ORIGINAL RESEARCH

Analysis of the Therapeutic Efficacy of Hysteroscopic Electric Resection in the Treatment of Atypical Endometrial Hyperplasia and Factors Influencing Prognosis

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ABSTRACT

Objective • The objective of this study was to evaluate the efficacy of hysteroscopic electroresection in the treatment of atypical endometrial hyperplasia and to determine the prognostic factors.

Methods • 226 patients with endometrial dysplasia treated in hospital from January 2021 to August 2022 were selected and divided into control group (113 cases) and study group (113 cases) according to different treatment methods selected by the patients themselves. The control group received curettage plus conventional progesterone treatment, while the study group received hysteroscopic electroresection plus conventional progesterone treatment. After 6 months of treatment, the clinical efficacy (complete response, partial response and progress) of the two groups were evaluated, complications and adverse drug reactions of the two groups were analyzed, and estrogen levels before and after treatment were compared between the two groups. After 1 year follow-up, patients were divided into relapse group and non-recurrence group according to whether they had relapse or not. Clinical data of the two groups were compared to analyze the related factors affecting the prognosis of patients.

Results • (1) Chi-square test results showed that the total effective rate of the study group was higher (96.46% VS 77.88%) than that of the control group ($P < .05$). The complication rate and recurrence rate of the study group were lower than those of the control group (1.77% VS 7.96%, 4.42% VS 21.24%) ($P < .05$). (2) t test results of independent samples showed that after 6 months of

treatment, the levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) in the study group were lower than those in the control group ($P < .05$); (3) The t test results of independent samples indicated that the age and body mass index of the relapsed group were higher than those of the non-relapsed group ($P < .05$); Chi-square test results showed that the proportion of diabetes was higher than that of the group without recurrence, and the proportion of hysteroscopic electroresection was lower than that of the group without recurrence ($P < .05$). (4) Logistic regression model was established, and the results showed that age (OR=1.159), body mass index (OR=1.529) and diabetes (OR=3.861) were the risk factors for prognosis of patients with endometrial dysplasia ($P < .05$), and hysteroscopic electroresection was the protective factor (OR < 1, $P < .05$).

Conclusion • Hysteroscopic electroresection shows significant potential in the treatment of atypical hyperplasia of endometrial, and can improve clinical efficacy and reduce complications by effectively regulating estrogen secretion. In addition, studies have shown that the prognosis of endometrial dysplasia may be related to the age of patients, body mass index and diabetes mellitus. Therefore, for patients with the above risk factors, early consideration of hysteroscopic electrotomy therapy is recommended to reduce recurrence rates and provide important informational support for treatment protocols and clinical guidelines. (*Altern Ther Health Med.* 2025;31(1):72-77).

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INTRODUCTION

Endometrial hyperplasia is a condition in which the lining of the uterus (i.e., the lining of the uterus) thickens and may grow irregularly, often associated with medications, inflammation, and hormonal imbalances. In addition, endometriosis, obesity, and late menopause may also cause symptoms such as abnormal leucorrhea, abnormal uterine bleeding, and cervical mass, resulting in endocrine disorders, premature aging, and reduced reproductive function.[1] In 2014, the World Health Organization

