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Effect of Enhanced Recovery after Surgery (ERAS) Interventions on the Prognosis of Patients with Middle and Upper Ureteral Calculi Complicated by Hydronephrosis after Flexible Ureteroscopic Lithotomy

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Abstract: The objective is to investigate the effect of enhanced recovery after surgery (ERAS) intervention on the prognosis of patients with middle and upper ureteral calculi and hydronephrosis after flexible ureteroscopic lithotomy, thereby providing scientific references for optimizing the recovery strategies of patients. 70 patients with middle and upper ureteral calculi complicated by hydronephrosis from January 2024 to January 2025 were selected as the study subjects for flexible ureteroscopic lithotomy,who were divided into a control group (n=35) and a study group (n=35) using a random number table.Specifically, the control group received routine nursing and the study group was provided with ERAS interventions in addition to routine nursing, followed by a comparison of the operation time, intraoperative blood loss, duration of postoperative urinary catheterization, hospital stay, incidence of complications, and quality of life scores between the 2 groups, so as to evaluate the effect of ERAS interventions. No significant differences in operation time and intraoperative blood loss were observed between the study and control groups ($P > 0.05$). However, the duration of postoperative urinary catheterization and hospital stay were significantly shorter in the study group than in the control group ($P < 0.05$), with the study group showing a substantially lower incidence of complications than the control group ($P<0.05$). Additionally, the postoperative quality of life scores were remarkably higher in the study group than in the control group ($P<0.05$). ERAS interventions can significantly promote the recovery process, shorten the postoperative recovery time, reduce the incidence of complications, and improve the quality of life for patients with middle and upper ureteral calculi complicated by hydronephrosis after flexible ureteroscopic lithotomy.

1. Introduction

Ureteral calculi are a clinically prevalent urological disease, especially the calculi located in the upper and middle segments of the ureter, which often lead to hydronephrosis due to their proximity to the kidneys, ultimately causing severe physical discomfort and life disturbances for patients. With the rapid development of minimally invasive surgical techniques, flexible ureteroscopic lithotomy has become an effective method for treating ureteral calculi, characterized by minimal trauma and

fast recovery. In the meantime, the postoperative recovery process of patients is affected by various factors, including surgical operation, postoperative care, and the patient's own recovery capabilities [1]. In recent years, the concept of ERAS has gradually been applied in the field of urology, which accelerates postoperative recovery, reduces hospital stay, and minimizes complications through integrated multidisciplinary interventions [2].

Therefore, this study is designed to explore the effect of ERAS interventions on the prognosis of patients with upper and middle ureteral calculi complicated by hydronephrosis after flexible ureteroscopic lithotomy.

2. Materials and Methods

2.1 General Data

70 patients who experienced upper and middle ureteral calculi complicated by hydronephrosis from January 2024 to January 2025 were selected as study subjects and were randomly divided into a control group (n=35) and a study group (n=35) using a random number table. Specifically, the control group included 20 males and 15 females, aged 25-65 years, with an average age of 45.6 ± 12.3 years, and the course of the disease ranged from 3 months to 5 years, with an average of 2.1 ±1.4 years. The study group consisted of 19 males and 16 females, aged 26-67 years, with an average age of 46.2 ± 11.9 years, and the course of the disease ranged from 4 months to 6 years, with an average of 2.3 ±1.3 years. All patients exhibited comparability in general data such as gender, age, and the course of the disease.

Inclusion Criteria: Patients diagnosed with upper and middle ureteral calculi complicated by hydronephrosis through imaging, who underwent flexible ureteroscopic lithotomy.

Exclusion Criteria: Patients with other serious urological diseases, heart diseases, lung diseases, coagulation disorders, or those unable to tolerate surgery or rehabilitation interventions.

2.2 Methods

The control group received routine nursing: Preoperatively, a detailed inquiry of medical history was performed, along with routine physical examinations and necessary preoperative education to alleviate the anxiety of patients and enhance their confidence in the surgery. Afterward, the vital signs of patients were closely monitored by nurses intraoperatively to ensure the safety of the surgical process. Postoperatively, regular ward rounds were conducted to observe changes in the patient's conditions, including wound status and the color and volume of drainage fluid, thus promptly identifying and addressing any issues.

