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The application value of 5 Fr non-contact hysteroscopy in the diagnosis and treatment of intrauterine diseases in perimenopausal and postmenopausal women

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Abstract

Objective To explore the application value of 5 Fr non-contact hysteroscopy in the diagnosis and treatment of intrauterine diseases in perimenopausal and postmenopausal women.

Methods A total of 200 perimenopausal and postmenopausal patients who were to undergo hysteroscopy for intrauterine diseases from October 2022 to January 2024 were selected as the research objects, and the clinical data were retrospectively analyzed. According to the different treatment methods, these subjects were divided into a 5Fr non-contact hysteroscopic group (5Fr group) and a traditional hysteroscopic group (traditional group), with 100 cases in each group. The surgery-related indicators, postoperative-related indicators, intraoperative/postoperative disease diagnosis, and satisfaction of the patients in the two groups were compared.

Results Compared with the traditional group, the examination time of the 5Fr group was significantly shortened, and the proportion of intraoperative bleeding ≤ 5 mL was significantly increased ($P < 0.05$). Compared with the traditional group, the proportion of abnormal heart rate/blood pressure and nausea/vomiting, and pain score were significantly reduced in the 5Fr group ($P < 0.05$), while the proportion of postoperative bleeding time ≤ 1 week and postoperative abdominal pain time ≤ 2 h were significantly increased in the 5Fr group ($P < 0.05$). The satisfaction rate of the 5Fr group was 91.00% (41.00% relatively satisfied + 50.00% very satisfied), which was much higher than 75% (37.00% relatively satisfied + 38.00% very satisfied) in the traditional group ($P < 0.05$).

Conclusion 5Fr non-contact hysteroscopy had similar clinical effects to the traditional hysteroscopy, and the 5Fr non-contact hysteroscopy technology made up for the shortcomings of the traditional hysteroscopy, which could significantly reduce the pain and intraoperative bleeding of patients, and improve patient satisfaction.

Keywords 5 Fr non-contact hysteroscopy, Intrauterine disease, Menopause, Perimenopause

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Introduction

Perimenopause is the gradual aging process of the female reproductive system. Women during this period are prone to uterine cavity diseases due to hormone fluctuations, such as uterine cavity mass lesions, endometriosis, uterine cavity inflammation, etc., which may lead to irregular vaginal bleeding, dysmenorrhea, infertility, and other symptoms, seriously affecting the quality of life of patients [1]. In addition, the occurrence, development, and treatment response of perimenopausal women with uterine cavity diseases are different from those of women of childbearing age, which brings certain challenges to clinical diagnosis and treatment.

Ultrasound, as an important examination method, can play an important role in checking for growth in the uterine cavity and abnormal masses in the ovaries and bilateral fallopian tubes, etc [2, 3]. For local lesions of the endometrium, including endometrial polyps and endometrial hyperplasia, etc., hysteroscopy is required [4, 5]. Hysteroscopy can clarify the morphology of the uterine cavity and cervix and can observe the size of the lesion and abnormal blood vessels, which plays a preliminary judgment on benign and malignant space-occupying lesions [6]. In addition, targeted curettage can be carried out according to the hysteroscopy to prevent the occurrence of missed diagnosis and improve the accuracy of disease diagnosis. However, traditional hysteroscopy causes certain discomfort and even pelvic pain to patients due to the need to place vaginal speculums and cervical forceps, which in turn causes vagus reflex and even intensifies the conflict between doctors and patients [7]. Non-contact hysteroscopy is a newly developed examination method in recent years, which does not require anesthesia, and the diameter of the endoscope is smaller than that of a traditional hysteroscope, causing less pain to patients [8]. Non-contact hysteroscopic surgery does not require speculum placement, cervical clamping, cervical canal dilation, uterine cavity probe, and anesthesia, and the placement of a smaller diameter hysteroscope to show the structure of the vagina, cervix, and uterine cavity can greatly reduce intraoperative pain [9].

In this study, a retrospective analysis was conducted on perimenopausal and postmenopausal patients who needed to be admitted for hysteroscopy or treatment in our hospital, aiming to explore the value of 5Fr non-contact hysteroscopy and traditional hysteroscopy in the diagnosis of uterine cavity diseases, and to provide a certain reference for the diagnosis of clinical diseases.