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classified endometrial hyperplasia into typical endometrial hyperplasia and atypical endometrial hyperplasia. The former is considered to have regular cell structure and arrangement with normal cell nucleus size and shape, while the latter refers to abnormal cell structure, nuclear morphology and arrangement with thickened and hyperplasia of endometrial. There is a higher risk of precancerous or cancerous changes.[2,3] Ayhan A et al. pointed out that about 5% of patients with endometrial hyperplasia may develop endometrial cancer, especially the risk of endometrial atypical hyperplasia is higher, up to about 50%, which seriously affects the prognosis of patients.[6] Hui LS et al. found that among the patients initially diagnosed with atypical endometrial hyperplasia, 18.8% and 4.2% were found to have hidden endometrial atypia and malignant tumors.[7] Therefore, actively exploring the factors affecting the progression to endometrial cancer and the recurrence rate of patients with atypical endometrial hyperplasia, and taking corresponding treatment measures as soon as possible, is of great significance to improve the prognosis of patients. Curettage plus progesterone is a common method used in clinical treatment of endometrial dysplasia. The therapeutic effect is insufficient to completely remove abnormal endometrial cells, resulting in an increased risk of treatment failure or recurrence. Repeated curettage has great damage to the endometrial of patients, and there are drawbacks such as long treatment time.[4] Aguilar M and many other clinical scholars have found that hysteroscopic electroresection can effectively make up for the above deficiencies, and can accurately resect and treat abnormal endometrial areas in atypical hyperplasia of endometrial, improve symptoms and reduce recurrence rate.[5] In order to further explore its clinical application value, this study explored the efficacy of hysteroscopic electroresection in the treatment of atypical endometrial hyperplasia and established a Logistic regression model to analyze the factors affecting the prognosis of patients. This study method could consider multiple potential prognostic factors, such as patient age, body mass index, etc., to help more accurately predict the success rate and long-term efficacy of treatment. It helps to optimize the treatment strategy and make the treatment plan more personalized. The aim is to screen patients with higher risk of cancer, and then take relevant treatment measures early. The following is shown.

MATERIALS AND METHODS
General Information
The study subjects were 226 patients with endometrial dysplasia who were admitted to our hospital from January 2021 to August 2022, and were divided into two groups according to different treatment methods chosen by the patients themselves. The comparison of age, body mass index, fertility and menopause between the study group (113 cases) and the control group (113 cases) showed good balance ($P > .05$). It is comparable. See Table 1.

Inclusion and Exclusion Criteria
Inclusion Criteria: (1) endometrial atypical hyperplasia was confirmed by pathological examination;[8] (2) The progesterone receptor test is positive (usually indicating that

Table 1. Comparison of general data

index		Study group (n=113)	Control group (n=113)	Statistic	P value
Age ($\bar{x} \pm s$, years)		52.32±6.14	52.95±5.68	t=0.799	.425
Body mass index ($\bar{x} \pm s$, kg/m²)		25.03±1.86	25.35±1.80	t=1.316	.190
Procreation Status [cases (%)]	parity	97 (85.84)	94 (83.19)	χ^2=0.304	.581
	nulliparity	16 (14.16)	19 (16.81)		
menopausal status [case (%)]	Yes	92 (81.42)	96 (84.96)	χ^2=0.506	.477
	No	21 (18.58)	17 (15.04)		

the endometrial is highly sensitive to progesterone, indicating that the patient has a good response to progesterone treatment, increasing the likelihood of treatment success); (3) The patient voluntarily participated in the study and signed the informed consent; (4) The study group can tolerate surgical treatment; (5) The control group had a strong desire for conservative treatment.

Exclusion criteria: (1) Receive other relevant treatments before enrollment, and exclude other treatments that may affect the study results to ensure the purity and reliability of the study results; (2) Allergic to the experimental drug to avoid adverse effects on patients due to allergic reactions; (3) Combined with uterine fibroids, which may affect the interpretation of test results and evaluation of therapeutic effect; (4) Abnormal function of the heart, kidney, liver and other vital organs, which may increase the risk of use of the investigational drug, or affect its pharmacokinetics and pharmacodynamics; (5) There is a serious communication disorder or mental disorder, unable to cooperate with the research; (6) Combined with progesterone therapy contraindications to avoid interfering with the evaluation of the efficacy of the experimental drug or increasing the risk of adverse reactions of patients; (7) To avoid affecting the data collection and result analysis of the test.

Methods
Control Group. Conventional progesterone + curettage was used for treatment, ultrasound examination was performed to locate the lesion, and a second pathological examination was performed after the lesion was curettage. After confirming that it was consistent with conservative treatment, megestrol was given orally (Shanghai Xinyitenping Pharmaceutical, National Medicine approval number H20053712, 160mg/ tablet) 160mg/ day, once a day, for continuous treatment for 6 months. Nursing measures such as monitoring and observation of vital signs, pain relief and analgesia, attention to rest and recovery, diet and fluid intake, abstinence from sexual activity and use of sanitary care were adopted.

