Transabdominal laparoscopy and ureteroscopy one-stage surgery in the treatment of bilateral ureteropelvic junction obstruction combined with bilateral renal stones: A case report

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Abstract. Ureteropelvic junction obstruction (UPJO) is a common congenital malformation of the urinary system, which is mostly unilateral and frequently combined with hydronephrosis and kidney stones. The incidence of kidney stones is ~20%, which markedly increases the difficulty and risk of surgery. The present report describes a rare case of bilateral UPJO combined with bilateral renal stones. Laparoscopy and ureteroscopy one-stage surgery was performed creatively. CT urography demonstrated that the hydronephrosis was markedly reduced after the surgery, the ureteropelvic junction was patent without stone residue and the surgical outcome was ideal.

Introduction

Ureteropelvic junction obstruction (UPJO) is a common congenital malformation of the urinary system, which is mostly unilateral, and laparoscopic pyeloplasty is the optimal minimally invasive surgical procedure. However, UPJO is frequently combined with hydronephrosis and kidney stones. The incidence of kidney stones is ~20%, which markedly increases the difficulty and risk of surgery (1). In the present case report, a challenging case is discussed. The patient underwent laparoscopy and ureteroscopy one-stage surgery for the treatment of bilateral UPJO with renal stones and the surgery outcome was ideal.

Case report

The 20-year-old male patient was admitted to the Affiliated Hospital of Hebei University of Engineering (Handan, China) due to intermittent right waist and abdomen distension for 2 days in June 2020. The patient had right waist and abdomen soreness with no obvious cause since 2 days previously, without any symptoms of urinary frequency, urinary urgency and gross hematuria. Physical examination revealed mild percussion pain in both renal regions and no tenderness pain in the bilateral ureteral travel area. Creatinine was 83 μmol/l. Ultrasound examination revealed bilateral kidney stones in the renal pelvis and calyces, with dilation of the renal pelvis and calyces, and the bilateral ureteropelvic junction was thickened (Fig. 1). Thus, bilateral UPJO with bilateral renal stones was considered. The preoperative diagnosis was bilateral UPJO with bilateral kidney stones. Laparoscopy and ureteroscopy bilateral pyeloplasty and bilateral kidney stones Holmium laser lithotripsy was performed under general anesthesia. The right side was elevated at 45˚ and the pneumoperitoneum was established by entering the Veress needle at the right margin of the umbilicus. The pressure was set at 15 mmHg. After the pneumoperitoneum reached the set pressure, 10, 5 and 10 mm trocars were placed at the umbilicus, McBurney's point and 3 cm below the 12th rib of the midclavicular line, respectively. The right colon and abdominal wall adhesions were obvious and the ultrasonic knife was used to fully expose the right renal pelvis and the upper end of the right ureter, and part (~3 mm) of the ureteropelvic junction was cut off and a ureteroscope was placed to explore each renal calyx. After finding the stone, the Holmium laser was used to turn the stone into powder (Fig. 2A). Furthermore, after lithotripsy was completed, the obstruction was removed and the right pyeloplasty was continued with laparoscopy (Fig. 2B). A 6F double J stent was placed in the ureter and a rubber drain was placed and fixed at the pelvic and ureteral anastomosis. The vital signs of the patient were stable after operation of the right side. Similarly, trocars were placed at the left anti-McBurney's point and 3 cm below the 12th rib of the midclavicular line, and the intestine was pushed into the right abdomen to expose the left kidney and obtain a field of view. Part of the left obstruction was cut open and a ureteroscope was placed for exploration. Holmium laser lithotripsy and laparoscopic left pyeloplasty were performed. The double J stent was placed, the absence of active bleeding was confirmed and a rubber drain was placed at the left anastomosis. The procedure went smoothly without any

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Figure 1. CT urography images of the patient with bilateral ureteropelvic junction obstruction with bilateral kidney stones. Preoperative CT of (A) left renal pelvic calculi with bilateral renal pelvic and calyces dilatation and (B) right renal calyceal calculi (scale bars, 15 cm). (C) Preoperative CTU of bilateral ureteropelvic junction obstruction was observed.

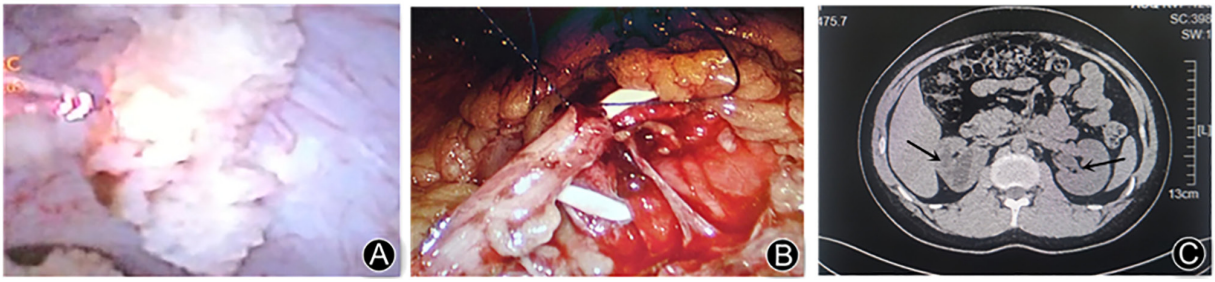

Figure 2. Intraoperative images and postoperative CT. (A) A ureteroscope was placed at the pelvic ureter interruption and lithotripsy was performed. (B) Transabdominal approach laparoscopic pyeloplasty. (C) Review of CT after 3 months revealed that hydronephrosis was markedly reduced following surgery and the ureteropelvic junction was patent without any residual stone (scale bar, 13 cm).

complications, such as macrovascular or adjacent organ damage. The operation time was 264 min and the exhaust time was 28 h after surgery. Review of diagnostic radiology of the urinary system 3 days after the surgery revealed that the double J stents were well placed and no stone residue was observed. The postoperative body temperature was stable and the patient had no fever. The drainage was markedly reduced 5 days after the surgery, the abdominal drainage tube was removed, the urinary catheter was removed and the patient was discharged 10 days after the surgery. The double J stents were removed after 2 months. Review of the CT after 3 months revealed that the hydronephrosis was markedly reduced and the ureteropelvic junction was patent without any residual stone (Fig. 2C).

