

Therapy of B-ultrasound-guided puncture for incision infection after total abdominal hysterectomy

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Abstract. – **OBJECTIVE:** This paper aims to investigate the clinical efficacy of B-ultrasound-guided puncture in the treatment of incision infection after total abdominal hysterectomy (TAH) and to provide references for the clinical treatment.

PATIENTS AND METHODS: 116 patients with uterine incision infection after TAH were selected and randomly divided into the observation group and the control group, with 58 cases in each group. The patients in the control group received an intravenous drip of ceftazidime and tinidazole to prevent infection, and the patients in the observation group received B-ultrasound-guided puncture treatment on the basis of the treatment plan of the control group. The clinical therapeutic effects between the two groups were compared.

RESULTS: The cure rate of excellence in the observation group was 84.48%, and the cure rate in the control group was 53.45%, while the difference between the two groups was statistically significant ($p < 0.05$). The total effective rate in the observation group was 98.28%, and that in the control group was 87.93%, but there was no statistically significant difference between the two groups. The hospital stay was (9.5 ± 1.6) days in the observation group and (12.3 ± 2.1) days in the control group, and the mean hospital stay in the observation group was significantly shorter than that in the control group; the difference between the two groups was statistically significant ($p < 0.05$).

CONCLUSIONS: TAH should be performed on patients when they are in the best physical condition, and strictly according to the operation steps to reduce the duration of surgery. The application of B-ultrasound-guided puncture can effectively improve the excellent recovery rate of the incision infection after TAH and shorten the hospitalization time. It is worth popularizing in clinical practice.

Key Words:

B-ultrasound, Hysterectomy, Postoperative infection, Puncture treatment, Clinical efficacy.

Introduction

The uterus, a unique organ of the female, is one of the main organs producing menstruation and fetus, which is located in the central pelvic cavity between the bladder and rectum¹. The intrauterine tumors are mainly uterine myoma, a kind of benign tumor caused by self-hormonal disorders, uncontrolled life or other factors, or more serious malignant tumors such as cervical erosions and endometrial carcinoma². Total abdominal hysterectomy (TAH) is the most commonly used method in the treatment of intrauterine tumors or intractable uterine bleeding in patients who do not need to retain the uterus. As an invasive operation with strict surgical requirements, it can easily cause damage to the bladder mucosa and urethra of the patient, and the postoperative rehabilitation cycle is longer, and the risk of infection is also extremely high^{3,4}. Nonetheless, there is still no other effective clinical treatment that can replace TAH in the treatment of uterine tumors because of its excellent curative effects and small trauma to patients⁵. Therefore, this study aims to provide patients with the most effective and the most convenient treatment plan without side effects by studying the curative effects of B-ultrasound-guided puncture in the treatment of incision infection after TAH and provide the reference and guidance for the clinical treatment of infection after TAH.

Patients and Methods

General Data

116 patients aged (52.6±18.2) years old with incision infection after TAH in our hospital from August 2013 to September 2015 were selected, including 51 cases of hysteromyoma, 26 cases of uterine malignant tumor, 15 cases of atypical hyperplasia of endometrium, 15 cases of endometriosis uterina (endometriosis), and 9 cases of uterine bleeding. Among them, 19 patients underwent a total hysterectomy, 58 patients underwent a radical hysterectomy, and 39 patients underwent a subtotal hysterectomy. The study was approved by the Ethics Committee of Gansu Maternal and Child Health Care Center.

Inclusion and Exclusion Criteria

The inclusion criteria were: all patients had incision infection after TAH, and all patients selected in the study had complete cases. The exclusion criteria were: patients with cardiovascular diseases, patients with digestive tract diseases, patients using other antibiotics not prescribed by our hospital before treatment or during treatment, anemic patients. All of the above patients signed the informed consent.

