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Observation on the Effectiveness of Hysteroscopy Combined with B-Ultrasound in Diagnosing Uterine Incision Diverticulum after Cesarean Section

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Abstract: *Objective:* To analyze the positive significance of employing hysteroscopy and B-ultrasound together in diagnosing uterine incision diverticulum after cesarean section. *Methods:* The study was conducted at the Shaanxi Provincial People's Hospital from February 2023 to February 2024. A total of 100 patients, all with a history of secondary cesarean section, were selected as research subjects for this experimental study. The selected patients were divided into two groups: the experimental group, who received a diagnosis through hysteroscopy combined with B-ultrasound diagnosis, and the control group, who underwent vaginal ultrasound diagnosis. Each group comprised 50 patients. The detection of uterine incision diverticula using the two methods was analyzed. *Results:* The combined diagnostic method of hysteroscopy and B-ultrasound in the experimental group revealed higher length, width, and depth measurements of uterine incision diverticulum defects post-cesarean section compared to the diagnostic method of the control group ($P < 0.05$), indicating a better diagnostic effect. *Conclusion:* Upon observing the recovery of patients after cesarean section, the diagnostic method involving hysteroscopy combined with B-ultrasound yielded superior results. This method enhances diagnostic accuracy and enables the identification of patients' incisional diverticulum, facilitating proactive intervention. Its significance is noteworthy and merits promotion.

Keywords: Cesarean section; Uterine incision diverticulum; Hysteroscopy; B-ultrasound; Diagnostic effect

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1. Introduction

In recent years, with the development and advancement of China, the rate of cesarean sections has gradually increased, highlighting postpartum recovery as a crucial issue in clinical development. Following cesarean section procedures, patients often face complications such as chronic pelvic pain and incisional diverticulum, with the latter being the most prevalent in clinical practice [1-3]. Uterine incision diverticula, also referred to as

uterine scar diverticula or uterine scar defects post-cesarean section, manifests clinically at an incidence rate of approximately 6.9%–19.4%. Patients typically present with persistent vaginal bleeding, diverticular pregnancy, and prolonged menstruation, significantly impacting their quality of life and necessitating active treatment.

Given the imperative of postoperative recovery, timely detection of patient's conditions is paramount. Therefore, selecting appropriate diagnostic methods to ensure clinical accuracy is of utmost importance [4-5]. This study focuses on patients selected from the Shaanxi Provincial People's Hospital as research subjects, employing a combination of hysteroscopy and B-ultrasound diagnostic methods. Subsequently, a detailed analysis of the specific diagnostic effects was conducted.

2. Materials and methods

2.1. General information

This experimental research was conducted at the Shaanxi Provincial People's Hospital, commencing in February 2023 and concluding in February 2024. A total of 100 patients with uterine incision diverticulum following cesarean section were selected as research subjects. These patients were divided into two groups, each comprising 50 individuals: the experimental group and the control group.

In the experimental group, the age ranges varied from 27 to 46 years, with an average age of 34.28 ± 4.28 years. The duration since the patients' previous cesarean sections ranged from 2 to 12 years, with an average of 4.23 ± 1.84 years. For the control group, the age range was between 28 and 45 years, with a mean age of 34.28 ± 4.19 years. The duration since the patients' previous cesarean sections ranged from 2 to 13 years, with an average of 4.18 ± 1.74 years. Statistical analysis comparing various data between the two groups yielded results with $P > 0.05$, indicating the establishment and adherence of this experimental study to research standards.

2.2. Methods

Patients in the control group underwent vaginal color ultrasound diagnostic examination. Meanwhile, patients in the experimental group underwent B-ultrasound combined with hysteroscopy. The specific examination methods were as follows:

The patient was positioned in the bladder lithotomy position and received combined spinal-epidural anesthesia. Following the induction of anesthesia, standard draping was applied, and a rotatable passive continuous perfusion hysteroscope was utilized. The hysteroscope, produced by Beijing BestScope Technology Co., Ltd., with model H6982, was selected for this study. Concurrently, ultrasonic instrumentation from China General Electric Medical Systems Company was employed, with model RT300 in combination with a real-time linear array ultrasonic instrument, model T2600, for ultrasonic diagnosis. The ultrasonic probe's frequency ranged mainly from 6 to 7.5 Hz, with uterine dilation maintained at 80–100 mm, and sodium chloride solution with a concentration of 0.9% utilized for fluid secretion. Perfusion speed was controlled at 260 mL/min. The anesthetic intervention involved infiltration anesthesia of the patient's cervical canal, primarily using 2% lidocaine at a dosage of 1 mL.

Under guidance from the injected uterine distension fluid, the hysteroscope was inserted into the patient's cervical canal to observe the cervical canal condition, ensuring real-time assessment of the uterine cavity shape and size, as well as evaluating the condition of the uterine incision and cavity post-cesarean section. Upon identifying severe diverticula from the uterine incision, including size, width, and distance from the serosal surface, appropriate treatment was administered according to individual circumstances, facilitating active patient management [6].

2.3. Observation indicator

The examination results of uterine incision diverticulum in both patient groups were compared and analyzed.

2.4. Statistical analysis

Calculations were conducted using SPSS 26.0 software. Categorical data are presented as [*n* (%)], while measurement data are presented as mean ± standard deviation (SD). During the data processing phase, comparison and calculation were primarily performed between different groups, utilizing the chi-squared test and the *t*-test to ascertain data differences. A *P*-value of less than 0.05 indicates a significant disparity between the groups.

3. Results

In comparison to the diagnostic method employed in the control group, the combined diagnostic method of the experimental group exhibited higher lengths, widths, and depths of uterine incision diverticulum defects post-cesarean section ($P < 0.05$), resulting in improved diagnostic efficacy, as shown in **Table 1**.

Table 1. Comparative observation of the detection of uterine incision diverticula between the two groups of patients after cesarean section (x±s)

Group	Defect length (left & right diameter)	Width (head & tail diameter)	Depth
Test group (n = 50)	19.56 ± 6.56	16.56 ± 4.38	10.89 ± 2.76
Control group (n = 50)	15.45 ± 4.85	8.90 ± 3.22	6.34 ± 1.90
t	3.562	9.964	9.602
P	0.001	0.000	0.000

4. Discussion

Diverticula typically refer to dilated cystic protrusions occurring when the inner wall of the mucosa becomes convex. Manifestations of diverticula vary across different organs. In the case of uterine diverticula, there are typically two types: congenital uterine diverticula and acquired uterine diverticula. The former primarily develops due to improper embryonic development, while the latter arises under the influence of surgical procedures. With the gradual liberalization of the three-child policy in China, the incidence of cesarean section has increased, leading to a rising prevalence of acquired uterine diverticula in clinical settings [7-9].

In clinical practice, active diagnosis and treatment are imperative due to the significant impact diverticula can have on patient's lives and their overall health and well-being. Currently, ultrasound technology serves as the primary diagnostic method under development. This approach is deemed safe, reliable, and minimally invasive to patients, enabling direct visualization of the uterine structure through vaginal insertion. However, this method also possesses certain limitations and is unable to ascertain the severity of uterine diverticulum [10-12].

Hysteroscopy, as a gynecological diagnostic technology, comprises a light source system, imaging system, and energy system. Its application facilitates uterine expansion via a medium and allows for the detection of lesions within the uterine cavity. This method boasts high clinical diagnosis accuracy and is commonly employed in clinical practices such as intrauterine device placement and the diagnosis and treatment of endometrial polyps [13-15]. On the other hand, B-ultrasound is a painless, cost-effective examination method known for its repeatability and penetrative capabilities. By producing different acoustic impedances based on

tissue and organ density, it offers optimal diagnostic results for patients. The combined utilization of B-ultrasound and hysteroscopy in diagnosing patients with uterine incision diverticula post-cesarean section enhances clinical diagnostic accuracy, fully leveraging the advantages of both diagnostic methods. It allows for the detection of the distance between severe diverticula and the serosa, aiding physicians in making accurate judgments based on individual circumstances.

In summary, the combined application of hysteroscopy and B-ultrasound diagnostic methods in diagnosing patients with uterine incision diverticulum post-cesarean section enhances clinical diagnostic accuracy and enables the determination of diverticulum severity. This approach holds significant clinical relevance and warrants promotion and dissemination.

Disclosure statement

The authors declare no conflict of interest.

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Clinical Efficacy of Microwave Combined with *Sophora flavescens* Gel in Treating HPV Infection Complicated with Chronic Cervicitis and its Influence on Vaginal Microecology of Patients

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Abstract: *Objective:* To analyze the effect of microwave combined with *Sophora flavescens* gel in patients with HPV infection and chronic cervicitis (CC). *Methods:* From May 2022 to May 2023, 65 patients with HPV infection complicated with CC were randomly selected and divided into group A (31 cases, microwave) and group B (34 cases, microwave + *Sophora flavescens* gel) by numerical numbering envelope method, and the effects of the two groups were compared. *Results:* The positive rate of vaginal microenvironment factors, inflammatory factor indexes, immune function indexes, and HPV-DNA viral load in group B were better than those in group A in the following month after treatment ($P < 0.05$). *Conclusion:* Combined use of microwave and *Sophora flavescens* gel in patients with HPV infection and CC can better improve the vaginal microenvironment and inflammatory reaction, boost the body's immune function, and reduce HPV-DNA viral load.

Keywords: Microwave; *Sophora flavescens* gel; HPV infection; Chronic cervicitis; Vaginal microecology

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1. Introduction

Chronic cervicitis (CC) is a common disease characterized by abnormal leucorrhea, cervical congestion, hypertrophy, cervical erosion, etc., which is common among women of childbearing age. Poor sexual hygiene or uterine cavity operation can lead to pathogen invasion of the cervix, causing CC. In addition, if acute cervicitis is not treated properly, it will develop into CC [1-2]. Human papillomavirus (HPV) infection can be detected in most CC patients, which is also the main factor that increases the difficulty and prolongs the treatment duration [3]. The female vaginal microecosystem mainly includes normal vaginal anatomy, vaginal flora, periodic endocrine changes, and local immunity of the vaginal cervix. Each component plays a role in maintaining the balance of the vaginal microecosystem. Once this balance is broken, the probability of female reproductive tract infection increases significantly. Clinical studies have confirmed that HPV infection is a high-risk factor for cervical lesions, and vaginal microecological imbalance can increase the risk of HPV

infection [3]. The main methods of clinical treatment for CC and HPV infection were antivirus and inhibition of cell proliferation. Although these treatments have a quick effect, the cure rate was low and the recurrence rate was high [4]. CC and HPV infection are classified as leukorrhea diseases in traditional Chinese medicine, and the inducement was the invasion of dampness pathogen, which is affected by disharmony of liver-spleen, injury of conception vessel, and loss of contract of belt vessel. Clinical practice has proved that integrated traditional Chinese and Western medicine therapy can improve the overall effect of treating HPV infection complicated with CC. This study analyzed the effect of microwave and *Sophora flavescens* (hereinafter known as Sophora gel) on patients suffering from HPV infection complicated with CC.

2. Information and methods

2.1. General information

From May 2022 to May 2023, 65 patients diagnosed with HPV infection and cervical cancer (CC) were randomly selected and grouped using a numerical numbering envelope method. Group A consisted of 31 patients, aged 21-52 years, with a mean age of 38.62 ± 3.58 years. The HPV typing in this group revealed 20 cases of high-risk type and 11 cases of low-risk type. The duration of CC ranged from 1 month to 6 years, with a mean duration of 2.35 ± 1.41 years. The severity of cervical erosion was classified as 6 mild cases, 10 moderate cases, and 15 severe cases. Group B comprised 31 cases with ages ranging from 20 to 51 years and a mean age of 38.18 ± 3.49 years. HPV typing showed 21 cases of high-risk type and 10 cases of low-risk type. The duration of CC in this group ranged from 1 month to 6.3 years, with a mean duration of (2.52±1.45) years. Cervical erosion severity was observed as 5 mild cases, 9 moderate cases, and 17 severe cases. General information between the two groups was compared, showing no significant differences ($P > 0.05$).

Inclusion criteria: diagnosed with CC (mainly erosive changes) and HPV, complete medical history, active participation in the study, and signed an informed consent to the study.

Exclusion criteria: patients complicated with malignant neoplasm, psychosis, immune and hematologic system diseases, hepatorenal dysfunction, etc.

2.2. Methods

2.2.1. Group A

Group A underwent microwave treatment, which was conducted 3–7 days after menstruation. The specific procedure involved conventional disinfection of the vulva, cervix, and vagina. Secretions on the cervical surface were wiped off using sterile dry cotton balls. A microwave instrument probe with a frequency of 45-50W was then used to irradiate the erosion surface from the cervical orifice outward, until the erosive tissue turned yellow and white, indicating coagulation and denaturation. The burnt surface extended beyond the erosion surface by 3-5mm, ensuring proper depth of treatment and a smooth wound surface. Patients were advised to abstain from sexual activity and bathing for 1 month post-treatment and to undergo timely reexamination as per the physician's instructions.

2.2.2. Group B

Group B was treated with Sophora gel on top of microwave treatment for 14 days.

2.2.3. Index observation

2.2.4. The rate of vaginal microenvironment factors

Vaginal microenvironmental factors in vaginal secretions were assessed using the Vaginitis Pentagonal Test Kit

3–7 days after menstruation before treatment and again the following month after treatment. The factors tested included leukocyte esterase (LE) (positive indicated by light blue color), hydrogen peroxide (H_2O_2) (positive indicated by red color), N-Acetylgalactosaminidase (NAG) (positive indicated by light blue color), and sialidase (SNA) (positive indicated by light blue color).

Positive rate of vaginal microenvironment factors = Positive cases/total cases × 100%

2.2.5. Inflammatory factor indexes

Enzyme-linked immunosorbent assay (ELISA) was employed to detect high-sensitivity C-reactive protein (hs-CRP), interleukin-1 (IL-1β), IL-2, IL-10, Tumor necrosis factor-α (TNF-α), and γ-Interferon (IFN-γ) in 5ml of fasting venous blood. The blood samples underwent centrifugation at a speed of 3000r/min for 15 minutes. This procedure was conducted 3–7 days after menstruation before treatment and again the following month after treatment.

2.2.6. Immune function indexes, HPV DNA viral load

Nephelometry was utilized to detect immunoglobulin (Ig) A, G, and M levels in 5 mL of fasting venous blood. Additionally, cervical orifice epithelial cells and transitional zone epithelial cells were collected 3–7 days after menstruation before treatment and again the following month after treatment. The HPV-DNA viral load was then assessed using a PCR fluorescence quantitative analyzer.

2.2.7. Statistical analysis

The data were processed using SPSS 25.0 software. The measurement data were expressed as mean ± standard deviation. t-tests were conducted to compare the measurement data and chi-square (χ^2) tests for counting data. A significance level of $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of positive rates of vaginal microenvironment factors

Before treatment, there was no significant difference in the positive rate of vaginal microenvironment factors ($P > 0.05$). However, after treatment, the positive rate in group B was lower than in group A ($P < 0.05$). Further details are shown in **Table 1**.

3.2. Comparison of Inflammatory factor indexes

Before treatment, the inflammatory factor indexes of the two groups were compared, revealing no significant difference ($P > 0.05$). However, after treatment, Group B exhibited better outcomes compared to Group A ($P < 0.05$). Please refer to Table 2 for detailed data, as shown in **Table 2**.

3.3. Comparison of Immune function indexes and HPV DNA viral load

Before treatment, the immune function indexes and HPV DNA viral load of the two groups were compared, showing no significant difference ($P > 0.05$). However, after treatment, Group B demonstrated superior outcomes compared to Group A ($P < 0.05$), as shown in **Table 3**.

Table 1. Comparison of positive rates of vaginal microenvironment factors [n (%)]

Groups	Cases	Positive rates of LE		Positive rates of H_2O_2		Positive rates of NAG		Positive rates of SNA	
		Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment
Group B	31	15 (48.39)	2 (6.45)*	12 (38.71)	1 (3.23)*	14 (45.16)	2 (6.45)*	11 (35.48)	1 (3.23)*
Group A	31	14 (45.16)	9 (29.03)	13 (41.94)	7 (22.58)	12(38.71)	8 (25.81)	13 (41.94)	6 (19.35)
χ^2	-	0.064	5.415	0.067	5.166	0.265	4.292	0.271	4.026
P	-	0.799	0.019	0.795	0.023	0.606	0.038	0.602	0.044

Note: Compared with this group before treatment $^{*}P < 0.05$.

Table 2. Comparison of Inflammatory factor indexes (mean ± standard deviation)

Groups	Cases	hs-CRP (mg/L)		IL-1β (ng/L)		IL-2 (pg/mL)		IL-10 (μg/L)		TNF-α (pg/mL)		IFN-γ (pg/mL)	
		Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment
Group B	31	13.12 ± 1.54	6.23 ± 1.02*	4.25 ± 0.86	0.62 ± 0.13*	27.38 ± 4.35	20.12 ± 4.36*	25.64 ± 4.59	18.06 ± 3.24*	29.34 ± 3.16	20.23 ± 2.05*	9.39 ± 1.27	12.34 ± 1.46*
Group A	31	13.05 ± 1.51	7.68 ± 1.34*	4.37 ± 0.85	1.25 ± 0.39*	27.14 ± 4.28	23.86 ± 3.24*	25.18 ± 4.67	21.95 ± 3.61*	29.81 ± 3.18	23.64 ± 2.53*	9.23 ± 1.24	11.09 ± 1.34*
t	-	0.180	4.793	0.552	8.532	0.218	3.833	0.391	4.465	0.583	5.830	0.501	3.511
P	-	0.857	0.000	0.582	0.000	0.827	0.000	0.697	0.000	0.561	0.000	0.617	0.000

Note: Compared with the same group before treatment $^{*}P < 0.05$.

Table 3. Comparison of Immune function indexes, HPV DNA viral load (mean ± standard deviation)

Groups	Cases	IgA (g/L)		IgG (g/L)		IgM (g/L)		HPV-DNA viral load (10^3 copy/mL)	
		Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment	Before treatment	One month after treatment
Group B	31	2.47±0.26	2.96 ± 0.21*	10.06 ± 1.07	11.68 ± 1.12*	0.92 ± 0.25	1.38 ± 0.26*	83.12 ± 10.37	5.67 ± 1.23*
Group A	31	2.43 ± 0.25	2.52 ± 0.23	10.04 ±1.08	10.27 ± 1.09	0.94 ± 0.23	1.02 ± 0.22	83.69 ± 10.42	9.26 ± 1.58*
t	-	0.617	7.865	0.073	5.023	0.327	5.885	0.215	9.982
P	-	0.539	0.000	0.941	0.000	0.744	0.000	0.829	0.000

Note: Compared with this group before treatment $^{*}P < 0.05$.

4. Discussion

The occurrence and development of CC are directly related to factors such as cervical damage, degree of damage, and viral infection. The local resistance of the cervix is significantly reduced under the influence of cervical damage and physical and chemical factors, increasing the probability of HPV and other types of infection, and thereby inducing inflammatory lesions. CC is induced by long-term inflammatory reactions in the cervix [5]. The incidence of HPV infection combined with cervical cancer (CC) is on the rise each year due to various factors, posing a significant threat to both the physical and mental health of affected individuals. High-risk HPV infection, in particular, is a major contributing factor to the development of cervical cancer. As such, early detection of HPV infection combined with CC and the prompt implementation of effective treatment measures hold paramount clinical importance [6].

Traditional Chinese medicine categorizes patients with HPV infection complicated by CC as having leukorrhea disease. According to this classification, the main causes of this condition are spleen deficiency, liver depression, emotional distress, and invasion of dampness pathogens. These factors lead to an imbalance in the conception vessel, resulting in the accumulation of dampness and turbidity in the lower abdomen and stagnation of the conception vessel [7]. Over time, the dampness evolves into toxins, exacerbated by other factors such as intrauterine procedures and unhygienic sexual practices, leading to the infiltration of pathogenic toxins into the uterus and damage to the Ren and Dai vessels, inducing a series of clinical symptoms. Therefore, traditional Chinese medicine views HPV infection complicated by CC as a syndrome characterized by both deficiency (liver depression and spleen deficiency) and excess (external pathogenic factors and internal dampness retention). The treatment principles involve strengthening the spleen and soothing the liver, eliminating dampness and toxins, and enhancing overall body resistance [8].

