

# Research on the influencing factors of vaginal cuff dehiscence after Laparoscopic hysterectomy

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## Research Article

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# Abstract

**Objective:** To explore the influencing factors of vaginal cuff dehiscence after laparoscopic hysterectomy.

**Methods:** From January 2015 to December 2021, the clinical data of patients who had vaginal cuff dehiscence after laparoscopic hysterectomy in our hospital were analyzed retrospectively, univariately, and multivariately. Logistic regression was used to analyze the high-risk factors of vaginal cuff dehiscence.

**Results:** Among 1459 cases with laparoscopic hysterectomy, there were 9 cases with vaginal cuff dehiscence after the operation, with an incidence of 0.617%. Univariate logistic regression analysis showed that preoperative hemoglobin value, vaginal cuff suture method, and postoperative first sexual lifetime were related to vaginal cuff dehiscence after laparoscopic hysterectomy ( $P < 0.05$ ). Preoperative hemoglobin value of  $<90\text{g/L}$  and time interval between postoperative first sexual life and operation  $<3\text{months}$  were independent risk factors for vaginal cuff dehiscence after laparoscopic hysterectomy ( $P < 0.05$ ), according to multivariate logistic regression analysis.

**Conclusions:** Postoperative hemoglobin correction  $\geq 90\text{g/L}$  and the time interval between postoperative first sexual life and operation  $\geq 3\text{months}$  can reduce the occurrence of vaginal cuff dehiscence after laparoscopic hysterectomy.

## Introduction

With the development of minimally invasive surgery in gynecology, laparoscopic total hysterectomy has been widely used in the clinic, which has the advantages of minimally invasive techniques such as fewer traumas, less pain, quick recovery, a short length of stay, etc. It has provided more benefits to patients and has become one of the most commonly used surgical methods for total hysterectomy. Therefore, it has gradually become the first choice of an increasing number of doctors and patients. However, some complications during and after operation also have a greater impact on the prognosis of patients[1]. Vaginal cuff dehiscence is a serious complication after laparoscopic total hysterectomy[2]. So far, there are limited studies on vaginal cuff dehiscence after a total hysterectomy, because there are few papers related to such events. A few papers point out that the overall incidence of dehiscence is very low[3], ranging from 0.14% to 0.28%; the incidence of dehiscence after laparoscopic total hysterectomy is the highest (1.35%), and once it occurs, it may be a fatal event due to its uncertain incidence. The majority of the reports in the literature are single case reports. Therefore, for the serious complication of vaginal cuff dehiscence, related case data must be collected in order to identify the relevant factors, with the goal of reducing the aforementioned risk factors, improving surgical techniques and instruments, and preventing the occurrence of such complications. Through the analysis on the medical records of 1459 patients who underwent a laparoscopic total hysterectomy in our hospital in the past 7 years. This study understands the related factors of vaginal cuff dehiscence, actively prevents the corresponding possible causes, guides our clinical work, and reduces the occurrence of vaginal cuff dehiscence after laparoscopic total hysterectomy.

## 1. Data And Methods

### 1.1 Clinical data

There were 1459 patients aged 31-79 years ( $50.70 \pm 6.39$ ) years who underwent a laparoscopic total hysterectomy in our hospital from January 2015 to December 2021, and their body mass index (BMI) was  $23.73 \pm 3.24$ , including 756 cases with uterine fibroids, 265 cases with adenomyosis, 66 cases with adenomyosis combined with uterine fibroids, 230 cases with cervical intraepithelial neoplasia grade III and carcinoma in situ, 28 cases with mixed endometriosis, 32 cases with benign ovarian tumor, 80 cases with atypical hyperplasia of endometrium, and 2 cases with placental site trophoblastic tumor (PSTT). There were 411 menopausal patients among them.

