



MINI-REVIEW

Unplanned resection of soft tissue sarcoma



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Abstract Unplanned surgery of a soft tissue sarcoma is defined as the gross removal of a tumor without appropriate preoperative imaging, biopsy, or attention to the wide surgical margin. Referrals after unplanned surgery account for between 14.7% and 53% of new patients in sarcoma centers. Treatment includes multiple modalities. It has been reported that 35–74% of residual sarcomas are found in reexcised specimens. Therefore, additional reexcision is typically warranted to remove the residual tumor and obtain an adequately safe margin. Adjuvant radiotherapy is generally used if the sarcoma is large, high grade, and deeply located. Adjuvant chemotherapy remains controversial because of its marginal benefits. A recent study indicated that adjuvant chemotherapy, an ifosfamide/epidoxorubicin protocol, showed 19% improvement in overall survival at 4 years. Therefore, adjuvant chemotherapy should be reserved for patients with a large, high-grade, localized lesion, and stage-IV disease. Unplanned surgery of high-grade sarcomas has resulted in increased rates of local recurrence but not disease-specific survival. Adequate additional reexcision may improve local control and survival. To avoid unplanned surgery of soft tissue sarcomas, guidelines have been recommended for clinicians to increase their awareness of the clinical features that suggest malignancy in any soft tissue lump.

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1. Introduction

Soft tissue sarcomas (STSs) are rare and heterogenic primary malignant tumors. They originate from the mesoderm and comprise < 1% of adult malignancies and 15% of all pediatric malignancies.¹ Because of the rarity of this disease, patients and physicians are often unaware of the involved tumor, thus delaying diagnosis and initial proper treatment. In addition, most general surgeons may not be familiar with the advanced multidisciplinary management. Therefore, hasty biopsy and unplanned surgery before referral frequently complicate the subsequent definite surgery and lead to a poor clinical outcome.

Unplanned surgery is defined as an operation undertaken for any excision of STSs without appropriate preoperative imaging, biopsy, or attention to the wide surgical margin.^{2–4} Once unplanned surgery has been performed, the margin of reexcision must be more extensive than the standard wide margin. This may necessitate soft tissue reconstruction and result in a longer operation time, complications, and functional loss.

Referrals after unplanned surgery account for between 14.7% and 53% of new patients in sarcoma centers.^{5–7} Even if there is no gross evidence of disease from clinical examination or contrast-enhanced magnetic resonance imaging (MRI), 35–74% of residual sarcomas have been found in the reexcised specimen.^{3,7–9} Reexcision is generally warranted to remove the residual tumor or obtain an adequately safe margin. Numerous reports have addressed clinical problems that could occur after initial unplanned excision.^{10,11} However, considerable controversy exists regarding the criteria of reexcision and the sequencing of radiation and surgery.

2. Inappropriately executed biopsy

Biopsy is the first step in the diagnosis of STSs. Without appropriate planning, poorly performed biopsy or the malposition of drainage often compromises the subsequent local management of STSs. A transverse incision in the extremities, a common error for an unexperienced surgeon, typically results in a more extensive excision or the need for a flap reconstruction. Therefore, a transverse incision for biopsy is absolutely contraindicated.

On the basis of biopsy diagnosis and definitive diagnosis, Mankin et al¹² reported an error rate of 17.8% in 597 patients. Of these 106 erroneous diagnoses, 81 (76%) were considered major errors and two-thirds occurred at referring institutions. When the biopsy was performed in a referring institute, the errors, complications, and dismal results were from two to 12 times greater compared with the biopsy performed in a sarcoma center. In addition, a 16% unnecessary amputation rate and 10% mortality rate were attributed to the complications of hasty biopsy. Therefore, although the biopsy is not a technically demanding procedure, it should be performed by the surgeon who will perform the definitive excision for the patient. Moreover, adhering to certain guidelines of the biopsy for extremity STSs is crucial (Table 1).

3. Evaluation after referral

Evaluating a referred patient consists of a physical examination, MRI of the tumor bed, computed tomography of the chest to determine the presence of metastases, and a complete review of the clinical data provided from the referring surgeon. Moreover, the original histologic material should be reviewed by an experienced musculoskeletal pathologist to confirm the diagnosis of STS. Determining the presence of a residual tumor after unplanned surgery remains challenging. Noria et al³ reported a 42% residual tumor rate in 65 patients who presented no gross evidence of a tumor from physical examination or MRI. Moreover, Manso et al⁷ reported that MRI may have a false-negative rate of 25%. Chandrasekar et al⁶ suggested several clinical parameters for determining the increased rates of a residual tumor, including tumors that are high grade, > 5 cm, and deep to the fascia.

After multidisciplinary evaluation, a treatment program is individually formulated with reexcision, adjuvant radiotherapy (RT), or chemotherapy, and soft tissue reconstruction if indicated.

4. Does unplanned surgery always require reexcision?

The reported rate of resection has varied from 35% to 100%, with the residual tumor rate ranging from 24% to 74%.^{2,3,5,9,13,14} According to the definition,^{2,3} for the patients presenting after unplanned surgery where margin is uncertain or positive, reexcision is generally recommended.^{10,11,15}

RT alone without additional excision was occasionally indicated in patients who were either medically inoperable or in whom further surgery would increase morbidity. Bell et al reported a 50% local control (LC) rate for patients who were received RT only without reexcision following unplanned surgery. Zagars et al,¹⁶ 371 of 666 patients who could not receive reexcision because of various reasons underwent RT only at a total dosage of 60–70 Gy. The 15-year LC, disease-free survival, and distant metastasis-free survival rates were 73%, 48%, and 64%, respectively. The results were less favorable compared with the group that underwent reexcision with postoperative RT.

Once unplanned surgery has been performed, the surgical margin of reexcision must be more extensive than the initial margin.¹⁷

5. Reexcision timing

The mean interval from the initial unplanned surgery to reexcision varies from 36 days to 108 days.^{10,14,18} Delay of a reexcision theoretically allows the proliferation of residual tumor cells, thus increasing the likelihood of local recurrence. Patients' delay was presumed to be one of the main reasons.¹⁹ Patients are recommended to receive reexcision as soon as possible, ideally within 3 weeks after the unplanned surgery. However, delaying reexcision could improve wound healing and prevent wound complications.

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