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Success Rate of Laparoscopic Pyeloplasty in the Treatment of Ureteropelvic Junction Obstruction

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Abstract

Objectives: Hydronephrosis is a common problem of renal disease in neonates, and it is shown that ureteropelvic junction obstruction (UPJO) is the most common cause of hydronephrosis. Several therapeutic surgical approaches have been introduced among which pyeloplasty have some advantages. In this study, the efficiency of this technique was studied on 30 patients with UPJO.

Materials and Methods: In this prospective clinical trial, 30 patients with UPJO who had undergone pyeloplasty during 2013 to 2017 were studied and the intraoperative and postoperative complications, as well as the success of the operation, were evaluated.

Results: In this study, 30 patients with UPJO participated. Their mean age was 24.76 ± 13.95. The results of this study showed that none of the patients needed blood transfusion, and 28 patients responded well to surgery while 2 patients had postoperative complications such as pain and urinary tract infection at the end of follow-up.

Conclusions: The results of this study indicated that since the operation time, recovery, and duration of hospital stay, in addition to postoperative complications such as blood loss, and the need for blood transfusion were reduced in pyeloplasty method, this surgical method can be considered as the method of choice for both surgeons and patients for the treatment of hydronephrosis.

Keywords: Hydronephrosis, Renal disease, UPJO

Introduction

Hydronephrosis is a common problem in the prenatal ultrasound that occurs in almost 1% of the neonates (1). Early diagnosis and appropriate management of the disease can prevent long-term complications associated with hydronephrosis. Almost all of the studies have shown that ureteropelvic junction obstruction (UPJO) is the most common cause of hydronephrosis; in addition, epidemiological studies have reported that the prevalence of this anomaly varies from 25 to 45% among the population (2,3). This anomaly is more common in boys. One in every 1500 fetuses has ureteral stenosis, which is often on the left and only 10 to 15% of cases is bilateral ureteral stenosis (4). UPJO is considered as one of the main causes of the upper urinary tract obstruction. Due to urinary tract obstruction, the urine is accumulated behind the obstruction site and therefore the pressure is increased in this region. This pressure can be transmitted to kidney tissues confronting with glomerular filtration pressure. If the pressure in the site of obstruction is higher than the pressure in glomerular filtration, the urine will not be secreted. Finally, this pressure can damage blood vessels in the kidney leading to tissue ischemia, infection, stone formation and renal failure (5,6).

UPJO is the most common site of upper urinary tract obstruction and the most common congenital malformation of the ureter and a common cause of hydronephrosis in children and young adults, which can lead to renal failure if not treated properly (7). The aim of UPJO treatment is to maintain or improve the renal performance and to relieve the symptoms of the disease. Currently, the most conventional treatments for UPJO include open pyeloplasty and minimally invasive treatments such as endopyelotomy and laparoscopic pyeloplasty.

Due to the failure to perform open surgery and less pain, laparoscopy is the method of choice for the treatment of UPJO. Various diagnostic tools are currently available to identify the various causes of hydronephrosis in infants; however, there are considerable controversies about using them and associated complications in the first month of birth (1,8). Diagnostic techniques such as ultrasound as

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an important tool for diagnosis with fewer complications, cystography by using a contrast agent such as voiding cystourethrography (VCUG), and renal function scans such as dynamic renal scan are the most conventional techniques for the diagnosis of hydronephrosis (9,10).

The choice of treatment is typically based on accurate information obtained from the patient. Since the choice of the patient is important for the procedure, it is necessary to inform the patient about the advantages, disadvantages and results of the intervention. This study aimed to evaluate the outcomes and complications after laparoscopic pyeloplasty.

Materials and Methods

Collection of Samples

In this clinical trial, patients with UPJO who were admitted to Ghaem hospital, Mashhad, Iran, were treated with laparoscopic pyeloplasty. In this study, 30 patients with UPJO who had undergone laparoscopic pyeloplasty during 2013 to 2017 were prospectively studied and the success of the operation, in addition to intraoperative and postoperative complications, was evaluated.

Clinical Evaluation

In this study, clinical success based on the resolution of clinical signs, as well as improving or stabilizing (lack of progress) in hydronephrosis and obstruction according to radiologic findings were evaluated. To this end, the variable of operation time was calculated in minutes, and the number of people requiring blood transfusion was considered by hemoglobin fell below 7 g/dL. Evaluation of hydronephrosis and renal function in treated patients was based on the pyelocalyceal system dilation at the next follow-up. All patients were evaluated in terms of operative time, hospital stay, a drain and its output, a double J stent and its output, the initial and final UPJO detection and imaging findings. The duration of the hospitalization was calculated based on the number of the days of hospitalization. The choice of treatment was based on the accurate information obtained from the patient, cause of the disease, and the choice of the patient who had been fully informed about the advantages, and disadvantages of interventional procedures.

