

To analyze the incidence and influencing factors of lower extremity deep vein thrombosis in patients with endometrial cancer after radical surgery

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Abstract:

Objective: To evaluate the incidence of lower extremity deep vein thrombosis (DVT) in patients with endometrial cancer after radical resection, and to investigate the related influencing factors. **Methods:** A total of 105 patients with endometrial cancer who underwent radical resection in our hospital from November 2022 to November 2023 were selected to observe the occurrence of postoperative DVT, and were divided into DVT group and non-DVT group. Logistic regression model was constructed to analyze the influencing factors of DVT in patients with endometrial cancer after radical resection. **Results** The incidence of DVT was 17.14% (18/105) 3 days after radical resection of endometrial cancer. The age ≥ 60 years old, the proportion of diabetes, the proportion of operation time ≥ 2 hours, and the expression level of D-D in the occurrence group were higher than those in the non-occurrence group, and the differences were statistically significant ($P < 0.05$). There were no significant differences in long-term smoking, long-term drinking, emaciation, degree of differentiation, hypertension, tumor stage, history of varicose veins, nerve invasion, TT and FIB levels between the two groups ($P > 0.05$). Logistic multiple regression model showed that age, diabetes, operation time and high level of D-D were the influencing factors of lower extremity deep vein thrombosis in patients with endometrial cancer after radical operation ($OR > 1$, $P < 0.05$). **Conclusions** Patients with endometrial cancer have a higher risk of DVT after radical operation, and there are many influencing factors. Age, diabetes, operation time and high level of D-D are the influencing factors of DVT in patients with endometrial cancer after radical operation.

Keywords: endometrial cancer; Deep venous thrombosis of lower extremity; Operation time; Diabetes mellitus; Influencing factors

Endometrial cancer is a malignant tumor of the endometrium, which lacks specific symptoms in the early stage of the disease, mainly menstrual disorder, vaginal bleeding and other symptoms, which is difficult to attract the attention of patients, and the progression of the disease can cause lumbosacral pain, persistent low-grade fever and other symptoms. The incidence and mortality of the disease are at a high level, and in recent years, the disease gradually tends to be younger^[1]. At present, there are various clinical treatment methods for endometrial cancer, including surgical resection, radiotherapy and chemotherapy intervention and immunotherapy, among which radical surgery is effective, and the risk^[2]

of death can be reduced by extensive hysterectomy. However, although radical surgery can effectively control the progression of the disease, due to the invasive operation, great trauma, and wide range of lesions, patients are prone to a variety of complications after surgery, which not only reduces the effect of surgical treatment, but also delays the recovery process^[3] of patients. deepvenousthrombosis (DVT) of the lower extremities is a common postoperative complication, which is mainly caused by abnormal coagulation of venous blood. Its early characteristics are not obvious, and if no intervention measures are taken in time, DVT will progress to malignancy, and in severe cases, it can induce pulmonary embolism, post-thrombotic syndrome and other complications^[4]. In addition, previous studies have also pointed out that the incidence of postoperative DVT is about 40%, and even with anticoagulant therapy, the incidence is still as high as 25%-30%^[5]. Therefore, early prevention, accurate judgment and treatment are of great value for the occurrence, development and prognosis of DVT. In view of this, 105 patients with endometrial cancer undergoing radical resection were included in this study. The incidence of postoperative DVT was counted, and the related influencing factors were investigated. The contents are as follows.

1 Materials and Methods

1.1 A total of 105 patients with endometrial cancer who underwent radical resection in our hospital from November 2022 to November 2023 were selected for the study. The patients were 50-65 years old, with an average age of 58.45 ± 5.35 years old. The body mass index was 20-26 kg/m², and the average body mass index was (22.87 ± 0.64) kg/m. This study was approved by the ethics committee of our hospital. The inclusion criteria were as follows: ① Endometrial cancer was diagnosed according to the diagnostic criteria, and was diagnosed as stage I-II by histopathological examination; ^[6] ② Elective radical surgery was performed; ③ patients were informed of the study and signed the consent form; ④ All patients underwent surgery for the first time. ⑤ The compliance was good, and the follow-up investigation could be completed. Exclusion criteria: ① Patients with severe dysfunction of important organs; ② patients with coagulation disorder; ③ with mental disorders, unable to communicate and cooperate; ④ with a history of uterine trauma or surgery; ⑤ lactating and pregnant women; ⑥ complicated with other gynecological tumors or other tumor diseases; ⑦ patients who received radiotherapy, chemotherapy and other treatments.