The results revealed that in the month following treatment, group B exhibited superior outcomes compared to group A in terms of the positive rate of vaginal microenvironment factors, inflammatory factor indexes, immune function indexes, and HPV-DNA viral load ($P < 0.05$). This confirmed that the combination of microwave therapy and Sophora gel in patients with HPV infection and CC could achieve optimal results.

The female vagina constitutes a vital component of the micro-ecosystem, characterized by its openness. A healthy vaginal micro-ecosystem relies on a dynamic equilibrium between the host and the environment, wherein both are mutually regulated and interdependent. HPV infection can lead to the proliferation of squamous epithelium in the vaginal mucosa, as HPV is a common DNA virus in the vagina. Under normal circumstances, HPV does not cause infection. However, if the balance of the vaginal micro-ecology is disrupted, persistent HPV infection in the vagina can lead to cervical epithelial dysplasia and even cancer. Microwave therapy functions essentially as an electromagnetic wave (with a frequency range of 300MHz-300GHz), coagulating tissue proteins through thermal and biological effects. It can expedite the recovery of cervical erosion and inflammatory tissue infected with HPV, thereby enhancing the local tissue defense barrier. When administered via the vagina, Sophora gel's active ingredient (total alkaloids in Sophora) adheres well to the vaginal wall mucosa. The drug directly contacts the lesion, allowing for rapid absorption and prolonged efficacy. Additionally, it stimulates the production of vaginal lactobacillus, thereby improving the inflammatory reaction and the vaginal micro-ecological environment, ultimately enhancing vaginal immunity with high safety [10]. In traditional Chinese medicine, the concept of "healthy qi" corresponds to immunity in Western medicine, and reduced immunity is one of the high-risk factors for HPV infection. In this study, while group A solely underwent microwave therapy, the immune function index (IgA, IgG, IgM) and inflammatory factor index showed some improvement. However, the degree of improvement was not as significant as observed in group B, which received a combination of Sophora gel. This indicates that the combined use of microwave therapy and Sophora gel effectively enhances the body's immune capacity, alleviates inflammation, and aids in virus resistance, thereby shortening the duration of the inflammatory reaction. Pro-inflammatory cytokines such as TNF-α and IL-1β sustain and exacerbate inflammation. Elevated levels of these cytokines prolong the duration of HPV infection. Combination therapy

rapidly reduces the levels of pro-inflammatory cytokines, thus swiftly ameliorating the inflammatory response.

5. Conclusion

The combined use of microwave therapy and Sophora gel demonstrates significant benefits for patients with HPV infection and cervical cancer (CC). This combination therapy improves the vaginal microecological environment, alleviates inflammatory reactions, enhances immune function, and reduces HPV-DNA viral load.

Disclosure statement

The authors declare no conflict of interest.

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Clinical Effect of Warm Acupuncture and Moxibustion Combined with Traditional Chinese Herbs in Treating Cold-Damp Stagnation Dysmenorrhea

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Abstract: *Objective:* To investigate the clinical effect of warm acupuncture and moxibustion with traditional Chinese herbs in treating cold-damp stagnation dysmenorrhea. *Methods:* 76 patients with cold-damp stagnation dysmenorrhea admitted to our hospital were selected as the sample for study and evaluation, and the time of admission to the hospital was from January–December 2023. The patients were divided into an observation group (n = 38) and a control group (n = 38) using a random number table. The patients in the control group were treated with conventional Western analgesic drugs. In contrast, the patients in the observation group were treated with warm acupuncture and moxibustion together with traditional Chinese herbs. The clinical effective rate, traditional Chinese medicine (TCM) symptom score, NRS score, serum factor level, and the incidence rate of adverse reactions were compared between the two groups. *Results:* The clinical efficacy of the observation group was higher than that of the control group ($P < 0.05$); the TCM symptom score of the observation group was lower than that of the control group ($P < 0.05$); the PGF2a and NRS scores of the observation group were lower than that of the control group, while the PGE2 was higher than that of the control group ($P < 0.05$); the incidence rate of adverse reactions of the observation group was lower than that of the control group ($P < 0.05$). *Conclusion:* Warm acupuncture and moxibustion combined with traditional Chinese herbs are effective in treating patients with cold-damp stagnation dysmenorrhea. This treatment regime alleviates clinical symptoms, reduces the degree of pain, improves the level of serum factor, and reduces the incidence of adverse reactions. Therefore, it should be popularized.

Keywords: Warm acupuncture; Traditional Chinese medicine; Cold-damp stagnation dysmenorrhea

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1. Introduction

Dysmenorrhea has a high incidence in the female population, characterized by lower abdominal pain and swelling during, before, or after menstruation. Some patients experience lumbar pain and other discomfort, and the nature of the pain is mostly spasmodic, which may radiate to the inner thighs, lumbosacral region, and

other areas [1]. Dysmenorrhea heavily impacts the physical and mental state of women, so proper measures should be taken to relieve their pain quickly. In Western medicine, analgesic and sedative drugs are often used to treat dysmenorrhea symptomatically. While these medications provide short-term pain relief, the pain still recurs during the next menstrual cycle. In Chinese medicine theory, the main evidence of dysmenorrhea is cold-damp stagnation, cold damage to yang qi, and poor blood circulation. Hence, the treatment is aimed at activating blood circulation, warming menstruation, and dissipating cold [2]. Traditional Chinese herbs and warm acupuncture are commonly used traditional Chinese medicine (TCM) treatment programs. In this study, 76 patients with dysmenorrhea due to cold-dampness stagnation were selected as samples for evaluation, and the clinical effects of warm acupuncture with traditional Chinese herbs were analyzed.

2. Information and methods

2.1. General information

76 patients with cold-damp stagnation dysmenorrhea admitted to our hospital were selected as the sample for study and evaluation, and the time of admission to the hospital was from January–December 2023. The patients were divided into an observation group (n = 38) and a control group (n = 38) using a random number table. The observation group had an age range of 24 to 37 years, with a mean age of 30.58 ± 2.79 years, and a disease duration range of 1 to 4 years, with a mean duration of 2.42 ± 0.51 years. Similarly, the control group had an age range of 26 to 36 years, with a mean age of 30.65 ± 2.72 years, and a disease duration range of 1 to 3 years, with a mean duration of 2.38± 0.55 years. Statistical analysis revealed no significant differences in the general characteristics between the two groups ($P > 0.05$).

Inclusion criteria: (1) Diagnosed with dysmenorrhea based on the criteria in “Obstetrics and Gynecology,” (2) evidence of cold-damp stagnation, (3) no organic lesions of the reproductive system.

Exclusion criteria: (1) Secondary dysmenorrhea, (2) combined with endometriosis or uterine fibroids. (3) Combined with major organ dysfunction, malignant tumor, infectious disease. Allergy to the study drugs.

2.2. Methods

The patients in the control group received treatment with conventional Western analgesics, specifically sustained-release ibuprofen capsules. These were administered once daily beginning one day before the onset of the menstrual cycle, taken orally twice a day at a dose of 200 mg per administration. This regimen continued throughout the menstrual cycle, spanning a total of two menstrual cycles.

The observation group was treated with warm acupuncture, moxibustion, and traditional Chinese herbs. The treatment was initiated 3d before the menstrual cycle and continued for 3 d after the end of the menstrual cycle, for a total of 2 menstrual cycles.

(1) Warm acupuncture treatment

Based on the patients’ individual conditions and principles from Chinese medicine meridians theory, physicians selected specific acupuncture points including Taichong, Hegu, Sanyinjiao, Xuehai, and Diji. They sterilized the skin at these acupuncture points and applied pressure for 5 seconds before directly inserting milliprecision needles. Subsequently, a technique involving gentle lifting and thrusting motions was applied to the needles for 30 seconds. Moxa sticks were then lit and placed above the needle handles, with one strong moxa stick used for each acupoint. The distance between the moxa stick and the skin was maintained at 3cm to produce a sensation of warmth in the local skin tissue. This warm acupuncture and moxibustion treatment was administered once daily, with each session lasting for 30 minutes.

(2) Traditional Chinese herbs

Si Ni soup was administered. The soup consisted of 9 g Gui Zhi, 12 g Angelica sinensis, 3g Xi Xin, 6g Tong Cao, 8g jujube, and 6 g baked licorice. The composition of the soup was adjusted according to the principle of dialectic treatment. For patients experiencing insomnia, 5g Yuan Zhi, 6 g Fu Shen, and 10g Shouwu vine were added. In cases of qi deficiency, 10g of *Astragalus membranaceus* and 10g of Tai Zi Shen were included. For patients with qi stagnation, 6g of *Pericarpium citri reticulatae*, 4g of citron, and 5g of *Pinellia ternata* were added. The medication was taken twice a day, and 150 mL each time, once in the morning and the evening.

2.3. Evaluation criteria

The treatment was considered very effective if dysmenorrhea-related symptoms disappeared after treatment and the TCM symptom score decreased by more than 70%. The treatment was considered effective if dysmenorrhea-related symptoms decreased after treatment and the TCM symptom score decreased by 50–70%. If the aforementioned criteria were not met, the treatment was considered ineffective. (2) Symptoms like abdominal coldness, lumbosacral pain, and coldness of limbs were evaluated according to the standards in the "Guidelines for Clinical Research of New Traditional Chinese Medicines" before and after treatment, with the highest score of each item being 3 points. (3) The Numeric Rating Scale (NRS) score, ranging from 0 to 10, was employed to gauge pain severity, with higher scores indicating more severe pain. Serum factor levels, including PGF2a and PGE2, were also measured via ELISA from blood samples collected before treatment and during the two menstrual cycles of treatment. (4) Adverse reactions in both groups were documented and statistically analyzed.

2.4. Statistical methods

SPSS23.0 was used to analyze the data. The measurement data were expressed as mean ± standard deviation and analyzed by a *t*-test, while the count data were expressed as percentages and analyzed by a χ^2. $P < 0.05$ indicated statistical significance.

3. Results

3.1. Clinical efficacy

The clinical efficacy of the treatment received in the observation group was higher than that of the control group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of the clinical effectiveness rate of the two groups (*n*/%)

Groups	Very effective	Effective	Ineffective	Overall efficacy
Observation group ($n = 38$)	28	8	2	36 (94.70)
Control group ($n = 38$)	20	9	9	29 (76.30)
χ^2				5.208
P				0.022

3.2. TCM symptom score

After treatment, the TCM symptom scores of the observation group were lower than those of the control group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of TCM symptoms points between the two groups (mean ± standard deviation)

Groups	Cold pain in the abdomen		Lumbosacral pain		Coldness in the limbs	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Control group (n = 38)	2.18 ± 0.46	0.75 ± 0.12	2.07 ± 0.41	0.69 ± 0.11	2.14 ± 0.42	0.81 ± 0.15
Observation group (n = 38)	2.23 ± 0.44	1.29 ± 0.36	2.12 ± 0.38	1.07 ± 0.32	2.09 ± 0.41	1.36 ± 0.42
t	0.484	8.772	0.551	6.923	0.525	7.602
P	0.630	0.000	0.583	0.000	0.601	0.000

3.3. NRS score and serum factor levels

After treatment, the PGF2a and NRS scores of the observation group were lower than those of the control group. However, the PEG2 score of the observation group was higher than that of the control group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of NRS scores and serum factor levels between the two groups (mean ± standard deviation)

Groups	NRS score		PGE2 (g/mL)		PGF2a (g/mL)	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Control group (n = 38)	4.01 ± 0.62	1.24 ± 0.29	21.53 ± 3.19	29.77 ± 4.82	38.96 ± 3.74	28.25 ± 1.85
Observation group (n = 38)	3.97 ± 0.55	2.41 ± 0.58	21.49 ± 3.26	25.16 ± 2.05	39.02 ± 3.68	33.25 ± 2.76
t	0.298	11.122	0.054	5.426	0.070	9.276
P	0.767	0.000	0.957	0.000	0.944	0.000

3.4. Incidence rate of adverse reactions

The incidence rate of adverse reactions in the observation group was lower than that in the control group ($P < 0.05$), as shown in **Table 4**.

Table 4 Comparison of adverse reactions between the two groups (n/%)

Groups	Abdominal pain	Nausea and vomiting	Rash	Incidence of adverse reactions
Observation group (n = 38)	1	0	1	2 (5.3)
Control group (n = 38)	3	3	2	8 (21.1)
χ^2				4.145
P				0.041

4. Discussion

Relevant data and statistics show that about 60% of women have experienced dysmenorrhea, with the main symptoms being pain and swelling in the lower abdomen during menstruation. Such pain can lead to dizziness, fatigue, paleness, and cold sweat [3]. The symptoms are mostly recurrent, which can affect the patients' work and life, so it is necessary to take effective treatment programs as early as possible.

The results of this study confirmed that the clinical efficacy of the treatment received in the observation group was higher than that of the control group. This suggests that warm acupuncture and moxibustion combined with traditional Chinese herbs are extremely effective in treating patients with cold-damp stagnation dysmenorrhea. In contrast, Western medicine typically relies on symptomatic supportive drug interventions for

dysmenorrhea, such as ibuprofen extended-release capsules, a type of non-steroidal anti-inflammatory drug. While these medications can alleviate pain symptoms, their efficacy tends to be short-lived, and prolonged use may lead to adverse reactions [4]. According to the principles of Chinese medicine, dysmenorrhea is categorized as menstrual abdominal pain, primarily attributed to cold and damp stagnation. The invasion of cold into the body can weaken yang qi, leading to congestion in the blood vessels, stagnation of qi, and blood stasis. Treatment strategies aim to warm menstruation, dispel cold, and promote blood circulation. Warm acupuncture and moxibustion are external treatment techniques in TCM combining the advantages of both acupuncture and moxibustion. By stimulating specific acupuncture points with warmth, these modalities effectively disperse cold, regulate blood circulation, and improve local blood flow. This process enhances metabolism, suppresses pain stimuli, and ultimately alleviates painful symptoms associated with dysmenorrhea [5]. Si Ni soup is a traditional Chinese medicine formula renowned for its clinical efficacy in alleviating pain, resolving blood stasis, and warming menstruation while dispelling cold. This formula combines various medicinal ingredients to achieve these therapeutic effects. When combined with warm acupuncture and moxibustion, there is a synergistic effect between the herbal components and external therapy. This combination therapy effectively regulates the flow of qi and blood, expels cold evils from the body, and enhances local stimulation. As a result, it significantly alleviates dysmenorrhea symptoms. Moreover, this treatment approach offers durable and stable efficacy, surpassing that of single Western medicine treatment protocols. Its comprehensive clinical benefits underscore its superiority in managing dysmenorrhea [6].

In this study, the TCM scores of the observation group were lower than those of the control group after treatment, suggesting that the use of warm acupuncture and moxibustion together with traditional Chinese herbs in patients with cold-damp stagnation dysmenorrhea can effectively alleviate a variety of symptoms. Western medicine primarily addresses dysmenorrhea with pain-relieving and sedative medications. However, upon discontinuation of these drugs, dysmenorrhea often recurs, and related symptoms persist. In contrast, the TCM treatment regimen integrates acupuncture and moxibustion techniques to warm menstruation, alleviate pain, and promote blood circulation while removing blood stasis. By gently manipulating the needles at multiple acupoints and utilizing moxibustion to clear qi through warm stimulation of the skin, this approach effectively expels cold from the body. Additionally, the internal consumption of Si Ni soup further enhances treatment efficacy, leading to the alleviation of numerous symptoms [7,8].

In this study, the observation group exhibited lower levels of PGF2a and NRS scores compared to the control group, while PGE2 levels were higher in the observation group. These findings suggest that warm acupuncture combined with Chinese medicine effectively reduces pain and modulates serum factor levels. The NRS score provides an objective and accurate measure of patient pain levels, with higher scores indicating more severe pain. While analgesic drugs like ibuprofen can provide short-term pain relief, dysmenorrhea often recurs after discontinuation. In contrast, warm acupuncture and moxibustion, when combined with Chinese herbal medicine, offer multifaceted pain relief. Internal Chinese medicine regulates qi mechanisms, resolves blood stasis, and alleviates pain by improving qi and blood circulation. Warm acupuncture and moxibustion inhibit inflammatory factor release, stimulate nerve tissues, and warm menstruation while dispelling cold, addressing the underlying pathogenesis of cold-damp stagnation and reducing pain severity. Clinical research indicates that dysmenorrhea induces abnormal changes in uterine tone, leading to excessive spasm or contraction, resulting in elevated PGF2a levels. Conversely, PGE2 inhibits uterine smooth muscle activity, promoting uterine relaxation [9]. The combination of warm acupuncture, moxibustion, and Chinese herbal medicine offers multifaceted analgesia, significantly alleviating pain symptoms and reducing the stimulatory effects of pain on uterine contractions, thereby improving overall serum factor levels. Moreover, the observation group exhibited a lower incidence of

adverse reactions compared to the control group. This discrepancy can be attributed to the strong stimulating effect of ibuprofen extended-release capsules on the body, potentially leading to adverse reactions with long-term use. In contrast, warm acupuncture, as an external treatment modality, poses minimal irritation to bodily tissues and organs, thus ensuring higher therapeutic safety. Si Ni soup, being a purely traditional Chinese medicine formula composed of natural substances, exerts mild stimulation on the body, making it well-tolerated by most patients. The combination of these two treatment interventions results in a low incidence of serious adverse reactions, indicating a high level of therapeutic safety. Therefore, these combined therapies are suitable for widespread adoption in medical institutions [10].

5. Conclusion

In summary, the effectiveness of warm acupuncture and moxibustion combined with traditional Chinese herbs in treating cold-damp stagnation dysmenorrhea. This approach effectively alleviates clinical symptoms, reduces pain severity, and improves serum factor levels, all while exhibiting a lower incidence of adverse reactions. Consequently, it is well-suited for widespread adoption. However, it is important to note that this study had limitations. The sample size of this study was relatively small, and cross-center data analysis was not conducted. Therefore, further research is needed to thoroughly explore the specific mechanisms underlying the effectiveness of warm acupuncture and moxibustion combined with traditional Chinese herbs.

Disclosure statement

The author declares no conflict of interest.

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Analysis of the Clinical Effect of Multi-Drug Combination Therapy on Patients with Gynecological Inflammation

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Abstract: *Objective:* To investigate the effect of multi-drug combination therapy for patients diagnosed with gynecological inflammation. *Methods:* A total of 100 patients diagnosed with gynecological inflammation between August 2023 and January 2024 were selected as the study subjects. The patients were separated into a control group and an observation group, with 50 patients in each group. The control group underwent conventional drug therapy while the observation group combined lactobacillus vaginal capsule treatment. The clinical effects of the treatments were compared. *Results*: The total efficacy of the treatment received in the observation was higher. The time taken for gynecological symptom relief was shorter, and the values of vaginal pH, interleukin-6 (IL-6), and C-reactive protein (CRP) were lower after treatment ($P < 0.05$) compared to the control group. *Conclusion:* The multi-drug combination therapy can achieve rapid symptomatic relief and improve the vaginal microenvironment in patients with gynecological inflammation, which can reduce their inflammatory response and improve their prognosis.

Keywords: Gynecological inflammation; Multi-drug combination therapy; Clinical effect; Vaginal pH; Inflammatory response

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1. Introduction

Gynecological inflammation refers to inflammatory diseases that occur in the female reproductive system like the internal organs (e.g., uterus, ovaries, fallopian tubes), external organs (e.g., vagina, vulva), or their surrounding tissues. Common gynecologic inflammatory diseases include vaginitis, cervicitis, and pelvic inflammatory disease [1], which are caused by bacterial, fungal, or viral infections. Women suffering from gynecological inflammation may experience symptoms such as irregular vaginal discharge, pain, burning sensation, and frequent urination. Gynecological inflammation is primarily treated using antibiotics, antifungal drugs, and other medications [2]. The pathogenesis of gynecological inflammation is complex and may be caused by a variety of factors such as bacterial infection, fungal infection, viral infection, etc. One medication alone cannot address all the causes of the disease, which leads to poor patient outcomes. Furthermore, since each

patient's condition varies, a singular drug cannot cater to personalized treatment needs, making it challenging to effectively manage uncomfortable symptoms such as vaginal pain, itching, and abnormal secretions [3]. Implementing timely and standardized combined therapy for gynecological inflammation can significantly alleviate patient symptoms, effectively prevent complications, deterioration, and recurrence; enhance cure rates, and safeguard reproductive health. This study aims to assess the impact of actively administering multi-drug combination therapy in patients with gynecological inflammation.