## 1.2 Operative Methods

Before the operation, all patients were well prepared for vaginal cleaning. The procedure was carried out under general anesthesia with endotracheal intubation. The bladder lithotomy position was maintained, with the head low and the buttocks high. The vital signs of patients were monitored during the operation, including blood pressure, heart rate, oxygen saturation, and airway pressure. Conventional disinfection, drape application, indwelling catheterization and placement of uterine lifting cup, umbilical air abdominal needle, pneumoperitoneum pressure maintained at 12-14mmHg, 10mm Trocar puncture and endoscope, a 10mm Trocar and a 5mm Trocar were placed in the left lower abdomen, and a 5mm Trocar was placed in the right lower abdomen. Ultrasonic scalpel cutting, bipolar electrocoagulation, and suture were employed throughout the operation steps of laparoscopic total hysterectomy. After the operation, infection was prevented and catheterization was indwelled for 72 hours, and the patient was discharged about 5 days later.

## 1.3 Analytical indicators

The related data of patients who underwent laparoscopic total hysterectomy were analyzed, including age, BMI, menopause, surgical reasons, complications, preoperative hemoglobin, length of surgery, suture method, postoperative hemoglobin, postoperative body temperature, and postoperative sexual lifetime.

## 1.4 Statistical methodology

The data were analyzed using SPSS23.0 statistical software. Mean standard deviation ( $\bar{x} \pm s$ ) was used to express the measurement data. For multiple factors, univariate and multivariate logistic regression analyses were used.  $P < 0.05$  means the difference with statistical significance.

# 2. Results

## 2.1 General condition

There were 1459 cases with laparoscopic total hysterectomy, among which 9 cases had vaginal cuff dehiscence after the operation, the incidence rate was 0.617%, 1 case was menopausal, and 6 cases had sexual life within 3 months after the operation. There were five cases of uterine fibroids, two cases of adenomyosis, two cases of cervical intraepithelial neoplasia grade III, and four cases of hemoglobin less than 90g/L. (Table 1)

## 2.2 Univariate regression analysis results of vaginal cuff dehiscence after laparoscopic total hysterectomy.

Among 1459 patients who underwent the laparoscopic total hysterectomy, 9 patients with vaginal cuff dehiscence were analyzed from age, body mass index, menopause, surgical reasons, complications, preoperative hemoglobin value, and length of surgery, vaginal cuff suture method, postoperative hemoglobin value, postoperative body temperature and postoperative first sexual lifetime. The results showed that the hemoglobin value before the

operation, the suture method of the vaginal cuff, and the time of first sexual life after operation were correlated with the vaginal cuff dehiscence, which was statistically significant ( $P < 0.05$ ). (Table 2)

### 2.3 Multivariate logistic regression analysis results of vaginal cuff dehiscence after laparoscopic total hysterectomy

Using the occurrence of vaginal cuff dehiscence as the dependent variable, each factor with a  $P < 0.05$  in Table 2 was assigned, and multivariate Logistic regression analysis was employed. The results showed that preoperative hemoglobin value and postoperative first sexual lifetime  $< 3$  months from surgery were independent risk factors for vaginal cuff dehiscence after laparoscopic total hysterectomy. (Table 3)

## 3. Discussion

The wide application of laparoscopic total hysterectomy in the clinic has brought many benefits to patients but also brought many complications, such as subcutaneous emphysema, abdominal wall vascular injury, various organ injuries, epigastric and scapular pain, etc. Vaginal cuff dehiscence is a rare but serious complication following laparoscopic total hysterectomy[4]. There are many risk factors for vaginal cuff dehiscence, such as menopause, anemia, diabetes, constipation, and cough leading to increased abdominal pressure, poor prognosis of the vaginal cuff, premature sexual life after operation, etc[5]. The total incidence of vaginal cuff dehiscence after hysterectomy was 0.14%-0.28%; compared with a transabdominal hysterectomy and transvaginal hysterectomy, the incidence of vaginal cuff rupture after laparoscopic total hysterectomy is higher, with an incidence rate of 0.6%-1.14%[6]. Due to laparoscopic operation with energy instruments, the increased incidence rate may also be damaged by thermal instruments, and the width and strength of sutures are not enough. As a minimally invasive operation, early recovery of daily activities and increase of abdominal pressure may, in turn, affect the healing of vaginal fornix[7].

