

# Original Article: Determining the Incidence and Risk Factors of Surgical Wound Infection after Abdominal Hysterectomy in Women with and without Cancer

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## ABSTRACT

**Introduction:** Hysterectomy is the most common surgery of choice after cesarean section in medical centers, and abdominal wall infection is one of the most important complications after this operation, which leads to readmission of the patient and long-term treatments. Therefore, this study was performed to determine the incidence and risk factors of surgical wound infection after abdominal hysterectomy in women with and without cancer.

**Methods:** This descriptive cross-sectional study was performed during the years 1920-20 in the hospitals of Tabriz University of Medical Sciences with the participation of 400 women candidates for abdominal hysterectomy. The incidence of infection after surgery was measured and its factors were examined.

**Results:** The incidence of ulcers after hysterectomy in this study was between 6 and 7%, which factors such as the use of drugs that weaken the immune system, diabetes, late shaving before surgery and the urgency of surgery lead to an increased risk of infection after surgery.

**Conclusion:** In our study, the rate of infection after abdominal hysterectomy was the same as in other studies; To reduce the rate of infection after abdominal hysterectomy, preventive measures should be taken based on the risk of infection.

## Introduction

Infections are an important cause of morbidity in the postoperative period and surgical wound infection is one of the most important types of these infections [1].

Hysterectomy is one of the most common gynecological surgeries after cesarean section and infection of various sites including wound infection [2], vaginal floor infection and urinary tract infection are complications after

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hysterectomy. This complication can lead to long hospital stay, reoperation and repeated manipulations [3]. The rate of infection after abdominal hysterectomy is reported to be approximately 15 to 24%, which is reduced to about 10% with prophylactic antibiotics [4].

In one study, patients undergoing abdominal hysterectomy receiving antibiotic prophylaxis developed urinary tract infection, wound infection, fever of unknown cause, vaginal infection, and intra-abdominal infection [5]. In another study, the incidence of wound infection after abdominal hysterectomy was reported to be about 5% and the risk factors for inadequate antibiotic prophylaxis and obesity were raised [6]. In another study, 8% of abdominal hysterectomies developed abdominal wall infections, with most patients receiving prophylactic antibiotics [7,8]. Obesity studies have identified a risk factor for infection after abdominal hysterectomy [7].

Hysterectomy is the most common surgery of choice after cesarean section in medical centers [9], and abdominal wall infection is one of the most important complications after this operation, which leads to readmission of the patient and long-term treatments. Therefore, this study was performed to determine the incidence and risk factors of surgical wound infection after abdominal hysterectomy in women with and without cancer

## Methods

This descriptive study was performed on 400 women who underwent abdominal hysterectomy hospitalized in Al-Zahra, Imam Reza and Taleghani hospitals (all three hospitals are affiliated to Tabriz University of Medical Sciences) by convenience sampling method and during the period of 2019 and 2020.

Age, number of deliveries, underlying disease (diabetes and hypertension), history of surgery, body mass index, history of use of immunosuppressive drugs, corticosteroids, number of days of preoperative hospitalization, time of site shaving, time of bath before Surgery, receiving prophylactic antibiotics, duration of surgery, intraoperative diagnosis, type of

hysterectomy (emergency, elective or supercervical) and pathology report were recorded.

Cases of wound infection based on the criteria for removing purulent discharge from a newly closed surgical wound with or without opening the wound and fever, positive culture of the discharge from the surgical site, or the surgeon's diagnosis of surgical wound infection that needs to be reopened Had; Within 10 days after the operation, the patient was diagnosed and registered by referring to the clinic or ward.

Risk factors for diabetes, hypertension, preoperative prophylaxis, malignant pathology, corticosteroids, immunosuppressive drugs, body mass index more than 25 kg / m<sup>2</sup>, shaving site more than one day before surgery, bath with The interval more than one day before the operation was more than one day in the preoperative hospital and the duration of the hysterectomy was more than 60 minutes.

Data were entered into the computer using SPSS statistical software (version 21). Data description was done by presenting frequency tables and describing qualitative characteristics through frequency and percentage and quantitative characteristics through means and amplitude of changes. Chi-square test was used to compare qualitative variables (two or more states) and t-test was used to compare quantitative variables. OR communication index and 95% confidence interval through logistic regression were used to determine the risk factors. The level of statistical significance in all tests was considered less than 0.05.

The present study was approved by the Ethics Committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1400.018).

## Results

The mean age of patients participating in the study was  $46.59 \pm 8.41$  years with an age range of 17 to 81 years. Infection was observed in 26 patients (6.5%) within 10 days after surgery. The most common symptom of infection was fever (24 patients, 6%). In 16 patients, there was fever with discharge and redness at the surgical wound site. In 4 patients, fever occurred with

discharge from the wound and partial opening of the surgical wound, and in 6 cases, there was extensive opening of the surgical wound with purulent discharge from the wound, which was repaired.

The mean age in the group with abdominal wall infection was  $45.39 \pm 5.14$  years and in the non-

infected group was  $48.11 \pm 7.21$  years which was not statistically significant. There was no statistically significant difference between the days of preoperative hospitalization, body mass index and duration of surgery in patients with surgical wound infection and without infection (Table 1).