2. Information and methods

2.1. General information

A total of 100 patients diagnosed with gynecological inflammation between August 2023 and January 2024 were selected as the study subjects. Inclusion criteria: (1) confirmed by gynecological examination, (2) no history of antibiotic treatment 30d before enrollment, (3) signed an informed consent to the study. Exclusion criteria: (1) allergy to therapeutic drugs, (2) serious organic lesions or infectious diseases, (3) mental disorders. The patients were separated into a control group and an observation group, with 50 patients in each group. The mean age of the control group was 42.88 ± 10.27 years (ranging from 26 to 68 years), while the experimental group had a mean age of 42.13 ± 10.18 years (ranging from 27 to 65 years). There was no statistical significance in the general data of the two groups ($P > 0.05$).

2.2. Methods

The control group was treated with conventional medication based on their condition.

(1) Trichomonas vaginitis: Administration of 2 g metronidazole tablets

(2) Bacterial vaginosis: Compound metronidazole vaginal suppositories (3 g/capsule) were prescribed. The patients were instructed to insert the capsule into the vagina in a squatting position every night after washing the vulva, 1 capsule/day.

(3) Vulvovaginal candidiasis: Outer genitalia vaginal pseudomycosis vaginal insertion of 0.15g clotrimazole vaginal suppository

(4) Chronic pelvic inflammatory disease: 0.4 g metronidazole tablets, 3 times/d.

The patients in the observation group were given lactobacillus vaginal capsule treatment regardless of the type of vaginitis. The patients were instructed to insert the capsule into the vagina after washing the vulva, 1 capsule (0.5g)/d.

All patients were instructed to pay attention to hand hygiene, change their underwear regularly, and refrain from sexual intercourse. All treatment lasted for 7 days.

2.3. Observation index

2.3.1. Clinical efficacy

(1) Very effective: the disappearance of symptoms, vaginal cleanliness – Degree I–II

(2) Effective: Improvement in clinical symptoms, vaginal cleanliness – Degree III–IV (3) Ineffective: no improvement in the above indicators [4].

Total efficacy = Very effective + Effective

2.3.2. Symptom relief

The indicators for symptom relief include the relief of abnormal vaginal secretions, itching, and burning sensation.

2.3.3. Relevant indicators

Vaginal secretions were collected as a means of detecting vaginal pH, with 3.8–4.4 as the normal range. Detection of interleukin-6 (IL-6) was performed according to the operation standard of enzyme-linked immunosorbent assay. The detection of C-reactive protein (CRP) was performed according to the operating standard of turbidimetric immunoassay.

2.4. Statistical analysis

The data were analyzed using SPSS 27.0. The measurement data were expressed as mean ± standard deviation and were analyzed using a t-test. The count data were expressed as percentages (%) and analyzed by a χ^2-test. $P < 0.05$ indicated that the difference was significant.

3. Results

3.1. Clinical efficacy

The total efficacy of the observation group was significantly higher than that of the control group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of clinical efficacy between the two groups [*n* (%)]

Groups	*n*	Very effective	Effective	Ineffective	Overall efficacy
Observation group	50	32 (64.00)	15 (30.00)	3 (6.00)	47 (94.00)
Control group	50	28 (56.00)	12 (24.00)	10 (20.00)	40 (80.00)
χ^2	-	-	-	-	4.332
P	-	-	-	-	0.037

3.2. Time taken for gynecological symptom relief

The time taken for symptom relief of the observation group was significantly shorter than that of the control group ($P < 0.05$), as shown in **Table 2**.

Table 2 Comparison of gynecological symptom relief time between the two groups (mean ± standard deviation, d)

Groups	*n*	Abnormal vaginal discharge	Vaginal itch	Burning sensation in the vagina
Observation group	50	1.98 ± 0.13	2.55 ± 0.32	1.81 ± 0.42
Control group	50	3.48 ± 0.06	4.08 ± 0.25	2.25 ± 0.72
t	-	74.079	26.641	3.732
P	-	0.000	0.000	0.000

3.3. Vaginal pH, IL-6, and CRP levels

The vaginal pH, IL-6, and CRP of the observation group were all lower than those of the control group ($P < 0.05$) as shown in **Table 3**.

Table 3 Comparison of vaginal pH, IL-6, and CRP levels between the two groups (mean ± standard deviation)

Groups	*n*	Vaginal pH		IL-6 (ng•mL^{-1})		CRP (mg/mL)	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Observation group	50	5.72 ± 0.34	4.08 ± 0.06	125.88 ± 4.75	74.32 ± 3.68	21.22 ± 3.35	6.21 ± 1.75
Control group	50	5.74 ± 0.36	4.42 ± 0.11	125.79 ± 4.72	95.42 ± 2.76	21.27 ± 3.38	11.24 ± 2.03
t	-	0.286	19.187	0.095	32.435	0.074	13.271
P	-	0.776	0.000	0.925	0.000	0.941	0.000

4. Discussion

Gynecological inflammation tends to have a lengthy treatment process and a high likelihood of recurring. Utilizing a combination of drugs can improve the efficacy, shorten treatment time, and reduce symptoms and recurrence rates. However, it is necessary to select the appropriate drug combination and dosage according to the patient's condition, strictly follow the medical prescription, and avoid drug interactions and adverse reactions. This approach ensures effective inflammation control and minimizes complications [5].

Metronidazole is a synthetic antimicrobial drug that exhibits potent efficacy against protozoa, bacteria, and anaerobes. In treating gynecological inflammation, it permeates cell membranes, disrupting nucleic acid synthesis, thus eliminating bacteria and protozoa and effectively curbing infection spread and recurrence [6]. Moreover, metronidazole inhibits leukocyte chemotaxis, adhesion, and release of inflammatory mediators, thereby reducing tissue inflammation and relieving symptoms. In summary, metronidazole effectively treats gynecological inflammation, alleviating symptoms and promoting recovery through antibacterial, anti-inflammatory, and antioxidant mechanisms [7]. Compound metronidazole suppositories exhibit antibacterial properties by inhibiting pathogenic microorganism growth, thus reducing inflammatory lesion infections. Besides its effectiveness against bacteria and protozoa, metronidazole also demonstrates antimicrobial activity against certain fungi, making it applicable for treating gynecological inflammation caused by fungal infection. Metronidazole also exhibits anti-inflammatory properties, which aid symptom relief and healing. Clotrimazole is a broad-spectrum antifungal drug that functions by inhibiting fungal cell wall synthesis and metabolic activity, thereby stopping fungal growth and reproduction. Vaginal clotrimazole can effectively combat inflammation caused by fungal infection. They possess anti-inflammatory properties, which reduce inflammation, alleviate symptoms, and facilitate recovery and healing. Moreover, when applied locally, these suppositories promote sustained release and absorption of the drug in the affected area, thereby enhancing its efficacy [8].

In this study, the total efficacy of the observation group was higher than that of the control group ($P < 0.05$). This suggests that combination of lactobacillus vaginal capsules and lactobacillus vaginal capsules is more effective in treating gynecological inflammation compared to conventional treatment. Lactobacillus vaginal capsule is a kind of probiotic bacteria that aids in regulating vaginal pH and maintaining a healthy microecological balance by producing lactic acid and other beneficial metabolites. This balance helps inhibit the growth and reproduction of harmful bacteria and reduces the risk of inflammation. Lactobacillus vaginal capsule can produce antimicrobial substances, such as lactic acid and hydrogen peroxide, which antagonize pathogenic bacteria and effectively inhibit their proliferation, thereby reducing inflammatory symptoms. Additionally, lactobacilli stimulate the immune system, enhance immune function, and facilitate tissue repair, accelerating the healing process and reducing inflammation duration and severity. Administering the drug vaginally directly targets the vagina, avoiding interference with gastrointestinal function and enhancing drug

concentration for restoring microecological balance and symptom relief [9]. Lactobacillus vaginal capsules possess antibacterial and anti-inflammatory properties, directly targeting pathogenic microorganisms causing gynecological inflammation to alleviate symptoms. These ingredients also clear heat and toxins, reducing fever, redness, and swelling associated with inflammation. Furthermore, they promote local blood circulation, regulate immune function, facilitate metabolic product discharge, and accelerate tissue repair, enhancing resistance and expediting recovery [10]. This study shows that the time taken for symptom relief in the observation group was shorter than that of the control group ($P < 0.05$). The combined use of multiple drugs offers comprehensive treatment for various causes and symptoms of gynecological inflammation, resulting in personalized treatment and improved effectiveness. This approach inhibits inflammatory responses at multiple levels, expedites inflammation subsidence, effectively controls inflammation development, shortens treatment duration, and reduces patient discomfort. Additionally, the combined drug therapy comprehensively removes pathogens, decreasing recurrence risk and enhancing treatment durability and effectiveness. Moreover, the observation group exhibited lower vaginal pH, IL-6, and CRP levels ($P < 0.05$). This indicates that lactobacillus vaginal capsules significantly normalize vaginal pH and improve the vaginal microecological environment in gynecological inflammation patients. It's believed that lactobacillus inhibits pathogen growth by regulating vaginal flora, maintaining bacterial balance, and suppressing inflammatory reactions, thus enhancing efficacy in adjuvant therapy.

5. Conclusion

The multi-drug combination therapy is effective in relieving the symptoms and improving the vaginal microenvironment of gynecological inflammation patients. It enhances the therapeutic effect, reduces inflammatory responses, and improves prognosis.

Disclosure statement

The author declares no conflict of interest.

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Clinical Efficacy Analysis of Different Surgical Modalities in the Treatment of Endometrial Polyps Under Hysteroscopy

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Abstract: *Objective:* To investigate the clinical effects of hysteroscopic electrosurgery and hysteroscopic diagnostic scraping on the treatment of endometrial polyps. *Methods:* Clinical data from 128 patients with endometrial polyps included in the study were collected and randomly divided into two groups, with 64 cases each in the electrodesiccation group and diagnostic scraping group. The electrodesiccation group underwent hysteroscopic electrodesiccation, while the diagnostic scraping group underwent hysteroscopic diagnostic scraping. Clinical indicators were combined to compare the efficacy of the two groups. *Results:* (1) Following treatment, the hemoglobin level in the electrodesiccation group was significantly higher than that in the diagnostic curettage group, and the endometrial thickness was significantly lower than that in the diagnostic curettage group ($P < 0.001$); (2) After treatment, the serum VEGF level in the electrodesiccation group was significantly lower than that in the diagnostic curettage group ($P < 0.001$); (3) Operative time and operative bleeding in the electrodesiccation group were significantly lower than those in the diagnostic scraping group ($P < 0.001$); (4) The complication rate was significantly lower in the electrodesiccation group (4, 6.251%) compared to the diagnostic scraping group (12, 18.751%), with a P value less than 0.05 ($P = 0.033$). *Conclusion:* Hysteroscopic electrosurgery demonstrates superior efficacy in the treatment of endometrial polyps compared to hysteroscopic curettage.

Keywords: Hysteroscopy; Electrosurgery; Curettage; Endometrial polyp; Clinical efficacy

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1. Introduction

Endometrial polyps, as a common benign uterine disease, manifest as multiple or solitary growths resulting from localized endometrial hyperplasia. They can lead to various clinical symptoms, including irregular vaginal bleeding, menstrual abnormalities, leucorrhea, infertility, and dysmenorrhea [1], significantly impacting women's quality of life and reproductive health. With the development of society and the increasing concern for women's health, there exists a pressing clinical necessity to diagnose and treat endometrial polyps effectively, aiming to

alleviate patient discomfort and restore reproductive function.

Hysteroscopic surgery has emerged as the primary treatment modality for endometrial polyps due to its minimally invasive nature, precision, and direct visualization capabilities [2,3]. In this paper, the efficacy of two commonly employed hysteroscopic treatment methods for endometrial polyps was analyzed: electrodesiccation and diagnostic scraping. The goal is to offer clinicians a clearer foundation for selecting appropriate surgical techniques and to provide patients with insights for developing personalized treatment plans. Through this, it aims to enhance therapeutic outcomes, reduce the likelihood of complications, and improve overall patient well-being.

2. Materials and methods

2.1. General information

Clinical data from 128 patients with endometrial polyps included in the study were collected and randomly divided into two groups: the electrosurgery group and the diagnostic scraping group, each comprising 64 cases. Inclusion criteria were as follows: (1) patients diagnosed with endometrial polyps (EP) confirmed by pathological histology; (2) aged between 18 and 60 years old; (3) presence of three or fewer endometrial polyps, with a maximum diameter not exceeding 2 cm; (4) provision of signed informed consent and willingness to undergo hysteroscopic surgical treatment; (5) availability of complete clinical data. Exclusion criteria included: (1) comorbidities with other gynecological diseases such as uterine fibroids, adenomyosis, etc.; (2) receipt of other endometrial surgery or hormone therapy within the last 3 months; (3) presence of serious heart, liver, lung, kidney, and other organ diseases rendering patients unable to tolerate surgery; (4) contraindications to hysteroscopic surgery, such as acute reproductive tract infection, cervical stenosis, etc.; (5) failure to meet inclusion criteria or inability to complete the experimental observation.

2.2. Methods

The electrosurgery group underwent hysteroscopic electrosurgery. A negative pressure suction device was utilized to remove tissue from the body; electrocoagulation or laser irradiation was employed for hemostasis to ensure no active bleeding postoperatively. Hemostasis was further managed with indwelling uterine drainage tubes or uterine gauze tamponade, and antibiotics were administered to prevent infections as required.

The diagnostic scraping group underwent hysteroscopic diagnostic scraping. Local anesthesia was applied to the cervix, and disinfection of the vulva and vagina was performed. Cervical softening and dilation were carried out, followed by hysteroscope insertion to observe the uterine cavity and identify the location, size, number, and shape of uterine polyps, and the structure of the inner lining of the uterine membrane. A spatula was utilized to scrape out the endometrial polyp, with the scraped tissue collected into pathological specimen vials. Postoperative hemostasis was achieved by leaving a uterine drain or gauze tamponade in the uterine cavity, and antibiotics were administered as necessary for infection prevention.

2.3. Observation indicators

Table 1 shows the observation indicators used in this study.

Table 1. Observation indicators

Observation indicators	Instruction
Clinical efficacy	(1) Endometrial thickness; (2) Hemoglobin profile; (3) Note: Vaginal ultrasound and routine blood tests were performed preoperatively and 1 year postoperatively.
Serum VRGF levels	Fasting venous blood was taken from patients preoperatively and 1 year postoperatively, and serum vascular endothelial growth factor levels were measured.
Length of stay and surgical indicators	(1) Length of hospitalization; (2) Duration of surgery; (3) Surgical hemorrhage.
Occurrence of complications	(1) Hyponatremia; (2) Infertility; (3) Uterine adhesions (4) Stenosis of the uterine canal; (5) Infection; (6) Description: Complications with 1-year postoperative follow-up; Total incidence = (number of hyponatremia cases + number of infertility cases + number of uterine adhesions cases + number of uterine stenosis cases + number of infections cases) ÷ total number of cases × 100%

2.4. Statistical analysis

SPSS 19.0 was applied to statistically analyze the data of this study. Measurement data were expressed as mean ± standard deviation (SD) and the *t*-test was used for comparison between the groups. Count data were expressed as [*n* (%)] and the χ^2 test was used for comparison between the groups. A *P* value of less than 0.05 indicates a statistically significant difference between the groups.

3. Results

3.1. Clinical efficacy

Table 2 shows that after treatment, the hemoglobin level of the electrodesiccation group was higher than that of the diagnostic scraping group, and the endometrial thickness was lower than that of the diagnostic scraping group, and the difference between the two groups showed a highly significant relationship ($t = 11.238$, $t = 5.588$, both $P < 0.001$).

Table 2. Comparison of clinical outcomes between the two groups of patients (mean ± SD)

Clinical efficacy indicators	Time	Electrodesiccation group (*n* = 64)	Diagnostic scraping group (*n* = 64)	*t*	*P*
Hemoglobin (g/L)	Before treatment	77.10 ± 6.68	76.38 ± 6.72	0.608	0.544
	After treatment	105.13 ± 8.67	89.37 ± 7.12	11.238	0.000
Thickness of endometrium	Before treatment	8.44 ± 1.21	8.32 ± 1.19	0.566	0.573
	After treatment	4.61 ± 0.83	5.46 ± 0.89	5.588	0.000

3.2. Serum VEGF levels

As seen in **Table 3**, the serum VEGF level in the electrodesiccation group after treatment was lower than that in the diagnostic scraping group, and the difference between the two groups was highly significant ($t = 58.981$, $P < 0.001$).

Table 3. Comparison of serum VEGF levels between the two groups of patients (mean ± SD)

Indicator	Time	Electrodesiccation group (n = 64)	Diagnostic scraping group (n = 64)	t	P
Serum VEGF levels	Before treatment	130.83 ± 2.70	130.26 ± 2.68	1.199	0.233
	After treatment	35.51 ± 1.22	48.98 ± 1.36	58.981	0.000

3.3. Hospitalization time and surgical indexes of patients

Table 4 shows that the surgical time and surgical bleeding in the electrosurgery group were lower than that in the diagnostic scraping group, and the difference was significant (t = 6.369, t = 11.058, P < 0.001). While the hospitalization time in the electrosurgery group was also shorter than that in the observation group, the difference was not statistically significant (P = 0.186).

Table 4. Comparison of hospitalization time and surgical indexes between two groups of patients (mean ± SD)

Indicators	Electrodesiccation group (n = 64)	Diagnostic scraping group (n = 64)	t	P
Duration of hospitalization (d)	4.75 ± 2.10	5.21 ± 1.80	1.331	0.186
Surgical time (min)	27.01 ± 6.38	34.21 ± 6.41	6.369	0.000
Intraoperative bleeding (mL)	19.88 ± 6.34	32.46 ± 6.53	11.058	0.000

3.4. Comparison of the incidence of complications between the two groups of patients

As shown in **Table 5**, compared with the diagnostic scraping group (12, 18.751%), the complication rate was significantly lower in the electrodesiccation group (4, 6.251%), with a P value of 0.033.

Table 5. Comparison of the incidence of complications between the two groups of patients [n (%)]

Indicators	Electrodesiccation group (n = 64)	Diagnostic scraping group (n = 64)	χ^2	P
Hyponatremia	1 (1.563%)	2 (3.125%)	-	-
Infertility	0 (0.00%)	2 (3.125%)	-	-
Uterine adhesions	1 (1.563%)	3 (4.688%)	-	-
Stenosis of the uterine canal	0 (0.00%)	3 (4.688%)	-	-
Infection	2 (3.125%)	2 (3.125%)	-	-
Total incidence	4 (6.251%)	12 (18.751%)	4.571	0.033

4. Discussion

Endometrial polyps represent a common gynecological ailment typically arising from abnormal endometrial proliferation [4-6]. Various factors contribute to their development, with endocrine disorders being the most prevalent; an imbalance in hormone levels can lead to excessive endometrial growth and polyp formation. Additionally, factors such as inflammation, infection, obesity, and diabetes may elevate the risk of endometrial polyps [7,8]. These polyps profoundly impact women's health, often accompanied by menstrual irregularities, infertility, miscarriage, irregular vaginal bleeding, and potential malignant changes, underscoring the significance of timely treatment [9].

Treatment approaches for endometrial polyps hinge on polyp size and symptom severity. While smaller polyps may spontaneously regress, larger ones typically necessitate removal through hysteroscopic surgery. Presently, hysteroscopic electrosurgery and hysteroscopic curettage are commonly employed for this purpose [10].