Materials and methods

General materials

A total of 200 perimenopausal and postmenopausal patients who were to undergo hysteroscopy for intrauterine diseases from October 2022 to January 2024 were selected as the research objects, and the clinical data were retrospectively analyzed. According to the different treatment methods, these subjects were divided into a 5Fr non-contact hysteroscopic group (5Fr group, no anesthesia) and a traditional hysteroscopic group (traditional group, local anesthesia), with 100 cases in each group. The inclusion criteria flow chart was displayed in Fig. 1.

Inclusion criteria: Patients with indications for hysteroscopy during perimenopausal and postmenopausal periods, including abnormal uterine bleeding, postmenopausal bleeding, uterine submucous myoma, and endometrial polyps, and imaging suggested intrauterine mass but asymptomatic, abnormal thickening of the endometrium, intrauterine foreign bodies, intrauterine device insertion and loss, etc. Exclusion criteria: (1) Patients with severe cardiovascular and cerebrovascular diseases, liver and kidney diseases, or coagulation dysfunction diseases; (2) Patients in the acute phase of genital infection; (3) Patients with pregnancy-related diseases; (4) Patients with a large amount of persistent and active abnormal uterine bleeding; (5) Patients with uterine perforation in the past 3 months or a history of uterine cavity surgery in the past 1 month; (6) Patients with a body temperature > 37.5℃; (7) Patients with cervical atresia on gynecological examination, or a history of previous failure of uterine cavity manipulation.

Methods

Patients in perimenopausal periods underwent examinations 3 to 7 days after the end of their menstrual cycle (when the vaginal bleeding stopped or decreased in cases of menstrual disorders). Patients in postmenopausal periods underwent hysteroscopy at any time depending on the diagnosis and treatment. Before the examination, the patient held urine appropriately to facilitate B-ultrasound monitoring during hysteroscopy. The patient was guided to assume a bladder lithotomy position. The skin of the external genital area was disinfected with iodine, and a sterile towel was paved. Patients undergoing traditional hysteroscopy first exposed the cervix with a speculum, disinfected the cervix and vagina with iodophor, and clamped the anterior lip of the cervix with cervical forceps. When using a 6.5 mm external sheath hysteroscopy, 1% lidocaine was used to infiltrate anesthesia at 3 and 9 o'clock on the cervix. After the cervix was dilated to size 6.5, the air in the water inlet was emptied. A mirror was then placed in the cervical canal to observe whether there were any abnormal situations, the scope was placed in the cervical canal, and the external cervical orifice, cervical canal, internal cervical ostium, anterior uterine wall, posterior wall, bilateral wall, fundus and bilateral uterine horns were observed in turn. When using a 4.5 mm external sheath hysteroscopy, a 1% lidocaine cotton swab

