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The Effectiveness of Mirena Intrauterine Device in the Treatment of Adenomyosis

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Abstract: *Objective:* To explore the efficacy of the Mirena intrauterine device (IUD) in the treatment of patients with adenomyosis. *Methods:* Forty patients with adenomyosis treated in our hospital from January 2021 to December 2024 were randomly divided into an observation group and a control group, with 20 cases in each group. The observation group received Mirena IUD treatment, while the control group received drug treatment. The treatment indicators were compared between the two groups. *Results:* The total effective rate in the observation group was higher than that in the control group ($P < 0.05$). After treatment, the levels of sex hormone indicators in the observation group were better than those in the control group ($P < 0.05$). Compared with the control group, the observation group had significant improvements in menstrual pain score, menstrual volume score, uterine volume, and endometrial thickness ($P < 0.05$). The incidence of adverse reactions in the observation group was significantly lower than that in the control group ($P < 0.05$). *Conclusion:* The treatment of adenomyosis patients with Mirena IUD is significantly effective, which can effectively improve menstrual volume and reduce the degree of menstrual pain. With fewer adverse reactions, the treatment is safer and feasible for promotion.

Keywords: Mirena intrauterine device; Adenomyosis; Sex hormones; Menstrual volume

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1. Introduction

Adenomyosis is a gynecological disease that mainly affects women of reproductive age. Patients typically present with increased menstrual volume and menstrual disorders, accompanied by progressive menstrual pain. If not treated promptly, the risk of infertility increases with the progression of the disease, directly affecting their quality of life and physical and mental health [1]. Clinical treatment for such patients mainly includes surgery and medication. Surgery can achieve a radical cure but may cause significant trauma and even loss of fertility [2]. Medication, on the other hand, has a relatively slow onset time and may not provide satisfactory results. Currently, the Mirena intrauterine device (IUD) is gradually gaining recognition in the clinical treatment of adenomyosis. As a type of intrauterine device, it contains levonorgestrel, which can inhibit endometrial hyperplasia and cause few serious adverse reactions [3]. Therefore, further investigation of the clinical application value of this treatment option is of practical significance.

2. Materials and methods

2.1. Clinical data

The subject selected patients with adenomyosis (n = 40) who were treated in our hospital from January 2021 to December 2024 as the research objects, and the grouping was done based on a random number table. There were 20 patients in the control group, with a maximum of 4 pregnancies and a minimum of 1 pregnancy, averaging (2.58 ± 0.46) pregnancies. The age range was from 22 to 47 years old, with an average age of (34.79 ± 4.07) years old. In the observation group, the range of pregnancies was between 2 and 4, averaging (2.62 ± 0.42) pregnancies. The maximum age was 48 years old, and the minimum age was 23 years old, with a median age of (34.83 ± 4.04) years old. The basic information of the two groups of patients showed no difference, with $P > 0.05$.

Inclusion criteria: Patients who meet the diagnostic criteria for adenomyosis; patients with complete clinical data; patients without cardiac dysfunction. Exclusion criteria: Patients with contraindications to Mirena intrauterine device (IUD); patients with immune dysfunction; patients who withdrew from the study.

2.2. Methods

Patients in the control group were treated with mifepristone. The treatment began on the first day of menstruation, once a day, with a dose of 12.5 mg each time. The observation group received Mirena intrauterine contraceptive device (IUD) treatment. Before the treatment, basic clinical information such as menstrual cycle, menstrual flow, anemia status, and reproductive history was checked and confirmed with the patients. The patients were also informed about the significance, advantages, key points to note, and possible adverse effects of this treatment method. Routine gynecological examinations, including liver and kidney function, blood, urine, breast, and vaginal discharge, were performed. The Mirena IUD was placed in the uterine cavity between the 3rd and 7th day of menstruation, with a tail string (2 cm) left at the cervix to facilitate later removal. The position of the IUD was confirmed by B-ultrasound examination. If adverse reactions occurred during the treatment, prompt improvement measures or discontinuation of treatment were taken. After the insertion of the IUD, patients received antibiotic therapy for three days. Both groups of patients received treatment for half a year.