Study Group. Hysteroscopic electroresection plus conventional progesterone treatment was performed. Phloroglucinol (Nanjing Hundsun Pharmaceutical, Sinophoric code H20046766, specification: 4ml: 40mg) was used to soften the cervix before surgery, and 5% mannitol (Jiangsu Zhengda Fenghai Pharmaceutical, Sinophoric code H32022586, specification: 250ml) was used to soften the cervix. 50g) dilatation treatment was performed, the patient was given general anesthesia, lithotomy of the bladder was taken, the output power was set at 100W, the dilatation pressure was about 70mmHg, hysteroscopic electroresection

was performed, and the lesion and 2mm superficial muscle layer below the lesion were removed under the direct vision of hysteroscope. Pathological examination confirmed that there was no muscular infiltration or tumor limitation. After operation, megestrol was given orally with the same dosage as the control group, and the treatment continued for 6 months. Nursing measures such as monitoring and observation of vital signs, analgesia and analgesia, attention to rest and recovery, diet and fluid intake, avoidance of sexual behavior and use of sanitary care devices were adopted

Observational Indicators

Clinical efficacy: After 6 months of treatment, the patient was returned to the hospital and given diagnostic curettage examination. Pathological analysis showed that the endometrial was completely retraction and no endometrial hyperplasia was considered complete remission; The endometrium did not completely retreat, but the lesion grade decreased as partial remission; The presence of obvious extrauterine lesions or progression to tumor is considered as progress. Total response rate = complete response rate + partial response rate.

Postoperative complications (intrauterine adhesion, bleeding) and adverse drug reactions (breast tenderness, weight gain, abnormal menstruation) were analyzed in the two groups.

Estrogen level: 3ml of fasting venous blood was collected from the two groups before treatment and 6 months after treatment, and luteinizing hormone (LH) and estradiol (E2) follicle stimulating hormone (FSH) were measured by electrochemiluminescence analysis. High levels of LH and E2 may indicate the hyperestrogenic state of endometrium, while high levels of FSH may indicate the influence of ovarian function.

Prognosis. Patients were followed up for 1 year after surgery, and were divided into non-recurrence group and recurrence group according to whether recurrence occurred during the follow-up period. Baseline data of the two groups were compared. It included age, body mass index, endometrial thickness, fertility status (fertility, non-fertility), menopause (yes, no), hypertension (yes, no), diabetes (yes, no), uterine fibroids (yes, no), endometrial polyps (yes, no), treatment plan (hysteroscopic electroresection, curettage).

Statistical analysis

SPSS 23.0 software was used for data processing. Measurement data were expressed as ($\pm$s) and tested by t. The statistical data were represented by n (%), and χ^2 test showed that $P < .05$ was statistically significant.

RESULTS
#### Comparison of Clinical Efficacy Between Two Groups

The overall efficacy rate in the research group is higher than that in the control group (96.46% vs. 77.88%) ($P < .05$). See Table 2 and Figure 1.

Comparison of Complications, Adverse Drug Reactions, and Recurrence Rates Between two Groups

Table 2. Comparison of the clinical efficacy between the two groups n (%)

Group	Complete remission	Partial remission	Progression	Total efficacy
Research group (n=113)	89 (78.76)	20 (17.70)	4 (3.54)	109 (96.46)
Control group (n=113)	69 (61.06)	19 (16.81)	25 (22.12)	88 (77.88)
χ^2				17.446
P value				.003

Figure 1. The clinical efficacy ratio of the two groups
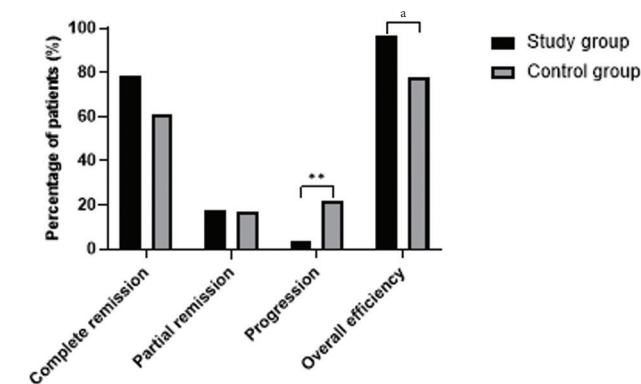
$^{a}P < .01$