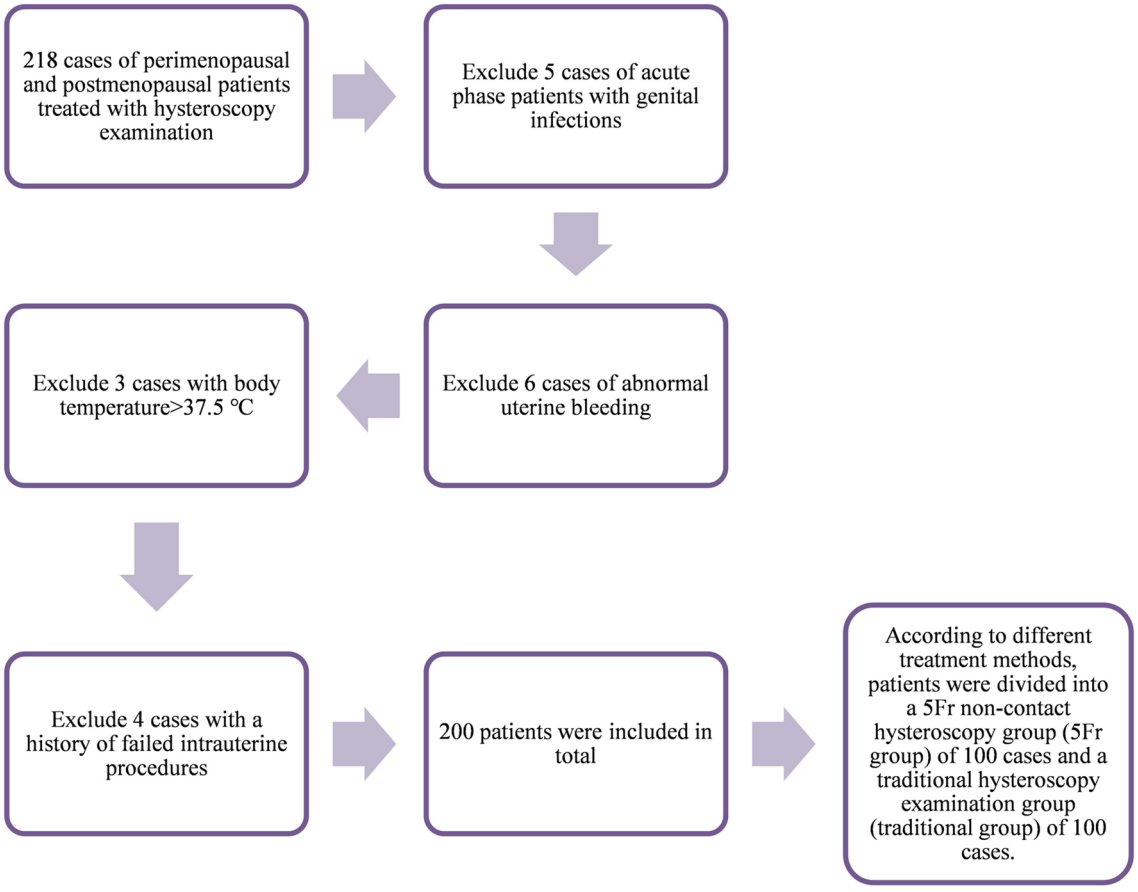

Fig. 1 The inclusion criteria flow chart

was inserted into the cervical canal, the posterior endoscopy was performed for 3 min, and the process was the same as before. In the case of non-contact hysteroscopy, a 4.5 mm hysteroscope was inserted from the vagina without speculum and cervical forceps, and the vagina was dilated with normal saline. After seeing the cervix, the mirror was inserted into the cervix, and the subsequent observation was the same as before, without anesthesia. If the space-occupying lesion had a thin pedicle under hysteroscopy, the patient was treated with enucleation; If there was a thicker pedicle, the patient was given excision; If the pedicle was not present, the patient was treated with biopsy. All patients were treated with segmented curettage. During the operation, the patient's blood pressure and breathing were closely monitored to ensure the patient's stable vital signs. At the same time, the two groups of patients were given pathological diagnoses. The examinations were all performed by the same team of physicians, and the surgeons had more than 5 years of clinical experience.

The patient was abstained from bathing and sexual life for 2 weeks after surgery. The patient had regular outpatient re-examinations after surgery to observe whether there were fever, abdominal pain, abnormal vaginal bleeding, and abnormal discharge, and if so, be given active treatment measures.

Outcome measures

(1) Surgical-related indicators: The changes in surgical-related indicators were recorded, including the examination time, surgical duration, amount of dilation fluid, presence of false passage during surgery, intraoperative bleeding volume, and surgical failure rate.

(2) Analysis of postoperative-related indicators: Postoperative-related indicators, such as the heart rate (abnormal heart rate less than 60 beats per minute or more than 100 beats per minute [10]), blood pressure (Abnormal blood pressure included hypertension and hypotension. Hypertension is systolic blood pressure ≥ 140mmHg and/or diastolic blood pressure ≥ 90mmHg in the absence of antihypertensive drugs, and hypotension is systolic blood pressure less than 90 mmHg and diastolic blood pressure less than 60 mmHg [11]), nausea/vomiting, pain score, the bleeding time and abdominal pain time (≤ 2 h, >2 h), were analyzed.

Pain score was evaluated using a visual analogue scale (VAS) [12], which quantified the patient's feelings or symptom intensity through a graduated straight line. A straight line about 10 cm long was used, with one end marked 0, indicating no pain or symptoms, and the other end marked 10, representing the most intense pain or most severe symptoms. The higher the score, the more severe the pain of the patient.

(3) Intraoperative and postoperative disease diagnosis: The pathological examination results were used as the gold standard for the diagnosis of intraoperative microscopic and postoperative diseases.