Methods and Grouping

All patients stopped sexual activity for 3 months before the operation and had hip-bath with potassium permanganate (KMnO₄) solution together with vaginal washing with body lotion once daily for 3 days prior to surgery to fully clean the vagina and uterus for TAH. The operative method was in reference to that used by Johnson et al⁶. All patients with incision infection (n=116) were randomly divided into two groups. 58 patients in the control group were administrated with ceftazidime and tinidazole as the therapeutic drugs by intravenous drip once a day for 5 days. Other 58 patients in the observation group were treated with CSBX/T-900 B-ultrasound (Shenzhen Zhuo Mei Medical Technology Co., Ltd., Shenzhen, China) guided extraction of effusion in the infected area, and the infected area was flushed by 0.9% sodium chloride and tinidazole until the extracted effusion was transparent and clear. 80,000 units of tobramycin sulfate injection were injected into the infected area, and then, ceftazidime and tinidazole were administered by intravenous infusion for 5 days. The most effective treatment method of the incision infection after TAH was analyzed by comparing the clinical therapeutic effects between two groups of patients.

Evaluation Criteria

The studies on the treatment of patients by Kovalenko et al⁷ were used as the evaluation criteria for the treatment of patients. The treatment was considered excellent if the patient's body temperature returned to normal, there was no pain in the section, and no infection was detected by ultrasonography. The treatment was considered good if the patient's body temperature was slightly lower or slightly higher than normal, there was tenderness in the section, and ultrasonography showed that the infection was limitedly reduced. The treatment was considered bad if the patient's body temperature, the pain in the section, and the infection detected by ultrasonography were not improved or even worsened.

Statistical Analysis

The Statistical Product and Service Solutions (SPSS) 22.0 software (IBM Corp., Armonk, NY, USA) was used for statistical analysis. The measurement data were expressed by ($\bar{x}\pm s$) and tested by the *t*-test. The enumeration data were tested by the χ^2 -test. $p<0.05$ suggested that the difference was statistically significant.

Results

Clinical Data of Patients

By comparing the clinical data of patients, it could be seen that there were no significant differences between the two groups of patients in the disease type, course of disease, type of surgery, age, body weight, smoking history, exercise habit, place of residence, nationality, and education level ($p>0.05$) (Table I).

Analysis of Infection Factors

By observing the infection data among patients, it could be seen that the older the patients were, the higher the infection rate would be (62.07%). The infection rate of patients with malignant tumors receiving TAH (40.52%) was significantly higher than that of patients with other types of diseases. In terms of type of surgery, the infection in patients receiving total hysterectomy was the most serious (57.76%). 80 minutes were determined as the standard time according to TAH procedure by Andersen et al⁸. The infection rate of patients with operation time of more than 80 minutes was significantly increased (65.52%). The infection rate of patients with abnormal white blood cell count and platelet count in preoperative

Table I. Clinical data of patients [n (%)].

	Observation group (n=58)	Control group (n=58)	χ^2	<i>P</i>
Disease type			2.54	0.425
Hysteromyoma	27 (46.55)	24 (41.38)		
Malignant tumor	11 (18.97)	15 (25.86)		
Atypical hyperplasia	9 (15.52)	6 (10.34)		
Endometriosis	7 (12.07)	8 (13.79)		
Uterine bleeding	4 (6.90)	5 (8.62)		
Type of surgery			2.24	0.317
Total hysterectomy	8 (13.79)	11 (18.97)		
Subtotal hysterectomy	22 (37.93)	17 (29.31)		
Radical hysterectomy	28 (48.28)	30 (51.72)		
Age			3.06	0.266
<45 years old	34 (58.62)	29 (50.00)		
≥45 years old	24 (41.38)	29 (50.00)		
Smoking history			2.15	0.415
Yes	16 (27.59)	14 (24.14)		
No	42 (72.41)	44 (75.86)		
Exercise habit			3.07	0.374
Yes	32 (55.17)	36 (62.07)		
No	26 (44.83)	22 (37.93)		
Residence			3.56	0.381
City	39 (67.24)	35 (60.34)		
Country	19 (32.76)	23 (39.66)		
Nationality			2.14	0.482
Han nationality	52 (89.66)	53 (91.38)		
Ethnic minority	6 (10.34)	5 (8.62)		
Education level			2.25	0.462
<Senior high school	23 (39.66)	21 (36.21)		
≥Senior high school	35 (60.34)	37 (63.79)		
Body weight			3.17	0.298
<50KG	26 (44.83)	24 (41.38)		
≥50KG	32 (55.17)	34 (58.62)		
Course of disease			3.05	0.329
<7d	33 (56.90)	31 (53.45)		
≥7d	25 (43.10)	27 (46.55)		

