

Surgical Site Infections in Gynecologic Oncology Patients: A Retrospective Study of Patient Characteristics and Intraoperative Parameters

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Surgical site infections in gynecologic oncology patients: A retrospective study of patient characteristics and intraoperative parameters

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Objective

To identify modifiable preoperative and intraoperative factors that contribute to surgical site infections (SSI).

Background

An SSI is an infection at or near surgical incisions within 30 days of surgery. SSIs account for 38% of nosocomial infections, resulting in increased length of stay, mortality, and cost.¹⁻⁴

The American College of Obstetricians and Gynecologists recommends prophylactic antibiotics within 60 minutes of incision to prevent SSI.⁵ The Joint Commission has identified the prevention of SSI as one of its National Patient Safety Goals.⁶

Methods

This retrospective case-control study was approved by the Institutional Review Board. All gynecologic oncology patients undergoing surgery from January 2000 to December 2009 (excluding pediatric, pregnant, and robotic surgery patients) were included in the analysis. Infection Control identified SSIs during the study period and we temporally matched each case to controls in a 1-to-4 ratio using surgical scheduling records.

Categorical variables were analyzed using chi-square test, and the continuous variables using Student's t-test. Multivariate logistic regression Cox model was used to identify independent predictors of SSI.

Results

Table 1: Patient preoperative characteristics

Variable	SSI cases, 38, n (%)	Controls, 152, n (%)	p-value
Age (mean)	63.9	56.4	0.0042
BMI (mean)	34.9	30.9	0.0158
Malignancy	34 (89.5)	97 (63.8)	0.002
Organ site			0.008
Private health insurance	13 (34.2)	72 (47.7)	0.054
Smoker	13 (34.2)	69 (45.4)	0.213
Any co-morbidity	33 (86.8)	127 (83.6)	0.619
Cardiovascular	29 (76.3)	82 (54.0)	0.012
ASA physical status			0.301

ASA = American Society of Anesthesiologists

Table 2: Surgical details

Variable	SSI cases, 38, n (%)	Controls, 152, n (%)	p-value
Surgeon			0.340
Incision			0.012
open	32 (84.2)	88 (57.9)	
laparoscopic	2 (5.3)	34 (22.4)	
vulvectomy	3 (7.9)	9 (5.9)	
converted to open	1 (2.6)	3 (2.0)	
none	0 (0)	18 (11.8)	
Midline vertical incision	31 (81.6)	79 (52.0)	0.001
Hysterectomy			0.368
Total	25 (65.8)	91 (59.9)	
Radical	5 (13.2)	13 (8.6)	
none	8 (21.1)	48 (31.6)	
Salpingo-oophorectomy	33 (86.8)	114 (75.0)	0.119
Lymphadenectomy	24 (63.2)	51 (33.6)	0.001
Omentectomy	21 (55.3)	34 (22.4)	< 0.0001
Appendectomy	10 (26.3)	10 (6.6)	< 0.0001
Cystoscopy	8 (21.1)	23 (15.1)	0.377
Bowel surgery	11 (29.0)	12 (8.0)	< 0.0001
Stoma creation	3 (7.9)	5 (3.3)	0.206
Debulking	18 (47.4)	19 (12.5)	< 0.0001
Jackson-Pratt drain	8 (21.1)	23 (15.1)	0.377

Bold = statistically significant p-value

Table 3: Mean intraoperative parameters

Variable	SSI cases, 38, n (%)	Controls, 152, n (%)	p-value
Room time (minutes)	251.6	192.2	0.0001
Surgery time (minutes)	189.7	132.7	0.0001
Wound class (number)			0.214
Min mean arterial pressure (mmHg)	54.3	57.5	0.0627
Min heart rate	62.4	60	0.312
Min body temperature (C)	35.5	35.2	0.2103
Max body temperature (C)	37.1	36.7	0.0003
Estimated blood loss (cc)	777.0	294.0	< 0.0001
Circulating nurses (number)	2.64	2.45	0.2931
Scrub nurses (number)	2.08	1.78	0.0267
Number of patients who received			
blood transfusion	15 (39.5)	14 (9.21)	< 0.0001
Prophylactic antibiotics	31 (81.6)	129 (86.0)	0.494
Additional antibiotics	7 (38.9)	11 (30.6)	0.540

Table 4: Possible predictors of surgical site infections in gynecologic oncology patients

Variable	OR	95% CI	p-value
Age	1.09	1.02-1.16	0.014
Malignancy	8.52	1.41x10 ⁻⁶ -5.14x10 ⁷	0.788
BMI	1.11	1.01-1.21	0.023
Organ site	1.03	0.877-1.212	0.710
Midline vertical incision	0.42	0.082-2.17	0.302
Bowel surgery	2.60	0.297-22.699	0.389
Debulking	9.10	0.741-111.80	0.084
Surgery time	0.96	0.968-1.00	0.093
Max body temperature	5.89	1.65-20.97	0.006
Estimated blood loss	1.00	0.999-1.006	0.084
Intraoperative transfusion	1.16	0.069-16.81	0.915
Number of scrub nurses	3.64	0.820-16.19	0.089
Cardiovascular co-morbidity	4.35	0.522-36.263	0.174

Bold = statistically significant p-value

- Of 3123 gynecologic oncology procedures performed, 38 SSI were identified and temporally matched to 152 controls.
- Univariate analysis of patient characteristics identified age, BMI, malignancy, primary cancer site and cardiovascular morbidity as risk factors.
- Univariate analysis of surgical details identified type of incision, staging procedures, debulking surgery and bowel surgery as risk factors.
- Univariate analysis of intraoperative parameters identified duration of surgery, maximum body temperature, number of scrub nurses and blood transfusions as risk factors.
- Multivariate analysis regression model identified age, BMI, and maximum intraoperative body temperature as independent risk factors.

Conclusions

- Age, BMI, and maximum intraoperative body temperature are independent risk factors for SSI.
- Maximum intraoperative body temperature is the only modifiable risk factor. Subtle temperature differences may influence SSI.

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