

# Classifying Wound Healing Complications in Surgically Treated Extremity Soft Tissue Sarcoma

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INTRODUCTION:

Wound healing complications occur in up to one-third of soft tissue sarcoma (STS) patients following limb-sparing resection and are a major source of morbidity. Despite their prevalence, no universally accepted classification system exists to characterize complication severity. We aimed to develop and apply a more comprehensive reporting system to enhance accuracy and clinical relevance.

## METHODS:

We conducted a retrospective review of 186 adult patients with extremity or trunk STS treated surgically by orthopedic oncologists at a single institution (2013–2023). Data were imported to REDCap via extraction from the Electronic Medical Record. Exclusion criteria included intra-abdominal/retroperitoneal, intrathoracic, or head/neck tumors, or primary amputations. Wound healing complications listed in Table 1 were identified using previously reported terminology and a novel proposed scale (Types 1–4) reflecting level of intervention, OR return, and reconstructive demands. A senior investigator verified all complication classifications, and the primary complication was determined when multiple types were present.

## RESULTS:

Of 186 patients, 62 (33.3%) had a wound complication: 52 (83.9%) lower extremity, 9 (14.5%) upper extremity, and 1 (1.6%) trunk. Of these, 47 (75.8%) had a reoperation and 23 (37.1%) had multiple reoperations. 41 (66.1%) patients with complications received preoperative radiation therapy. Refer to Table 2 for the proposed grading system and results.

## DISCUSSION AND CONCLUSION:

Our proposed framework of reporting captures complication severity and resource utilization. These offer insight into the patient experience as well as demands on the healthcare system. Incorporating this system into STS literature going forward may improve comparability of future prospective investigations.

Table 2. Proposed Classification System for Wound Healing Complications

Tier	Definition	Examples / Criteria	Purpose	Cases (n=62)
Type 1: Minor	Clinically documented wound complication not requiring intervention	Superficial infection treated with PO or topical antibiotics, mild dehiscence or seroma observed only, no VAC use, and no aspiration performed.	Captures cases not generally reported in literature but reported by patients as impairments to QoL	3 (4.8%)
Type 2: Moderate	Requires non-OR intervention or delayed wound healing	Aspiration of seroma, initiation of wound VAC, or packing/dressing changes lasting more than 6 weeks.	Adds nuance to procedures short of OR but resource-intensive	9 (14.5%)
Type 3: Major	Requires return to OR	Reoperation for I&D, debridement, re-closure, or hematoma evacuation	Identifies patients requiring invasive procedure	30 (48.4%)
Type 4: Complex	Requires multiple OR trips, flap/graft reconstruction, amputations	2+ reoperations, flap or graft reconstruction, or amputation; reflects significant surgical burden.	Highlights high-resource/high-risk cases	20 (32.3%)

Table 1. Wound Complication Types and Outcomes

Complication	n (%)	Avg Time to Complication (days)	Reop Rate	≥2 Reops
Skin/ Tissue Necrosis	26 (41.9%)	89	88.5%	52.1%
Seroma	15 (24.2%)	29	60.0%	44%
Hematoma	8 (12.9%)	31	87.5%	28.6%
Dehiscence	7 (11.3%)	40	57.1%	50%
Deep Infection	4 (6.5%)	62	100%	75%
Superficial Infection	1 (1.6%)	26	0%	0
Other	1 (1.6%)	40	0%	0