Journal of Cardiovascular Disease Research
ISSN: 0975-3583,0976-2833 VOL15, ISSUE 1, 2024

Original Research

Analysis of surgical site infection in patients with endometrial cancer undergoing open surgery: An observational study

[1]Dr. Ratna Patel MBBB, MD, [2]Dr. Prashant kumar Jain MS, MCh

[1]Assistant Professor, Department of Microbiology ,Sukhsagar Medical College and Hospital, Jabalpur
[2]Assistant professor, Department of general surgery ,Sukhsagar medical college, Jabalpur

Corresponding Author: Dr. Ratna Patel
Assistant Professor, Department of Microbiology ,Sukhsagar Medical College and Hospital, Jabalpur

Received: 27 December 2023 Accepted:02 january, 2024

Abstract
Background: The present study was conducted for evaluating surgical site infection (SSI) in patients with endometrial cancer undergoing open surgery.**Materials & methods:**The present study was conducted in the Department of Microbiology and General surgery Department of Sukhsagar Medical college and Hospital Jabalpur, study included women with histologically verified endometrial cancer who underwent primary open surgery. Biochemical profile at the baseline and Perioperative period was done. In all the patients, total abdominal hysterectomy was performed. Antibiotic coverage was given intravenously half an hour before the abdominal incision. For a lengthy procedure, the prophylaxis was given every three hours. An infection at the surgical site that occurs within 30 days after the procedure was designated as SSI. All the results were recorded in Microsoft excel sheet followed by statistical analysis using SPSS software. **Results:** A total of 100 patients with endometrial cancer were enrolled. Blood transfusion was required in 20 percent of the patients. Overall, SSI was present in 13 percent of the patients. Staphylococcus aureus, Staphylococcus epidermides, Escherichia coli, Klebsiella pneumonia and Pseudomonas aeruginosa was seen in 30.77 percent, 15.38 percent, 30.77 percent, 15.38 percent and 7.69 percent of the patients with SSI respectively.
Conclusion: SSI is a potential postoperative complication among patients with endometrial cancer undergoing open surgery. Hence; adequate history and knowledge of risk factors could help in reducing the incidence.
Key words: Surgical site infection, Endometrial cancer

Introduction

Uterine corpus cancer is the most prevalent gynecologic malignancy in American women with over 60,000 new cases expected during the next year and accounting for nearly 11,000 deaths. Endometrial carcinomas account for the greatest number of these cases, as fewer than 10% of uterine corpus cancers are sarcomas. Endometrioid carcinomas compose more than 83% of uterine corpus cancers.[1, 2]Infections that occur in the wound created by an invasive surgical procedure are generally referred to as surgical site infections (SSIs). A prevalence survey undertaken in 2006 suggested that approximately 8% of patients in hospital in the UK have an HCAI. SSIs accounted for 14% of these infections and nearly 5% of patients who had undergone a surgical procedure were found to have developed an SSI.[3- 5]The process of wound infection is complex and involves an interplay between several biological pathways at the molecular levels. Wound infections account for high morbidity and mortality. Current data indicates that surgical site wound infections account for over two million nosocomial infections in patients who have been hospitalized in the United States.[5, 6]Hence; the present study was conducted for evaluating surgical site infection in patients with endometrial cancer undergoing open surgery.

Materials & methods

The present study was conducted in the Department of Microbiology and General surgery Departement of Sukhsagar Medical college and Hospital Jabalpur for evaluating surgical site infection in patients with endometrial cancer undergoing open surgery. Inclusion criteria for the present study included women with histologically verified endometrial cancer who underwent primary open surgery. All the surgeries were performed on the patient under general anesthesia. During the surgical procedure, continuous monitoring of electrocardiogram, airway pressure, blood oxygen and hemodynamic variables was done. The diagnostic criteria for SSI was based on the “Technical Guidelines for Surgical Site Infection Prevention and Control” and “Diagnosis of Nosocomial Infections”, that was, surgery-