1.2 Methods

1.2.1 The diagnosis of DVT was evaluated according to the relevant literature^[7]. The clinical symptoms mainly included: a, in the acute stage, the skin of the affected limb was red, the skin temperature was higher than that of the healthy limb, and the skin was swollen, and the skin could also be blue-purple, flower-like, and some might have tension blisters; B. The affected limb had persistent tenderness, swelling and pain, accompanied by low fever; c had superfi-

cial varicose veins, and the surface of the skin was prominent and significantly thickened; And CT venography showed that the blood vessels were dilated, incompletely compressed, or there was shadow formation in the lumen.

1.2.2 Baseline data collection and analysis methods The baseline data of patients were obtained by reviewing the hospital information system and answering questions. The content mainly included: (1) General information: age (≥ 60 years old, < 60 years old), long-term smoking (yes, no; Smoking ≥ 1 cigarette/day for more than 1 year), long-term drinking (yes, no; Beer or greater amount of 200 g/ or liquor quantity or 50 g/times, and 2 or more times per week, lasting more than one year), pelvic fractures (with), lower limb fractures (with), thin (yes, no, Body mass index $< 18.5\text{kg/m}^2$), combined chronic diseases (hypertension, diabetes), operation time ($\geq 2\text{h}$, $< 2\text{h}$), bed rest time ($\geq 5\text{d}$, $< 5\text{d}$). (2) Laboratory indicators: Before the operation, 10mL of fasting peripheral elbow venous blood was drawn from the patients at 8:00-8:30 in the morning, and centrifuged (2500r/min, 15cm radius) for 20min. The upper serum was taken to determine D-dimer (D-D), and thrombin time (thrombin time, thrombin time, thrombin time) was measured in all patients. TT) and Fibrinogen (FIB) were measured.

1.3 Observation indicators (1) The incidence of DVT in 105 patients with endometrial cancer undergoing radical resection was statistically analyzed. (2) Patients with DVT were included in the DVT group, and patients without DVT were included in the non-DVT group. The general data of the two groups were compared. (3) Logistic regression model was used to analyze the influencing factors of DVT in patients with endometrial cancer after radical operation.

1.4 SPSS 25.0 software was used $\bar{x}$ for statistical analysis. “ $\pm s$ ” and t were used to represent and test measurement data respectively. Percentage and χ were used to represent and test count data², respectively. Logistic regression model was used to analyze the influencing factors of DVT in patients with endometrial cancer after radical operation, and $P < 0.05$ was considered as a significant difference.

2 Results

2.1 Incidence of DVT after radical resection of endometrial cancer was investigated. Three days after operation, 18 of 105 patients with radical resection of endometrial cancer were complicated with DVT, with an incidence of 17.14%.

2.2 Comparison of single factor data: the age ≥ 60 years old, the proportion of diabetes, the proportion of operation time ≥ 2 hours, and the expression level of D-D in the occurrence group were higher than those in the non-occurrence group, and the differences were statistically significant ($P < 0.05$). There were no significant differences in long-term smoking, long-term drinking, emaciation, degree of differentiation, hypertension, tumor stage, history of varicose veins, nerve invasion, TT and FIB levels between the two groups ($P > 0.05$). As shown in **Table 1**.