Table 3. Comparison of complications, adverse drug reactions and recurrence rates in the two groups [n (%)]

	Complication		
Group	intrauterine adhesious	hemorrhage	summation
Research group (n=113)	1 (0.88)	1 (0.88)	2 (1.77)
Control group (n=113)	4 (3.54)	5 (4.42)	9 (7.96)
χ^2			4.683
P value			.031

	Drug adverse reaction				Recurrence rate
Group	Breast distending pain	Weight gain	menoxenia	summation	
Research group (n=113)	1 (0.88)	1 (0.88)	3 (2.65)	5 (4.42)	5 (4.42)
Control group (n=113)	2 (1.77)	2 (1.77)	2 (1.77)	6 (5.31)	24 (21.24)
χ^2				0.096	14.281
P value				.757	.005

The incidence of complications and recurrence rates in the research group were lower than those in the control group (1.77% vs. 7.96%, 4.42% vs. 21.24%) ($P < .05$). However, there was no evident difference in adverse drug reactions between the two groups ($P > .05$). Refer to Table 3.

Comparison of Estrogen Levels before and after 6 Months of Treatment in Two Groups

After six months of treatment, the levels of LH, E2, and FSH in the research group were lower than those in the control group ($P < .05$). See Table 4 and Figure 2.

Comparison of Clinical Data between Recurrence and Non-recurrence Groups

The recurrence group exhibited higher age, BMI, and prevalence of diabetes compared to the non-recurrence group. The proportion of hysteroscopic resection was lower in the recurrence group ($P < .05$), as shown in Figure 3. However, there were no obvious differences in endometrial thickness, reproductive history, menopausal status, hypertension, uterine fibroids, and endometrial polyps

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Table 4. Comparison of estrogen levels before and 6 months after treatment ($\bar{x} \pm s$)

| group	LH (IU/L)		E$_2$ (pmol/L)		FSH (U/L)	
	pretherapy	After 6 months of treatment	pretherapy	After 6 months of treatment	pretherapy	After 6 months of treatment
Research group (n=113)	9.89±1.36	3.94±0.63[a]	182.27±19.52	81.34±9.76[a]	7.76±1.22	4.02±0.49[a]
Control group (n=113)	10.02±1.21	4.78±1.28[a]	179.46±18.73	90.53±11.47[a]	7.59±1.18	4.58±0.57[a]
t	0.759	6.259	1.104	6.487	1.065	7.920
P value	.449	<.001	.271	<.001	.288	<.001

[a]Compared with those prior to treatment in this group, [a]$P < .05$

Figure 2. Comparison of estrogen levels before and after 6 months of treatment
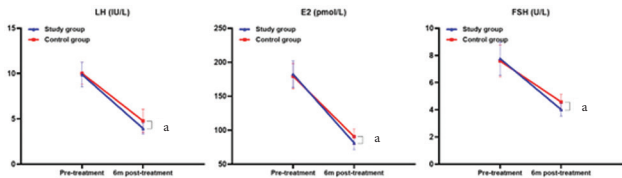
[a]$P < .001$

Figure 3. Comparisons of age, body mass index, diabetes and treatment modality between the recurrent and nonrecurrent groups
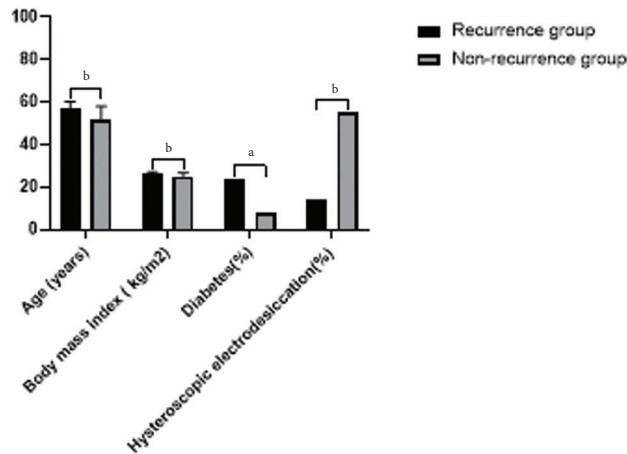
[a]$P < .05$
[b]$P < .001$