blood routine examination was significantly higher than that of patients with normal white blood cells and platelets (69.83%, 61.21%). The infection rate of patients who received a blood transfusion of more than 250 mL during surgery was also remarkably higher than that of patients who received less blood (67.24%). The differences were statistically significant ($p < 0.05$). The observation of the patient's hospitalization seasons showed that there were no significant differences among the four seasons ($p > 0.05$), and there was no statistical significance (Table II).

Comparison of Therapeutic Effects

The hospital stay in the observation group was (7.5±1.6) days, which was markedly shorter compared with that in the control group (10.3±2.1) days ($p < 0.05$). The therapeutic effect of the obser-

vation group was excellent in 49 cases (84.48%), which was significantly more than that in the control group (31 cases, 53.45%). Moreover, the effective treatment rate in the observation group (98.28%) was also higher than that in the control group (87.93%), and the difference was statistically significant ($p < 0.05$) (Table III).

Discussion

There exist a large number of bacteria in women's vagina and cervix, but there exists a layer of protective mucosal tissues in the vagina and cervix, which can resist the infection and pathogenicity of a large number of bacteria⁹. However, after traumatic surgery, the surgical trauma destroys the original mucosal tissues, so that a

Table II. Analysis of infection factors.

	<i>n</i>	The total cases of total infection (%)	χ^2	<i>P</i>
Age				
<45 years old	44	37.93	16.24	0.026
≥45 years old	72	62.07		
Disease type				
Hysteromyoma	13	11.21	18.31	0.015
Malignant tumor	47	40.52		
Atypical hyperplasia	21	18.10		
Uterine bleeding	17	14.66		
Type of surgery				
Total hysterectomy	67	57.76	17.33	0.019
Subtotal hysterectomy	32	27.59		
Radical hysterectomy	17	14.66		
Hospitalization season				
Spring	22	18.97	8.62	0.058
Summer	35	30.17		
Fall	31	26.72		
Winter	28	24.14		
Operation time (min)				
<80	40	34.48	15.64	0.025
≥80	76	65.52		
Preoperative white blood cell count				
Normal	35	30.17	16.39	0.021
Abnormal	81	69.83		
Preoperative platelet count				
Normal	71	61.21	14.29	0.035
Abnormal	45	38.79		

Table III. Therapeutic effects.

	<i>n</i>	Hospital stay (d)	Therapeutic effect [n (%)]			Effective treatment rate (%)
			Excellent	Good	Bad	
Observation group	58	9.5±1.6	49 (84.48)	8 (13.79)	1 (1.72)	98.28
Control group	58	12.3±2.1	31 (53.45)	20 (34.48)	4 (6.90)	87.93
<i>p</i>		F=16.81 0.026	$\chi^2=15.64$ 0.015	$\chi^2=12.56$ 0.038	$\chi^2=11.67$ 0.042	$\chi^2=11.52$ 0.041

large number of pathogenic bacteria are poured into the tissues, causing infections¹⁰. At the same time, as the intestine is very close to the uterus, it is very easy to cause damage to the intestine during TAH, resulting in an overflow of intestinal contents, which is also one of the causes of incision infection in patients¹¹. Therefore, compared with surgeries on other parts, the postoperative infection rate of patients receiving TAH

is extremely prominent. In clinical research, the clinical studies on incision infection in patients receiving TAH are particularly important. This experiment, by studying the composition of the infected population and comparing the effects of B-ultrasound-guided puncture in the treatment of incision infection after TAH with those of the conventional drug treatment, aims to provide the clinic with the most effective and efficient method

for the treatment of incision infection after TAH.