Hysteroscopic electrosurgery is suitable for the treatment of endometrial polyps of all sizes, especially for symptomatic polyps such as irregular menstruation and excessive menstrual bleeding. For small asymptomatic polyps, if there are no signs of malignancy, observation, and conservative treatment can be carried out depending on the patient's age and reproductive needs. In the treatment of endometrial polyps, hysteroscopic electrodesiccation is less invasive, has quicker recovery, shorter operation time, is more intuitive to see and remove polyps, and reduces the damage to the endometrium [11]. It also reduces intraoperative bleeding and complications [12]. This is consistent with the results in this study, hysteroscopic diagnostic curettage is a minimally invasive surgical method that is based on the principle of using a hysteroscope to observe the diseased tissues in the uterine cavity and then using a curette to scrape out the diseased tissues. This method has the advantage of being simple to perform and having a lower risk of uterine perforation. Of course, it is not without disadvantages. Firstly, hysteroscopic curettage has shortcomings in completely removing endometrial polyps, and the inability to completely remove them means that multiple scraping is needed, which is likely to damage the uterine wall and aggravate the postoperative complications; secondly, compared with hysteroscopic electrodesiccation, this procedure requires more surgical time and more surgical blood loss; in addition, this surgical procedure is prone to recurrence [13]. This is also consistent with the present study.

This study concluded that patients who underwent hysteroscopic electrodesiccation had better clinical outcomes and lower serum VEGF levels, hospitalization time, surgical indexes, and complication rates compared to those who underwent hysteroscopic diagnostic curettage. Many studies have also proved this, for example, Ji *et al.* [14] concluded that the efficacy of hysteroscopic electrodesiccation in the treatment of endometrial polyps was significant, and there were fewer postoperative complications. Zheng *et al.* [15] also believed that hysteroscopic electrodesiccation was more effective in the treatment of endometrial polyps.

However, this study has limitations that guide future research directions. The small sample size may affect the stability and reliability of the results, warranting larger studies for improved accuracy. Furthermore, while this study primarily analyzed two hysteroscopic surgical modalities for treating endometrial polyps, a broader exploration of surgical options is needed to provide clinicians with a more diverse treatment arsenal.

In conclusion, hysteroscopic electrodesiccation demonstrates superior therapeutic efficacy compared to hysteroscopic curettage for treating endometrial polyps and merits further adoption in clinical practice.

Disclosure statement

The authors declare no conflict of interest.

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Analysis of the Effect of Maternal Serologic Prenatal Screening in Mid-Trimester Pregnancy

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Abstract: *Objective:* To analyze the results of maternal serological prenatal screening in the middle trimester. *Methods:* The study was conducted on 7815 middle-pregnant women who underwent prenatal screening in our hospital between January 2021 and December 2022, of which pregnant women aged 35 years and above were taken as the high-age group; those who were under 35 years old were included in the low-age group. The results of maternal serological screening in mid-pregnancy were analyzed. *Results:* The probability of detecting the disease was higher in prenatal screening results. *Conclusion:* Maternal serologic prenatal screening in the middle trimester has the advantages of economy and convenience, and can effectively reduce birth defects in newborns, which is of some value for promotion.

Keywords: Mid-trimester pregnancy; Serology; Prenatal screening

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1. Introduction

Birth defects are a major cause of infant mortality. It refers to the abnormalities of body structure, metabolic conditions, and organ functions that appear in the process of fetal development. Some examples of birth defects of body structure are congenital heart disease, cleft lip and palate, and limb abnormalities. Birth defects of metabolic conditions and organ functions can cause deafness, mental retardation, and other diseases. Therefore, birth defects not only severely impact their growth and development, but also impose a great burden on their families and society. In addressing the significant impact of birth defects, the state promotes prenatal screening. This involves testing various indicators in pregnant women to identify high-risk groups for fetal abnormal development. Through modern medical diagnostics, efforts are made to terminate undesirable pregnancies as early as possible, aiming to reduce the incidence of birth defects. Birth defects are a condition that profoundly threatens human health. However, prenatal diagnostic methods such as cord blood, amniotic fluid, and chorionic villus are invasive and cannot be used as routine diagnostic methods [1,2]. Prenatal screening serologic testing is an economical and convenient method that does not cause any harm to the patient. It plays a crucial role in the early detection of hereditary diseases and congenital defects, thereby reducing the risk of birth defects. In China, the most commonly conducted prenatal screening tests include those for Down syndrome, neural tube

deformity (ODS), and trisomy 18-trimester. These conditions have high incidence rates and pose significant threats to the health of both mothers and infants, with no definitive therapy available. In this study, we analyzed the results of serological screening conducted on 7815 women during mid-trimester pregnancy at our hospital.

2. Data and methods

2.1. Clinical data

We chose 7815 women in their mid-trimester pregnancy who underwent prenatal screening in our hospital from January 2021 to December 2022 as study subjects. Their ages ranged from 21 to 46 years, with a mean age of 30.52±1.23 years. Among them, pregnant women aged 35 years and older were classified into the high-age group, while those under 35 years were categorized into the low-age group. Pregnant women aged 35 and older were considered at high risk for prenatal screening due to their advanced age. In cases where there was a high risk of Down syndrome, cytogenetic testing using amniotic fluid was performed to detect any chromosomal abnormalities. High-risk pregnancies underwent ultrasound imaging to identify fetal structural malformations.

2.2. Methods

2.2.1. Collection of maternal information

The basic information about the mother was collected by the attending obstetrician. The study subjects have all signed an informed consent for prenatal screening. The collected information included the name of the pregnant woman, birth year and month, weight, number of fetuses, gestational week and judgment criteria, telephone number, sampling date, informed consent signature of the pregnant woman, and signatures of the doctor and blood collection nurse.

2.2.2. Specimen collection

On the day of blood collection, 5 ml of fasting venous blood was taken and stored at 22℃ for 30 minutes. The blood sample was then centrifuged at 3000r/min for 7 minutes. Subsequently, the serum was separated and stored in the refrigerator at -20℃ for future use.

2.2.3. Detection method

Time-resolved fluorescence immunoassay was conducted using the corresponding reagents and the standardized procedures were followed rigorously to ensure quality during screening. The likelihood of Down syndrome, neural tube malformation, and 18-trisomy syndrome was assessed, with different intermediate values selected for various gestational weeks. For Down syndrome, a risk cutoff of 1:270 was used, above which it was considered high risk; for 18-trisomy, the cutoff was 1:350, also considered high risk. For open neural tube defects, an alpha-fetoprotein (AFP) multiple of the median (MoM) = 2.5 was used as the risk cutoff. In cases of high-risk pregnancies for Down syndrome, cytogenetic testing could be performed on amniotic fluid to detect any chromosomal abnormalities. Additionally, high-risk pregnancies could undergo ultrasound imaging to rule out fetal structural malformations.

2.3. Statistical processing

Statistical software SPSS20.0 was used to process and analyze the data. The measurement data was expressed as the number of cases and percentage (%) and analyzed with a χ^2 test. The count data were expressed as mean ± standard deviation and analyzed using a *t*-test. $P < 0.05$ indicated statistical significance.

3. Results

The results of the screening are shown in **Tables 1 and 2**.

Table 1. Screening results in 2021

Groups	Number of cases	Number of NIPT inspections	Number of amniocentesis	Normal live births	Child with birth defects	Other adverse pregnancy outcomes
High risk	333	139	102	322	0	11
Threshold risk due to high age	254	138	47	250	0	4
High age-related risk	383	-	-	378	1	4
Threshold risk	464	-	-	455	1	8
Low risk	2863	-	-	2823	0	40

Table 2. Screening results in 2022

Groups	Number of cases	Number of NIPT inspections	Number of amniocentesis	Normal live births	Child with birth defects	Other adverse pregnancy outcomes
High risk	314	187	103	303	0	11
Threshold risk due to high age	265	190	53	262	0	3
High age-related risk	373	-	-	369	0	4
Threshold risk	407	-	-	405	0	2
Low risk	2578	-	-	2555	2	21

4. Discussion

With the implementation of the “two children” and “three children” national policies, China’s birth rate has been increasing year by year. About 5% of newborns have congenital defects, and the proportion has been increasing due to various reasons. This situation not only places significant pressure on families, affecting their livelihoods, finances, and mental well-being but also poses challenges to China’s economic and social development. To enhance the overall quality of China’s population and reduce the occurrence of birth defects, the government has enacted laws such as the Population and Family Planning Law and the Maternal and Child Health Law. These laws provide a framework for preventing and controlling birth defects and have led to the development of relevant management measures and strategies. In this context, the national health authorities have continuously strengthened their efforts in preventing and treating birth defects. With the rapid advancement of modern medicine, prenatal screening technology has become increasingly important in detecting chromosomal abnormalities and fetal anomalies. This technology has greatly reduced the uncertainty associated with pregnancy tests, enabling early intervention for newborns [5,6]. During pregnancy, women undergo screening tests for Down syndrome, trisomy 18, and open neural tube defects. The triple screening involves assessing various factors: decreased serum levels of alpha-fetoprotein and free estriol, along with increased levels of free β-human chorionic gonadotropin, indicate Down syndrome; elevated serum alpha-fetoprotein levels higher than 2.5 MoM suggest neural tube defects; and decreased levels of alpha-fetoprotein, free estriol, and free β-human chorionic gonadotropin are characteristic of trisomy 18 [7,8]. Alpha-fetoprotein is

a glycoprotein, mainly derived from vitellogenin and fetal liver. It is a glycoprotein that enters the blood and amniotic fluid of pregnant women. Its level rises linearly at 14–20 weeks of pregnancy and decreases slowly thereafter. Neural tube malformation refers to an abnormality or lesion of the chorionic villus, which leads to an increase in its permeability, resulting in the entry of fetal plasma and cerebrospinal fluid into the amniotic fluid, which leads to an elevation of alpha-fetoprotein in the serum of the pregnant woman; and 18-trisomy is a type of embryonic dysplasia. Human chorionic gonadotropin is a glycoprotein, secreted by placental trophoblasts, which consists of an alpha subunit and a beta subunit. Among them, the β-subunit is a special amino acid sequence that exhibits immunological properties that are different than other hormones, which can reduce cross-reactivity and comprehensively reflect the state of the fetus and the function of the placenta. The serum level of human chorionic gonadotropin β is about 1% during pregnancy, peaking at 8 weeks of gestation and leveling off at 18–20 weeks [9,10]. Serum levels of free-hCG gonadotropins are significantly higher in pregnant women with Down syndrome compared to healthy individuals; serum levels of free-hCG gonadotropins are significantly lower in pregnant women with trisomy 18-trimester syndrome. Free estriol, primarily synthesized by the fetal adrenal cortex and liver, is produced in the placenta and released in a free form [11,12]. In women, it becomes detectable after 8 weeks of pregnancy. Throughout gestation, estrogen levels in women rise, responding to fetal and placental function. A decrease in free estrogen levels correlates with the progression of fetal development and is observed in cases of Down syndrome and trisomy 18 [13,14].

5. Conclusion

This study highlights the effectiveness of prenatal screening in detecting chromosomal abnormalities in fetuses, alleviating the burden of prenatal diagnosis on pregnant women, and demonstrating significant clinical value. However, it is essential to recognize that prenatal screening, while straightforward, is not the definitive diagnostic standard and has inherent limitations and risks. To enhance the detection rate of prenatal screening, better communication and collaboration with clinical professionals are necessary.

Disclosure statement

The authors declare no conflict of interest.

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Comparison of Clinical Effects Between Minimally Invasive Laparoscopic Surgery and Laparotomy in Treating Ovarian Endometriosis Cysts

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Abstract: *Objective:* To compare the clinical effects of laparoscopic minimally invasive surgery and laparotomy in the treatment of ovarian endometriosis cysts. *Methods:* 66 patients with endometriosis cysts admitted to our hospital from December 2022 to December 2023 were selected as the study subjects and randomly divided into a control group (n = 33) and an observation group (n = 33). The control group was treated with laparotomy, and the observation group was treated with minimally invasive laparoscopic surgery. The surgical indexes, ovarian function indexes, and complications were observed. *Results:* All surgical indexes of the observation group (surgical time, intraoperative blood volume, hospital stay, postoperative antibiotic use time) were significantly better than the control group, ($P_{mean} < 0.001$). After surgery, the E_2 score of ovarian function indexes in the observation group was higher than that in the control group, while the luteinizing hormone (LH) and follicle-stimulating hormone (FSH) levels were lower than those in the control (t = 5.246, t = 5.173, t = 3.535, $P_{mean} < 0.001$). Lastly, the overall incidence of complications in the observation group (1/3.03%) was lower than that in the control group (8/24.24%), ($\chi^2 = 4.632$, $P < 0.05$). *Conclusion:* Minimally invasive laparoscopic surgery is more effective than laparotomy in treating ovarian endometriosis.

Keywords: Minimally laparoscopic invasive surgery; Laparotomy; Ovary; Ovarian endometriosis cyst

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1. Introduction

Ovarian endometriosis is a common gynecological disease characterized by the growth of endometrial tissue outside the uterine cavity, often involving the ovaries, pelvis, and other abdominal organs. Among them, endometriosis cyst (also known as chocolate cysts) is one of the most common manifestations of endometriosis, which is caused by the repeated bleeding of endometrial tissue in the menstrual cycle, may cause pain, infertility, and other diseases, which severely impacts one's quality of life and fertility. Surgery is the main treatment method for ovarian endometriotic cysts in clinical practice. Traditional laparotomy has long been the main method for dealing with widespread or complex endometriotic cysts due to its ability to provide a broad operating field and intuitive anatomical structure recognition. However, laparotomy causes significant trauma

and slow postoperative recovery, which puts a significant burden on the patient's physical and psychological well-being. With the continuous advancement of medical technology, minimally invasive laparoscopic surgery has gradually become the preferred method for treating endometriotic cysts due to its advantages of small trauma, fast recovery, and mild postoperative pain [1,2].In recent years, relevant clinical studies have shown that laparoscopy is not only equivalent to traditional laparotomy in terms of therapeutic effect but also superior in terms of postoperative recovery speed, complication rate, and improvement of quality of life. Therefore, the purpose of this study was to compare the effect of traditional laparotomy and laparoscopic minimally invasive surgery in the treatment of ovarian endometriosis cysts to provide more data support for clinical practice, facilitate the selection of surgical methods, and improve the treatment effect.

2. General information and methods

2.1. General information

66 patients with endometriosis cysts admitted to our hospital from December 2022 to December 2023 were randomly divided into a control group and an observation group, with 33 cases in each group. The age range of the control group was 26–45 years, with a mean age of 35.56 ± 6.05 years. The diameter of cysts ranged from 4 to 11cm, with a mean diameter of 7.16 ± 1.98 cm. For the observation group, ages ranged from 25 to 44 years, with a mean age of 36.31 ± 6.02 years. Cyst diameters ranged from 4 to 13cm, with a mean diameter of 7.42 ± 1.92 cm.

Inclusion criteria:(1) ovarian endometriosis cyst diagnosed by clinical examination and pathology; (2) clear surgical indications and willing to undergo minimally invasive laparoscopic surgery or laparotomy; (3) no preoperative hormone therapy or other related therapy; (4) no other serious heart, liver, kidney and other systemic diseases, able to tolerate surgery. Exclusion criteria: (1) patients with surgical contraindications, such as coagulation dysfunction, severe cardiopulmonary insufficiency, etc.; (2) preoperative hormone therapy or other related treatments that may affect the surgical effect; (3) presence of a malignant tumor or suspected malignant tumor; and (4) patients who cannot tolerate surgery or refuse surgery.

2.2. Methods

The control group received laparotomy. The patient lied in a supine position and received general anesthesia; vertical and horizontal incisions were made on the abdomen (horizontal or vertical) according to the position and size of the cyst. After opening the abdominal cavity, the size and position of the cyst and the adhesion with surrounding tissues were observed, and the cyst was slowly separated from the surrounding tissues using various instruments. After completely dissociating the cyst, it was removed from the ovary. Hemostasis treatment was performed on the dissected surface and the abdominal cavity was flushed with normal saline. The abdominal cavity was closed and the abdominal incision was sutured layer by layer.

The observation group was treated with minimally invasive laparoscopic surgery. The patient was placed in a supine position and given general anesthesia. A pneumoperitoneum needle was inserted through a small incision in the umbilicus or lower abdomen, and carbon dioxide was injected to establish a pneumoperitoneum to make space for laparoscopic operation. A laparoscope was inserted through an incision in the umbilicus or lower abdomen to observe the situation in the abdominal cavity. Additional operation holes were created in the lower abdomen according to the position of the cyst, and surgical instruments were inserted; under the guidance of laparoscopy, the adhesion between the cyst and surrounding tissues was separated by using instruments, and the cyst was removed from the ovary. After removing the cyst, hemostatic treatment and abdominal irrigation were performed. all surgical instruments were withdrawn, and the incisions in the umbilicus and lower abdomen

were sutured.

2.3. Observation indexes

In this study, surgical indexes were evaluated by surgical time, hospital stay, intraoperative blood volume, and postoperative antibiotic use time; ovarian function was evaluated by estradiol (E_2), luteinizing hormone (LH), and follicle-stimulating hormone (FSH); and five complications such as intestinal obstruction, pelvic inflammatory disease, intestinal adhesion, ovarian dysfunction, and infertility were counted.

2.4. Statistical methods

SPSS20.0 software was used to analyze the study data. Data conforming to the normal distribution were expressed as mean ± standard deviation and analyzed using a *t*-test. The count data were expressed as percentages and compared using a χ^2-test. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Surgical indexes

All indexes of the observation group were significantly better than those of the control group ($P_{mean} < 0.001$), as shown in **Table 1**.

Table 1. Comparison of surgical indexes between two groups of patients

Surgical indexes	Control group (n = 33)	Observation group (n = 33)	t	P
Duration of surgery (min)	92.35 ± 12.12	67.89 ± 10.56	8.741	0.000
Hospital stay (d)	9.34 ± 1.58	7.16 ± 1.32	6.083	0.000
Intraoperative blood volume (mL)	100.55 ± 9.21	56.35 ± 8.12	20.679	0.000
Duration of postoperative antibiotic use (d)	5.68 ± 2.16	3.16 ± 1.22	5.836	0.000

3.2. Ovarian function indexes

The E_2 level of the Observation group was higher than that of the control group, while LH and FSH scores were lower than those of the control group, and the differences were significant ($P_{mean} < 0.001$), as shown in **Table 2**.

Table 2. Comparison of ovarian function indexes between two groups of patients

Indexes	**Time**	**Control group (n = 33)**	**Observation group (n = 33)**	***t***	***P***
E_2 (mmol/L)	Pre-operative	125.25 ± 26.58	124.32 ± 26.48	0.142	0.887
	Post-operative	88.65 ± 18.45	115.35 ± 22.68	5.246	0.000
LH (IU/L)	Pre-operative	7.56 ± 1.52	7.54 ± 1.50	0.054	0.957
	Post-operative	11.86 ± 2.43	9.20 ± 1.68	5.173	0.000
FSH (IU/L)	Pre-operative	6.29 ± 1.53	6.26 ± 1.55	0.079	0.937
	Post-operative	7.82 ± 1.77	6.36 ± 1.58	3.535	0.001

3.3. Complication rate

After treatment, the overall incidence of complications in the observation group (1/3.03%) was lower than that in the control group (8/24.24%), ($P < 0.05$). See Table 3.

Table 3. Comparison of complications between two groups of patients

Complication indexes	Control group (n = 33)	Observation group (n = 33)	χ^2	P
Intestinal obstruction	1 (3.03%)	0	-	-
Pelvic inflammatory disease	2 (6.06%)	1 (3.03%)	-	-
Intestinal adhesion	2 (6.06%)	0	-	-
Ovarian dysfunction	3 (9.09%)	0	-	-
Infertility	0	0	-	-
Overall incidence	8 (24.24%)	1 (3.03%)	4.632	0.031

4. Discussion

Ovarian endometriotic cysts usually occur in women of childbearing age and are formed through the abnormal growth of endometrial cells (usually located in the uterus) on the ovaries [3]. These ectopic growing endometrial cells, under the influence of hormones, will also experience menstrual bleeding like normal endometrium. Due to the inability of blood to be discharged smoothly, cysts will eventually form. The blood inside the cyst, due to long-term accumulation and oxidation, becomes like chocolate sauce in color, hence it is also known as a "chocolate cyst." The treatment methods for ovarian endometriotic cysts include drug therapy and surgical treatment. Drug therapy is mainly used to alleviate symptoms, alleviate pain, and control disease progression. Commonly used drugs include nonsteroidal anti-inflammatory drugs (NSAIDs), oral contraceptives, progesterone and gonadotropin-releasing hormone agonists (GnRH-a), etc. Surgical treatment is mainly used for patients with ineffective drug treatment or large cysts. The surgical methods include laparoscopic surgery and laparotomy to remove cysts and ectopic endometrial tissue and preserve fertility [4]. Laparotomy is a traditional surgical method used to diagnose and treat diseases in the abdominal cavity. It usually involves making a larger incision in the abdomen so that doctors can directly see and operate the organs inside the abdominal cavity. This type of surgery is usually used in more complex cases or when laparoscopic surgery is not feasible. Laparotomy usually causes significant surgical trauma and may also damage ovarian tissue [5], leading to complications such as wound infection and intestinal adhesions [6]. Laparoscopic surgery is a minimally invasive surgical method that involves making several small incisions in the abdomen and inserting a camera-equipped instrument (laparoscopy) and other surgical instruments. Doctors can view the abdominal cavity on a television screen and perform surgical operations [7]. There, laparoscopic treatment is superior to laparotomy in terms of treating endometriotic cysts.