Table 1. Univariate analysis of demographic and clinical characteristics[n (%)/(±s)] $\bar{x}$

General Information		DVT Group (n=18)	Non-DVT Group (n=87)	Statistical Analysis	P
Age	≥60 years old	12 (66.67)	27 (31.03)	$\chi^2 = 8.111$	0.004
	< 60 years old	6 (33.33)	60 (68.97)		
Long-term smoking	Yes	10 (55.56)	37 (42.53)	$\chi^2 = 1.024$	0.312
	No	8 (44.44)	50 (57.47)		
Chronic alcohol use	Yes	12 (66.67)	47 (54.02)	$\chi^2 = 0.969$	0.325
	No	6 (33.33)	40 (45.98)		
Wasting away	Yes	10 (55.56)	57 (65.52)	$\chi^2 = 0.641$	0.423
	No	8 (44.44)	30 (34.48)		
Degree of differentiation	Low differentiation	10 (55.56)	32 (36.78)	$\chi^2 = 1.588$	0.452
	Intermediate differentiation	6 (33.33)	35 (40.23)		
	High degree of differentiation	2 (11.11)	14 (16.09)		
Hypertension	Yes	11 (61.11)	34 (39.08)	$\chi^2 = 2.956$	0.086
	No	7 (38.89)	53 (60.92)		
Diabetes	Yes	13 (72.22)	32 (36.78)	$\chi^2 = 7.649$	0.006
	No	5 (27.78)	55 (63.22)		
Operative duration	≥2h	10 (55.56)	20 (22.99)	$\chi^2 = 7.751$	0.005
	< 2h	8 (44.44)	67 (77.01)		
Tumor staging	Stage I	9 (50.00)	30 (34.48)	$\chi^2 = 1.538$	0.215
	Stage II	9 (50.00)	57 (65.52)		
History of varicose veins	Yes	7 (38.89)	40 (45.98)	$\chi^2 = 0.527$	0.468
	No	12 (66.67)	47 (54.02)		
Nerve invasion	Yes	10 (55.56)	57 (65.52)	$\chi^2 = 0.641$	0.423
	No	8 (44.44)	30 (34.48)		
D-D (μg/mL)		18.21±2.51	10.44±1.35	T = 18.749	< 0.001
TT (S)		16.57±1.99	16.05±1.81	T = 1.091	0.278
FIB (g/L)		3.36±0.91	3.51±0.92	T = 0.631	0.530

2.3 Multivariate analysis of patients with endometrial cancer undergoing radical resection complicated with DVT as the dependent variable, the occurrence of DVT was assigned as “1”, and the non-occurrence of DVT was assigned as “0”. The above variables with differences (age ≥60 years old, proportion of diabetes, proportion of operation time ≥2 hours, and D-D expression level) were used as independent variables and assigned values (Table 3). Logistic multiple regression model was constructed, and the results showed that age, diabetes, operation time and high level of D-D were the influencing factors of DVT in patients with endometrial cancer after radical resection (OR > 1, P < 0.05). See **Table 3**.

Table 2. Variable Assignments for Logistic Regression Analysis

Independent variable	Description of variables	Case of assignment
Age	Categorical variables	≥60years old= “1”, < 60years old= “0”
Diabetes	Categorical variables	Yes= “1”, No= “0”
Operative duration	Categorical variables	≥2h= “1”, < 2h= “0”
D-D	Continuous variables	-

Table 3. Logistic Regression Analysis of Risk Factors for Postoperative DVT in Endometrial Cancer Patients

Variable	B	SE	Wald	P	OR	95% CI
Age	1.435	0.709	4.093	0.043	4.199	1.046-16.861
Diabetes	1.686	0.708	5.679	0.017	5.399	1.349-21.612
Operative duration	1.372	0.679	4.082	0.043	3.944	1.042-14.928
D-D	0.311	0.087	12.793	< 0.001	1.365	1.151-1.618
Constant quantity	-8.564	1.739	24.259	< 0.001	-	-