TAH is currently the most effective method to cure cervical diseases in clinic, and it can completely cure the patient by removing the diseased parts of the uterus¹². However, TAH is more harmful to the patient, and will make the patient lose fertility after surgery, and may also cause endocrine system disorders, and have a certain impact on the patient's mentality, emotion, and sexual life¹³. Therefore, in clinic, TAH must be performed through a rigorous screening and repeated communication with patients to achieve the best surgical results¹⁴. TAH patients should meet the following criteria: placenta previa or abruption; serious uterine infection; hysteromyoma for more than three months during pregnancy and no fertility needs; severe dysmenorrhea or pelvic adhesions caused by endometriosis; malignant tumor of uterus; uterine disease and drug treatment is ineffective or even worsens it; severe degeneration of the cervix which cannot be handled; severe prolapse of the uterus; dysfunctional endometrial bleeding and drug treatment is ineffective or even worsens it; cancer adjacent to digestive tract or urinary system¹⁵.

By comparing the composition of patients with incision infection, it could be seen that there were more patients with advanced age, and the infection rate of patients with malignant tumors receiving TAH was also significantly higher than that of patients with other types of diseases. In the type of surgery, the infection in patients receiving total hysterectomy was the most serious. There were differences between the patients in the operation time and preoperative white blood cell count and platelet count. The reason is that with the increase of age, the body functions of patients decline, so that the immunity also declines and the probability of infection becomes higher¹⁶. However, the tumor necrosis factors and cancer cells in cancer patients have a more serious impact on the incision, which reduces the lymphocyte immune target cell cytotoxicity and disruption of normal immune metabolism, leading to infect more easily¹⁷. At the same time, due to the wider resection range and longer operation time, the incision is stimulated by oxidation more and more widely, the damage to the surrounding tissue structure is also greater, and the natural infection rate will increase¹⁸. The white blood cells and platelets can improve the patients' body functions and increase inflammation by accelerating the healing of the section and the killing of pathogenic bacteria in patients¹⁹. Therefore, among the infected patients,

there were more patients with abnormal white blood cells and platelets than those with normal white blood cells and platelets. However, the observation of the patients' hospitalization seasons showed that seasons had no significant influence on the infection. There were slightly more patients only in summer, compared with other seasons. The reason may be that hot weather raises patients' body temperature and the skin and sweat glands secrete more intensely. The harmful substances excreted in the body cause the incision infection, suggesting that patients should pay attention to personal hygiene and regular and prompt cleaning of the affected area²⁰. The application of the B-ultrasound-guided puncture in the treatment of incision infection after TAH could effectively reduce the length of the hospital stay and improve the excellent treatment rate of patients. In the clinical treatment of incision infection after surgery, in addition to the use of anti-bacterial drugs and anti-inflammatory drugs for treatment, the treatment and cleaning of the infected areas in patients is also a very effective way, which mainly includes the drainage treatment in the infection site²¹. However, since the patient's incision is inside the body after TAH, it cannot be cut and drained *in vitro*. In this case, reoperation may lead to secondary injuries to the patient²². Therefore, the use of B-ultrasound guidance, under the premise of ensuring the accuracy of the puncture, has improved the safety of puncture treatment and achieved the purpose of "drainage" (take out the effusion at the incision) at the same time. With the use of the antimicrobial drugs, it not only controls the exacerbation of infections, but also effectively improves the effective rehabilitation rate of patients, which is consistent with the research results of Till et al²³.

Conclusions

TAH should be performed on patients when they are in the best physical condition, and strictly according to the operation steps to reduce the duration of surgery. The application of B-ultrasound guided puncture treatment can effectively improve the excellent recovery rate of incision infection after TAH, and shorten the hospitalization time. It is worth popularizing in clinical practice.

Conflict of Interests

The Authors declare that they have no conflict of interests.

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