(4) Satisfaction analysis: The satisfaction was evaluated using a questionnaire. This questionnaire was developed according to previous references [13–18] together with the actual situation of our department. The satisfaction scale integrated the service attitude of doctors and nurses (20 points for doctors and 15 points for nurses), professional skills (20 points), examination environment (15 points), process efficiency (15 points), pain management (10 points) and overall feeling (5 points). The total score was 100 points, including dissatisfaction (60 points and below), relatively satisfied (61–89 points), and very satisfied (90 points and above). The satisfaction was calculated.

Statistical analysis

SPSS 24.0 statistical software was employed for data analysis. In this study, an independent sample t-test was used to compare the measurement data between two groups, represented by ($\bar{x} \pm s$), including the examination time, pain score, etc. The comparison of enumeration data between groups was conducted using a χ^2 test, expressed as [cases (%)], with indicators including satisfaction and surgical failure rate. $P<0.05$ was statistically significant.

Results

Comparison of general data

Among them, the age range of the 5Fr group was 45 ~ 60 years old, with an average age of 48.17 ± 6.95 years old. The number of pregnancies in the 5Fr group was 1–4. The menstrual cycle of the 5Fr group was 25 ~ 33 days. Besides, the age range of the traditional group was 48 ~ 62 years old, with an average age of 49.35 ± 5.26 years old. The number of pregnancies in the traditional group was 1–4. The menstrual cycle of the traditional group was 25 ~ 33 days. There was no significant difference in general information between the two groups ($P>0.05$, Table 1).

Analysis of surgical-related indicators

There was no significant statistical difference between the two groups in the surgical duration, amount of dilation fluid, intraoperative false passage, and surgical failure rate ($P>0.05$). Compared with the traditional group, the inspection time was significantly shortened, and the proportion of intraoperative bleeding ≤ 5 mL was significantly increased in the 5Fr group ($P<0.001$, Table 2; Fig. 2).

Analysis of two postoperative-related indicators

Compared with the traditional group, the proportion of abnormal heart rate/blood pressure and nausea/vomiting was significantly reduced, the pain score was significantly reduced, and the proportion of postoperative bleeding time ≤ 1 week and postoperative abdominal pain time ≤ 2 h was significantly increased in the 5Fr group ($P<0.05$, Table 3).

Analysis of intraoperative and postoperative disease diagnosis

There was no significant statistical difference between the traditional group and the 5Fr group in the intraoperative and postoperative disease diagnosis ($P>0.05$, Table 4).

Patient satisfaction analysis

The satisfaction rate of the traditional group was 75% (relatively satisfied 37.00%+very satisfied 38.00%), which

Table 1 Comparison of general data [case (%), ($\bar{x} \pm s$)]

Groups	The traditional group ($n=100$)	The 5Fr group ($n=100$)	t/χ^2	P
Age (years)	49.35 ± 5.26	48.17 ± 6.95	1.354	0.177
Pregnancy (times)	2.46 ± 0.51	2.52 ± 0.46	0.874	0.383
Menstrual cycle (d)	29.50 ± 2.97	29.25 ± 3.05	0.587	0.558
Complication				
Diabetes	8(8.00)	10(10.00)	0.244	0.621
Hypertension	25(25.00)	27(27.00)	0.104	0.747
Menstrual status			0.997	0.318
Perimenopause	53 (53.00)	60 (60.00)		
Postmenopausal	47 (47.00)	40 (40.00)		

Table 2 Comparison of surgical-related indicators [cases (%), ($\bar{x} \pm s$)]

Groups	The traditional group ($n=100$)	The 5Fr group ($n=100$)	t/χ^2	P
Inspection time (min)	5.82 ± 1.47	2.53 ± 1.01	18.447	< 0.001
Surgical duration (min)			1.426	0.232
≤ 10	62 (62.00)	70 (70.00)		
> 10	38 (38.00)	30 (30.00)		
Dosage of dilation fluid (mL)			0.287	0.592
≤ 300	79 (79.00)	82 (82.00)		
> 300	21 (21.00)	18 (18.00)		
False passage appeared during surgery (%)			2.020	0.155
No	98 (98.00)	100 (100.00)		
Yes	2 (2.00)	0 (0.00)		
Intraoperative bleeding volume (mL)			14.881	< 0.001
≤ 5	74 (74.00)	94 (94.00)		
> 5	26 (26.00)	6 (6.00)		
Surgical failure (%)			3.046	0.081
No	100 (100.00)	97 (97.00)		
Yes	0 (0.00)	3 (3.00)		