Table 5. Comparison of clinical data between the recurrent and nonrecurrent groups

| index		Recurrent group (n=29)	nonrecurrent groups (n=197)	statistic	P value
Age ($\bar{x} \pm s$, years)		56.69±3.53	52.04±5.96	t=4.092	<.001
Body mass index ($\bar{x} \pm s$, kg/m^2)		26.34±0.98	25.02±1.87	t=3.722	<.001
Endometrial thickness ($\bar{x} \pm s$, mm)		6.31±1.64	6.19±1.93	t=0.318	.751
Reproductive history [cases (%)]	parity	23 (79.31)	168 (85.28)	χ^2=0.308	.579
	nulliparity	6 (20.69)	29 (14.27)		
Menopausal status [cases (%)]	yes	26 (89.66)	162 (82.23)	χ^2=0.536	.464
	no	3 (10.34)	35 (17.77)		
Hypertension [cases (%)]	exist	8 (27.59)	59 (29.95)	χ^2=0.068	.795
	no	21 (72.41)	138 (70.05)		
Diabetes [cases (%)]	exist	7 (24.14)	15 (7.61)	χ^2=6.087	.014
	no	22 (75.86)	182 (92.39)		
Uterine fibroids [cases (%)]	exist	2 (6.90)	11 (5.58)	χ^2=0.022	.886
	no	27 (93.10)	186 (94.42)		
Endometrial polyps [cases (%)]	exit	3 (10.34)	9 (4.57)	χ^2=0.725	.394
	no	26 (89.66)	188 (95.43)		
Treatment modality [cases (%)]	hysteroscopic electric resection	4 (13.79)	109 (55.33)	χ^2=17.446	<.001
	uterine curettage	25 (86.21)	88 (44.67)		

Table 6. Description of the main independent variables

independent variable	variable declaration	Voluation
Age	numerical variable	-
Body mass index	numerical variable	-
Diabetes	classified variable	1=exit, 0=no
Treatment modality	classified variable	1=hysteroscopic electric resection, 0=uterine curettage

Table 7. Comparison of Clinical Data between Recurrence and Non-recurrence Groups

index	β	standard error	Wald χ^2	P value	OR	95%CI	
						Minimum limit	Upper limit
Age	0.147	0.039	14.093	.000	1.159	1.073	1.251
Body mass index	0.425	0.122	12.172	.000	1.529	1.204	1.941
Diabetes	1.351	0.510	7.005	.008	3.861	1.420	10.497
Treatment modality	-2.047	0.557	13.488	.000	0.129	0.043	0.385

Figure 4. Forest plot of clinical features based on the multivariate Logistic regression analysis
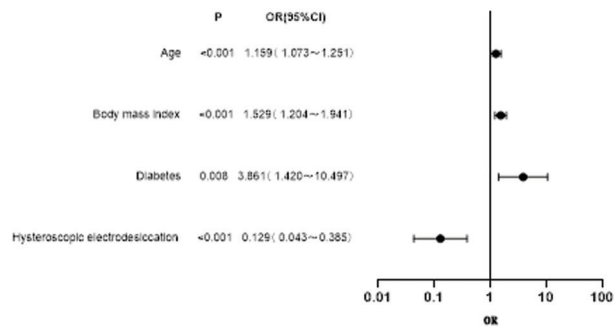
between the two groups ($P > .05$). Refer to Table 5.