Discussion

UPJO is a common disease of the urinary system and the pathogenic feature is that normal helical muscle tissue of the ureter is replaced by abnormal vertical bunch or fibrous tissue, which leads to the loss of normal peristaltic rushes in the ureter and the blocking of urine transmission from the renal pelvis to the ureter (2). Although most patients have congenital malformations, the majority exhibit clinical symptoms long after birth; severe obstructions may lead to inadequate drainage of the upper urinary tract, which leads to a vicious circle of hydronephrosis, kidney stones and urinary tract infections (3). Therefore, the renal function of patients is seriously affected.

The traditional 'gold standard' of clinical treatment is dismembered Anderson-Hynes pyeloplasty (4); however, this has certain shortcomings, such as large trauma, intense pain and long recovery time. Laparoscopic pyeloplasty was first proposed by Schuessler in 1993 and has become one of the conventional treatments for UPJO after >20 years of development (5). The efficacy is comparable to that of open surgery and an effective rate of 90-95% has been reported in the literature (6). In recent years, with the continuous development of medical care, laparoscopic pyeloplasty has become more common in the treatment of UPJO and has gradually become the new 'gold standard' of UPJO treatment (7). The primary advantages include reduced trauma, fewer complications, faster recovery, a significant therapeutic effect, safety and reliability. Laparoscopic pyeloplasty has two main surgical approaches: Transabdominal and retroperitoneal (8). Retroperitoneoscopic pyeloplasty is widely accepted by Chinese surgeons, as it has a relatively closed gap with only small interference with the intestine, although the operational room is tight. UPJO is frequently accompanied by kidney stones, which makes the operation more difficult, and the operation requires fenestration with the endoscope through the renal pelvis during the laparoscopy and ureteroscopy surgery. The extraperitoneal approach is more difficult due to the large angle of the endoscope. The abdominal approach has obvious advantages when investigating the collecting system, as the endoscope placed through the trocar is facing the renal pelvis (9).

In the present case, laparoscopy and ureteroscopy one-stage surgery were used to treat UPJO combined with bilateral kidney stones and the surgical outcomes were ideal; to the best of our knowledge, the present study was the first to report this type of procedure. One-stage surgery for bilateral pyeloplasty has been indicated to be both safe and effective (10), but there are no other relevant reports for cases accompanied by kidney stones at present. According to clinical guidelines and

clinical practice, if the patient has bilateral hydronephrosis, the side with severe hydronephrosis, obvious renal injury or severe symptoms is usually treated first. Although bilateral staged surgery is safer, patients are required to undergo two operations. Considering that the patient was a young male in otherwise good health and with relatively normal renal function, and the patient and his family had a strong desire for one-stage treatment, it was explained to the patient's family that if bilateral pyeloplasty and lithotripsy could not be completed at the same time, the left side with mild hydronephrosis would need to be treated in stages, and the family understood and agreed to the treatment. In order to reduce the patient's psychological burden, reduce the trauma and avoid the long operational time caused by changing the position during the operation, the transabdominal laparoscopy and ureteroscopy one-stage surgery was performed after comprehensive consideration. The postoperative review revealed that there was no stone residue, the temperature was stable and there was no urine extravasation from the anastomosis. The following observations were made during the treatment: i) As the transabdominal endoscope placed through the trocar was facing the renal pelvis, the collecting system was able to be fully exposed, which markedly improved the stone removal rate (11); ii) the water pressure during lithotripsy cannot be too high and a large amount of high-pressure flushing may easily lead to the spread of infection and cannot ensure the removal of stones; iii) after freeing the ureteropelvic junction, the fenestration cannot be too large, so that the endoscope may pass smoothly, which may effectively prevent the stone entering into the abdominal cavity with the flushing fluid; iv) a small amount of residual stone may be removed by a stone basket; v) since the position of the pelvic fenestration does not coincide with that of the transurethral procedure, the operator may miss the stone with regular endoscope exploration habits and steps, so C-arm fluoroscopy during the operation is recommended to assist in positioning and observing whether the stone is completely removed; vi) the drainage tube should be placed at the lowest point in the abdominal cavity for full drainage; and vii) in the present study, the combination of laparoscopic pyeloplasty and ureteroscopy was an ideal treatment for UPJO combined with kidney stones, as it has the unique advantages of the two minimally invasive treatments, compensates for the shortcomings of each and allows for the completion of both 'forming' and 'lithotomy' in one surgery without increasing the risk.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

WF and CR collected data, performed data analysis and drafted the manuscript. JZ and HC designed the operation procedures and revised the manuscript. JZ contributed to the minimally invasive surgery. WF and HC provided assistance in the operation. WF, JZ and HC confirm the authenticity of all the raw data. All authors read and approved the final manuscript.

Ethics approval and consent to participate

All clinical application protocols for the techniques performed were approved by the Ethics Committee of the Affiliated Hospital of Hebei University of Engineering (Handan, China). The subject signed an informed consent form and had complete clinical data.

Patient consent for publication

The patient provided written informed consent for the publication of any associated data and accompanying figures.

Competing interests

The authors declare that they have no competing interests.

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