2.3. Evaluation indicators

(1) The treatment effect and incidence of adverse reactions were evaluated.

(2) Changes in sex hormone levels, menstrual pain scores before and after treatment, menstrual flow scores, uterine volume, and endometrial thickness were compared between the two groups.

2.4. Statistical analysis

Statistical software SPSS 21.0 was used to analyze the data from both groups, with $P < 0.05$ considered statistically significant.

3. Results

3.1. Study on treatment effects in the observation group and control group

The total effective rate in the observation group was higher than that in the control group ($P < 0.05$). (**Table 1**).

Table 1. Comparison of treatment effects between the two groups (*n*/ %)

Group	n	Significant Effect	Effective	Ineffective	Total Effective Rate
Observation group	20	11 (55)	8 (40)	1 (5)	19 (95)
Control group	20	8 (40)	4 (20)	8 (40)	12 (60)
χ^2					7.0251
P					0.0080

3.2. Comparison of sex hormone indices

Before and after treatment in both groups: Before treatment, there were no significant differences in the indices between the groups ($P > 0.05$); After treatment, the sex hormone indices in the observation group were significantly different from those in the control group ($P < 0.05$) (**Table 2**).

Table 2. Analysis of changes in sex hormone indices in the observation group and control group (mean ± SD)

Group	n	E_2 (nmol/L)		LH (IU/L)		FSH (IU/L)		T (nmol/L)		PRL (μIU/L)		TSH (mol/L)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation Group	20	98.13 ± 7.79	97.79 ± 7.55	11.88 ± 2.29	9.98 ± 1.11	11.89 ± 3.32	10.75 ± 2.13	3.92 ± 0.42	3.64 ± 0.35	214.39 ± 21.85	210.09 ± 20.24	8.77 ± 2.36	7.69 ± 2.05
Control Group	20	98.15 ± 7.75	79.98 ± 7.33	11.85 ± 2.32	7.02 ± 1.28	11.86 ± 3.35	8.21 ± 2.09	3.95 ± 0.45	2.39 ± 0.31	214.43 ± 21.89	191.28 ± 22.23	8.79 ± 2.33	6.29 ± 1.44
T Value		0.0081	7.5691	0.0412	7.8132	0.0284	3.8066	0.2180	11.9564	0.0058	2.7981	0.0270	2.4992
P Value		0.9935	0.0000	0.9674	0.0000	0.9775	0.0000	0.8286	0.0000	0.9954	0.0080	0.9786	0.0169

3.3. Comparison of dysmenorrhea scores, menstrual volume scores, uterine volume, and endometrial thickness changes in the observation group and control group

Before treatment, there were no significant differences in the relevant indices between the two groups ($P > 0.05$). After treatment, there were significant differences in the indices between the groups ($P < 0.05$) (**Table 3**).

Table 3. Study of dysmenorrhea scores, menstrual volume scores, uterine volume, and endometrial thickness before and after treatment in both groups (mean ± SD)

Group	n	Dysmenorrhea Score (points)		Menstrual Volume Score (points)		Uterine Volume (cm3)		Endometrial Thickness (mm)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group	20	6.11 ± 1.09	2.02 ± 0.78	167.90 ± 15.48	61.15 ± 15.03	159.87 ± 29.98	110.32 ± 11.27	11.77 ± 3.48	6.63 ± 2.09
Control group	20	6.13 ± 1.11	3.42 ± 0.96	167.87 ± 15.43	82.29 ± 15.47	159.92 ± 29.96	130.58 ± 17.53	11.79 ± 3.44	8.95 ± 2.99
T Value		0.0575	5.0617	0.0061	4.3832	0.0053	4.3476	0.0183	2.8441
P Value		0.9545	0.0000	0.9951	0.0001	0.9958	0.0001	0.9855	0.0071

3.4. Analysis of the incidence of adverse reactions in both groups

The total incidence rate in the observation group was lower than that in the control group ($P < 0.05$) (**Table 4**).