related infections of subcutaneous tissue, incision skin, fascia and muscle layer that occurred within 30 days after surgery.[7]Biochemical profile at the baseline and Perioperative period. In all the patients, total abdominal hysterectomy was performed. Antibiotic coverage was given intravenously half an hour before the abdominal incision. For a lengthy procedure, the prophylaxis was given every three hours. Povidone-iodine was used for preoperative skin and vaginal preparations. An infection at the surgical site that occurs within 30 days after the procedure was designated as SSI. The clinical specimens collected were sent for microbiological assessment. Upon receipt of the surgical incision (wound) swab was inoculated on sheep blood agar and MacConkey agar as well as Mannitol salt agar and incubated at 37°C for 24–48 h under aerobic conditions. Then, identification of the growth was performed by studying the morphology of the colonies; smear from pure colonies were prepared and stained with Gram stain; and a microscopic examination was performed to aid the identification process. The isolated bacteria were further microbiologically identified by using the relevant biochemical tests. The test for antibiotic susceptibility was performed by using the Kirby–Bauer disc diffusion method on Mueller–Hinton agar using antibiotics according to the Clinical and Laboratory Standards Institute (CLSI) guideline,. All the results were recorded in Microsoft excel sheet followed by statistical analysis using SPSS software.

Results

A total of 100 patients with endometrial cancer were enrolled. Mean age of the patients was 56.2 years. Mean BMI of the patients was 28.3 Kg/m^2. Hypertension, diabetes and positive smoking history was present in 38 percent, 21 percent and 25 percent of the patients respectively. Mean duration of surgery was 312.7 hours. Blood transfusion was required in 20 percent of the patients. Overall, SSI was present in 13 percent of the patients.BMI and presence of hypertension were found to be significant risk factors associated with SSI. Staphylococcus aureus, Staphylococcus epidermides, Escherichia coli, Klebsiella pneumonia and Pseudomonas aeruginosa was seen in 30.77 percent, 15.38 percent, 30.77 percent, 15.38 percent and 7.69 percent of the patients with SSI respectively. While analyzing the antibiotic sensitivity pattern, it was seen that for staphylococcus aureus, clindamycin,vancomycin ,teicoplanin and linezolid were found to be maximum sensitive. for Escherichia coli, maximum sensitivity was found to be for piperacillintazobactam,cefoperazone -sulbactam, imipenem & meropenem and Amikacin.

Graph 1: Incidence of SSI

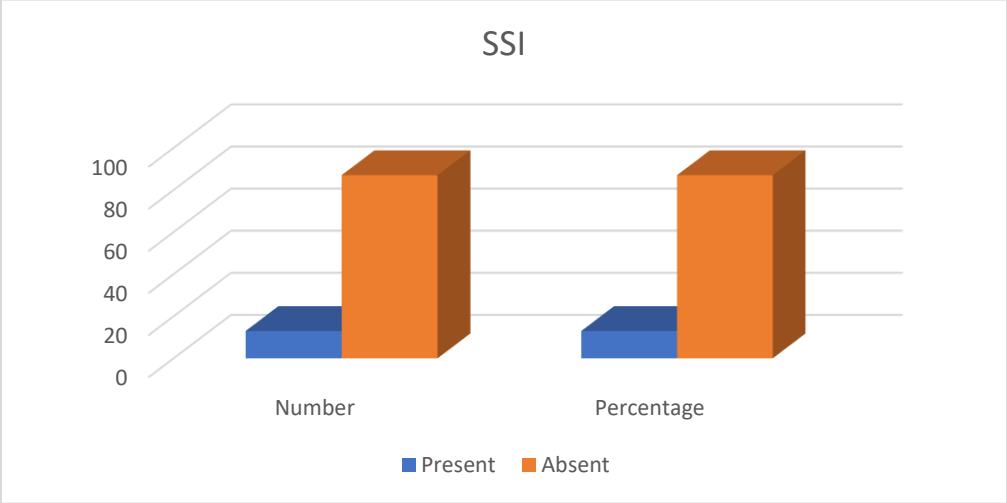

Table 1: Evaluation of predictors of SSI

Predictors of SSI	SSI Present	SSI absent	p-value
Mean age (years)	59.3	55.1	0.128
Mean BMI (Kg/m^2)	30.12	26.78	0.001*
Diabetes (%)	23.07	20.68	0.362
Hypertension (%)	61.54	34.48	0.000*
Mean duration of surgery (mins)	328.4	304.9	0.774
Need of blood transfusion (%)	23.07	19.54	0.358