There were 1459 cases with laparoscopic total hysterectomy in our hospital, 9 cases with vaginal cuff dehiscence after the operation, the incidence rate was 0.617%, of which 2 cases were due to intestinal prolapse through the vagina. Emergency exploratory laparotomy was performed without incarceration and necrosis of the intestinal canal. 4 cases were sutured through the vagina, 3 cases of conservative treatment. All patients recovered well, there was no peritonitis or other complications, and the prognosis was good. Univariate analysis showed that preoperative hemoglobin  $< 90\text{g/L}$ , intermittent suture, and the first sexual lifetime  $< 3$  months after the operation are related to the occurrence of vaginal cuff dehiscence after laparoscopic total hysterectomy. Multivariate Logistic regression analysis showed that preoperative hemoglobin  $< 90\text{g/L}$  and the first sexual lifetime  $< 3$  months after the operation are independent risk factors for the occurrence of vaginal cuff dehiscence after laparoscopic total hysterectomy. After surgical trauma, the patient's resistance decreased, coupled with preoperative anemia, which affected postoperative recovery and wound healing, resulting in poor healing of the vaginal cuff. Premature sexual life and frequent sexual life following surgery impose direct external force on the vaginal cuff, resulting in vaginal cuff dehiscence. At the same time, vaginal PH increases after sexual life, vaginal microecology is destroyed, and flora imbalance is easy to cause vaginitis, thus affecting the healing of the vaginal cuff. Multiple factors interact and the incidence rate of vaginal cuff dehiscence increases[8, 9]. Therefore, correcting anemia before operation and prohibiting sexual life within 3 months after the operation can reduce the occurrence of vaginal cuff dehiscence. Follow-up of patients should be strengthened after the operation, and timely treatment of vaginal cuff bleeding, inflammation, and poor healing should be carried out to reduce the occurrence of vaginal cuff dehiscence.

Laparoscopic hysterectomy has high surgical difficulty, with a long learning curve for surgical methods. The operation of instruments under the microscope, the proficiency of suture techniques, and the choice of suture methods may all have an impact on the occurrence of complications[10, 11]. Laparoscopy is characterized by the expansion of the field of vision. Surgeons are easy to misidentify the distance during suture, resulting in insufficient suture width and affecting later healing. Therefore, special attention should be given to the suture width of the vaginal cuff. At the same time, clinicians should improve the operation skills under a microscope, be familiar with pelvic anatomy, avoid damaging periodic tissues and organs, reduce intraoperative bleeding and shorten the operation time, which will play a certain role in reducing the occurrence of complications of vaginal cuff dehiscence[12, 13]. In our hospital, the risk of thermal injury caused by ultrasonic scalpel incision of the vaginal wall is low in comparison to unipolar and bipolar. However, due to the unique characteristics of laparoscopic energy instrument operation, thermal injury remains a risk factor that must be overlooked[14].

Other possible influencing factors, such as postoperative measures to reduce intraperitoneal pressure, may also be conducive to vaginal cuff healing, in theory, proper exercise, attention to diet structure, keeping stool unobstructed, using stool softener when necessary, preventing constipation, and treating chronic long-term cough and vomiting. Postmenopausal women are prone to flora imbalance and vaginal inflammation due to the decrease of estrogen level and vaginal resistance, which will also affect the healing of the cuff. Appropriate estrogen supplement therapy for postmenopausal women may also contribute to the healing of the cuff[15].

The benefits of laparoscopic total hysterectomy are numerous; yet, the complications associated with this operation need our attention. This research reveals the related factors that may cause this complication through more than 1,000 operations in our hospital over the last 7 years, and established corresponding preventive measures to limit the occurrence of complications. However, there are still many deficiencies and more cases need to be accumulated and conducted further research.

## Declarations

Availability of data and materials

We agree to share our data supporting our findings. If anyone would like to request data from this study, please contact me. My email: shiyao0810@163.com.

