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Effectiveness of Combined Dual-lens Treatment of Ureteral Stenosis after Ureteral Stone Surgery

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Abstract: *Objective:* To investigate the clinical effect of dual-lens combined treatment of ureteral stenosis after ureteral stone surgery. *Methods:* The study period was from January 2023 to December 2023, and the sample was selected from 76 patients with ureteral stenosis after ureteral stone surgery admitted to our hospital, which was randomly grouped into the experimental group (n = 38) and the control group (n = 38) by using the numerical table lottery method. The control group was treated with urethroplasty, and the experimental group was treated with a dual-lens combination, comparing the intraoperative blood loss, postoperative recovery time, hospitalization time, and complication rate between the two groups. *Results:* The intraoperative blood loss, postoperative recovery time and hospitalization time of the experimental group were lower than those of the control group ($P < 0.05$); the complication rate of the experimental group was lower than that of the control group ($P < 0.05$). *Conclusion:* Dual-lens combined treatment can reduce intraoperative blood loss, shorten postoperative recovery time and hospital stay and reduce the incidence of complications, which has the value of popularization and application.

Keywords: Dual-lens combination; Ureteral stone; Ureteral stenosis

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1. Introduction

Clinical treatment of ureteral stones includes extracorporeal shock wave lithotripsy, ureteroscopy lithotripsy, etc., which requires high-pressure irrigation and is very likely to be combined with periureteral fibrosis and retroperitoneal fibrosis in the postoperative period, leading to ureteral stenosis in patients [1]. The conventional clinical treatment of ureteral stenosis after ureteral stone surgery is urethroplasty, in which the stenotic ureter is removed and then joined anastomosed, the main defect of which is that the surgical trauma is large and it is very easy to combine with all kinds of postoperative complications [2]. Double lens combination for clinical treatment of ureteral stones after ureteral stenosis of a new technique that uses laparoscopy and ureteroscopy to complete the operation. The surgical field of vision is clear and can ensure the surgical effect on the basis of reducing surgical trauma [3]. This study selected 76 samples of patients with ureteral stenosis after ureterolithiasis to explore the clinical effect of dual-lens combined treatment.

2. Information and methods

2.1. General information

The study was carried out from January 2023 to December 2023, and the sample was selected from 76 patients with ureteral stenosis after ureteral stone surgery admitted to the hospital, which was randomly grouped into the experimental group (n = 38) and the control group (n = 38) by using the numerical table lottery method. In the experimental group, there were 24 males and 14 females, and the statistical age range was 38–66 years old, with a mean of 52.17 ± 4.19 years old, among which there were 7 cases of extracorporeal shock wave lithotripsy, 15 cases of holmium laser lithotripsy in the upper part of the ureter and 16 cases of pneumatic ballistic lithotripsy in the middle and lower part of the ureter. In the control group, there were 23 males and 15 females, with the age range of 40–65 years old, a mean of 52.26 ± 4.22 years old, including 8 cases of extracorporeal shock wave lithotripsy, 16 cases of holmium laser lithotripsy in the upper ureter, and 14 cases of pneumatic ballistic lithotripsy in the middle and lower part of the ureter, and there was no significant difference in the results of comparing the general information of the patients of the two groups ($P > 0.05$).

Inclusion criteria:

(1) History of ureteral stone surgery;

(2) Diagnosed with hydronephrosis and ureteral stenosis by imaging examination;

(3) Meet the indications for surgery and sign the informed consent for the study.

Exclusion criteria:

(1) Combined with ureteral atresia;

(2) The length of the ureteral stenosis segment is greater than 3 cm;

(3) Combined with major organ pathology, unable to tolerate surgery.

2.2. Methods

The control group was treated with urethroplasty, general anesthesia was administered, the patients were kept in the folding position, the waist was elevated, a surgical incision was set in the area where the ureter was located, the location of the narrowed segment of the ureter was identified by probing, the narrowed segment of the ureter was resected longitudinally, then a beveled anastomosis was performed, and the surgical incision was closed with absorbable suture.