*: Significant

Graph 2: Evaluation of predictors of SSI

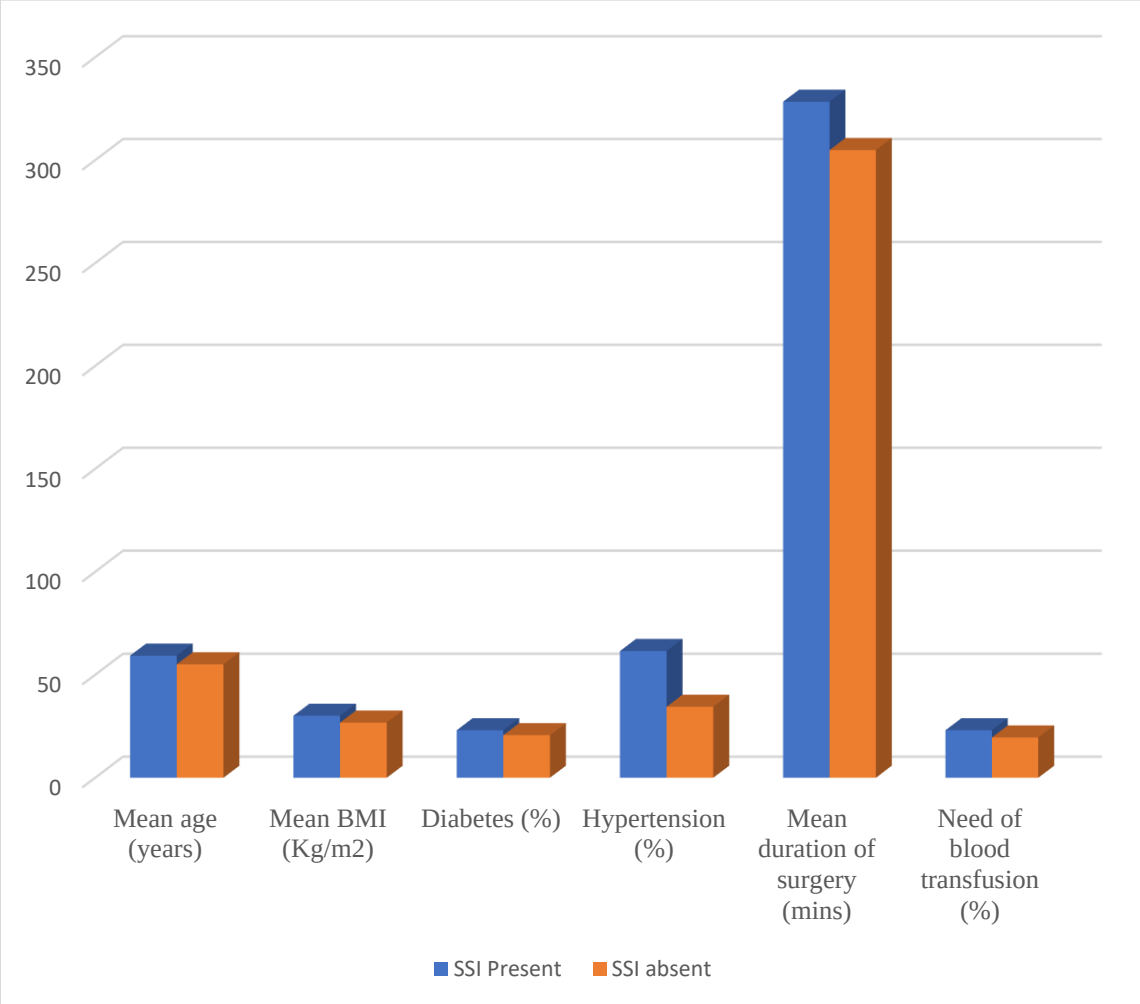

Table 2: Microbiological profile of patients with SSI

Microorganism	Number	Percentage
Staphylococcus aureus	4	30.77
Staphylococcus epidermides	2	15.38
Escherichia coli	4	30.77
Klebsiellapneumoniae	2	15.38
Pseudomonas aeruginosa	1	7.69

Table 3: Antibiotic sensitivity pattern of patients with SSI

Antibiotic sensitivity pattern	Staphylococcus aureus (n=4)	Staph epidermidis (n=2)	Antibiotic sensitivity pattern	Escherichia coli (n=4)	Klebsiellapneumoniae (n=2)	Pseudomonas aeruginosa (n=1)
Erythro	2	1	ampi	0	0	0
Penici	0	0	Genta	2	1	1
Cipro	2	1	Amika	3	2	1
Clinda	4	1	Pip-tazo	3	2	1
Tetra	2	1	Cefo-Sulbact	3	2	1
Cotri	2	2	imipen	4	2	1
Genta	1	1	meropen	4	2	1

