

Microbiologic Spectrum and Risk Factors for Surgical Site Infection Following Soft Tissue Sarcoma Resection

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Significance & Hypothesis

Postoperative surgical site infection (SSI) following soft tissue sarcoma (STS) resection is a clinically important complication associated with prolonged hospitalization, reoperation, and delayed oncologic therapy. Despite this impact, the microbiologic characteristics of these infections remain poorly defined. Existing studies are limited by small sample sizes, anatomic restriction to specific regions, and heterogeneous patient populations. The objective of this study was to characterize the microbiologic spectrum of SSIs following STS resection across all anatomic locations and identify clinical factors associated with postoperative infection risk.

Innovation

This study represents one of the largest contemporary analyses examining the microbiologic profile of SSIs following STS resection across diverse tumor locations. By integrating detailed microbiologic culture data with clinical and oncologic variables, the study provides new insight into whether current prophylactic antibiotic strategies adequately cover the pathogens responsible for postoperative infection in sarcoma surgery.

Approach

A retrospective cohort study was conducted using a prospectively maintained musculoskeletal oncology database in accordance with STROBE guidelines. The cohort included 1,997 patients who underwent STS resection between 2010 and 2024. Patients with culture-confirmed postoperative SSI requiring surgical or antibiotic management were included. Per institutional protocol, perioperative prophylaxis consisted of cefazolin administered within 30 minutes of incision, with clindamycin or vancomycin used in patients with beta-lactam allergy. Collected variables included patient demographics, tumor size, histologic subtype, anatomic location, radiation exposure, time to infection, microbiologic culture results, and antibiotic susceptibility. Multivariable logistic regression was performed to identify independent predictors of culture-positive infection.

Results

Among 1,997 patients, 147 (7.3%) developed postoperative wound complications. Of these, 76 required surgical management and 78 were treated nonoperatively. Wound cultures were obtained in 101 cases, with bacterial growth identified in 95 (94%). Infections were frequently polymicrobial (70%), and 28% demonstrated anaerobic organisms. The most commonly isolated pathogens were *Enterococcus* (26%), *Pseudomonas* species (21%), and *Staphylococcus aureus* (18%). Overall, 78% of infections involved organisms resistant to or not adequately covered by standard cefazolin prophylaxis. Pelvic girdle and upper thigh tumors demonstrated the highest rates of anaerobic growth (31%). On multivariable analysis, tumor size >10 cm (OR 2.27; 95% CI 1.11–4.63), preoperative radiation (OR 2.09; 95% CI 1.13–3.85), and pelvic or upper thigh tumor location (OR 4.80; 95% CI 2.20–10.45) were independent predictors of culture-positive infection.

Discussion & Impact

SSIs following STS resection are commonly polymicrobial and frequently involve organisms not adequately covered by standard cefazolin prophylaxis. Tumor size, preoperative radiation, and pelvic or proximal thigh location significantly increase infection risk. These findings suggest that risk-stratified or broader-spectrum perioperative antibiotic prophylaxis may be warranted for high-risk sarcoma resections. Prospective studies are needed to evaluate whether targeted antimicrobial strategies can reduce wound complications while maintaining antimicrobial stewardship.

Table 1. Predictors of culture positive surgical site infections

Variable	Odds Ratio	95% CI		P Value
		Lower	Upper	
Age (per decade)	1.12	0.99	1.26	0.079
Radiation				
None (ref)				
Preoperative	2.09	1.13	3.85	0.018
Postoperative	1.55	0.65	3.68	0.316
Max Diameter				
<5cm (ref)				
5-10cm	1.34	0.64	2.82	0.437
>10cm	2.27	1.11	4.63	0.024
Anatomic Site				
Upper Extremity (ref)				
Pelvic Girdle/Upper	4.80	2.20	10.45	<0.001
Thigh	2.40	0.81	4.33	0.141
Knee	2.39	0.76	7.50	0.134
Foot and ankle	0.78	0.16	3.79	0.766

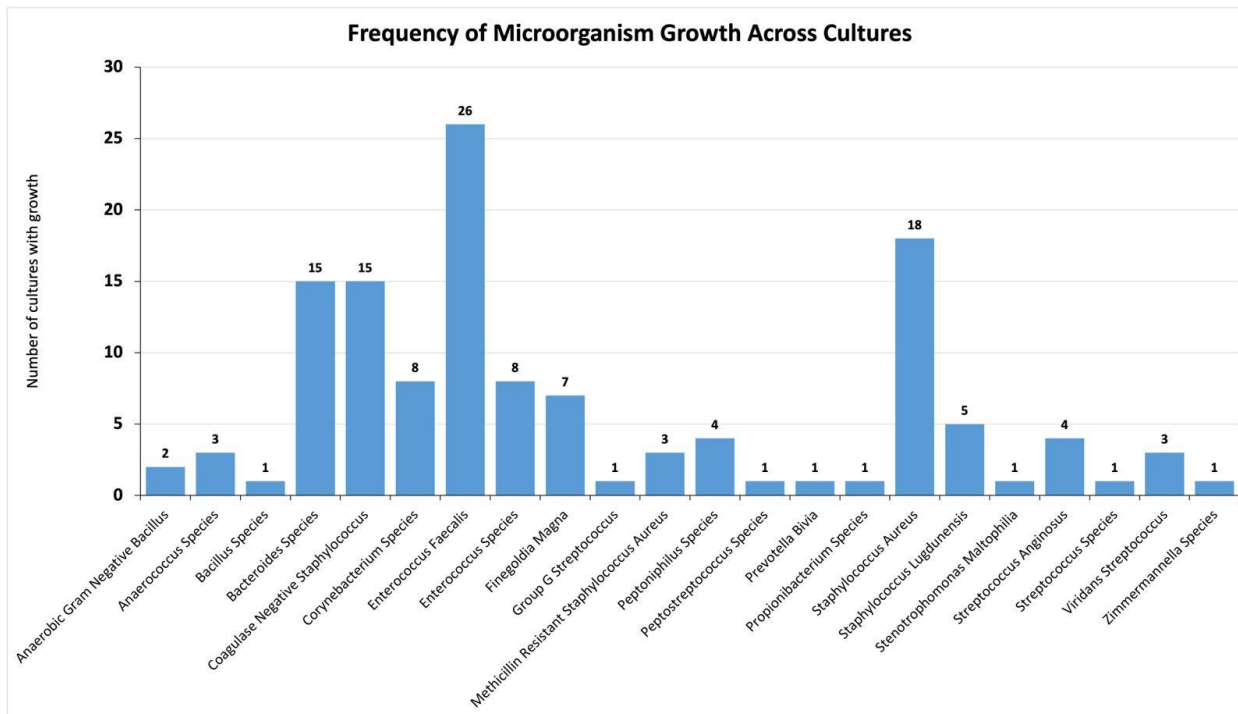


Figure 1. Frequency of microorganism growth across cultures.