Logistic Regression Analysis of Adverse Prognosis in Patients with Atypical Endometrial Hyperplasia

Factors with significant differences in Section 2.3 (age, body mass index, diabetes, treatment modality) were used as independent variables and assigned values (see Table 6). The prognosis of patients with atypical endometrial hyperplasia was considered as the dependent variable (1 = recurrence, 0 = non-recurrence). A logistic regression model was established, revealing that older age, higher body mass index, and diabetes were risk factors for the adverse prognosis of atypical endometrial hyperplasia patients (OR > 1, $P < .05$), while hysteroscopic resection was a protective factor (OR < 1, $P < .05$). Refer to Table 7 and Figure 4.

DISCUSSION

The abnormal increase of estrogen level and the lack of progesterone counteraction lead to the inability of endometrial to shift from proliferative to secretory stage, and continuous hyperplasia of endometrial is one of the important factors leading to atypical hyperplasia of endometrial.[9] Therefore, curettage plus progesterone is often used clinically to treat patients with atypical endometrial hyperplasia. Curettage can quickly remove hyperplasia of endometrial and achieve rapid hemostasis.[10] Progesterone supplementation can transform the endometrium from a proliferative stage to a secretory stage, thus achieving the purpose of inhibiting endometrial hyperplasia and improving clinical symptoms of patients.[11] However, with the

extensive application of this treatment program, its disadvantages are becoming increasingly prominent, and repeated curettage treatment is very easy to cause endometrial injury, resulting in uterine adhesions and other complications. In addition, the treatment effect of progesterone is slow, the duration of medication is long, and the recurrence rate after stopping the drug is high, and the clinical efficacy is not ideal.

In recent years, hysteroscopic surgery has become the gold standard for clinical diagnosis and treatment of intrauterine diseases. Hysteroscopic surgery can provide doctors with a good vision, help them make accurate and comprehensive assessment of intrauterine diseases, and accurately implement treatment operations.[12] In this study, hysteroscopic electroresection was applied to patients with atypical endometrial hyperplasia. The results showed that after 6 months of treatment, the total effective rate of the study group was higher than that of the control group (96.46% vs 77.88%), and the levels of LH, E2 and FSH were lower than those of the control group, indicating that hysteroscopic electroresection plus progesterone therapy could effectively regulate the estrogen levels of patients. Improve clinical efficacy. Hysteroscopic electrotomy acts directly on abnormal areas of the endometrium and reduces estrogen production in these areas by removing or destroying abnormal endometrial hyperplasia. Atypical endometrial hyperplasia is often accompanied by local high estrogen status, and this local treatment can effectively reduce the source of estrogen production, thereby improving the estrogen level of patients. The reason is that: Hysteroscopic electroresection can be performed under a clear visual field to help doctors perform surgical operations, and can directly target the lesions in the abnormal endometrial region and the superficial muscle layer below the lesion for excision and treatment, which can more accurately remove the lesions of dysplasia, reduce the possibility of residual cells, and improve the thoroughcy and effect of treatment. Intraoperative electrocoagulation can quickly stop the bleeding without leaving suture knots. To a certain extent, the amount of intraoperative blood loss is reduced, which is conducive to postoperative recovery of patients. Combined progesterone therapy can effectively promote the secretion of gonadal hormone, regulate ovarian function, improve the over-secretion of estrogen, promote endometrial atrophy or shedding, play a good therapeutic effect, reduce the chance of lesion regeneration, and improve long-term efficacy and recurrence risk. van Weelden WJ et al. found that compared with other intervention groups, electroendometrial resection combined with progesterone had a higher rate of complete remission and a lower rate of adverse pregnancy and recurrence, which was consistent with the results of this study.[13] In addition, the results of this study showed that the complication rate was lower in the study group than in the control group. It is suggested that hysteroscopic electroresection plus progesterone therapy can help reduce complications. The reason may be that hysteroscopy can help doctors perform surgery under direct vision, reduce unnecessary endometrial injury caused by blind scratches, and play a protective role in

endometrial to a certain extent, thus reducing related complications. Rodriguez AM et al. found that in the treatment of patients with atypical endometrial hyperplasia, the adverse reactions and complications of patients with progesterone combined with hysteroscopic electroresection were lower than those of the conventional control group. This treatment program can regulate estrogen and optimize the pregnancy outcome of patients, which is worthy of promotion, consistent with the results of this study.[12] Traditional curettage is an invasive operation that requires general or local anesthesia and is associated with higher bleeding risk and postoperative pain. Although combined progesterone therapy can control endometrial hyperplasia by adjusting estrogen levels, the local resection of existing lesions is less direct and accurate than hysteroscopic resection. Hysteroscopic resection is a minimally invasive procedure that precisely removes abnormal areas of the endometrium while maximizing the preservation of healthy tissue. It not only reduces the damage to the uterine wall, but also helps to reduce the postoperative pain and recovery time.