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## Contributions

All procedures were performed by SY. SY wrote the manuscript. SY and WL conceptualized and designed the study, and they also assisted with drafting or revision of the paper. HK, WQ, WS, and WC collected the data. WQ performed data analysis and assisted with proofreading. All authors read and approved the final manuscript. Each author has participated in the treatment and work to take public responsibility for appropriate portions of the content. All authors read and approved the final manuscript.

## Ethics declarations

### Ethics approval and consent to participate

Ethics approval and consent to participate The Medical Ethics Committee of Yuyao People's Hospital (Registration Number: 2022-04-002) granted approval and preoperative written informed consent was obtained from all patients.

I confirm that all methods were carried out in accordance with relevant guidelines and regulations.

I confirming that informed consent was obtained from all subjects and/or their legal guardian(s).

### Consent for publication

Consent for publication Written informed consent was obtained from the patients featured in clinical data for publication of this article.

### Competing interests

The authors declare that they have no competing interests

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## Tables

Table 1 Relevant data of 9 patients

case	disease	preoperative hemoglobin value ( g/L)	Review 1 month after surgery	Clinical symptoms	Vaginal cuff rupture time after surgery(days)	reason	treat
1	uterine fibroids	118	-	vaginal bleeding	15	Infect	Conservative treatment
2	uterine fibroids	115	-	asymptomatic	24	Infect	Conservative treatment
3	uterine fibroids	145	-	asymptomatic	30	Sex	transvaginal repair
4	Adenomyosis	68	basic healed	vaginal bleeding	48	Infect and Sex	transvaginal repair
5	uterine fibroids	82	basic healed	vaginal bleeding	55	Infect and Sex	transvaginal repair
6	cervical intraepithelial neoplasia	125	fully healed	asymptomatic	75	Sex	Exploratory Laparotomy
7	Adenomyosis	80	fully healed	asymptomatic	98	Sex	Exploratory Laparotomy
8	uterine fibroids	78	fully healed	asymptomatic	102	Sex	transvaginal repair
9	cervical intraepithelial neoplasia	133	-	vaginal bleeding	130	Infect	Conservative treatment

Table 2 Single factor analysis of vaginal stump dehiscence after laparoscopic hysterectomy

Univariate logistic regression analysis		P values
	OR(95%CI)	
Age	2.20(0.55-8.82)	0.267
<50		
≥50		
BMI	1.72(0.36-8.32)	0.499
<25kg/m <sup>2</sup>		
≥25kg/m <sup>2</sup>		
Menopause	3.17(0.40-25.38)	0.278
no		
yes		
Reason for surgery	1.16(0.74-1.82)	0.516
Uterine leiomyoma		
Adenomyosis		
Adenomyosis with uterine leiomyoma		
Cervical high-grade intraepithelial neoplasia		
Endometriosis		
Benign ovarian tumor		
Atypical endometrial hyperplasia		
Placental site trophoblastic tumor		
Comorbidities	0.74(0.39-1.43)	0.373
Hypertension		
Diabetes		
Hypertension with diabetes		
Hyperthyroidism		
Cholecystitis, gallstones		
Without		
Operation time	1.08(0.27-4.34)	0.912
<120		
≥120		
Preoperative hemoglobin (g/L)	5.12(1.36-19.23)	0.016
<90		

≥90		
Suture method	0.26(0.70-0.99)	0.048
Interrupted suture		
Continuous suture		
Postoperative hemoglobin(g/L)	2.38(0.59-9.57)	0.223
≥90		
≥90		
Postoperative body temperature	0.37(1.00-1.38)	0.138
≥38°C		
≥38°C		
Sexuality	15.86(2.83-88.97)	0.002
without		
≥3 months		
≥3 months		

Table 3 Multivariate Logistic regression analysis of vaginal stump dehiscence after laparoscopic hysterectomy

Multivariate logistic regression analysis	OR(95%CI)	P values
Preoperative hemoglobin (g/L)	5.17(1.37-19.49)	0.015
≥90		
≥90		
Suture method	0.26(0.70-0.98)	0.052
Interrupted suture		
Continuous suture		
Sexuality	54.00(3.59-811.35)	0.004
≥3 months		
≥3 months		