In this study, the duration of surgery and hospital stay, the intraoperative blood volume, and the duration of postoperative antibiotic use time of the observation group were all less than those in the control group ($P_{mean} < 0.001$), indicating that laparoscopic surgery promotes postoperative rehabilitation of patients. This is because laparoscopic surgery provides clear intra-abdominal images through high-definition cameras, enabling doctors to identify and operate target tissues more accurately, thus reducing unnecessary bleeding. The tiny incision under laparoscopy also causes less damage to blood vessels and tissues, reducing postoperative bleeding. Secondly, the clear images help doctors find ectopic cysts quickly, thus shortening the duration of surgery. Thirdly, laparoscopic surgery causes less trauma and postoperative pain, so patients can get out of bed earlier, which in turn promotes physical recovery and shortens hospital stays. Fourthly, because laparoscopic surgery is less invasive and the risk of infection is relatively low, so the duration of antibiotic use after surgery is reduced.

This study showed that the postoperative E_2 level score in the observation group was higher than that in the control group, while the LH and FSH scores were lower than those in the control group ($P_{mean} < 0.001$). E_2, LH, and FSH are key hormones in the female reproductive system. E_2 is one of the main estrogens produced by the ovaries. Due to the periodic changes in ectopic endometrial tissue under the action of hormones, it may lead to an increase in local estradiol levels. High levels of estradiol may further promote the growth of ectopic endometrium, and exacerbate the formation and development of cysts. LH is a hormone secreted by the anterior pituitary gland. In patients with ovarian endometriotic cysts, LH levels increase with the formation and development of the cyst. High levels of LH may further promote the growth of endometriosis in the ovary, leading to the enlargement of the cyst. FSH is also a hormone secreted by the anterior pituitary gland, and with the formation and development of cysts, the patient's FSH level will increase. In laparoscopic surgery, doctors can more accurately identify and remove ectopic cysts, preserve normal ovarian tissue as much as possible, and reduce long-term effects on ovarian function. In addition, the interference with ovarian tissue during the surgical process is relatively small, which can effectively reduce the risk of premature ovarian failure [8].

The overall incidence of complications in the observation group (1/3.03%) was lower than that in the control group (8/24.24%) ($\chi^2 = 4.632$, $P < 0.05$). This is because laparoscopic surgery has less trauma and reduces the risk of infection in the surgical incision. In addition, laparoscopic surgery has less interference with the tissue in the abdominal cavity, thus reducing the incidence of complications such as intestinal adhesion and obstruction.

5. Conclusion

Laparoscopic treatment of ovarian endometriotic cysts has significant advantages in promoting postoperative recovery, minimizing the impact on ovarian function, and reducing complications. These advantages make laparoscopic surgery the preferred treatment method for many doctors and patients because it offers fast recovery, helps preserve fertility, and has fewer surgical risks. In short, minimally invasive laparoscopic surgery is more effective than laparotomy in the treatment of ovarian endometriosis cysts.

Disclosure statement

The author declares no conflict of interest.

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Significance of Mid-Pregnancy Down Syndrome Risk Screening in Predicting Adverse Maternal and Fetal Outcomes

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Abstract: *Objective:* To investigate the value of mid-pregnancy Down syndrome risk screening in predicting adverse maternal and fetal outcomes. *Methods:* 536 mothers who underwent mid-pregnancy screening for Down syndrome at Chengyang District Maternal and Child Healthcare and Family Planning Service Center from January 2021 to December 2022 were selected for retrospective analysis. The risk was calculated using the Asian population database in the American prenatal screening software PRISCA 4.0, combined with the age, gestational week, and body mass of the day of the pregnant women's blood collection. *Results:* The screening results showed that there were 469, 54, and 13 cases in the low-risk, critical-risk, and high-risk groups, respectively, and there were no statistically significant differences in the age and body mass of each group ($P > 0.05$). However, there was a significant difference between the adverse fetal outcomes in low-risk, critical-risk, and high-risk groups ($P < 0.05$); and the screening results showed that there was a significant difference between the adverse maternal outcomes in the low-risk, critical-risk, and high-risk groups ($P < 0.05$). *Conclusion:* There is a relationship between the high risk of Down syndrome detected through screening and adverse maternal and fetal outcomes. Besides, the false positive and negative rates of Down syndrome screening results are positively correlated with adverse maternal and fetal outcomes.

Keywords: Down syndrome screening; Risk prediction; Adverse pregnancy outcome

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1. Introduction

Mid-pregnancy Down syndrome screening is an early screening tool for specific chromosomal abnormalities that offers advantages like simplicity, non-invasiveness, low cost, and accuracy. Therefore, it has been widely used in China. However, mid-pregnancy Down syndrome screening cannot predict the occurrence of maternal and fetal adverse pregnancy outcomes (e.g., miscarriage, stillbirth, etc.) caused by chromosomal abnormalities [1]. Therefore, it is important to study the value of mid-pregnancy Down syndrome screening risk in predicting adverse maternal and fetal outcomes. In this study, we retrospectively analyzed the value of mid-pregnancy Down syndrome

screening risk in predicting maternal-fetal adverse pregnancy outcomes at the Maternal and Child Health and Family Planning Service Center of Chengyang District from January 2021 to December 2022, with the goal of reducing adverse maternal and fetal outcomes.

2. Information and methods

2.1. General information

A retrospective analysis of the value of mid-pregnancy Down syndrome screening risk in predicting adverse maternal-fetal pregnancy outcomes was performed on 536 cases from January 2021 to December 2022. The average maternal age was 26.98 ± 2.69 years, with an average of 1.58 ± 0.89 pregnancies per patient. All cases involved singleton pregnancies, and deliveries were followed up via case-finding and telephone recall at the end of one year.

2.2. Methods

3 mL of fasting blood samples were collected from the elbow vein of the patients using a standard negative pressure pro-coagulation serum tube. After static incubation for 30 minutes, the samples were centrifuged at 5000 r/min for 10 minutes to extract serum for the triple test: human chorionic gonadotropin (hCG), free estriol (uE3), and alpha-fetoprotein (AFP). Each test was conducted simultaneously with three levels of indoor quality control. Risk assessment was performed using the Asian population database in the American prenatal screening software PRISCA 4.0, considering factors such as the pregnant women's age, gestational week, and body mass on the day of blood collection.

2.3. Criteria for determining the risk of Down syndrome

The risk of a fetus developing 21-trisomy syndrome or 18-trisomy syndrome is considered low if it is less than 1:1000 or if the value of the alpha-fetoprotein test is less than 2.5 AFP-MOM. A critical risk level is identified when the risk of developing 21-trisomy syndrome falls between 1:1000 and 1:270, or when the risk of 18-trisomy syndrome falls between 1:1000 and 1:350. High risk is defined as a risk of developing 21-trisomy syndrome higher than 1:270, a risk of 18-trisomy syndrome higher than 1:350, and an alpha-fetoprotein test value higher than 2.5 AFP-MOM.

2.4. Statistical methods

SPSS18.0 statistical software was used to analyze the data. Measurement data were expressed as mean ± standard deviation and compared using a t-test; count data were expressed as percentages (%) and compared using a χ^2-test. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Screening results

The screening results showed that there was no statistically significant difference between the age and weight mass of the low-risk, critical-risk, and high-risk groups ($P > 0.05$), as shown in **Table 1**.

Table 1. Statistics of screening results

Group	Low-risk group	Critical-risk group	High-risk group
Cases (*n*/%)	469 (87.50)	54 (10.07)	13 (2.43)
Age (years)	27.01 ± 1.36	26.87 ± 1.65	27.02 ± 1.48
Weight (kg)	62.12 ± 2.69	62.06 ± 2.47	62.15 ± 2.58

Note: There was no statistical difference between the three groups in terms of age and body mass, i.e., $P > 0.05$.

3.2. Correlation between labor screening risk and adverse fetal outcome

The results of the screening showed that there was a significant difference ($P < 0.05$) between the three groups in terms of adverse fetal outcomes, as shown in **Table 2**.

Table 2. Correlation between labor screening risk and adverse fetal outcomes.

Group	Stillbirth	Malformation	Neonatal asphyxia	Neonatal infection	Premature labor	χ^2	P
Low-risk group (*n* = 469)	2 (0.43)	2 (0.43)	12 (2.56)	14 (2.99)	21 (4.48)		
Critical-risk group (*n* = 54)	3 (5.56)	4 (7.41)	8 (14.81)	7 (12.96)	12 (22.22)	105.017	0.000
High-risk group (*n* = 13)	0 (0.00)	2 (15.38)	2 (15.38)	2 (15.38)	1 (7.69)		

2.3 Correlation between labor screening risk and maternal adverse pregnancy outcomes

The results of the screening showed that there was a significant difference ($P < 0.05$) between the adverse pregnancy outcomes of pregnant women in the low risk, critical risk and high risk groups as shown in Table 3.

Table 3. Correlation between labor screening risk and adverse pregnancy outcomes in pregnant women.

Group	Cesarean section	Spontaneous abortion	Premature rupture of membranes	Premature exfoliation of membranes	χ^2	P
Low-risk group (*n* = 469)	154 (32.84)	2 (0.43)	36 (7.68)	11 (2.35)		
Critical-risk group (*n* = 54)	8 (14.81)	4 (7.41)	3 (5.56)	3 (5.56)		0.000
High-risk group (*n* = 13)	2 (15.38)	2 (15.38)	0 (0.00)	1 (7.69)		

4. Discussion

Currently, Down syndrome screening methods include serologic screening and noninvasive DNA testing, both of which are used to detect fetal chromosomal aneuploidy abnormalities by detecting indicators such as maternal serum levels of alpha-fetoprotein, chorionic gonadotropin, and free estriol. However, they cannot yet completely exclude the occurrence of maternal-fetal adverse pregnancy outcomes caused by chromosomal abnormalities. In recent years, a large number of studies at home and abroad have shown that the incidence of adverse maternal and fetal outcomes is similar in the high-risk and low-risk groups of Down syndrome screening. However, some studies have also pointed out that the risk of miscarriage, stillbirth, and neonatal severe congenital anomalies (such as neural tube malformations) is higher in the high-risk group of Down syndrome screening [2].

Although there are fewer studies related to Down syndrome screening, the probability of spontaneous

abortion in early pregnancy is significantly higher in the high-risk group than the low-risk group, and the probability of stillbirth and severe congenital anomalies of the newborn is higher in early pregnancy than in the low-risk group. The above results suggest that the risk of spontaneous abortion, stillbirth and severe congenital anomalies of the newborn in the Down syndrome high-risk group is higher than that of the low-risk group. It has been suggested that maternal serum concentration of alpha-fetoprotein is lower and free estriol level is higher during pregnancy in the high-risk group, and free estriol is most closely related to fetal chromosomal abnormalities, so it is hypothesized that high risk of Down syndrome screening may be related to abnormal maternal serum concentration of alpha-fetoprotein and free estriol level [3]. This may be because the detection rate of chromosomal abnormalities in the population of pregnant women in the high-risk group is higher than that in the low-risk group, and the same chromosomal abnormalities are present in the population of high-risk pregnant women; therefore, pregnant women with high-risk Down syndrome screening results are at a higher risk of adverse pregnancy outcomes than those with low risk.

A retrospective analysis by Li *et al.* showed that there was no statistically significant difference in the number of fetuses with chromosomal abnormalities in pregnant women in the high-risk group compared with those in the low-risk group [4]. Similarly, Gao et al. highlighted that there was no variance in the frequency of adverse maternal-fetal pregnancy outcomes between the high- and low-risk groups identified through Down syndrome screening. This lack of distinction could potentially stem from variations in the quality of data obtained during screening conducted within the same region, at similar gestational weeks, and following identical protocols, thereby rendering the conclusions incomparable[5]. In addition, neither study analyzed the correlation between abnormal screening results and indications for prenatal diagnosis.

In this study, significant differences were observed in adverse fetal outcomes among the low-risk, critical-risk, and high-risk groups ($P < 0.05$), as well as in adverse maternal outcomes ($P < 0.05$). Notably, the incidence of maternal-fetal adverse pregnancy outcomes was significantly lower in the low-risk group compared to the high-risk group ($P = 0.000$). Conversely, the high-risk group exhibited a significantly higher incidence of adverse maternal-fetal pregnancy outcomes compared to the low-risk group (P = 0.000). However, there was no significant difference in maternal-fetal adverse pregnancy outcomes between the high-risk and low-risk groups, indicating that Down syndrome screening may not fully predict such outcomes. Furthermore, pregnant women identified as high-risk through Down syndrome screening were more likely to experience low birth weight babies (P = 0.024), preterm births ($P = 0.041$), and low birth weight babies (P = 0.036) compared to low-risk pregnant women. Additionally, patients categorized as high-risk had poorer pregnancy outcomes, with a higher proportion of miscarriages, stillbirths, and malformations observed in the low-risk group compared to the high-risk group ($P = 0.039$). Moreover, the low-risk group had a higher proportion of preterm births ($P = 0.007$), and patients with a high risk of Down syndrome screening were more likely to experience preterm labor compared to those with low risk (P = 0.016). These findings suggest a correlation between false-positive Down syndrome screening results and the incidence of adverse pregnancy outcomes. Higher rates of false-positive and false-negative screening results are associated with an increased likelihood of preterm labor and malformations, highlighting the importance of minimizing false-positive results to mitigate the risk of maternal-fetal adverse pregnancy outcomes.

Zhang's research revealed a significantly elevated risk of adverse pregnancy outcomes, including miscarriage, stillbirth, and malformation, among pregnant women identified as high-risk through Down syndrome screening compared to those classified as low-risk [6]. Similarly, Han's findings indicated that all pregnant women experiencing adverse pregnancy outcomes in the low-risk group were identified as high-risk through Down syndrome screening. This suggests a higher false-positive rate of Down syndrome screening

results in the low-risk group compared to the high-risk group, implying that Down syndrome screening may not entirely predict the occurrence of maternal and fetal adverse pregnancy outcomes [7]. Furthermore, Zhang *et al.* discovered that high-risk pregnant women identified through Down syndrome screening were more prone to adverse pregnancy outcomes such as preterm labor, stillbirth, and fetal developmental abnormalities compared to low-risk pregnant women [8].

Down syndrome screening is a simple, effective, and safe means of early screening, and it is clinically valuable due to the high incidence and lethality of Down syndrome [9]. demonstrated a significant association between the risk identified through mid-pregnancy Down syndrome screening and the occurrence of adverse maternal and fetal pregnancy outcomes [10]. However, the predictive model for this risk is not yet perfected and cannot fully replace traditional Down syndrome screening. In recent years, an increasing number of studies have focused on the value of mid-pregnancy Down syndrome screening in predicting adverse maternal-fetal pregnancy outcomes, leading to the proposal of different theoretical models by scholars, such as ROC curve analysis, linear regression analysis, and logistic regression [11,12]. Nevertheless, these models have varying degrees of limitations in accurately predicting adverse maternal-fetal pregnancy outcomes.

5. Conclusion

There exists a correlation between a high risk identified through Down syndrome screening and adverse maternal-fetal pregnancy outcomes. Moreover, the rates of false-positive and false-negative results in Down syndrome screening are directly linked to adverse maternal-fetal pregnancy outcomes. As medical technology advances, more individuals may be categorized into the high-risk group for mid-pregnancy Down syndrome screening, potentially leading a better prediction of adverse maternal-fetal pregnancy outcomes among these high-risk groups. Consequently, further clinical research is necessary to investigate high-risk groups and incorporate them into Down syndrome screening for comprehensive analysis in the future. Additionally, researchers should strive to enhance and refine existing prediction models and explore new methods to better anticipate adverse maternal-fetal pregnancy outcomes. This endeavor aims to enhance the accuracy of Down syndrome screening and mitigate the risk of adverse maternal-fetal pregnancy outcomes in clinical practice.

Disclosure statement

The authors declare no conflict of interest.

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Analysis of the Relationship Between Body Perception and Self-Esteem of Women with Total Abdominal Hysterectomy Bilateral Salpingo-Oophorectomy Surgery – A Secondary Publication

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Abstract: *Objective:* To determine the relationship between body image and self-esteem of women who underwent total abdominal hysterectomy bilateral salpingo-oophorectomy (TAH-BSO). Method: The sample of the descriptive study consisted of 118 women who underwent TAH-BSO in the obstetrics and gynecology service of a university hospital in Mersin. Data was collected using a self-made questionnaire, the Body Perception Scale (BAS), and the Rosenberg Self-Esteem Scale (RBSS). Descriptive statistics included median, mean, standard deviation, number, and percentage values. Data evaluation methods included Mann-Whitney U Test and *t*-test to compare the means of two groups; Kruskal Wallis test and one-way ANOVA were used to compare the means of more than two groups; and Spearman correlation coefficient was used to determine the relationship between two continuous variables. *Results:* The mean age of the women was 50.13 ± 9.57, and the mean duration of marriage was 26.53 ± 11.97 years. It was found that 86.4% of the women were married, 40.7% were primary school graduates, and 55.1% had at least three children. Besides, 47.5% of the women applied to the hospital with the complaint of bleeding and according to 39% of them, the uterus meant nothing to them. Furthermore, the mean score of the women in BAI was 151.05 ± 26.64, and the mean score from RBSS was 5.02 ± 1.08. In the study, it was found that there was no statistically significant relationship between BAI and RBRS (r = -0.113; *P* = 0.224). *Conclusion:* In this study, it was determined that TAH-BSO surgery did not have a negative effect on women's body perceptions and self-esteem. This result shows that women's perspectives on common gynecological surgeries such as TAH-BSO have changed.

Keywords: Body image; Self-esteem; Hysterectomy; Nursing

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1. Introduction

Hysterectomy is one of the most common major interventions after tonsillectomy in developed countries such as

the United Kingdom and the United States, as well as in our country [1]. It is also the most common gynecologic surgical intervention after cesarean section worldwide. Generally, the decision to perform hysterectomy in women between the ages of 40 and 55 depends on the woman's age, her desire for children, the effects of alternative treatments, and the degree of dysfunction [2].

Surgical intervention is an important stress factor that threatens the body integrity, body perception, life, and psychosocial status of the individual. In gynecologic surgeries such as hysterectomy, in addition to this stress, reproductive and sexual functions of the individual are also threatened [2-4]. Fear of surgery, pain, aging, infertility, concern about spousal commitment, change in body image, and thoughts of decreased femininity may cause women to perceive hysterectomy negatively. While the feeling of decreased femininity leads to a decrease in self-worth, loss of fertility may lead to a feeling of emptiness [5]. Studies also support this information, and it is reported that women see the uterus as a sexual organ, childbearing organ, secretory organ, source of youth, attractiveness, and power, and cultural beliefs about the importance of genital organs affect the way women perceive hysterectomy [6-10]. In the literature, it is emphasized that body perception and self-esteem are in a cyclical relationship.

It has been reported that women's body perception and self-esteem are affected especially after total abdominal hysterectomy-bilateral salpingo-oophorectomy (TAH-BSO), which causes surgical menopause, and that women experience this process more severely than natural menopause [9,10]. This is associated with the psychodynamic view of menopause as a loss of productivity and femininity [11].