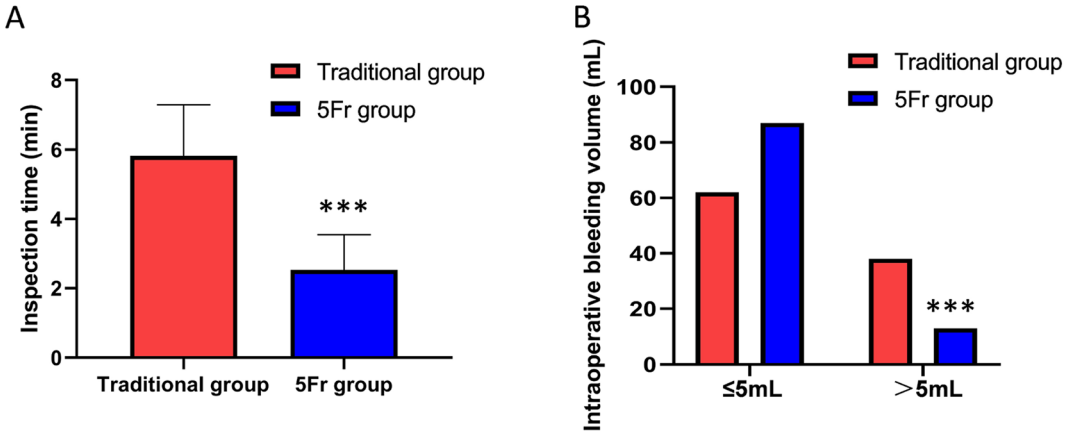

Fig. 2 Comparison of surgical-related indicators between two groups. **A**: Comparison of inspection time between two groups; **B**: Comparison of intraoperative blood loss between two groups. *Note*: $^{***}P<0.001$ compared with the traditional group

was significantly lower than that of the 5Fr group with 91.00% (relatively satisfied 41.00%+very satisfied 50.00%) ($P<0.01$, Table 5; Fig. 3).

Discussion

With the development of science and technology and the improvement of people's living standards, the diagnosis and treatment of female gynecological diseases are more and more inclined to use minimally invasive techniques. Hysteroscopy, as a typical representative of transluminal endoscopic technology, is increasingly widely used in clinical practice and has become a highly used diagnostic and treatment method in gynecology. Because of its ability to accurately examine and treat the uterine cavity, it has become the gold standard for the diagnosis of intrauterine lesions [19]. With the advancement of technology and equipment, hysteroscopic surgery has become safer and more minimally invasive in modern times. Compared with traditional laparotomy, hysteroscopy has the characteristics of less trauma, shorter surgical time, and faster postoperative recovery, which opens a new chapter for gynecological surgery [20].

Although hysteroscopy is commonly used in clinical practice, there are many different diseases of the uterine cavity. Especially in perimenopausal and postmenopausal women, with the gradual decline of estrogen levels, the vagina will shrink and narrow, the cervix will shrink and flatten, the use of a speculum can cause obvious discomfort and pain, and it is even difficult for cervical atrophy to place cervical forceps [21]. Traditional hysteroscopy requires the placement of a vaginal speculum and cervical forceps. Due to the large diameter of the mirror body, local or general anesthesia is required, which causes discomfort and pelvic pain in patients, and even vagus nerve reflex, limiting the scope of application [22, 23]. Compared with traditional hysteroscopy, the 5Fr non-contact hysteroscopy can significantly reduce patient pain and discomfort, relieve patient tension, and

Table 3 Analysis of two postoperative-related indicators [Cases (%), ($\bar{x} \pm s$)]

Groups	The traditional group ($n=100$)	The 5Fr group ($n=100$)	χ^2/t	P
Abnormal heart rate/blood pressure (%)			14.047	< 0.001
No	70 (70.00)	91 (91.00)		
Yes	30 (30.00)	9 (9.00)		
Nausea/vomiting (%)			5.775	0.016
No	72 (72.00)	92 (92.00)		
Yes	18 (18.00)	8 (8.00)		
Pain score (score)	3.52 ± 0.63	1.33 ± 0.42	28.924	< 0.001
Postoperative bleeding time (week)			18.000	< 0.001
≤ 1	81 (81.00)	99 (99.00)		
> 1	19 (19.00)	1 (1.00)		
Postoperative abdominal pain time (h)			9.205	0.002
≤ 2	72 (72.00)	89 (89.00)		
> 2	28 (28.00)	11 (11.00)		