**Table 1.** Mean and standard deviation of age, days of preoperative hospitalization, body mass index and duration of surgery in wound hysterectomy

Variable	surgical wound infection		P value
	Yes	No	
<b>Age (Year)</b>	$45.39 \pm 5.14$	$48.11 \pm 7.21$	0.259
<b>hospitalization before surgery (Day)</b>	$1.49 \pm 0.22$	$1.59 \pm 0.33$	0.329
<b>BMI</b>	$27.11 \pm 1.24$	$28.18 \pm 1.62$	0.114
<b>Duration of surgery (minutes)</b>	$81.87 \pm 11.47$	$85.57 \pm 12.01$	0.598

There was a history of corticosteroids in 14 patients and immunosuppressive drugs (azitoprine due to rheumatic disease) in 4 patients (1%). In one patient taking corticosteroids, a surgical wound infection occurred. Also, surgical wound infection occurred in 2 patients taking immunosuppressive drugs. These differences were not statistically significant. The surgical site was performed in 367 patients the day before surgery, in 20 patients two days before surgery and in 13 patients on the day of surgery.

Also, bathing was performed in 15 patients on the day of surgery in 370 patients the day before surgery in 12 patients two days before surgery and in 3 patients four days before surgery. All patients received cefazolin as prophylaxis; But combined prophylaxis with several antibiotics was received in only 4 patients. Clindamycin and gentamicin were prescribed half an hour before surgery.

Hysterectomy was performed in 373 complete patients and in 27 patients supraservically. Emergency hysterectomy was performed in 6 patients due to severe hemorrhage and in other patients it was performed selectively. The shortest duration of surgery was 45 minutes and the longest time of operation was 180 minutes.

Pathology was reported in 11 malignant patients and in 389 benign patients. Cases of malignancy included 6 cases of ovarian epithelial cancer and 5 cases of endometrial cancer. The relationship between the variables of diabetes, combined prophylaxis, body mass index, type of hysterectomy and type of operation with the incidence of wound infection is shown in Table 2.

The use of drugs that weaken the immune system, the urgency of the operation and diabetes are the risk factors for wound infection after hysterectomy (Table 3).

**Table 2.** Prevalence of diabetes, combined prophylaxis, pathology outcome, body mass index, use of immunosuppressive drugs, type of hysterectomy and type of operation in infection with abdominal hysterectomy

Variable		surgical wound infection		P value
		Yes	No	
<b>Diabetes</b>	Yes	7	41	0.029
	No	19	333	
<b>Combined prophylaxis</b>	Yes	1	3	0.514
	No	25	371	
<b>Malignant</b>	No	2	9	0.142
	Yes	24	365	

<b>BMI</b>	thin	0	165	0.236
	Normal	4	61	
	Overweight	7	153	
	Fat	14	132	
<b>drug that weakens the immune system</b>	Yes	2	2	0.514
	No	24	372	
<b>Type of hysterectomy</b>	Total	21	352	0.159
	Superservical	5	22	
<b>Type of surgery</b>	Emergency	2	4	0.048
	Elective	24	370	

**Table 3.** Determining the risk factors for wound infection after abdominal hysterectomy using regression analysis

Variable	OR	CI95%	P Value
<b>Diabetes</b>	3.241	1.112-3.254	0.021
<b>Hypertension</b>	1.290	1.01-2.142	0.044
<b>Cancer</b>	9.514	5.547-11.584	0.225
<b>Combined prophylaxis</b>	0.980	0.514-1.962	0.315
<b>Takes corticosteroids</b>	8.514	3.471-9.547	0.651
<b>drugs that weaken the immune system</b>	11.248	6.547-15.249	0.012
<b>BMI&gt;25</b>	2.5	1.145-3.552	0.369
<b>Shave more than one day before surgery</b>	0.314	0.251-0.585	0.011
<b>Bath more than one day before surgery</b>	0.485	0.201-0.670	0.419
<b>Hospitalized for more than one day</b>	1.958	1.059-2.224	0.226
<b>duration of surgery is more than 60 minutes</b>	1.524	1.047-2.291	0.301
<b>Supercervical hysterectomy</b>	1.549	1.048-2.503	0.099
<b>Urgency of surgery</b>	5.2	3.549-8.237	0.009

### Discussion and conclusion

The results of this study showed that wound infection occurred after surgery in 6.5% of patients. Surgical wound infection after abdominal hysterectomy in several studies has been between 5 and 8%, which is consistent with the results of our study. Wound infection after surgery has a great impact on the patient's quality of life and significantly increases the cost of patient care. The result is increased pain, care for an infectious open wound, and even in the more complex stages of the patient's death. Some of the factors influencing the spread of wound infection include host resistance, surgical technique, number and type of organism present in the wound at the end of surgery. Many patients who are hospitalized for a long time or

those who have an underlying disease have an increase in the number of organisms located in their skin. [10].

In our study, diabetes mellitus, immunosuppressive drugs, and the urgency of the operation were identified as risk factors for wound infection after hysterectomy. In most previous studies, the history of diseases and the use of drugs in the subjects have not been studied, however, the results of our studies are consistent with the results of other studies. In the present study, all patients received Keflin as prophylaxis. One study recommended that all patients who were candidates for vaginal hysterectomy should receive prophylactic antibiotics [11]. In one study, factors related to wound infection, long-term hospitalization before emergency surgery, and long-term

surgery were identified. However, in that study, apart from abdominal hysterectomy, other abdominal surgeries were also examined, which cannot be examined due to the difference in surgery time in different surgeries. In our study, almost all hysterectomies were performed within 60 to 120 minutes, and patients were admitted the day before surgery. [7]. In several other studies, severe blood transfusions and obesity were identified as risk factors for wound infection. Prolonged surgery and obesity were also associated with a higher risk of wound infection. This discrepancy may be related to the lack of severe obesity in our patients and the fact that most hysterectomies were performed in this study in less than two hours [12].

### Conclusion

In our study, the rate of infection after abdominal hysterectomy was the same as in other studies; To reduce the rate of infection after abdominal hysterectomy, preventive measures should be taken based on the risk of infection.

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