A review of the literature revealed no studies evaluating the relationship between women's body perception and self-esteem after hysterectomy or TAH-BSO. Therefore, this study aimed to determine the relationship between body perceptions and self-esteem of women who underwent TAH-BSO surgery.

2. Materials and methods

2.1. Type, population, and sample of the study

The population of the descriptive study consisted of women who were admitted to the gynecology and obstetrics service of a university hospital in Mersin between July 21, 2017 and September 22, 2017 for TAH-BSO surgery and who came to the outpatient clinic on the 10th postoperative day. The sample of the study consisted of women who were hospitalized in this service between the same dates, whose mother tongue was Turkish, who had no communication problems, and who agreed to participate in the study. The study initially aimed for a sample size of 82 to achieve 80% statistical power with a 0.05 margin of error, based on an anticipated correlation of 0.3 between the Body Perception Scale and Rosenberg Self-Esteem Scale scores, calculated using the G*Power 3.1.9.4 program. However, the final sample size in our study comprised 118 women. Upon completion of the study, the test's statistical power was recalculated and found to be 92%.

2.2. Data collection

The data of the study were collected through a self-made questionnaire, the Body Perception Scale, and the Rosenberg Self-Esteem Scale.

2.2.1. Personal information

The questionnaire form included 13 questions related to the patient's personal information (medical diagnosis, age, educational status, employment status, longest living place, income status, social security status, marital status, marriage duration, number of children, and family type) and gynecologic characteristics (preoperative complaint that brought the individual to the doctor, meaning of uterus for the individual) [2,4,9,12-18].

2.2.2. Body perception scale

In the study, the Body Perception Scale (BPS), which was developed by Secord and Jourand in 1953 to determine the body perception of individuals and whose Turkish validity and reliability study was conducted by Hovardaoğlu in 1993, was used. This five-point Likert-type scale consists of 40 items. The total score of the scale, which has response options for each item as "I don't like it at all," "I don't like it," "I am undecided," "I like it," and "I like it a lot," varies between 40 and 200. The cut-off score of the scale is 135, and those with a score below 135 are defined as the group with low body perception. In the Turkish validity and reliability study of the scale, Cronbach's alpha value was found to be 0.91 [19]. In our study, Cronbach's alpha value was found to be 0.95.

2.2.3. Rosenberg Self-Esteem Scale (RBSS)

The Rosenberg Self-Esteem Scale (RBSS) was developed by Morris Rosenberg in 1963, and its validity and reliability were verified by Çuhadaroğlu in 1986. This scale was used to collect data on individuals' self-esteem. RBSS has 11 subscales. In this study, the "self-esteem subscale" consisting of 10 items was used. In the scale organized according to the Guttman measurement method, items with positive and negative loadings were ordered consecutively. According to the evaluation system within the scale, the participants receive a score between 0 and 6. In comparisons made with numerical measurements, self-esteem is evaluated as high (0–1 point), medium (2–4 points), and low (5–6 points). A high score indicates low self-esteem and a low score indicates high self-esteem.

The validity coefficient of the scale was found to be 0.71 and the reliability coefficient was found to be 0.75 [20]. In our study, the Cronbach alpha value of the scale was found to be 0.73.

2.3. Statistical analysis

The data were evaluated after the prerequisites of normality (Shapiro Wilk Test) and homogeneity of variances were checked. Descriptive statistics: Mann-Whitney U Test and Student's *t*-test for the comparison of two group averages, Kruskal Wallis test and One Way ANOVA test for comparison of more than two group averages, and Tukey HSD test as a post-hoc test for multiple comparisons; Spearman correlation coefficient was used to determine the relationship between two continuous variables; percentage, median, mean, standard deviation, minimum, and maximum values. $P < 0.05$ was used to indicate statistical significance.

2.4. Ethical aspects of the study

Before collecting the research data, the necessary permission (Date: 23/06/2017 Decision no: 36) was obtained from the Social and Human Sciences Ethics Committee of a university in Mersin province. In addition, written and verbal permissions were obtained from the women who agreed to participate in the study.

3. Findings

In our study, the mean age of the women was 50.13 ± 9.57 years and the mean duration of marriage was 26.53 ± 11.97 years. Among them, 86.4% of the women were married, 72.9% lived in nuclear families, 40.7% were primary school graduates, 84.7% were not working, 63.6% had incomes equal to their expenses, almost all of them (93.2%) had social security, and 78% lived in a city or metropolitan area. It was found that 55.1% of the women participating in the study had at least three children, about half (45.8%) had a medical diagnosis of benign tumor, about half (47.5%) applied to the hospital with the complaint of bleeding, and 39% stated that the uterus had no meaning for them.

When the distribution of the mean scores of the women who participated in our study was examined, it was seen that the mean score of the women on the BLS was 151.05 ± 26.64 and the mean score on the RBSS was 1.42 ± 1.31 (**Table 1**).

Table 1. Women's BAI and RBSS mean scores (*n* = 118)

Item	Mean ± SS	Min.–Max.	Cronbach α
BPS	151.05 ± 26.64	51–200	0.95
RBSS	0–6	0–6	0.73

Abbreviations: Body Perception Scale, BPS; Rosenberg Self-Esteem Scale, RBSS

Table 2 shows the distribution of women's BPS and RBSS scores according to their sociodemographic characteristics. It was found that the scores of women with three or more children were statistically lower (P < 0.05). A post-hoc analysis discovered that the difference was largely attributed to the variation between women who had two children and three children.

Table 2. BPS and RBSS score averages according to women's sociodemographic characteristics (*n* = 118)

Sociodemographic characteristics	BPS score averages			RBSS score averages	
	n	Mean ± SS	test/*P*	Mean ± SS	test/*P*
Marital status					
Married	102	150.99 ± 27.08	-0.071	1.37 ± 1.31	-1.325
Single	16	151.500 ± 24.49	0.944***	1.75 ± 1.29	0.185*
Family type					
Nuclear	86	152.47 ± 26.42	0.947/	1.41 ± 1.25	-0.242 /
Extended	32	147.25 ± 27.29	0.346***	1.43 ± 1.25	0.808*
Education level					
Illiterate	26	149.53 ± 22.64		1.65 ± 1.32	
Literate	23	151.34 ± 26.54	0.094/	1.56 ± 1.37	2.216/
Primary school graduate	48	152.43 ± 28.12	0.936***	1.31 ± 1.22	0.547***
High school graduate and above	21	149.47 ± 29.47		1.23 ± 1.22	
Working status					
Working	18	159.44 ± 18.90	1.457/	1.22 ± 1.16	-0.568/
Not working	100	149.55 ± 27.61	0.148***	1.46 ± 1.33	0.570*
Income status					
Income < expenses	38	152.31 ± 25.94		1.55 ± 1.20	
Income = expenses	75	150.94 ± 27.62	0.257/	1.29 ± 1.31	3.807/
Income > expenses	5	143.20 ± 26.49	0.774***	2.40 ± 1.81	0.149*
Social security status					
Yes	110	150.20 ± 26.66	-1.303/	1.42 ± 1.33	-0.262
No	8	162.87 ± 25.05	0.195***	1.37 ± 0.91	0.794*

Table 2 (Continued)

Sociodemographic characteristics		BPS score averages		RBSS score averages	
	n	**Mean ± SS**	**test/*P***	**Mean ± SS**	**test/*P***
Primary residence					
Village-town	26	155.46 ± 26.66	-1.303	1.38 ± 1.35	-0.262/
City-metropolitan	92	149.81 ± 26.78	0.342***	1.43 ± 1.30	0.795*
Number of children					
No[a]	12	150.50 ± 28.28		1.25 ± 1.21	
1[b]	13	164.15 ± 18.80	4.203/	1.22 ± 1.16	0.483/
2[c]	28	161.28 ± 22.93	0.007***	1.35 ± 0.98	0.923*
≥ 3[d]	65	144.13 ± 26.26		1.52 ± 1.48	
Significant difference				(c–d)	

The distribution of BPS and RBSS scores of women according to their gynecologic characteristics is shown in **Table 3**. There was no significant difference between the mean BPS and RBSS and medical diagnosis, preoperative complaint, and the significance of the uterus ($P > 0.05$).

Table 3. RBSS and BPS score averages according to women's gynecological characteristics ($n = 118$)

Gynecological characteristics	*n*	BPS score averages		RBSS score averages	
		Mean ± SS	**Test/*P***	**Mean ± SS**	**Test/*P***
Medical diagnosis					
Benign tumor	54	149.12 ± 25.73		1.44 ± 1.29	
Malignant tumor	10	145.50 ± 34.08	0.687/	1.70 ± 1.88	0.337/
Endometrial hyperplasia	39	152.53 ± 27.47	0.602***	1.33 ± 1.26	0.947*
Abnormal uterine bleeding	10	153.10 ± 23.51		1.50 ± 1.26	
Prolapse	5	167.40 ± 21.83		1.20 ± 1.30	
Preoperative complaint					
Bleeding	56	151.28 ± 29.29		1.33 ± 1.37	
Pelvic pain	14	153.14 ± 16.88	0.282/	1.35 ± 1.21	1.488/
Stomach ache	27	151.14 ± 22.98	0.889***	1.59 ± 1.27	0.829***
prolapse	9	158.42 ± 30.47		1.33 ± 1.11	
Routine control	12	144.08 ± 32.59		1.58 ± 1.44	
Meaning of uterus					
Fertility-childhood	33	154.39 ± 26.48		1.21 ± 1.40	
Femininity-sexuality	15	145.60 ± 39.09	0.519/	1.46 ± 1.24	2.615/
Just an organ	24	153.50 ± 24.19	0.670***	1.37 ± 1.05	0.455*
Meaningless	46	149.17 ± 23.40		1.58 ± 1.39	

*Mann-Whitney U Test, **Kruskal Wallis Test, ***Student's t test, ****One-Way ANOVA Test

In our study, it was determined that 83.9% of the women had high body perception (**Table 4**). In addition, women with high body perception had statistically lower scores on the RBSS ($P < 0.001$). Furthermore, it was found that there was no relationship between BPS and RBSS ($r = -0.113$; $P = 0.224$) (**Table 5**).

Table 4. RBSS and BAI score averages according to women's body perception level ($n = 118$)

Body perception level	*n*	BPS score averages		RBSS score averages	
		Mean ± SS	Test/*P*	Mean ± SS	Test/*P*
Low body perception	54	108.00 ± 23.25	-10.887/	2.42 ± 1.92	-2.521/
High body perception	10	159.32 ± 17.88	0.001***	1.23 ± 1.06	< 0.012**

* Student's *t*-test, ** Mann-Whitney U Test

Table 5. The relationship between RBSS and BPS score

	Statistical values	RBSS
BPS	*r**	-0.113
	P	0.224

*Spearman correlation coefficient

4. Discussion

In this study, the relationship between body perception and self-esteem of women who underwent TAH-BSO surgery was examined. The uterus is a reproductive organ with a strong and important cultural value associated with femininity, although its presence or absence cannot be easily felt. In this context, hysterectomy may cause women to feel incomplete or reduce their self-esteem [21].

A review of the literature reveals that hysterectomy causes a decrease in women's body perception. El-Hadid and Zayed and Alshawish *et al.* found that women who had hysterectomy had low levels of body perception and self-esteem in societies where Islam is widespread [22,23]. Studies conducted by Pınar *et al.* and Erdoğan *et al.* in Turkey reported that women's body perception decreased significantly after hysterectomy [9,10]. In another study conducted in our country, it was found that women's self-confidence decreased after hysterectomy surgery in addition to their body perception [24]. In a three-center study involving Australia, New Zealand, and Hong Kong, similar to other studies, women who underwent abdominal hysterectomy were found to have lower body perception [8]. However, the women in our study all had a more positive body perception. This finding obtained in our study can be explained by the fact that more than half of the women perceive the uterus as just an organ, and for some, it does not mean anything.

Alshawish *et al.* found that women who underwent hysterectomy surgery had significantly lower self-esteem than healthy women [23]. Similarly, another study found that women after hysterectomy surgery had lower self-esteem than before surgery [9]. Contrary to these studies, it is noteworthy that women who underwent hysterectomy surgery in our study had higher self-esteem. Although gynecologic surgeries such as hysterectomy are included in the literature as a factor affecting women's self-esteem, the results of our study show that women's opinions about this surgery may change. This may be due to the fact that hysterectomy surgery is performed very frequently and is now considered a common surgery for women.

Furthermore, we found that women who had three or more children had lower body perceptions after hysterectomy. This finding is consistent with another study on women who had hysterectomy or oophorectomy, which showed that women's body perception decreased as the number of children they had increased [12]. On

the contrary, in the studies conducted by Yaman and Ayaz and Erbil, it was found that women's childbearing status did not have any effect on their perception in the post-hysterectomy period [18,25]. In the study conducted by Pınar *et al.*, 2012, it was determined that women who had children had a more positive body perception in the post-hysterectomy period [9]. When examining the relationship between childbirth and body perception, it is natural to consider that the process of giving birth can be physically demanding for women, potentially heightening their aesthetic concerns. Moreover, as the number of children increases, so do the maternal roles and responsibilities, particularly within the family, which may lead women to prioritize their children's needs over their own self-care. These factors collectively contribute to the findings obtained from the research.

In the study, although there was no relationship between women's body perception and their scores on the scales related to self-esteem, women with higher body perception had higher self-esteem. Therefore, there is a cyclical relationship between body perception and self-esteem [13].

This finding in our study may have been due to the fact that more than half of the women presented to the hospital with pre-operative complaints such as "bleeding," "prolapse," or "pelvic pain." A separate study highlighted that the psychological readiness for a hysterectomy could be influenced by the circumstance that women undergo surgery after hospital admission for gynecological issues. Consequently, it could be inferred that hysterectomy, as a treatment for complaints impacting women's physical and psychosocial well-being, may not significantly alter their body perception and self-esteem.

One of the limitations of our study is that the results obtained from this study are that the subjects are only limited patients who were admitted to the gynecology and obstetrics department of a university hospital in Mersin between 21 July 2017 and 22 September 2017 due to TAH-BSO.

5. Conclusion

Hysterectomy surgery does not have a negative impact on women's body image and self-esteem. Another important finding from our research is that women who have three or more children have lower body image than other women. The last finding of our research is that women with high body image also have higher self-esteem. The first result shows us that women's perspectives on hysterectomy have changed. However, nurses play a role in the decrease in body perception with the increasing number of children. Nonetheless, nurses can potentially influence the decline in body perception among women with multiple children. To address this, nurses should intervene during women's reproductive years, raising awareness about available social support systems and offering counseling services. Furthermore, nurses must involve not only the women but also their families, who constitute an integral part of the social support system, in the counseling process. Counseling efforts should aim to increase the time women allocate for self-care by enhancing awareness of their roles and responsibilities within the family. Considering that body perception is influenced not only by individuals' own perceptions but also by the attitudes and behaviors of those around them, the importance of robust social support systems is underscored once again. Additionally, the study recommends conducting further quantitative and qualitative research to explore the relationship between women's body perception and self-esteem post-hysterectomy.

Disclosure statement

The authors declare no conflict of interest

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Analysis of the Impact of Standardized Patient Teaching Model on Clinical Practice Results in Obstetrics and Gynecology

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Abstract: *Objective:* To explore the effect of the standardized patient teaching model on the clinical practice of obstetrics and gynecology. *Methods:* Interns of the hospital's Department of Obstetrics and Gynecology that were from the May 2022 to July 2023 batch were selected as the study subjects. A total of 42 people were selected, and they were separated into a traditional group and an observation group using a random number table method, with 21 people in each group. The former group underwent traditional teaching while the latter underwent standardized patient teaching. *Results:* The scores of interns in the observation group for theoretical knowledge, case analysis, and clinical practice were all significantly higher than those of the traditional group ($P < 0.01$). Besides, the interns in the observation group gave higher scores for teaching content, teaching methods, and teacher satisfaction than those of the traditional group ($P < 0.01$). *Conclusion:* The standardized patient teaching model is conducive to improving interns' professional skills and increasing their teaching satisfaction, so it should be popularized.

Keywords: Obstetrics and gynecology; Standardized patient teaching model; Internship effect

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1. Introduction

Obstetrics and gynecology is an important department in a medical institution that involves a wide range of professional knowledge. Its clinical work requires a solid foundation of theoretical knowledge and a high level of operational skills. There is a high demand for high-quality medical personnel. Based on the advancement of medical reform in recent years, the overall level of medical services has improved. In order to meet the growing needs of clinical service, it is particularly important to strengthen the cultivation of high-quality talents [1]. Obstetrics and gynecology diseases often involve private parts, so patients are often reluctant to cooperate with the treatment and require guidance from doctors. Moreover, medical disputes often occur in this department. In addition, patients' health awareness has been increasing in recent years, causing a surge in the number of patients admitted to obstetrics and gynecology. This has led to the increased workload of medical staff.

Therefore, it is imperative to improve their work efficiency and comprehensive qualities [2,4]. In view of this, the ways of strengthening the training of obstetrics and gynecology interns should be explored to better help them adapt to clinical work. The standardized patient teaching model, derived from past clinical encounters, is utilized to conduct simulated teaching sessions, immersing interns in real-life scenarios. This approach effectively nurtures interns' ability to respond to clinical emergencies, apply theoretical knowledge acquired in their studies to practical situations, and enhance teaching outcomes [5,6]. In this study, 42 interns were selected to study the effect of the standardized patient teaching model on obstetrics and gynecology interns, aiming to provide a reference for clinical teaching.

2. Materials and methods

2.1. General information

Interns of the hospital's Department of Obstetrics and Gynecology that were from the May 2022 to July 2023 batch were selected as the study subjects. A total of 42 people were selected, and they were separated into a traditional group and an observation group using a random number table method, with 21 people in each group. The traditional group consisted of 3 males and 18 females aged 22–27 (mean: 24.08 ± 1.66) years old; the observation group consisted of 2 males and 19 females, aged 22–27 (mean: 24.14 ± 1.49) years old. There was no difference in the baseline data of the interns ($P > 0.05$). This research was carried out in compliance with the Declaration of Helsinki.

Inclusion criteria: (1) Completed on-campus courses; (2) informed about the teaching content and model.

Exclusion criteria: (1) Withdrawal from the internship program; (2) poor compliance with the internship program.

2.2. Method

The traditional group followed the traditional teaching model. A teaching plan was formulated, including the schedule and syllabus, ward rounds, collecting medical history, and case analysis.

The observation group followed the standardized patient teaching model: (1) The teachers were required to possess extensive clinical and teaching experience. Besides, they should be familiar with the standardized patient teaching model, and they were responsible for selecting cases with clinical significance, pre-setting scenarios, scripting interpretations, and defining assessment criteria. (2) The teaching instructors designated simulated teaching topics to prompt interns to anticipate real-world challenges. Each intern was tasked with posing 1–3 questions and incorporating them into the simulated teaching scenario to heighten their engagement. Interns were encouraged to independently assign roles and utilize group dynamics. Following each simulation, the interns and teachers provided feedback to identify any areas for improvement [7]. Lastly, the teachers analyzed and summarized the performance of each intern.

2.3. Evaluation criteria

The director and deputy director of the Department of Obstetrics and Gynecology jointly formulated the test paper for the intern exit examination, which involved three modules: theoretical knowledge (40 points), case analysis (30 points), and clinical practice (30 points). The higher the score, the greater the mastery of professional knowledge. The office of the college developed a questionnaire to investigate the interns' satisfaction with the teaching content, teaching methods, and teachers. The total score was 100 points with a higher score indicating a higher level of satisfaction. The Cronbach's alpha of the questionnaire was 0.79, indicating that it was valid.

2.4. Statistical analysis

The data obtained were analyzed using SPSS 26.0. the measurement data such as exit examination scores and teaching satisfaction scores were expressed as mean ± standard deviation and compared using a *t*-test, with $P < 0.05$ indicating statistical significance.

3. Result

3.1. Exit examination scores

The theoretical knowledge, case analysis, and clinical practice scores of the interns in the observation group were all higher than those of the traditional group, ($P < 0.01$), as shown in **Table 1**.