Table 4. Comparison of the incidence of adverse reactions in the observation group and control group (*n*/%)

Group	n	Digestive tract injury	Breast pain	Impaired liver and kidney function	Total incidence rate
Observation group	20	1 (5)	0 (0)	1 (5)	2 (10)
Control group	20	2 (10)	2 (10)	4 (20)	8 (40)
χ^2					4.8000
P					0.0284

4. Discussion

Clinically, adenomyosis is categorized as endometriosis. Patients with this condition experience regular shedding and bleeding in the myometrium due to the invasion of endometrial tissue and stroma, which leads to the hyperplasia of surrounding muscle tissue in the myometrium [4]. In recent years, changes in daily habits and increased work pressure have contributed to a year-by-year increase in the risk of adenomyosis among women [5]. Clinically, the causes of adenomyosis are believed to be concentrated in the following aspects:

(1) Age factor. There is a certain relationship between the occurrence of the disease and age. As age increases, the severity of the disease also increases [6].

(2) The endometrium grows downward from the basal layer and invades the interior of the myometrium. The main reason is that patients have suffered severe trauma to the endometrial basal layer due to surgical treatments such as curettage or childbirth, or chronic inflammation in the body affects the boundary between the endometrium and myometrium, which leads to downward growth of the endometrium [7].

(3) The expression level of oxytocin receptors in patients with adenomyosis is relatively high. Based on the binding with receptors, many calcium ion signals play a synergistic role, causing the uterine smooth muscle to be in a contractile state [8].

(4) Reproductive status. Adenomyosis is commonly seen in women with a history of childbirth. The cause is damage to the inner wall of the uterus during pregnancy and childbirth [9].

(5) Neural mediators. During the release of substances such as nerve growth factor and TNF-α in adenomyosis lesions, nerve fibers show a trend of retrograde growth, which leads to dysmenorrhea [10].

In the clinical treatment of such patients, surgical procedures have significant effects but can greatly impact their fertility, and may even cause endocrine abnormalities, increasing the psychological stress on patients. If patients have a strong desire for fertility, surgical treatment is not recommended [11]. Non-surgical treatment options are diverse, but there is still no clear and unified treatment standard, so it is still necessary to actively explore more effective and safer treatment methods [12]. Among many therapeutic drugs, mifepristone is commonly used. It can bind to receptors such as progesterone and glucocorticoids, directly inhibiting the release of progesterone receptors in the uterine muscle layer and endometrium, thereby achieving the therapeutic goal of preventing glandular hyperplasia. This is more conducive to the atrophy of the endometrium and ultimately achieves the goal of reducing uterine volume [13]. At the same time, after medication, the patient's endometrium will undergo static changes, and menstrual flow will decrease with regular cycles, which is beneficial for improving disease symptoms. However, drug treatment cannot fundamentally cure adenomyosis. Once the medication is stopped, the disease is more likely to recur. Long-term medication can also induce a series of adverse reactions, which can adversely affect the efficacy.

The Mirena intrauterine device (IUD) is a T-shaped device that contains levonorgestrel and can slowly release a small amount of the drug into the uterine cavity after placement [14]. Levonorgestrel is a highly effective progesterone that can specifically improve the progesterone and estrogen receptors of the endometrium, also achieving the goal of inhibiting endometrial vascular hyperplasia. As a result, the efficiency of clinical repair of the patient's endometrium will increase, reducing menstrual flow and achieving menstrual regularity. Furthermore, the Mirena IUD can directly affect the interstitial and glandular cells of the lesion, further optimizing the patient's endometrial microenvironment and keeping the endometrial tissue in an atrophic state. This can achieve the effect of reducing uterine volume and significantly improve the degree of dysmenorrhea [15]. On this basis, placing a Mirena IUD in the uterus can help reduce the concentration of drug released, avoiding unnecessary impact on ovarian function.

5. Conclusion

In the study, the observation group had better treatment efficacy, fewer adverse reactions, and better sex hormone profiles compared to the control group ($P < 0.05$). This indicates that in the clinical treatment of patients with adenomyosis, the Mirena IUD has prominent efficacy and does not affect the patient's ovarian function, making it a safer treatment option.

Disclosure statement

The authors declare no conflict of interest.

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