective database, 244 patients treated surgically for primary, non-metastatic non-small round cell soft tissue sarcomas during 2001 and 2013 were identified. There were 137 men and 107 women. The median age of the patients was 54 years. The median follow-up time was 64 months. One hundred ninety five sarcomas (80%) were high-grade, and 49 (20%) were low-grade. The most common diagnosis was undifferentiated pleomorphic sarcoma. In 49 cases critical structures were preserved. Patient demographic information, tumor characteristics and local relapse patterns were assessed. Univariate and multivariate analyses were performed to identify prognostic factors.

**Results** The oncological outcome was CDF in 167 cases, AWD in 13, NED in 23, DOD in 30 and DOOD in 11. The overall survival rates at 5 years were 85.2%. The local recurrence-free survival rates at 5 years were 90.5% (high grade:87.9%, planned preservation surgery: 89.0%, positive margin: 72.5%, margin of 2 mm or less: 60.6%). The microscopic surgical margin was R0 in 217 cases, R1 in 27, and R2 in none. Local recurrence was detected at a median interval of 22 months after primary surgery. In 41 (84%) of the 49 preserved cases the histological surgical margin was negative, and in 33 (67 %) radiotherapy could be avoided. In the univariate analysis size ( $p = 0.005$ ), depth ( $p = 0.003$ ), histological grade ( $p = 0.015$ ) and positive margin ( $p < 0.001$ ) were significant unfavorable prognostic factors for local recurrence free survival. Planned preservation surgery provided no significant adverse effect on local recurrence free survival. In multivariate analyses, we showed that positive margin ( $p=0.015$ ) and histological grade ( $p<0.001$ ) were significant independent predictors of local recurrence free survival.

**Conclusions** When soft tissue sarcomas are located adjacent to bone or major vessels, by meticulously detaching the periosteum or neurovascular sheath referring to characteristic imaging and intraoperative findings, a histologically negative surgical margin can be achieved in the majority, allowing avoidance of postoperative radiotherapy. Planned preservation surgery provided no significant adverse effect on survival or local recurrence rates, validating this procedure.

**Keywords:** soft tissue sarcoma; critical structure; limb salvage; surgical margin; local recurrence

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Figure1:

Local recurrence free survival with or without planned preservation surgery