Table 1. Comparison of examination scores between the two groups of interns (mean ± standard deviation/min)

Group	*n*	Theoretical knowledge	Case analysis	Clinical practice
Traditional group	21	31.09 ± 3.16	22.49 ± 3.18	21.62 ± 3.59
Observation group	21	36.77 ± 3.98	26.44 ± 3.49	25.98 ± 3.77
t		5.122	3.834	3.838
P		0.000	0.000	0.000

3.2. Intern satisfaction

The interns in the observation group had higher satisfaction scores with teaching content, teaching methods, and teachers than those in the traditional group, ($P < 0.05$), as shown in **Table 1**.

Table 2. Comparison of satisfaction between the two groups of interns (mean ± standard deviation/min)

Group	*n*	Teaching content	Teaching methods	Teacher
Traditional group	21	86.29 ± 5.29	85.71 ± 5.30	88.09 ± 5.51
Observation group	21	90.76 ± 5.62	92.07 ± 5.88	93.58 ± 6.11
t		2.654	3.682	3.058
P		0.011	0.001	0.004

4. Discussion

Teaching obstetrics and gynecology during internships poses challenges, primarily due to the complexity and abstract nature of theoretical knowledge coupled with limited opportunities for practical application. Obstetrics and gynecology cases often involve sensitive privacy issues, and patient participation in teaching sessions tends to be low, potentially leading to resistance and teaching difficulties [8,9]. In order to effectively improve this difficulty, a standardized patient teaching model was proposed. The standardized patient teaching model offers valuable support for intern education by simulating patient scenarios. Through scenario-based simulations, pre-defined cases and roles prompt interns to engage in critical thinking, immersing them in various professional roles. This approach facilitates a deeper understanding of the subject matter and enhances interns' ability to apply theoretical knowledge to practical situations, thereby improving the quality of teaching and learning experiences [10-12].

The standardized patient teaching model helps to cultivate the critical thinking skills of interns. Unlike

traditional teaching methods where interns may feel hesitant to ask questions and passively follow instructions, the standardized patient teaching model empowers interns to take an active role. Interns are encouraged to independently devise teaching plans and scenarios, engaging in continuous problem-solving and deepening their understanding of the subject matter [13,14]. This approach also enhances interns' clinical adaptability.

Moreover, the standardized patient teaching model promotes teamwork among interns, transforming mundane teaching practices into dynamic and engaging experiences. By assuming different roles during interpretation and observation exercises, interns can effectively enhance their communication and teamwork skills, thereby improving their overall competence as future healthcare professionals [15]. Our data showed that the theoretical knowledge, case analysis, and clinical practice scores of interns in the observation group were all higher than those of the traditional group ($P < 0.01$). These findings affirm that the standardized patient teaching model effectively simulates interns' interactions with patients and equips them with problem-solving skills to tackle potential challenges encountered in clinical practice. The teaching approach, drawing upon extensive clinical experience and simulated scenarios, continuously enriches interns' learning experiences and enhances their clinical adaptability. Furthermore, interns in the observation group expressed higher satisfaction levels with teaching content, methods, and instructors compared to those in the traditional group, underscoring the efficacy of the standardized patient teaching model. These positive outcomes suggest a strong foundation for widespread implementation and promotion of this teaching model.

5. Conclusion

In summary, the standardized patient teaching model is conducive to improving interns' professional skills, increasing their satisfaction with the program, and improving teaching performance.

Disclosure statement

The authors declare no conflict of interest.

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Analysis of the Feasibility of Different Surgical Methods for Treating Uterine Fibroids and Their Impact on the Ovarian Function

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Abstract: *Objective:* To analyze the feasibility of different surgical methods for treating uterine fibroids and their impact on ovarian function. *Methods:* 90 patients with uterine fibroids admitted to our hospital from December 2018 to April 2023 were divided into Group A and Group B, with 45 patients in each group. Group A underwent laparoscopic myomectomy (LM) and Group B underwent transcervical resection of myoma (TCRM). The patients were followed up 3 months after surgery and their clinical indexes were compared. *Results*: The duration of hospitalization, surgery, anal ventilation, and getting out of bed were shorter in Group B. Besides, Group B also experience less intraoperative bleeding ($P < 0.05$). There was no difference in the follicle-stimulating hormone (FSH), luteinizing hormone LH, estradiol (E2), and anta follicle count (AFC) levels between the two groups after surgery ($P > 0.05$). The Female Sexual Function Index scores of two groups increased significantly after surgery, with Group B showing a more drastic increase ($P < 0.05$); The VAS ratings of the two groups showed a decreasing trend 1–5 days after surgery, with Group B showing a larger decrease ($P < 0.05$). There was no difference in the incidence of complications between the two groups within 3 months after surgery ($P > 0.05$). *Conclusion:* Both LM and TCRM are effective in treating uterine fibroids with little impact on ovarian function and complications. However, TCRM is associated with reduced bleeding, quicker postoperative recovery, decreased pain, and an enhanced quality of sexual life. Therefore, this surgical approach appears more beneficial for improving prognosis.

Keywords: Uterine fibroids; Laparoscopic myomectomy; Hysteroscopic electrotomy

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1. Introduction

Uterine fibroids often have no obvious symptoms and are mainly diagnosed through physical examinations. However, some patients may also have menstrual abnormalities, lower abdominal distension, or other symptoms. As the condition progresses, it can cause various complications (abnormal uterine bleeding, infertility, etc.), which seriously damage the patient's physical and mental health [1,2]. At present, the clinical treatment of uterine fibroids mainly adopts surgical methods, including traditional laparotomy (open tumor resection), minimally invasive surgery, etc [3]. Although traditional laparotomy can effectively control the progression of the condition, it causes

significant trauma to the patient, resulting in slower postoperative recovery and unideal prognosis [4]. Laparoscopic myomectomy (LM) and transcervical resection of myoma (TCRM) are the most commonly used minimally invasive surgical methods in treating uterine fibroids, with less trauma and bleeding. However, the differences in the efficacy of these two treatments have not been compared. Therefore, this study aimed to explore the differences in the efficacy of TCRM and LM in treating patients with uterine fibroids.

2. Information and methods

2.1. General information

This study was approved by the Medical Ethics Committee of our hospital. 90 patients with uterine fibroids admitted to our hospital from December 2018 to April 2023 were divided into Group A and Group B, with 45 patients in each group. Group A underwent LM and Group B underwent TCRM. In Group A, the duration of the disease ranged from 0.5 to 2 years, with an average duration of 1.11 ± 0.28 years. There were 26 cases of single fibroids and 19 cases of multiple fibroids. The age of patients ranged from 26 to 45 years, with an average age of 37.78 ± 4.56 years, and the fibroid diameter ranged from 4 to 9 cm, with an average diameter of 5.61 ± 0.69 cm. In Group B, the duration of the disease ranged from 0.6 to 2 years, with an average duration of 1.15 ± 0.24 years. There were 25 cases of single fibroids and 20 cases of multiple fibroids. The age of patients ranged from 27 to 45 years, with an average age of 37.83 ± 4.64 years, and the fibroid diameter ranged from 4 to 8 cm, with an average diameter of 5.67 ± 0.74 cm. There were no significant differences in the general information of the patients.

Inclusion criteria: patients whose diagnosis aligned with the criteria outlined in the “Clinical Diagnosis and Treatment Guidelines Obstetrics and Gynecology Division” [5], confirmed by imaging examination, able to comply with relevant treatments and examinations, eligible for minimally invasive surgery, without abnormal amenorrhea pre-surgery, and who provided informed consent. Exclusion criteria: patients with concurrent reproductive system tumors, pregnant or lactating individuals, those with intrauterine adhesions or large uterine fibroids, coagulation dysfunction, prior uterine surgery, or previous relevant treatments.

3. Surgical methods

3.1. Group A (LM)

Surgery was performed 5–7 days after menstruation, and all vital signs should be checked before surgery to ensure the patient’s safety. The patient was placed in a lithotomy position, and routine disinfection was performed. Then, the patient was draped and received general anesthesia or epidural anesthesia. After the anesthesia took effect, the surgery began. The uterine lift was inserted to fully expose the uterine fibroids. A transverse incision (about 1 cm in length, located at the upper edge of the patient’s umbilical cord) was made to create a carbon dioxide pneumoperitoneum. Then, a laparoscope was inserted to carefully observe the condition of the lesion (size, position, shape, and surrounding anatomical structure). Next, trocar puncture holes (5 mm, 10 mm) were made, surgical instruments were placed, and the surgery was performed. If the subserosal uterus fibroid of the patient had a pedicle, then direct electrocoagulation was performed to cut and stop bleeding, and the fibroid was circumcised and removed with a rotary cutter. The residual fibroid was completely removed using large forceps. For patients with a thicker pedicle, the wound was sutured according to the actual situation to avoid postoperative bleeding. Before removal, posterior pituitary hormones were injected around the uterine fibroid between the muscle walls, the uterine fibroid capsule was cut open, and blunt separation was performed. Then, the tumor body should be removed, and electrocoagulation should be performed to stop bleeding, suture, and flush the pelvic cavity (with physiological saline). When the bleeding stopped, a suture was performed to

complete the surgery. Routine anti-infection treatment was given after the surgery. The patients were followed up for 3 months after surgery.

3.2. Group B (TCRM)

The timing, preoperative examination, anesthesia protocol, patient position, routine disinfection, and draping were consistent with Group A, and the surgery started after anesthesia took effect. The bladder was emptied, the vagina cleaned, and then dilated (with a cervical dilator) to fully expose the cervix. A hysteroscope was inserted to carefully observe the lesion's condition (size, position, shape, and surrounding anatomical structure). If the fibroid volume (submucosa of the pedicle) was small, electrocoagulation was performed to cut off the pedicle and remove the tumor. If the fibroid diameter exceeded 3 cm, it was excised through tissue excision or circular electrode slicing in sections. Non-pedicle submucosal fibroids were directly electrocoagulated for resection under ultrasound guidance. During this phase, uterine fibroids were appropriately pulled downward to reduce intraoperative bleeding as per the actual situation, and uterine ligaments and blood vessels were treated properly using energy instruments like intelligent bipolar electrocoagulation to effectively shorten the surgical time. Attention was given to layered suturing during the suturing phase to avoid dead space and minimize impact on later pregnancy. Both groups were followed up for 3 months post-surgery. The patients were followed up for 3 months after surgery.

4. Observation indexes

(1) Perioperative indexes: Duration of hospitalization, surgery, anal ventilation, and getting out of bed, and volume of intraoperative bleeding.

(2) 5 mL venous blood samples were collected before and 3 months after surgery in the morning. The samples were centrifuged at 3500 r/min for 10 minutes, and the patient's FSH, LH, and E2 levels were measured using enzyme-linked immunosorbent assay. The patient's AFC was detected using vaginal B-scan ultrasonography.

(3) The patients' sexual function was evaluated before and 3 months after surgery through the Female Sexual Function Index (FSFI) [6], which included 6 items, totaling up to 36 points. A higher score indicated better sexual function.

(4) The patient's pain levels were evaluated at 1–5 days after surgery using the Visual Analogue Scale (VAS) [7], with a higher score indicating more severe pain and the maximum score being 10 points.

(5) The incidence of complications within 3 months post-surgery was recorded.

5. Statistical methods

Comparison of categorical data was conducted using the χ^2 test, with results presented as [cases (%)]. For normally distributed econometric data, the Shapiro-Wilk (S-W) method was employed. Intergroup differences were assessed using independent samples *t*-test, within-group differences with a paired *t*-test, and between multiple groups with an *F*-test. Results were indicated as mean ± standard deviation. Data analysis was performed using SPSS 23.0 statistical software, with statistically significant differences denoted as $P < 0.05$.

6. Results

6.1. Perioperative indexes

Based on the data in **Table 1**, Group B showed shorter durations of hospitalization, surgery, anal ventilation,

and getting out of bed, and lower intraoperative bleeding volume ($P < 0.05$).

Table 1. Comparison of perioperative indexes between the two groups (mean ± standard deviation)

Groups	Number of cases	Hospitalization time (d)	Duration of surgery (min)	Anal ventilation time (h)	Volume of intraoperative bleeding (mL)	Time taken to get out of bed (h)
Group A	45	4.33 ± 0.44	54.92 ± 4.16	15.56 ± 2.62	44.62 ± 4.46	13.25 ± 2.18
Group B	45	3.15 ± 0.58	40.55 ± 4.68	10.85 ± 1.91	41.15 ± 4.38	6.82 ± 1.84
t		10.873	15.395	9.745	3.724	15.120
P		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

6.2. Ovarian function

There was no difference in the serum levels of FSH, LH, E2, and AFC between the two groups, both in the comparison between preoperative and postoperative measurements at 3 months and in the intergroup comparison after 3 months ($P > 0.05$).

Table 2. Comparison of ovarian function between the two groups (mean ± standard deviation)

Groups	Number of cases	FSH (U/L)		LH (IU/L)		E2 (pmol/L)		AFC (pieces)	
		Before surgery	3 months after surgery	Before surgery	3 months after surgery	Before surgery	3 months after surgery	Before surgery	3 months after surgery
Group A	45	9.28 ± 1.74	9.45 ± 1.53	7.36 ± 1.58	7.59 ± 1.54	167.52 ± 33.46	169.52 ± 35.87	12.25 ± 2.47	12.33 ± 2.41
Group B	45	9.32 ± 1.81	9.46 ± 1.62	7.22 ± 1.45	7.46 ± 1.57	168.25 ± 32.84	170.45 ± 35.70	12.37 ± 2.69	12.45 ± 2.34
t		0.107	0.030	0.438	0.397	0.104	0.123	0.220	0.240
P		0.915	0.976	0.663	0.693	0.917	0.902	0.826	0.811

6.3. Sexual functions

The FSFI scores of the two groups of patients all increased 3 months after surgery), with Group B demonstrating higher scores ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of sexual functions between the two groups (mean ± standard deviation)

Group	Number of cases	Sexual desire		Sexual arousal		Orgasm	
		Before surgery	3 months after surgery	Before surgery	3 months after surgery	Before surgery	3 months after surgery
Group A	45	2.55 ± 0.51	3.45 ± 0.46*	2.35 ± 0.48	3.26 ± 0.49*	2.29 ± 0.35	3.55 ± 0.42*
Group B	45	2.68 ± 0.34	4.20 ± 0.47*	2.32 ± 0.47	3.84 ± 0.52*	2.25 ± 0.37	4.11 ± 0.51*
t		1.423	7.650	0.300	5.445	0.527	5.686
P		0.158	< 0.001	0.765	< 0.001	0.600	< 0.001

Group	Cases	Vaginal lubrication		Sexual satisfaction		Sexual pain	
		Before surgery	3 months after surgery	Before surgery	3 months after surgery	Before surgery	3 months after surgery
Group A	45	2.16 ± 0.34	3.72 ± 0.36*	2.30 ± 0.41	3.42 ± 0.48*	2.35 ± 0.38	3.54 ± 0.47*
Group B	45	2.15 ± 0.36	4.25 ± 0.48*	2.28 ± 0.37	4.01 ± 0.56*	2.40 ± 0.35	4.25 ± 0.48*
t		0.135	5.926	0.243	5.366	0.649	7.090
P		0.893	< 0.001	0.809	< 0.001	0.518	< 0.001

Note: *$P<0.05$ compared to the preoperative period

6.4. Pain level

According to the data shown in **Table 4**, the VAS scores of both groups showed a decreasing trend (1-5 days after surgery), with Group B showing a larger decrease, $P < 0.05$.

Table 4. Comparison of pain levels between groups (mean ± standard deviation)

Group	Cases	1 day after surgery	3 days after surgery	5 days after surgery	*F*	*P*
Group A	45	5.72 ± 0.63	$4.12 \pm 0.57^{\#}$	$3.10 \pm 0.53^{\#\triangle}$	455.830	< 0.001
Group B	45	5.15 ± 0.60	$3.45 \pm 0.51^{\#}$	$2.45 \pm 0.48^{\#\triangle}$	382.540	< 0.001
t		4.395	5.876	6.098	-	-
P		< 0.001	< 0.001	< 0.001	-	-

Note: Compared to 1 day after surgery, $^{\#}P < 0.05$, compared to 3 days after surgery, $^{\triangle}P < 0.05$

6.5. Complications

There was no difference in the incidence of complications between the two groups (within 3 months after surgery), $P > 0.05$, as shown in **Table 5**.

Table 5. Comparison of incidence of complications between the two groups [cases (%)]

Group	Cases	Vaginal bleeding	Fever	Hyponatremia	Uterine cavity infection	Uterine perforation	Total incidence
Group A	45	2 (4.44)	1 (2.22)	1 (2.22)	1 (2.22)	1 (2.22)	6 (13.33)
Group B	45	1 (2.22)	0 (0.00)	0 (0.00)	1 (2.22)	0 (0.00)	2 (4.44)
χ^2							1.235
P							0.266

7. Discussion

The pathogenesis of uterine fibroids is closely related to genetic and secretion disorders. Relevant research shows that uterine fibroids are most common among women aged 30–50 years, of which the incidence and prevalence of women of childbearing age are about 25% and 50% respectively [8]. Therefore, timely clinical diagnosis and treatment are of great significance. Currently, uterine fibroids is mainly treated through surgery. However, traditional surgery comes with many limitations like trauma and heavy bleeding. Therefore, so there is an urgent need to find a safer and more effective treatment plan in clinical practice.

In this study, no significant differences were found in the FSH, LH, E2, and AFC levels between the two groups. both in the comparison between preoperative and postoperative measurements at 3 months and in the intergroup comparison after 3 months. Additionally, there was no disparity in the incidence of complications within 3 months after surgery between the two groups. These findings suggest that in the treatment of patients with uterine fibroids, both LM and TCRM can yield favorable outcomes with minimal impact on ovarian function and fewer complications. This can be attributed to the minimally invasive nature of both surgical methods, which primarily affect the superficial tissue of the uterus without adversely affecting the ovarian blood supply or environment. Consequently, these surgeries have a relatively minor impact on ovarian function, ensuring safety and reliability.

In this study, perioperative time-related indexes such as hospitalization, surgery duration, time to anal exhaust, and time to getting out of bed were shorter in Group B. Perioperative time-related indexes such as hospitalization, surgery duration, time to anal exhaust, and time to getting out of bed were shorter in Group B.

Additionally, Group B exhibited lower intraoperative bleeding, higher FSFI scores at 3 months post-surgery, and lower VAS scores within 1–5 days after surgery. These findings suggest that compared to LM, TCRM offers benefits including reduced bleeding, faster postoperative recovery, decreased pain, and improved quality of sexual life, thereby contributing to better prognosis. The rationale behind these advantages lies in the surgical approach of TCRM, which primarily utilizes vaginal access, resulting in a milder impact on the patient's abdominal environment and facilitating quicker postoperative recovery. Unlike LM, which involves abdominal cavity perforation and post-surgery sutures, the smooth execution of TCRM procedures is less influenced by the skills and experience of clinical physicians or the severity of uterine fibroids. This approach reduces intraoperative bleeding, shortens both surgery and recovery times, alleviates postoperative pain, and expedites the enhancement of the patient's sexual life.

8. Conclusion

Both LM and TCRM are effective in treating uterine fibroids with little impact on ovarian function and complications. However, TCRM offers reduced bleeding, quicker postoperative recovery, decreased pain, and an enhanced quality of sexual life. Therefore, this surgical approach appears more beneficial for improving prognosis.

Disclosure statement

The author declares no conflict of interest.

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Analysis of the Effect of Danshen Polyphenols Combined with Doxofylline in Treating Chronic Pulmonary Heart Disease Patients in the Compensated Stage

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Abstract: *Objective*: To analyze the effect of Danshen polyphenols combined with doxofylline treatment in patients with chronic pulmonary heart disease in the compensated stage. *Methods:* 76 patients with chronic pulmonary heart disease in the compensated stage were selected from January 2023 to January 2024 as the study subjects, and they were divided into a study group and a reference group through a random number table. the study group was treated with Danshen polyphenols combined with doxorubicin while the reference group was treated with conventional treatment, and the treatment effects of the two groups were compared. *Results*: The patients in the study group were treated with Danshen polyphenols combined with doxorubicin, and the maximal ventilation was 73.26 ± 4.83 L/min, the left ventricular ejection fraction was 56.14 ± 1.98 %, and the total effective rate of the treatment was 94.74%, which were all significantly better than those of the reference group ($P < 0.05$), which is statistically significant. *Conclusion*: Danshen polyphenols combined with doxofylline treatment resulted in an improvement in maximum ventilation and left ventricular ejection fraction, and its overall efficacy is also higher than conventional treatment in treating chronic pulmonary heart disease in the compensated stage.