The experimental group was treated with dual-lens combination therapy, general anesthesia was administered, and the patient was kept in the healthy side reclining position + lithotomy position. After the onset of anesthesia, a ureteroscope was inserted through the patient's urethral orifice to dilate the ureteral opening area moderately, and a zebra guidewire was used to guide the scope so that it could accurately enter the inner ureter on the affected side and the location of the ureteral stenosis ring was observed and determined. Subsequently, a puncture hole was set up next to the umbilicus, an artificial carbon dioxide pneumoperitoneum was established, a 10 mm Trocar and a laparoscope were inserted, and puncture holes were set up bilaterally in the rectus abdominis muscle area about 6 cm below the umbilicus of the patient, and a 10 mm Trocar and a 5 mm Trocar were inserted, respectively, and the adherent tissues were freed and loosened with the use of surgical instruments so that the freed area could reach the normal area of the affected side of the ureter. Using laparoscopy and ureteroscopy to determine the exact location of the ureteral stenosis, resection of the stenotic segment of the ureter, longitudinal incision of the obliquely cut end of the ureter to increase the area of the dissection, and trimming and flattening of the dissection, followed by absorbable suture. Suture priority was given to the posterior wall area with 3 stitches, and then the double J tube was placed inside the ureter on the affected side so that the distal area of the double J tube was inside the bladder and the proximal area was in

the renal pelvis, and the ureteral stumps were sutured completely after being aligned. After the operation, the bleeding was stopped properly, the effect of the suture was checked, and if there were uneven areas, the suture was strengthened with several stitches. After the operation, the urine leakage was checked for, the drain was routinely left in place, the artificial pneumoperitoneum was lifted, and the surgical incision was sutured.

2.3. Evaluation criteria

Compare the intraoperative blood loss, postoperative recovery time and hospitalization time of the two groups of patients. Statistics on the complication rate of patients in the two groups.

2.4. Statistical methods

Using SPSS 23.0 software to analyze the research data, the measurement data of mean ± standard deviation (SD) is *t*-test, the count data % is χ^2 test, $P < 0.05$ is the difference is statistically significant.

3. Results

3.1. Comparison of intraoperative blood loss, postoperative recovery time and hospitalization time

As the data in **Table 1**, the intraoperative blood loss, postoperative recovery time and hospitalization time of the experimental group were lower than those of the control group ($P < 0.05$).

Table 1. Comparison of intraoperative blood loss, postoperative recovery time and hospitalization time between the two groups (mean ± SD)

Group	Intraoperative blood loss (mL)	Time to exhaustion (d)	Time to get out of bed (d)	Time to extubation (d)	Length of stay (d)
Experimental group (n = 38)	32.48 ± 2.96	1.04 ± 0.32	0.79 ± 0.12	1.75 ± 0.31	5.02 ± 1.17
Control group (n = 38)	88.75 ± 5.94	3.58 ± 0.79	1.48 ± 0.35	2.88 ± 0.69	7.29 ± 1.84
t-value	52.266	18.370	11.496	9.209	6.417
P-value	0.000	0.000	0.000	0.000	0.000

3.2. Comparison of complication rates

As the data in **Table 2**, the complication rate of patients in the experimental group is lower than that of the control group ($P < 0.05$).

Table 2. Comparison of complication rates between the two groups (n/%)

Group	Leakage of urine	Fever	Bleeding	Complication rate
Experimental group (n = 38)	0	1	1	2 (5.3)
Control group (n = 38)	3	2	3	8 (21.1)
t-value				4.145
P-value				0.041

4. Discussion

Ureteral stone is a common disease in urology, and the clinical treatment is mostly extracorporeal shock wave lithotripsy, ureteroscopy and other surgical treatments. It is very easy to damage the mucosa of the ureter during the surgical operation, which leads to a combination of ureteral stenosis in the patients after the operation. Clinical studies have shown that ureteral stenosis can affect urination and lead to hydronephrosis, which can progress to renal pus and even damage renal function if treatment is not on time [4].

Clinical treatment of ureteral stenosis after ureterolithiasis through surgical solutions, urethroplasty is an open surgery. Its main advantage is simple operation, but the surgical trauma area is large, intraoperative blood loss is large, and it is very easy to induce various types of postoperative complications, which leads to a prolonged recovery cycle for the patient [5]. Compared with urethroplasty, the advantages of dual-lens combined treatment are as follows:

(1) Under the dual-lens combined treatment mode, the surgeon uses laparoscopy and ureteroscopy to complete the observation. This can quickly and accurately locate the ureteral stenosis area under direct vision and determine whether there is scar hyperplasia, inflammation, adhesion, fibrosis and other lesions around the ureteral stenosis section [6–7].

(2) The area of the surgical incision is small, and the operation is completed in a relatively closed environment, which can reduce the impact on the body's internal environment, and through the combined observation of laparoscopy and ureteroscopy, a clear surgical field of vision can be obtained. The physician can quickly determine the location of the ureter and accurately complete the resection of ureteral stenosis, which can reduce the trauma of the surgery on the basis of the surgical effect [8].

