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Original Research

Risk factors in infection development of surgical site ınfection ın patients who were operated due to endometrial cancer

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Abstract

Endometrial cancer is the most commonly encountered malignancy of female genital system. Surgery is the main treatment approach in endometrial cancer. The frequency of surgical site infections (SSI) has recently increased. Prediction of risk factors which may cause SSI and taking due precautions may provide a decrease in frequency of these infections. The aim of this study was to determine the risk factors for SSI after surgery for endometrial cancer. The medical records of patients who were operated due to endometrial cancer in Kanuni Sultan Suleyman Education and Research Hospital between January 1, 2015, and July 31, 2015, were retrospectively reviewed. The patients were divided into two groups; those that developed SSI following the operation and those that did not develop SSI. SSI was diagnosed based on Center for Disease Control and Prevention criteria. Ages, comorbid diseases, body mass index, American Society of Anesthesiologists (ASA) scores, smoking, durations of operation, the presence of drainage, blood transfusion, pre-operative hemoglobin level, and pre-operative glucose level of patients were recorded. A $P < 0.05$ was considered to be statistically significant. Of the 103 patients included, 12 patients (11.65%) developed SSI. We found a relationship between SSI development and high body mass index; the presence of diabetes mellitus, presence of transfusion, and high pre-operative glucose level. No relationship among age, hypertension, smoking, ASA score, presence of drainage, duration of operation, pre-operative hemoglobin level, and development of SSI has been determined. In conclusion, although there are patient-related and non-modifiable risk factors, we are in thought of that prediction of modifiable risk factors, such as blood glucose level, may reduce the frequency of SSI after endometrial cancer surgery.

Introduction

Due to increased number of older patient groups, the rate of chronic patients, long-lasting complicated surgical interventions, and patients using implants especially in recent years, surgical site infections (SSI) has increased and hence cases with severe clinical presentations are being encountered more frequently. This situation leads to a longer duration of hospital stay in surgery, an increase in morbidity/mortality, and excessive financial expenditures. SSIs are described as infections concerning surgical incision and opened area which occurs within 30 days following surgical intervention. SSI remains to be a serious problem of surgery despite developments in antisepsis activities, conditions of operating theaters, surgical methods and intensive care unit possibilities and use of antibiotics. The source of agent of SSI is skin, mucosa, and endogenous flora of intestinal tract. Various factors such as

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diabetes mellitus (DM), smoking, malnutrition, lengthening of hospital stay, inappropriate antimicrobial prophylaxis, insufficient observance of asepsis and antisepsis rules and surgical method have roles in the development of SSI. In this case, evaluation of each patient who are planned to be operated in terms of these risk factors and taking necessary precautions will be helpful in decreasing incidence of SSI (1-4).

Endometrial cancer is the most commonly encountered malignancy of female genital system and detection of risky cases is crucial for the early diagnosis of epidemiological and pharmacological features related with this cancer. A major treatment approach in endometrial cancer is surgery. For solving clinical issues in endometrial cancer, an increase of studies targeted on this issue will contribute to developments in the management of this cancer. According to data of Ministry of Health, there were 1364 new cases of endometrial cancer and 726 people passed away in 2010 (5,6).

SSI after gynecological oncological surgery varies between 5% and 35%. The development of SSI after gynecological surgical procedures is one of the commonly encountered complications and causes morbidity in high rates. Potential pathogenic micro-organisms in skin, vagina, and endocervix can be the agent. In addition, it has been well-known that changeable risk factors due to the patient himself/herself and surgical factors in terms of the development of SSI after pelvic surgery also increase risk for SSI (7,8).

Prediction of risk factors which may cause SSI and taking due precautions may provide a decrease in frequency of these infections. Our aim in this study is to determine risk factors for SSI after surgery for endometrial cancer, to take due precautions in high-risk patients to decrease the frequency of these infections and to provide prediction in terms of organization of follow-up and treatment.