Keywords: Danshen polyphenols; Doxofylline; Chronic pulmonary heart disease; Compensatory phase

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1. Introduction

Chronic pulmonary heart disease mainly includes the compensatory period of pulmonary heart function and the compensatory period of pulmonary heart function. Patients in the compensatory stage of pulmonary heart function usually have symptoms such as coughing, fatigue, dyspnea, and palpitations. If not treated in time, heart failure and respiratory failure may occur. has a better effect on the treatment of the compensatory phase of the disease. In this study, 76 patients with chronic pulmonary heart disease in the compensated stage who came to our hospital from January 2023 to January 2024 were selected to study the efficacy of Tansy polyphenols

combined with doxofylline treatment on the disease.

2. Information and methods

2.1. General information

Seventy-six patients were selected for the study from patients with chronic pulmonary heart disease in the compensated stage who came to our hospital from January 2023 to January 2024, and their general information is shown in **Table 1**.

Table 1. General information about the study subjects

Group	Male patients	Female patients	Age (years)	Average age (years)
Study group (38 cases)	20 cases	18 cases	47–84	62.2 ± 8.4
Reference group (38 cases)	19 cases	19 cases	46–85	64.1 ± 7.6

The consent of the patients and their families was obtained for this study. There was no statistically significant difference between the general information of the above two groups ($P > 0.05$).

2.2. Methods

2.2.1. Reference group

Patients in the reference group were treated conventionally with cardiotonic agents, diuretics, anti-inflammatories, and medications for water-electrolyte imbalance and cough relief [1-2]. The treatment lasted for two weeks.

2.2.2. Study group

The study group was treated with Danshen polyphenols combined with doxofylline on top of conventional treatment. 200 mg of Danshen polyphenols was dissolved in 250 mL of 0.9% sodium chloride, and the solution was injected intravenously once a day. Meanwhile, doxofylline was administered through intravenous drip once a day (200 mg doxofylline dissolved in 250 ml of 5% dextrose) for two weeks. At the same time, patients are told to drink more water and quit smoking and drinking during the medication period.

2.3. Observation indicators

The maximum ventilation and left ventricular ejection fraction of patients in the study and the reference groups were compared before and after treatment. Besides, the efficacy of both treatments was also compared. Very effective – elimination of significant improvement in symptoms; effective – symptom relief; ineffective – no improvement in the symptoms. The formula for calculating the total efficacy is as follows:

Total effective rate = (Very effective + Effective)/Total number of cases × 100%

2.4. Statistical analysis

SPSS 22.0 was used to analyze the data. The measurement data were expressed in mean ± standard deviation and compared using a *t*-test; the count data was expressed as *n*/% and compared using a χ^2 test; $P < 0.05$ indicated statistical significance.

3. Results

3.1. Maximum ventilation and left ventricular ejection fraction

The maximum ventilation and left ventricular ejection fraction of patients in the study group were significantly higher than those of the reference group after treatment ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of maximum ventilation and left ventricular ejection fraction before and after treatment (mean ± standard deviation)

Group	Before treatment		After treatment	
	Maximum ventilation (L/min)	Left ventricular ejection fraction (%)	Maximum ventilation (L/min)	Left ventricular ejection fraction (%)
Study group (38 cases)	67.43 ± 3.62	48.12 ± 3.45	73.26 ± 4.83	56.14 ± 1.98
Reference group (38 cases)	66.67 ± 3.51	47.65 ± 3.32	70.42 ± 4.23	52.36 ± 1.85
t	0.929	0.605	2.727	8.599
P	0.356	0.547	0.008	0.000

3.2. Treatment efficacy

The total efficacy of the treatment received in the study group was 94.74%, which was significantly higher than that of the reference group ($P = 0.042$), as shown in **Table 3**.

Table 3. Comparison of the efficacy of the two treatments (*n*/%)

Group	Very effective	Effective	Ineffective	Overall efficacy
Study group (38 cases)	19 (50.00)	17 (44.74)	2 (5.26)	36 (94.74)
Reference group (38 cases)	10 (26.32)	20 (52.63)	8 (21.05)	30 (78.95)
χ^2				4.146
P				0.042

4. Discussion

When patients with chronic pulmonary heart disease in the compensated stage enter the decompensated stage, respiratory or heart failure will occur, which will not only severely impact the patient's health but may also be life-threatening [3]. Therefore, patients should seek timely medical treatment once they experience related symptoms.

Danshen polyphenols have a diastolic effect on the patient's vascular smooth muscle, and it can also dilate the patient's small bronchial arteries, reduce the cardiac load, and increase the concentration of blood oxygen [4-7]. Doxofylline is a bronchodilator, which can relax the patients' bronchial smooth muscle, thus improving lung ventilation. Combined use of these two drugs can effectively enhance the symptom relief of chronic pulmonary heart disease in the compensated stage [8-10].

In this study, patients in the study group received treatment with Danshen polyphenols combined with doxofylline. Results showed that the maximal ventilation reached 73.26 ± 4.83 L/min and the left ventricular ejection fraction was 56.14 ± 1.98%, with a total efficacy of 94.74%. These results were notably better compared to the reference group, and the difference between the two groups was statistically significant ($P < 0.05$).

The application of Danshen polyphenols combined with doxofylline in treating patients with chronic pulmonary heart disease in the compensatory stage led to significant improvements in maximal ventilation and

left ventricular ejection fraction, demonstrating high treatment efficacy

5. Conclusion

Patients with chronic pulmonary heart disease in the compensated stage can be treated with Danshen polyphenols combined with doxofylline to improve cardiopulmonary function and prevent further progression of the disease.

Disclosure statement

The authors declare no conflict of interest.

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The Effect of Assisted Reproductive Technology on Morbidity and Mortality of Twin Premature — A Secondary Publication

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Abstract: *Objective:* It is thought that twin neonates born from pregnancies resulting from assisted reproductive technology (ART) are clinically riskier than twin neonates born from spontaneous pregnancy. However, information on the risks in premature infants born as a result of ART pregnancies is limited. In our study, premature twin infants born from ART and spontaneous pregnancies were compared to clinical outcomes. *Method:* All premature twin infants hospitalized in our unit between September 2017 and September 2019 and born under 32 weeks of gestation were included in our study. Demographic and clinical results of premature twins born as a result of spontaneous and ART pregnancies were compared. *Results:* A total of 142 premature twins, 116 (81.6%) in the spontaneous twin group and 26 (18.4%) in the ART twin group, were included in the study. Demographic and clinical features were similar between ART and spontaneous twin groups ($P > 0.05$). *Conclusion:* Our study determined that premature infants born due to ART pregnancies did not have any additional risk compared to spontaneous infants. This result shows that the main determinants of clinical outcomes in premature infants are gestational week and birth weight.

Keywords: Premature; Twin; Morbidity; Mortality; Assisted reproductive technique

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1. Introduction

Pregnancy rates have increased with the introduction of assisted reproductive techniques (ART) in the last forty years. Additionally, ART has caused the incidence of twin births to increase to 1–4%. Although it causes an increase in pregnancy rates, the older age of mothers who become pregnant as a result of ART, the use of high doses of medication, and the transfer of more than one embryo may also cause some negative consequences. There is an increased risk of gestational diabetes, gestational hypertension, and preeclampsia in women who become pregnant as a result of ART. In addition, it also brings with it an increased risk of premature birth and the risks associated with prematurity [1].

Approximately 1 in 10 twins are born before the 32nd week of gestation (GH). The increased risk of preterm birth with ART causes an increase in the number of premature babies born < 32 GW, which is at

greater risk for morbidity and mortality [2]. It is still unclear whether twin babies born after ART or spontaneous pregnancy at the same GW will change perinatal outcomes. Generally, in ART and spontaneous twin studies, it is 22–42. The outcomes of babies born at a wide range of GH, such as GH, have been evaluated [1,3]. The issue of whether premature twin babies born at < 32 GH, which are particularly at risk for morbidity and mortality, and resulting from ART, are at risk compared to spontaneous twin babies, has not been adequately investigated. Therefore, our study aimed to compare the clinical outcomes of premature twin babies born below the 32nd GW after ART and spontaneous pregnancies.

2. Materials and methods

2.1. Study design

Our study was conducted as a retrospective cohort among premature babies admitted to our neonatal intensive care unit (NICU) between September 2017 and September 2019. All premature twin babies born at gestational age < 32 weeks were included in the study. Singleton and triplet babies with major congenital anomalies and babies born at ≥ 32 GH were excluded from the study. Premature twin babies included in the study were divided into groups as ART and spontaneous twins according to the type of pregnancy.

Demographic and clinical characteristics of all patients were obtained from medical records. Approval was obtained from the local ethics committee before the study. This study was conducted in accordance with the Declaration of Helsinki Principles.

2.2. Demographic and clinical characteristics

In the ART and spontaneous twin groups, maternal age, GH, birth weight (BW), gender, low birth weight for gestational age (SGA; small for gestational age)[4], maternal hypertension/diabetes, antenatal steroid administration, delivery method (cesarean or vaginal birth), 1st and 5th minute Apgar score, early neonatal sepsis (ENS; sepsis ≤ 3 days postnatal), late neonatal sepsis (GNS; sepsis > 3 days postnatal)[5], respiratory distress syndrome (RDS)[6], oxygen duration of support need non-invasive duration of ventilation (NIV) and invasive MV, bronchopulmonary dysplasia (BPD; moderate/severe)[7], retinopathy of prematurity (ROP) requiring treatment [8], intraventricular hemorrhage (IVH) (Stage ≥ 3)[9], necrotizing enterocolitis (NEC) (Stage ≥ 2)[10], hemodynamically significant patent ductus arteriosus (PDA)[11], time to transition to full enteral nutrition, NICU stay, and mortality were recorded. ART and spontaneous twin groups were compared in terms of demographic and clinical characteristics.

2.3. Statistical analysis

Demographic and clinical data obtained from medical records were transferred to the computer environment. Statistical analyses were performed using SPSS 16.0 statistical program. The conformity of the measured values to normal distribution was determined both graphically and by the Shapiro-Wilk test. Results are presented as mean ± standard deviation or median (minimum-maximum). For continuous variables, the *t*-test or Mann-Whitney U test was applied. For nominal variables, the χ^2 test or Fisher exact test was applied. If the *P* value was < 0.05, it was considered statistically significant.

3. Results

A total of 142 twin premature babies (GW: 28 ± 1.1 weeks, BM: 1083 ± 218 g) were included in the study. 116 (81.6%) premature babies were included in the spontaneous twin group and 26 (18.4%) premature babies in the

ART twin group. No significant difference was detected between the ART twin and spontaneous twin groups in terms of demographic and clinical characteristics ($P > 0.05$). The statistical analysis results of the data are given in **Tables 1 & 2**.

Table 1. Demographic characteristics of the study groups

Variables	Spontaneous twin group (*n* = 116, 81.6%)	ART twin group (*n* = 26, 18.4%)	*P*
Maternal age (years)	28 ± 5.6	30.8 ± 6.9	0.218
Maternal hypertension, *n* (%)	0 (0)	1 (3.8)	0.327
Maternal diabetes, *n* (%)	4 (3.4)	0 (0)	0.340
Antenatal steroids, *n* (%)	73 (63)	18 (69)	0.718
Gestational age (weeks, [a])	28.1 ± 11	27.7 ± 1.2	0.564
Birth weight, (g,[a])	1069 ± 218	1145 ± 212	0.110
SGA, *n* (%)	10 (8.6)	1 (3.8)	0.310
Cesarean section, *n* (%)	112 (96.5)	26 (100)	0.1441
Apgar score, [b]	5 (2)	5 (2)	0.7565
Apgar score, [b]	7 (2)	7 (2)	
Male gender, *n* (%)	60 (51.7)	15 (57.6)	0.588

Note: [a] mean ± standard deviation, [b] median (interquartile range) ART, assisted reproductive technique; SGA: low birth weight for gestational age

Table 2. Comparison of the study groups in terms of clinical characteristics

Variables	Spontaneous twin group (*n* = 116, 81.6%)	ART twin group (*n* = 26, 18.4%)	*P*
ENS, *n* (%)	3 (2.5)	0 (0)	0.083
GNS, *n* (%)	21 (18.1)	5 (19.2)	0.908
RDS, *n*	88 (75.8)	19 (73)	0.776
Oxygen requirement (per day)	25.6 ± 12.4	22.5 ± 16.7	0.437
NIV duration (days, [a])	7.9 ± 5.9	6.9 ± 4.4	0.523
MV duration (days, [a])	3.0 ± 2.7	2.7 ± 2.2	0.119
BPD, *n*	20 (17.2)	6 (23)	0.208
ROP, *n*	11 (9.4)	1 (3.8)	0.090
IVK, Stage ≥ 3, *n* (%)	16 (13.7)	3 (11.5)	0.473
NEC, Stage ≥ 2, *n* (%)	2 (1.7)	0 (0)	0.158
PDA, *n* (%)	57 (49.1)	15 (57.6)	0.086
Complete enteral nutrition (days, [a])	15.8 ± 6.3	14.8 ± 3.7	0.440
NICU length of stay (days, [a])	54.3 ± 31.75	53.3 ± 22.6	0.858
Mortality, *n* (%)	21 (18.1)	3 (11.5)	0.195

Note: [a] Mean ± standard deviation, ART, assisted reproductive technique; BPD, bronchopulmonary dysplasia; ENS, early neonatal sepsis; IVH, intraventricular hemorrhage; MV, mechanical ventilation; GNS, late neonatal sepsis; NEC, necrotizing enterocolitis; NICU, neonatal intensive care unit; NIV, non-invasive ventilation; PDA, patent ductus arteriosus; RDS, respiratory distress syndrome; ROP, retinopathy of prematurity.

4. Discussion

In our study, premature twin pregnancies below 32 weeks gestation were evaluated. Our premature patient population at < 32 weeks gestation, which is riskier in terms of morbidity and mortality compared to term, early term ($37^{0/7}$–$38^{6/7}$ weeks), and late preterm ($34^{0/7}$–$36^{6/7}$ weeks) babies, were divided into groups as ART twins and spontaneous twins. The demographic characteristics and clinical outcomes including morbidity and mortality were similar between the groups.

Güler *et al.* reported that 66.6% of twin babies were born as a result of ART pregnancies and 33.4% were born as a result of spontaneous pregnancies [12]. In our results, the rate of ART was 18.4% and the rate of spontaneous twins was 81.6%. This rate may be influenced by the frequency of ART practice in the centers, the follow-up protocol of the perinatology clinic, and the level of technology of the center. Twin pregnancies are considered risky pregnancies due to high maternal and perinatal mortality. Since the frequency of twin pregnancies after ART increases, an increase in premature birth and related risks may be observed [12,13]. In fact, it has been reported that multiple babies born as a result of ART pregnancies are hospitalized in the intensive care unit for longer periods and have more serious problems and higher treatment costs [14]. Although there have been studies comparing ART and spontaneous twins, the results of these studies differ from one another.

While some studies indicate that maternal and fetal outcomes of multiple pregnancies following ART there are also studies showing no statistically significant difference. These studies often evaluate pregnancies at term, near term, or across all gestational ages [1,3,12,15]. More specifically, studies evaluating the effect of ART pregnancies on the morbidity and mortality of premature deliveries at < 32 GA are limited.

The maternal age of ART mothers was higher than those of spontaneous birth. This is due to the fact that mothers who cannot have a baby at a young age become pregnant with ART at an older age [1,16]. In our study, although maternal age was higher in the ART group, no statistically significant difference was found. Similar results have been obtained in other clinical studies [12,17].

In the literature, the rate of cesarean delivery has been reported to be higher in ART pregnancies compared to spontaneous multiple pregnancies [18,19]. Similar to our results, studies conducted in our country also found high rates of cesarean delivery in ART and spontaneous twin pregnancies, but these rates were reported to be similar between the groups [12,20]. The reason for this is that multiple pregnancies are often seen as an indication of cesarean delivery.

The risk of maternal morbidity may increase in premature babies born as a result of ART pregnancies. However, as in our study, ART may not increase the risk of maternal disease. The possible reason for the lack of difference between the groups in terms of maternal diseases may be that maternal diseases occur more frequently in the 3rd trimester. Since our study group patients were not in the 3rd trimester, the results in terms of maternal diseases may have been similar [1,13,21]. In addition, GH and DA were found to be similar in the groups. However, some studies have reported that GH and DA were lower in ART pregnancies. In ART pregnancies, there will be an increase in preterm labor due to increased maternal disease and placental risks in the 3rd trimester, increased maternal and fetal risks, and preterm delivery, which will lead to lower GH and DA [1,13,22]. We think that GH and DA were similar in the ART and spontaneous twin groups due to similar maternal and fetal risks in our study population. Our results are similar to some previous studies [12,23,24].

Perinatal morbidity and mortality are inversely related to GH [25]. The effect of ART, especially at < 32 GH, is not fully known [26]. In terms of mortality, neonates born to ART pregnancies have been reported to be at higher risk for morbidity and mortality. However, this may change as GH decreases. Twin premature twins from ART pregnancies may have lower perinatal mortality than spontaneous twins. The possible reason may be that twins from ART pregnancies are born as monozygotic twins at a lower rate than spontaneous twins. This

is explained by the higher incidence of twin-to-twin transfusion syndrome in monochorionic twins compared to dichorionic twins [26]. In our data, mono/dichorionic information is unknown. Although ART pregnancies increase the risk of prematurity, there may not be an increased mortality compared to spontaneous twins with the same GA [3,26]. Our results support this information. Therefore, the main factor affecting mortality, especially in premature infants, is GH and DA rather than ART [3,26].

Babies with very low birth weight, which is our current patient population, are at risk for many morbidities (RDS, BPD, ROP, IVK, NEC, PDA, etc.) [25]. In addition to the advances in current treatment approaches and the risk of prematurity, it is still unclear whether twins born from ART pregnancies carry an additional risk for morbidity compared to spontaneous twins [26,27]. In a study examining all GA, the results were similar in terms of RDS, MV, mortality, and severe morbidity in twins born as a result of ART pregnancy and twins born from spontaneous pregnancy [3]. More specifically, there is insufficient information on the relationship between morbidity and ART at < 32 GA.

In our study, we concluded that being a twin after ART or spontaneous pregnancy did not pose a risk for the morbidity of prematurity in pre-terms born at < 32 GH. This may be because this group of pre-terms did not experience the third trimester and were not affected by maternal and placental factors. In addition, the fact that the main risks affecting the morbidity and mortality of prematurity such as antenatal steroids, GH, and DA were similar in the groups explains the similar clinical outcomes in both groups. According to our results, these babies born with similar prenatal risk factors and having similar postnatal care conditions face similar clinical outcomes due to similar GH and DA, regardless of whether they are ART or spontaneous twins.

Our study has limitations because it was single-centered, retrospective, and had a small sample size. In addition, data such as the technique of ART, twin-twin transfusion, mono- or dichorionic information, and placental pathology are missing.

5 Conclusion

In conclusion, some adverse clinical outcomes may be seen in infants born after ART pregnancies. However, our results showed that premature twins below 32 GH born from ART pregnancies had no additional risk compared to spontaneous twins. Considering that there is insufficient information on the effect of ART on morbidity and mortality especially in very low birth weight premature infants, studies with larger series should be conducted in this group of patients.

Author contribution

Conceptualization: Burak Ceran, Ufuk Çakir
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Disclosure statement

The authors declare no conflict of interest.

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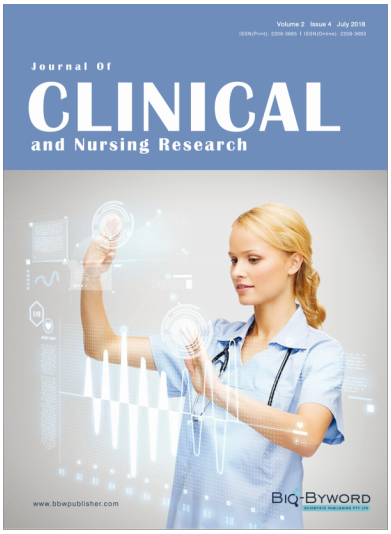

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