(3) During the double lens combination, the patient maintains the running position on the healthy side, which is more comfortable for the patient, and there is no need to adjust the position during the operation, and the operation can be completed jointly with the upper and lower sides, which can significantly shorten the operation time and avoid the risk caused by repeatedly adjusting the position [9].

(4) During the double lens combined treatment, the physician uses the light source to guide the surgical operation, which can reduce the difficulty of retaining the double J-tube, shorten the surgical operation time, and reduce the risk of surgical operation.

(5) During the dual-lens combined treatment, the physician accurately completes the oblique ureteral incision operation, trims and ensures that the inner surface of the ureter is smooth and accurately closes the suture, which can significantly reduce the incidence of postoperative ureteral restenosis [10–11].

The data of the results of this study show that the intra-operative blood loss, postoperative recovery time and hospitalization time of the experimental group are lower than those of the control group, suggesting that the use of dual-lens combined treatment for patients with ureteral stenosis after ureterolithiasis can reduce the amount of intraoperative blood loss and shorten the postoperative recovery time and hospitalization time. Through result analysis, the conventional urethroplasty incision is longer, the surgical trauma area is large, intraoperative blood loss is more and the difficulty of locating the ureteral stenosis segment is greater, although the retrograde imaging, the degree of adhesion and the degree of ureteral dilatation can be observed by mortal events to locate the stenosis site, there is still the possibility of mistakenly cutting the patient, resulting in the damage of the patient's normal ureter, the anastomosis of the tubal breaks with high tensions, anastomotic difficulty and the inability to effectively complete the loosening of scar tissue, and it is very easy for re-stenosis and urine leakage to occur after surgery, leading to prolonged recovery and hospitalization time [12]. Under the dual-lens combined treatment mode, the surgeon first determines the position of the ureteral stenosis segment under direct vision using ureteroscopy, determines the length of the stenosis segment and the degree of stenosis,

marks the distal part of the stenosis segment using the head end of the ureteral catheter, and then marks the area of the ureter across the iliac blood vessels by using laparoscopic observation, and the tail end of the upper ureter is freed from the head end, and the head end of the upper and middle ureter is freed from the head end, and then the lumen can be clipped together with the operation to determine the location of the stenosis segment. The operation can identify the distal and proximal ureteral stenosis segments [13]. After completing the positioning of the ureteral stenosis segment, the surgeon completes the resection operation of the stenosis segment with the assistance of laparoscopy, which can precisely control the scope of freeing and resection to ensure that the adhesion is fully loosened, avoiding the damage of the symptomatic ureter and reducing the tension at the anastomotic end to ensure that the anastomotic effect is avoided, reduce the support and tension, and shortening the patient's recovery and hospitalization time. Double lens combination belongs to the minimally invasive treatment mode, with a small surgical incision area, precise intraoperative operation and slight trauma, which can significantly reduce intraoperative blood loss [14]. The results of this study showed that the complication rate of patients in the experimental group was lower than that of the control group, suggesting that the use of dual-lens combined treatment in patients with ureteral stenosis after ureteral stone surgery can reduce the incidence of complications. Conventional urethroplasty cannot accurately locate the ureteral stenosis segment; it is very easy to damage the healthy ureter, the anastomosis process is more tense and the intraoperative blood loss is more, which can induce a variety of complications. Bicameral therapy is minimally invasive, with small incisions and slight trauma. The physician uses ureteroscopy and laparoscopy to locate the ureteral stenosis segment, fully loosens the adhesions and accurately completes the resection and anastomosis operation, which can maximally guarantee the effect of anastomosis to avoid damaging the healthy ureter and the amount of intraoperative blood loss is small, which can significantly reduce the incidence of complications [15]. The analysis of this study concludes that patients with ureteral stenosis after ureteral stone surgery can obtain ideal results by using dual-lens combined treatment, but the operation difficulty of this procedure is high, so physicians need to accurately complete the surgical operations, clearly define the characteristics of the narrowed segment of the ureter, and accurately resect and anastomose, in order to ensure the effect of the operation and safety.

5. Conclusion

In conclusion, ureteral stenosis patients after ureteral stone surgery can be treated with a dual-lens combination to reduce intraoperative blood loss, shorten the postoperative recovery time and hospital stay, and reduce the incidence of complications, which has the value of promotion and application.

Disclosure statement

The author declares no conflict of interest.

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