Statistical Analysis

After investigation and determination of the variables and primary processing of the data in SPSS software version 11.5, chi-square test was used to compare the qualitative variables between the 2 groups, and repeated measure of ANOVA or Freidman tests were used to evaluate the quantitative variables in the groups. In all tests, 0.05 was considered as the significance level.

Results

Demographic Data

In this study, 30 patients with UPJO were enrolled, of whom 60% (n = 18) were female and 40% (n = 12) were male. The mean age of the patients in this study was 24.76 ± 13.95, with the minimum and maximum age of 5 and 62 years, respectively. Additional demographic information is provided in Table 1.

Table 1. Demographic Data of the Patients

Gender	No. (%)	Age (mean)
Male	12 (40)	23.3
Female	18 (60)	26.9

Clinical Findings

Among the 30 patients in this study, no one needed blood transfusion, and 28 patients responded well to surgery while 2 patients had a urinary tract infection at the end of follow-up. In the initial diagnosis, there were 19 left-sided (63.33%), 10 right-sided (33.33%) and one bilateral UPJO (3.43%) patients. The patient with bilateral UPJO was reported as right-sided UPJO in the final diagnosis. He was a 5-year-old boy in whom the hydronephrosis was later improved during 1.5 months of follow-up and his renal function was normal. In addition, imaging findings demonstrated that there were 17 patients (56.4%) with left-sided hydronephrosis and mechanical obstruction of the urinary tract, and 7 patients (23.3%) had moderate to severe left-sided hydronephrosis. In addition, right-sided hydronephrosis was reported in 5 (16.7%) patients, and one patient had moderate to severe hydronephrosis (3.3%). Surgery technique in all patients was laparoscopic pyeloplasty and only in one patient, Heinicke-Mikulicz method was performed. The patient was a 26-year-old woman and her operation time was 120 minutes with 2 days of hospital stay. Her clinical symptoms resolved after 1.5 months of follow-up. No serious complication was observed in any patient during surgery or postoperatively. Clinical symptoms and kidney function were improved in all (93.33%), except in 2 patients. Of whom, a 19-year-old boy complained of flank pain after surgery, but imaging findings showed normal kidneys and a 6-year-old girl who was suffering from urinary tract infection in her follow-up.

After the surgery, depending on the patient's condition, analgesic drugs including pethidine (n = 7, 26.6%), tablet and rectal acetaminophen (n = 14, 46.66%; and n = 1, 3.33%, respectively), and methadone (n = 8, 23.33%) were used in different doses, and only in one patient no analgesic drug was used.

Discussion

In this study, clinical outcomes of patients with UPJO were studied after laparoscopic surgical technique. Findings of this study showed that postoperative opioid consumption and the need for analgesic drugs have declined following laparoscopic surgery. The operative time for laparoscopic

surgery was also reduced compared to other studies, while the duration of hospitalization was in consistent with other studies (11). In this study, there was no need for transfusion, and intraoperative complications were not observed in this study, except for one patient in whom a different surgical technique (Heinicke) was used.

In a study on 56 patients with UPJO wherein the patients had been treated with 3 methods including open surgery, laparoscopy and pyeloplasty, it was shown that the operation time for these methods was 127, 130, and 114 minutes, respectively. Moreover, it was reported that the blood loss during the surgery was 105 mL, 31 mL and 28 mL for open surgery, laparoscopy and pyeloplasty, respectively. The average hospitalization time was also greater in open surgery (4.14 ± 1.8) in comparison with laparoscopy (2.8 ± 0.75) and pyeloplasty (2 ± 1). The results of this study suggested that laparoscopy and pyeloplasty are reliable safer methods for patients (12). In a study in the United States on patients with hydronephrosis who had undergone open pyeloplasty or laparoscopic surgery, it was shown that operation time was greater in laparoscopy than in pyeloplasty (242 minutes vs. 199 minutes) (13). In consistent with this study, our results showed that operation time is reduced in the present study.

Furthermore, in consistent with our results, the results of some studies wherein the efficiency of pyeloplasty had been evaluated in patients with hydronephrosis showed that the hospitalization time, recovery time, and overall blood loss were less in pyeloplasty group (14-16). Findings indicate that due to the lack of postoperative complications as well as less operation time, pyeloplasty can be considered as the method of choice for the treatment of patients with UPJO. However, this study had a major limitation. It focused on the efficiency of pyeloplasty alone, and did not compare it with other surgical methods. Nevertheless, all outcomes were listed and compared pre- and postoperatively to demonstrate the efficiency of the method.

Conclusions

Findings of this study indicated that pyeloplasty can be considered as the method of choice for both surgeons and patients for the treatment of hydronephrosis. In addition, the results of this study showed that operation time, recovery, and duration of hospital stay, as well as postoperative complications such as blood loss, and the need for blood transfusion were reduced following pyeloplasty.

Conflict of Interests

The authors declare that there is no conflict of interest between the authors.

Ethical Issues

The study was approved by the Ethics Committee of Mashhad University of Medical Sciences (Research project No. 940465).

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