A large number of studies have reported that endometrial hyperplasia and endometrial cancer have similar histological morphology and the same pathogenesis.[14,15] About 80% of endometrial adenocarcinomas develop from endometrial atypical hyperplasia.[16] In this study, it was found that the proportion of obvious extrauterine lesions or tumor progression in the study group was 3.54%, which was significantly lower than 22.12% in the control group. It can be seen that hysteroscopic electroresection is effective in preventing endometrial atypical hyperplasia from progressing to endometrial cancer. The Logistic regression model was further established in this study, and the results showed that age, high body mass index and diabetes were the risk factors for prognosis of patients with atypical endometrial hyperplasia, and hysteroscopic electroresection was the protective factor. The above factors were analyzed one by one: (1) With the increase of age, the ovarian function gradually declined, leading to the increase of estrogen level; It can also lead to a decrease in the proliferation ability of endometrial cells, but for the formed atypical hyperplasia, the body cells will initiate the apoptosis mechanism, and at the same time, inflammatory factors will also play a role, causing damage to the body's immune system, reducing the body's immune function, and increasing the risk of recurrence.[17] (2) Body mass index is a key indicator reflecting the level of human metabolism, and its high level may cause obesity, polycystic ovary syndrome, diabetes and a series of endocrine diseases. Obesity is often accompanied by increased estrogen levels, which may promote the occurrence and progression of atypical endometrial hyperplasia. People with high body mass index have high body fat, and aromatase in adipose tissue can convert catecholamines, androstenedione and other substances into endogenous estrogens, which can continuously stimulate endometrial, induce endometrial cancer and increase the risk of disease recurrence.[18] (3) Many studies have confirmed that diabetes is an important factor that promotes endometrial hyperplasia to

progress into endometrial cancer or recurrence.[19,20] Insulin receptors are widely distributed in the endometrial, and endometrial differentiation and hyperplasia are regulated by high-affinity insulin receptors. Insulin can bind to insulin receptors, activate related signaling pathways, increase the activity of insulin-like factors, and induce disease recurrence.[21] (4) Hysteroscopic electroresection can directly observe uterine conditions through optical instruments, accurately judge the condition, implement targeted treatment plans, accurately remove and apply the tissue, and reduce the risk of disease deterioration and recurrence.[22] In this regard, it is suggested that patients with atypical endometrial hyperplasia should actively cooperate with doctors to implement hysteroscopic electrotomy treatment, improve their eating habits, reduce the intake of high-fat and high-calorie foods, reduce weight, control blood sugar level, reduce the risk of postoperative recurrence, and improve the prognosis of patients.

Follow-up care and monitoring after hysteroscopic resection is particularly important to manage patients with identified risk factors and to monitor their postoperative recovery, including for bleeding, infection, or other surgery-related complications. Early detection and timely treatment can effectively reduce the incidence and severity of complications. To evaluate the effect of hysteroscopic resection on atypical endometrial hyperplasia, including the degree of remission of the lesion, improvement of symptoms, and changes in estrogen levels. This can help determine if further treatment or adjustment of treatment is needed.

In summary, hysteroscopic electroresection for atypical hyperplasia of endometrial can effectively regulate estrogen secretion, improve clinical efficacy and reduce complications. In addition, the poor prognosis of patients with atypical endometrial hyperplasia may be related to the patient's age, body mass index and diabetes. For patients with the above factors, it is recommended to undergo hysteroscopic electroresection as soon as possible to reduce the postoperative recurrence rate, which provides important information support for treatment plans and clinical guidelines.

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