Patients and Methods

In this study, files of patients who were operated due to the diagnosis of endometrial cancer in Kanuni Sultan Süleyman Training and Research Hospital Training and Research Hospital between the dates of January 1, 2015, and July 31, 2015, were examined retrospectively. Patients were divided into two groups, as ones that developed SSI following the operation and another one that did not develop SSI. SSI were diagnosed based on the Centers for Disease Control and Prevention (CDC): CDC criteria. Ages, additional diseases, body mass indices (BMIs), American Society of Anesthesiologists (ASA) scores, habits of smoking, durations of operation presence of drainage, pre-operative hemoglobin levels, and pre-operative glucose levels of patients were recorded. Statistical evaluations were made using program SPSS, and a value of $P < 0.05$ was considered to be statistically significant.

Results

In total, 103 cases 12 of which were that developed SSI and 91 of which that did not develop SSI, forming the control group was involved in our study. SSI ratio was determined to be 11.65%. In this study, we conducted, in the case of high BMI index, the presence of DM and high pre-operative glucose level, the likelihood of development of SSI was determined to be statistically significantly increased. No relationship among age, hormone therapy, smoking, ASA score, the presence of drainage, duration of operation, pre-operative hemoglobin level, and development of SSI has been determined (Table 1).

Discussion

The incidence of SSI may exhibit some changes according to hospital, applied surgical procedure or type of surgery. Whereas incidence of SSI is low after clean surgical operations, the incidence of SSI may be higher after colorectal and trauma surgeries. When factors determining status of SSI are examined, along with microorganisms responsible for the infection and features of the wound, factors depending on the patient

Table 1: Risk factors in cases that developed and did not develop SSI

Parameters	SSI (n=12)	Non-SSI (n=91)	P value
Age at surgery (years)	66.75±11.99	60.18±13.00	0.10
BMI (kg/m²)	39.84±2.58	31.51±6.59	<0.001
ASA score >2, (n/%)	9 (75)	42 (46.2)	0.06
Diabetes mellitus (n/%)	8 (66.7)	19 (20.9)	0.001
Hypertension (n/%)	3 (25)	31 (34.1)	0.53
Cigarette smoking (n/%)	0 (0)	14 (15.4)	0.14
Operation time (min)	186.66 ±79.32	174.83±74.39	0.60
Drain use (n/%)	10 (83.4)	72 (79.1)	0.73
Pre-operative Hb (g/dl)	12.13±1.15	13.42±7.36	0.54
Pre-operative glucose (mg/dl)	124.33±33.80	108.09±25.97	0.05

BMI: Body mass index, ASA: American Society of Anesthesiologist, SSI: Surgical site infection, Hb: Hemoglobin

such as smoking, using steroid, age, DM and perioperative anemia and factors depending on the operation such as duration of operation and type of operation may exist (2).

Standard definitions were established by USA CDC in 1992 and 1998 to establish diagnosis in infections which develop after surgery based on particular criteria and to obtain more accurate data and use of definition "SSI" was accepted (9).

The standard treatment for endometrial cancer begins with surgery which is necessary for the determination of staging, prognosis, and adjuvant treatment; these surgical procedures carry some risks including SSI. It has been reported in studies that laparoscopic colorectal, gastric, prostatic, and hepatobiliary surgical procedures are more effective in SSI and other postoperative complications and shortening of hospital stay compared to open surgery (10).

SSI rate after operation in patients with endometrial cancer was determined to be 11.65% in our study. Results of some relevant studies which were conducted in our country and abroad in which rates of SSI that developed especially after gynecological oncological surgery were investigated are demonstrated in Table 2.

It was determined in our study that rate of SSI development was statistically significantly higher in cases of higher BMI; presence of DM, presence of transfusion and having higher pre-operative glucose level. When other studies concerning this issue were examined, whereas SSI was found to be related with a longer hospital stay in the study of Mahdi et al. which they included 6854 patients, elevated BMI and prolonged duration of operation were found to be independent risk factors for SSI in the study conducted by Tran et al. (11,12).