Table 4 Analysis of intraoperative and postoperative disease diagnosis [Cases (%)]

Group	The traditional group ($n=100$)	The 5Fr group ($n=100$)	χ^2	P
Intraoperative disease diagnosis (%)	40 (40.00)	31 (31.00)	1.769	0.184
Cervical adhesion	12 (12.00)	8 (8.00)		
Intrauterine adhesions	16 (16.00)	15 (15.00)		
Uterine incision diverticulum	7 (7.00)	5 (5.00)		
Implantation of contraceptive rings	5 (5.00)	3 (3.00)		
Postoperative disease diagnosis (%)	77 (77.00)	68 (68.00)	2.031	0.154
Endometrial polyps	13 (13.00)	10 (10.00)		
Endometrial hyperplasia	27 (27.00)	30 (30.00)		
Endometrial cancer	10 (10.00)	8 (8.00)		
Submucosal fibroids of the uterus	22 (22.00)	20 (20.00)		

improve patient tolerance during the examination process, as it does not require the use of scope or cervical forceps during operation. The 5Fr non-contact hysteroscopy has the advantages of shorter surgical time, less pain, significantly less intraoperative and postoperative bleeding, less trauma, faster recovery, and lower chances of infection [24]. Ultrasound-guided access is available for patients with cervical stenosis or cervical adhesions, which is more suitable for menopausal women. The results of this study found that compared with the traditional group, the examination time, postoperative bleeding time, and abdominal pain time in the 5Fr group were largely shortened. Patients had lower intraoperative bleeding volume and a lower occurrence rate of abnormal heart rate/blood pressure and nausea/vomiting. The above results suggested that 5Fr non-contact hysteroscopy had the characteristics of less trauma, faster recovery, and a more significant advantage in reducing pain. In addition, the results of this study found no significant difference in disease diagnosis between the two groups. Similar to the results of this study, multiple studies have shown that non-contact hysteroscopy technology not only has similar therapeutic effects as traditional hysteroscopy, but also can effectively reduce patient pain and increase the convenience of hysteroscopy diagnosis [25, 26]. The duration of postoperative abdominal pain in this study was limited to two hours, which was based on the general observation of the degree of surgical trauma and recovery speed among patients included in the study. However, this time limit was not absolute, because the duration of abdominal pain varies depending on individual differences, surgical types, postoperative care, and the presence of complications. A systematic evaluation, including 6 randomized controlled trials also showed that there was no significant difference in the examination effect between non-contact hysteroscopy and traditional hysteroscopy, with shorter vaginal endoscopy surgery time and reduced pain in patients [27]. Randomized controlled trials have shown that non-contact hysteroscopy largely reduces examination time and pain compared to traditional hysteroscopy, accompanied by a lower proportion of postoperative complications [28]. These results indicate that the 5Fr non-contact hysteroscopy can bring a better surgical experience to patients while effectively diagnosing. However, during the surgery, it is still necessary to pay attention to the microscopic search and identification of the external cervical opening and the internal cervical opening. The inexperience of the operator or stenosis of the internal and external cervical adhesions may lead to the failure of endoscopic implantation. In addition, there is no evidence on whether non-contact hysteroscopy increases postoperative infections, but it emphasizes complete vaginal elimination before

Table 5 Patient satisfaction analysis [cases (%)]

Groups	Cases	Dissatisfied	Relatively satisfied	Very satisfied	Satisfaction rate
The traditional group	100	25 (25.00)	37 (37.00)	38 (38.00)	75 (75.00)
The 5Fr group	100	9 (9.00)	41 (41.00)	50 (50.00)	91 (91.00)
χ^2					9.072
P					0.003