3 Discuss

Endometrial cancer (EC) is a kind of reproductive endocrine disorder, which is caused by excessive stimulation of the endometrium by estrogen. It mainly occurs in perimenopausal and postmenopausal women, and the patient population has gradually developed to be younger in recent years, causing great^[8-9] harm. At present, surgery is the main clinical treatment for endometrial cancer, which can achieve accurate resection of tumor lesions to alleviate the disease and prolong the survival period. However, radical surgery involves extensive resection operation, involving multiple systems of the patient's urinary and pelvic cavity, and is easily accompanied by a variety of complications after surgery, among which DVT is more common^[10-11]. Deep vein thrombosis (DVT) is a common complication after radical resection of endometrial cancer, and it is also one of the important reasons for the prolongation of treatment and hospitalization time. It is necessary^[12-13] to prevent the occurrence of DVT to strengthen or consolidate the benefits of surgical treatment. Therefore, it is necessary to pay attention to the occurrence of DVT in patients with endometrial cancer after surgery, analyze the related influencing factors of such complications, and formulate targeted treatment and intervention measures according to the results to prevent the occurrence of DVT.

The results of this study showed that 18 of 105 patients with endometrial cancer undergoing radical resection were complicated with DVT, with an incidence of 17.14%. The results indicate that patients with endometrial cancer have a high risk of DVT after radical surgery, and clinical attention should be paid to it. By constructing a Logistic multiple regression model, the results showed that age, diabetes, operation time and high level of D-D were the influencing factors of DVT in patients with endometrial cancer after radical surgery. The reasons are as follows: (1) age: with the increase of age, the body functions of patients are reduced, the metabolic mechanism is weakened, and there are more vascular sclerosis, blood stasis, venous valve degeneration, and other conditions. Their own blood circulation is not good, and they are more^[14-15] likely to form thrombosis in blood vessels due to the influence of surgical treatment, thus increasing the risk of DVT. (2) Diabetes mellitus: Diabetes mellitus is a common chronic metabolic disease. Patients with hyperglycemia for a long time can cause irreversible dam-

age to the vascular wall, vascular endothelium and venous wall structure, stimulate the activation of the coagulation system, and induce pathological changes such as microcirculation and nerve dysfunction of lower limbs. Moreover, hyperglycemia can also affect the function of venous endothelial cells. By participating in mechanisms such as platelet aggregation and inflammatory response, it induces hemodynamic abnormalities and further increases the risk of DVT.^[16-17](3) Operation time: Patients with longer operation time are more serious, the tumor lesions involve a wide range of areas, the operation is relatively difficult, and the physiological function is more seriously damaged. And with the increase of operation time, the patient is in a state of anesthesia for a long time, the blood circulation is slow, the amount of bleeding and coagulation substances in the body are increased, the hypercoagulable state of blood is aggravated, and the blood viscosity is increased. As a result, the risk of DVT is increased.^[18-19](4) D-D polymer: D-D is the degradation product^[20] of fibrin monomer after cross-linking and then hydrolysis. If there is abnormal activity in the process of fibrinolysis in blood vessels, the fibrinolytic system in the body will be activated, and the D-D concentration will increase significantly, the blood viscosity will increase, and the risk of DVT will increase.

Based on the above influencing factors, it is recommended to formulate targeted intervention measures as soon as possible, mainly including: first, the hospital can further improve the collection of baseline data and past medical history of patients with endometrial cancer, and for the elderly and patients with underlying diseases, they can be included in the high-risk group of DVT, and blood glucose control can be done as soon as possible. Secondly, surgeons can refine the examination items for patients before surgery, plan the surgical path as early as possible, and do a daily skill training for medical staff in the operating room, so as to shorten the duration of surgery as much as possible and reduce the risk of DVT. Finally, medical staff should take postoperative intervention measures, and nursing staff should further strengthen the intensity of postoperative nursing. Patients with lower limb fractures need to pay attention to, and appropriate lower limb massage and rehabilitation training measures should be given to improve the blood circulation of lower limbs, so as to reduce the risk of DVT. However, there are still some limitations in this study, such as the time range of study inclusion, the sample size is relatively small, and the level of evidence is lower than that of multi-center studies. It is suggested that the scope of sample selection can be further broadened in the future to provide scientific data support for further clarifying the conclusions of this study.

In conclusion, patients with endometrial cancer have a higher risk of DVT after radical resection, and there are many influencing factors. Age, diabetes, operation time and high level of D-D are the influencing factors of DVT in patients with endometrial cancer after radical resection.

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