Cefe	3	0	tigecy	4	2	0
Vanco	4	2	cefepime	1	1	0
Teico	4	2	Augem	2	1	0
linezolid	4	2	cipro	0	0	0

Erythro: Erythromycin, Penici: Penicillin, Cipro: Ciprofloxacin, Clinda: Clindamycin, Tetra: Tetracycline, Cotri: Cotrimoxazole, Genta: Gentamicin, Cefe: Cefepime, Ampi: Ampicillin, Augem: Augmentin,Amika-Amikacin,Pip-tazo-Piperacillin-tazobactam,Cefo-Sulbact-Cefoperazone -Sulbactam,Imipen-Imipenem,Meropen-Meropenem,

Discussion

Surgical site infections (SSIs) are among the most common and most costly health care-associated infections, leading to adverse patient outcomes and death. Wound contamination occurs with each incision, but proven strategies exist to decrease the risk of SSI. In particular, improved adherence to evidence-based preventive measures related to appropriate antimicrobial prophylaxis can decrease the rate of SSI. Aggressive surgical debridement and effective antimicrobial therapy are needed to optimize the treatment of SSI. Despite improvements in prevention, SSIs remain a significant clinical problem as they are associated with substantial mortality and morbidity and impose severe demands on healthcare resources. The incidence of SSIs may be as high as 20%, depending on the surgical procedure, the surveillance criteria used, and the quality of data collection. In many SSIs, the responsible pathogens originate from the patient's endogenous flora.[6- 9]Hence; the present study was conducted for evaluating surgical site infection in patients with endometrial cancer undergoing open surgery.A total of 100 patients with endometrial cancer were enrolled. Mean age of the patients was 56.2 years. Mean BMI of the patients was 28.3 Kg/m^2. Hypertension, diabetes and positive smoking history was present in 38 percent, 21 percent and 25 percent of the patients respectively. Mean duration of surgery was 312.7 hours. Blood transfusion was required in 20 percent of the patients. Overall, SSI was present in 13 percent of the patients. The first national audit of SSI following gynaecological cancer surgery was conducted by O'Donnell RL et al. Clinicopathological data were collected, and wound complications and their sequelae were recorded during the 30 days following surgery. In total, 339 women underwent laparotomy for suspected gynaecological cancer during the study period. A clinical diagnosis of SSI was made in 54 (16%) women. 33% (18/54) of women with SSI had prolonged hospital stays, and 11/37 (29%) had their adjuvant treatment delayed or cancelled. Wound drains and staple closure were also associated with increased risk of SSI. SSI is common in women undergoing surgery for gynaecological cancer leading to delays in discharge and adjuvant treatment.[10]In the present study, BMI and presence of hypertension were found to be significant risk factors associated with SSI. Staphylococcus aureus, Staphylococcus epidermides, Escherichia coli, Klebsiella pneumonia and Pseudomonas aeruginosa was seen in 30.77 percent, 15.38 percent, 30.77 percent, 15.38 percent and 7.69 percent of the patients with SSI respectively. The potential risk factors of SSI in patients with endometrial carcinoma was evaluated in a study conducted by Shi et al. A total of 318 postoperative patients with endometrial carcinoma were included. The incidence of SSI in patients with endometrial carcinoma was 14.47 %. FIGO stage IV, open surgery, durations of drainage $\geq$ 7 d, postoperative serum albumin $<$ 30 g/L, postoperative blood sugar $\geq$ 10 mmol/L were the independent risk factors of SSI in patients with endometrial carcinoma. Measures including reasonable control of serum albumin and blood glucose levels, minimally invasive surgery as much as possible, timely assessment of drainage and early removal of the tube may be beneficial to reduce the postoperative SSI in in patients with endometrial carcinoma.[11]The incidence of, and risk factors for, SSIs in endometrial carcinoma was evaluated in another study conducted by Y. Arakaki et al. Women with endometrial cancer who underwent primary open surgery. Of all 107 patients, ten were diagnosed with SSI. Univariate analyses assessed age, BMI, diabetes mellitus, hypertension, postoperative body temperature, and serum albumin level as potential risk factors. There was no significant correlation between the mode of lymph node surgery and the occurrence of SSI. Multivariate analysis indicated that BMI was independently associated with a higher risk for SSI.[12]

Conclusion

SSI is a potential postoperative complication among patients with endometrial cancer undergoing open surgery. Hence; adequate history and knowledge of risk factors could help in reducing the incidence.

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