By contrast, the study group was provided with ERAS interventions in addition to routine nursing: Preoperatively, a comprehensive assessment was conducted by a professional team to develop personalized recovery plans while providing psychological counseling to mitigate the anxiety of patients. Later, an optimized anesthesia plan was used intraoperatively to minimize stress responses, along with minimally invasive techniques employed to mitigate surgical trauma. Immediately after surgery, pain management was implemented using a multimodal analgesia strategy to ensure patient comfort, encouraging early ambulation to promote intestinal peristalsis and reduce complications. Additionally, strict dietary guidance was provided to ensure nutritional balance and promote wound healing. Moreover, regular recovery assessments were conducted, with recovery plans dynamically adjusted following the assessment results, aiming to ensure smooth recovery for the patients.

2.3 Observation Indicators and Evaluation Criteria

The observation indicators included operation time, intraoperative blood loss, duration of postoperative urinary catheterization, hospital stay, incidence of complications, and quality of life scores. Notably, quality of life was assessed using a Quality of Life Scale, which covers multiple aspects of the patient's condition, including physical function, psychological state, social interaction, and daily life, comprehensively reflecting the patient's recovery status, with a score of 0-100 points, where higher scores indicate better quality of life [3].

2.4 Statistical Analysis

SPSS 22.0 software was used for statistical analysis. Count data were expressed as % and analyzed using the x^2 test. Measurement data were expressed as (Mean ± SD), with the t-test utilized for the analysis. $P < 0.05$ was considered significantly different.

3. Results

No significant differences in operation time and intraoperative blood loss were observed between the study and control groups ($P > 0.05$). The duration of postoperative urinary catheterization and hospital stay in the study group were substantially shorter than those in the control group, with the study group also exhibiting a remarkably lower incidence of complications and markedly higher postoperative quality of life scores than the control group ($P < 0.05$). See Table 1.

Table 1 Comparison of Observation Indicators between the 2 Groups.

Indicators	Study Group	Control Group	t/χ^2 value	P value
Operation time (min)	65.4 ±15.2	67.1 ±14.8	0.540	>0.05
Intraoperative blood loss (mL)	30.5 ±10.6	31.2 ±11.3	0.290	>0.05
Postoperative urinary catheterization (d)	2.1 ±0.6	3.5 ±1.2	6.140	<0.05
Hospital stay (d)	4.2 ±1.1	6.8 ±1.8	6.870	<0.05
Incidence of implications (%)	5.7(2/35)	22.9(8/35)	4.630	<0.05
Quality of life (point)	85.6 ±7.4	72.3 ±9.1	6.780	<0.05

4. Discussion

Upper and middle ureteral calculi are a common disease in the urinary system, typically occurring in the ureter close to the kidneys, and urine cannot be discharged normally due to stone obstruction, leading to increased pressure within the kidneys and resulting in hydronephrosis, which can cause severe abdominal and lumbar pain, possibly accompanied by nausea, vomiting, and fever. Particularly, hydronephrosis can damage renal function and even lead to infection and renal failure if not treated promptly. Treatment options include medical expulsive therapy(MET), extracorporeal shock wave lithotripsy, and minimally invasive flexible ureteroscopy, which relieve obstruction, restore normal urine flow, alleviate patient suffering, and protect renal function[4]. The findings of this study reveal a significantly shorter duration of postoperative urinary catheterization and hospital stay, a substantially lower incidence of postoperative complications, and remarkably higher quality of life scores in the study group. Notably, ERAS interventions alleviated postoperative discomfort, shortened the duration of catheterization, and reduced hospital stay through preoperative education, optimized anesthesia protocols, intraoperative temperature management, and early postoperative

activities, which are of great significance in patient recovery. Given this, they can significantly decrease hospital costs and the psychological burden on patients, enhancing overall treatment satisfaction. Additionally, the reduction in postoperative complications not only helps accelerate patient recovery but also lowers the readmission rate and reduces the consumption of medical resources, demonstrating excellent social and economic benefits. Moreover, the significantly higher postoperative quality of life scores in the study group compared to the control group are closely related to the comprehensive measures in ERAS interventions, such as psychological support, nutritional management, and early postoperative activities, which focus not only on physical recovery but also emphasize the psychological health and overall quality of life of patients, reflecting the patient-centered modern medical philosophy [5].

In conclusion, ERAS interventions positively contribute to the postoperative recovery of patients with upper and middle ureteral calculi complicated by hydronephrosis, thereby providing scientific references for clinical practice.

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