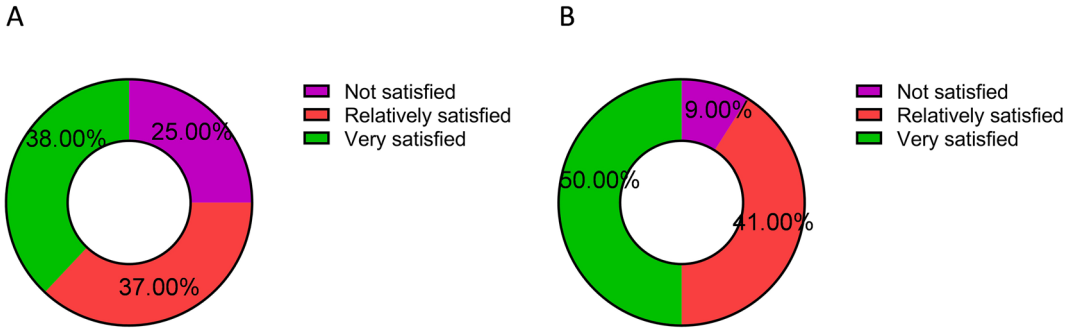

Fig. 3 Analysis of patient satisfaction in two groups. **A**: Traditional group; **B**: 5Fr group

operation and the avoidance of contact between the lens and the vaginal wall as much as possible [29].

With the gradual application of small hysteroscopes, Stefano Bettochi modified the 6.5 mm hysteroscopic sheath to a 5 mm oval cross-section outer sheath to allow more comfortable access to the cervix [30]. Some scholars believe that a reduction of 1 ~ 2 mm in the outer diameter of the endoscope will reduce the cross-section of the outer sheath by 50%~75%, and the development of endoscopic miniaturization has led to the increasing acceptance of hysteroscopic surgery as an outpatient surgery [31]. In addition, 5Fr caliber instruments can also enter the uterine cavity through the instrument manipulation orifice for operation. A study points out that compared to traditional hysteroscopes, non-contact hysteroscopes avoid dilating the vagina during the surgical process, do not require clamping and dilating the cervix, and do not require measuring the length of the uterine cavity. Therefore, patients can undergo hysteroscopy in an extremely relaxed state, with advantages such as shorter surgical time, less pain, reduced intraoperative and postoperative bleeding, less trauma, faster recovery, and lower possibility of infection [32, 33]. Hadisaputra et al.. found that women who underwent hysteroscopy in an outpatient setting had a satisfaction rate of 84.00%, which is safe to some extent [14]. Similarly, the results of this study showed that the satisfaction rate of 91.00% in the 5Fr group was much higher than that of 75% in the traditional group. This is because the 5Fr non-contact hysteroscopy uses a thinner mirror to carry out non-contact hysteroscopic surgery, there is no need to place a vaginal speculum during the operation, the instruments do not touch the patient's external genitalia and vagina as much as possible, and the endoscopy is directly inserted into the uterine cavity for operation, which reduces the damage to the cervix and greatly improves the comfort of the patient. It can be seen that based on the advantages of less trauma and good experience, 5Fr non-contact hysteroscopy has higher patient satisfaction.

In general, the 5Fr non-contact hysteroscopy has similar clinical effects to the traditional hysteroscopy, and can compensate for the shortcomings of the traditional hysteroscopy, which can significantly reduce the pain of patients, reduce the amount of intraoperative bleeding, and improve patient satisfaction. However, there are still some shortcomings in this study as follows: (1) The study was a retrospective analysis and relied on existing clinical data, which may be inaccurate due to incomplete recording, missing or errors. (2) Due to the limitations of the sample size, data quality, variable control, and other factors, the statistical power of retrospective studies may be insufficient, failing to detect actual associations or differences. (3) The follow-up time of this study might not be sufficient to fully evaluate the long-term effect of 5Fr contactless hysteroscopy in the management of perimenopausal and postmenopausal women with uterine disease, and some complications or disease recurrence might not occur until a longer period after surgery. Thus, we conduct large-scale, multicenter, prospective studies in the future, which can help collect more diverse and representative data and improve the reliability and generalizability of research results.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12893-024-02680-0.

Supplementary Material 1

Author contributions

Jun Huang confirmed the authenticity of all the raw data and edited the manuscript, Jun Huang and Cunsi Yin collected data and processed the data. Junli Wang and Cunsi Yin conducted the statistics.Jun Huang and Junli Wang reviewed and revised the article. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Human Ethics and consent to participate declarations
This study was approved by The Ethics Committee of Maanshan Maternal and Child Health Care Hospital (Approval number: PJ-2022-06). Written informed consent was obtained from each participant for the participation in the study.

Consent for publication
Not Applicable.

Competing interests
The authors declare no competing interests.

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