Table 2: Rates of SSI that developed after gynecological surgery

Study	Year	Group	Patient number	SSI rate (%)
Mahdi et al. (11)	2014	Endometrial, cervical or ovarian	6854	5.4
Tran et al. (12)	2015	Epithelial ovarian cancer	888	10.8
Petruzziello et al. (10)	2014	Pelvic exenteration	28	25
Bakkum-Gamez et al. (13)	2013	Endometrial cancer	1369	9.9
Tuomi et al. (14)	2015	Endometrial cancer	1164	8.1
Açmaz et al. (15)	2015	Endometrial cancer	42	9.5
Present study	2015	Endometrial cancer	104	11.5

SSI: Surgical site infection

In the study conducted by Bakkum-Gamez et al. which they conducted with patients with endometrial cancer, the most common observed infection was superficial SSI, followed by hollow organ infections (13) and it was reported that significant risk factors for development of superficial SSI were obesity, DM, ASA >2, pre-operative anemia (hematocrit <36%) and smoking and patient to be elderly, presence of a vascular disease and pre-operative glucose level >110 mg were in hollow organ infections. In another study concerning this issue, it was determined that obesity (BMI ≥30 kg/m^2), DM and prolonged duration of operation, incision, smoking, transformation to laparotomy, and lymphadenectomy were related with risk for organ/hollow infection (14).

In another study concerning gynecological SSI, status of SSI after hysterectomy was investigated and as a result; it was determined to be related with prolonged duration of operation, gynecological cancer and open hysterectomy, also in another study with abdominal hysterectomy, it was determined that risk for SSI increased in patients over 75 years old and ones having BMI >40 in operations carried out with open technique (16-18).

The presence of risk for cancer in patients with HIV infection is well-known. It has been shown that especially some cancers associated with some infections, Kaposi's sarcoma, non-Hodgkin lymphoma and cervical cancer from gynecological cancers occur in high rates in patients having HIV infection. It has been determined that individuals infected with HIV are under risk in terms of both infection-related and infection-unrelated malignancies. HIV infection has been gradually increasing recently in our country and according to data of Ministry of Health, 9379 HIV/AIDS cases were diagnosed within the period between 1985 and 2014 in Turkey (19,20).

In a study concerning this issue in which 77 HIV-infected patients for whom hysterectomy was performed were examined, however, in 17 (22%) of these patients developed SSI and 53% of this was due to pelvic abscess, 29% was due to superficial wound site infection

and 1% was due to vaginal cuff cellulitis, it was determined that low pre-operative serum albumin levels and abdominal hysterectomy posed risks for SSI in patients infected with HIV (21).

In the study of Kiran et al. which investigated factors influencing SSI after colorectal surgery, it was determined, similarly, that there was a significant relationship among ASA to be >3, smoking, DM and duration of operation to be longer than 180 min and SSI. Furthermore, in a study conducted for colorectal surgery, elevated BMI and intraoperative hypotension were determined to be independent risk factors (22,23).

Endometrial cancers are generally encountered advanced ages. However, it is most commonly seen between 60 and 70 years of age; the majority of patients are over 50 years of age when tumor is detected (15).

In our study, the mean age of our patients was determined to be 62. Old age population is getting increased as in all over the world. As old age population increases, incidence of cancer also increases. The risk for many infectious diseases increases with age and many researchers have concluded that increasing age is associated with increased risk for SSI. Many diseases associated with SSI risk are present more commonly in older age population rather than young population. Increased incidence of SSI in elderly is associated not only with decreased host response but also with comorbidities which are more commonly seen in elderly such as DM, malnutrition, and chronic hypoalbuminemia, as well as age-related alterations in phagocytosis and antibody production in immune system (24-27).

In this study, we tried to determine situations which may be risk factors in terms of SSI among patients with gynecological cancer and endometrial cancer. These results may contribute to determination of patients who may develop strategies in order to reduce SSI risk and SSI rate and to reduce expenditures for gynecological cancer surgery care, as well as it may contribute to operative planning. Pre-operative risk evaluation of risk factors for SSI is important for prevention and control of infection.

Conclusion

Although there are patient-related and non-modifiable risk factors, we are in thought of that prediction of modifiable risk factors may reduce the frequency of these infections with taking due precautions.

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