

Risk Factors for Surgical-Site Infection after Soft-Tissue Sarcoma Resection and Development of a Risk Scoring System

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INTRODUCTION: Surgical-site infection (SSI) after soft-tissue sarcoma (STS) resection is a serious complication. In this retrospective single-center study, we investigated the risk factors for SSI after STS resection. Furthermore, a risk scoring system was developed by combining the risk factors.

METHODS: The clinical records of 534 patients, who underwent surgical resection of STS, were reviewed (Table 1). The associations of various variables (age, diabetes, smoking during the previous year, tumor depth, resected tumor size, preoperative chemotherapy, radiation therapy, intraoperative blood loss, and operative time) with SSI were evaluated. Furthermore, a scoring system was developed by combining these risk factors, and the correlation between the risk scores and the SSI incidence was evaluated.

RESULTS:

Among the 534 patients, 48 (9%) had SSI. In univariate analysis, age \geq 73 years, smoking during the previous year, resected tumor size \geq 148 mm, operative time \geq 222 min, intraoperative blood loss \geq 90 mL, and radiation therapy were significantly associated with SSI (Table 2). Multiple logistic regression analysis revealed that age (OR, 3.1; 95% CI, 1.6–6.2; $p < 0.001$), smoking during the previous year (OR, 2.3; 95% CI, 1.1–4.8; $p = 0.030$), resected tumor size (OR, 2.2; 95% CI, 1.1–4.3; $p = 0.024$), operative time (OR, 3.8; 95% CI, 1.8–8.3; $p < 0.001$), and radiation therapy (OR, 4.6; 95% CI, 1.8–11.7; $p = 0.001$) were independent risk factors for SSI (Table 3). A risk scoring system combining these factors was developed on the basis of the correlations between the risk factors and SSI (Table 4). The incidence of SSI was 2% (7/296) in patients with a risk score of 0–1 point, 11% (20/181) in patients with 2–3 points, and 37% (21/57) in patients with 4–8 points (Table 5).

DISCUSSION AND CONCLUSION:

Our data indicate that older age, large size of the resected specimen, radiation therapy, smoking during the previous year, and long operative time are risk factors for SSI after STS resection. Our risk scoring system, which was developed by combining these factors, was correlated with the incidence of SSI. In the treatment of STS, deciding the operative procedure and postoperative treatment based on SSI risk assessment is recommended.

Characteristic	n (%)
Sex	
Male	293 (54.9)
Female	241 (45.1)
Age (years)	
< 73 years	487 (91.2)
≥ 73 years	47 (8.8)
Height of resected tumor	
≤ 147.5 mm	446 (83.5)
> 147.5 mm	88 (16.5)
Microscopically confirmed histopathologic liposarcoma	48 (9.0)
Myxoid liposarcoma	50 (9.4)
Liposarcoma	127 (23.8)
Spindle sarcoma	36 (6.7)
MFSDT	36 (6.7)
Clear cell sarcoma	16 (3.0)
Others	79 (14.8)
Anatomical site	
Upper extremity	36 (6.7)
Lower extremity	280 (52.6)
Trunk	133 (24.9)
Head and neck	149 (27.9)
Tumor depth	
Type I sarcoma	246 (46.1)
Superficial sarcoma	149 (27.9)
Resected tumor size	
< 148 mm	288 (53.9)
≥ 148 mm	176 (33.1)
Preoperative chemotherapy	
Yes	121 (22.7)
No	413 (77.3)
Radiation therapy	
Yes	27 (5.1)
No	497 (94.9)
Diabetes	
Yes	35 (6.5)
No	499 (93.5)
Smoking during the previous year	
Yes	26 (4.9)
No	498 (95.1)
Operative time	
< 222 min	487 (91.4)
≥ 222 min	47 (8.6)
Intraoperative blood loss	
< 90 mL	260 (48.7)
≥ 90 mL	274 (51.3)

Factor	OR	95% CI	p Value
Age			
< 73 years	20.02 (2.75)	1.84–3.09	< 0.001
≥ 73 years	26.87 (4.4)		
Tumor location			
Trunk	19.53 (1.7)	1.49–2.69	0.291
Extremity	23.83 (3.9)		
Tumor depth			
Deep	32.38 (2.7)	0.87–1.02	0.400
Superficial	30.59 (30.7)		
Resected tumor size			
< 148 mm	23.79 (2.7)	1.52–3.98	< 0.001
≥ 148 mm	21.38 (2.9)		
Chemotherapy			
Yes	15.21 (2.7)	1.29–1.69	0.479
No	20.02 (2.7)		
Radiation therapy			
Yes	30.33 (2.8)	4.23–11.38	< 0.001
No	30.89 (2.4)		
Diabetes			
Yes	19.5 (1.7)	1.80–2.39	0.135
No	43.07 (4.4)		
Smoking during the previous year			
Yes	15.96 (2.4)	2.43–1.02	0.036
No	23.88 (2.4)		
Operative time			
< 222 min	21.77 (2.7)	3.90–11.73	< 0.001
≥ 222 min	22.07 (3.9)		
Intraoperative blood loss			
< 90 mL	20.53 (2.7)	4.18–2.82	< 0.001
≥ 90 mL	30.93 (2.7)		

Factor	OR	95% CI	p Value
Age ≥ 73 years	3.13	1.39–6.68	< 0.001
Resected tumor size ≥ 148 mm	2.18	1.14–4.21	0.024
Radiation therapy	4.64	1.84–11.70	0.001
Smoking during the previous year	2.28	1.09–4.83	0.030
Operative time ≥ 222 min	3.83	1.77–8.30	< 0.001
Intraoperative blood loss ≥ 90 mL	2.08	0.97–4.49	0.062

Factor	Points
Age ≥ 73 years	2
Operative time ≥ 222 min	2
Radiation therapy	2
Smoking during the previous year	1
Resected tumor size ≥ 148 mm	1

Risk group	Risk score	SSI incidence
Low	0–1	2.0% (7/296)
Intermediate	2–3	20.0% (20/181)
High	4–8	37.0% (21/57)