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Minimally Invasive Treatment of Renal Pelvis Stones in Children: A Case Report

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Abstract

Recently, nephrolithiasis is increasingly seen in children. Metabolic disease is present in 50% of patients diagnosed with kidney stones in the pediatric population. Other factors include infection, nutritional factors, and anatomical malformations of the urinary system. In addition to the treatment methods used in the adult population, laparoscopic and retroperitoneal approaches can sometimes be considered in children. A 8-year-old female patient with a premature birth history, CP sequel and posture disorder applied with vomiting, fever, macroscopic hematuria and abdominal pain. No previous urinary infection history. Further examinations show right pelvic kidney, rotational anomaly and stones filling the renal pelvis. After the urinary infection treatment, treatment options were evaluated and it was decided to perform laparoscopic pyelolithotomy.The procedure occurred with no complications. The patient's foley catheter was withdrawn on Day 2. Drain withdrew on Day 4. No residual stone was observed in the control and 3 weeks later, DJ stent was removed with cystoscopy. We think that laparoscopic pyelolithotomy is a safe and effective method for selected patients.

Introduction

Urinary system stones in children are rare and often associated with urinary tract infection, anatomical abnormalities or metabolic disorders and should always be examined [1]. The incidence of urinary system stone disease increases with age and 50% recurs within 5-10 years [2].

In recent years, there have been significant developments in the surgical treatment of urinary stones. However, conservative and stone prevention therapies remain as the primary treatment modalities of urinary stone disease [3]. Still, some stones require surgical intervention [4, 5]. Therefore, minimally invasive treatment alternatives come to the fore in pediatric age group [3]. In recent years, Laparoscopic Pyelolithotomy (LP) has progressed rapidly in the treatment of kidney stones, and the risks of bleeding and nephron damage are lower compared to PCNL [6,7].

There are reports in the literature showing that LP is a safe and effective alternative to open stone surgery [8]. In this study, we wanted to present our experience with LP in a patient with right renal pelvic stones.

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Case report

An 8-year-old girl presented with vomiting, fever, macroscopic hematuria and abdominal pain. There was a history of premature birth by C-section at 29 gestational weeks and admission to neonatal intensive care unit for 3.5 months.

There was a sequelae of Cerebral Palsy (CP). Physical examination was unremarkable except posture anomaly. There was no previous history of urinary tract infection.

There was no abnormalities in the patient's biochemical parameters. Complete urinanalysis was positive for nitrite, leukocyte and erythrocyte. In the Urinary System Ultrasonography (USG), the right kidney was 74x35 mm in size, rotation anomaly was present, and the renal pelvis was located anteriorly. There was a 30x28 mm calculus in the renal pelvis. Renal parenchyma thickness was decreased (5 mm). The parenchyma echo was normal. The left kidney was in normal appearance and size.

Since 10^5 CFU/ml Escherichia Coli was grown in the urine culture, the patient was hospitalized and Gentamicin treatment was given intravenously for 7 days. After the infection was treated, treatment options were evaluated and it was decided to perform laparoscopic pyelolithotomy on the patient.

Surgical technique

After inserting a 10 F catheter into the bladder under general anesthesia, the patient was placed in the left lateral decubitus position. Operative field was prepared. A 10 mm trocar was entered from the umbilicus using the Hasson technique. The abdomen was inflated with carbon dioxide gas at a pressure of 12mm/Hg at a rate of 3 liters/minute. Laparoscopy was performed with a 30 degree 10 mm optic.

Subsequently, the working ports of 5 mm from the right upper quadrant, approximately 3 cm from the right lateral of the umbilicus, and 2 cm from the medial of the right crista iliaca anterior superior, 5 mm from the right lower quadrant were safely entered into the abdomen. The ascending colon was separated from its attachments with the abdominal wall using ligasure. The right kidney was exposed .

There was rotation anomaly in the right kidney. Transperitoneally, the renal pelvis was reached by opening the Gerota's fascia with hook cautery. At this stage, we introduced a 2/0 prolene through abdominal wall and hung the ureter on the anterior abdominal wall to stabilize the renal pelvis (Figure 1). Renal pelvis was incised approximately 3 cm from the ureteropelvic junction to the renal calyx with an oblique incision using hook cautery. A Staghorn stone, approximately 3x3 cm in size, was filling the renal pelvis completely (Figure 2). The stone was removed in one piece and taken into an endobag using a grasper. Renal pelvis and surrounding tissues were irrigated with normal saline and suctioned. A double J stent was placed in the ureter (Figure 3). Renal pelvis was closed in continuous fashion with 4/0 vicryl. A drain was placed in the operative field. After confirming that there were no residual stones with fluoroscopy, the procedure was ended. Port entry places were properly closed.

Foley catheter was removed on the 2nd postoperative day. Drain was removed on the 4th postoperative day. Patient was discharged on the 4th postoperative day. After 3 weeks, the DJ stent was removed by cystoscopy. The patient had no problems in her follow-ups.

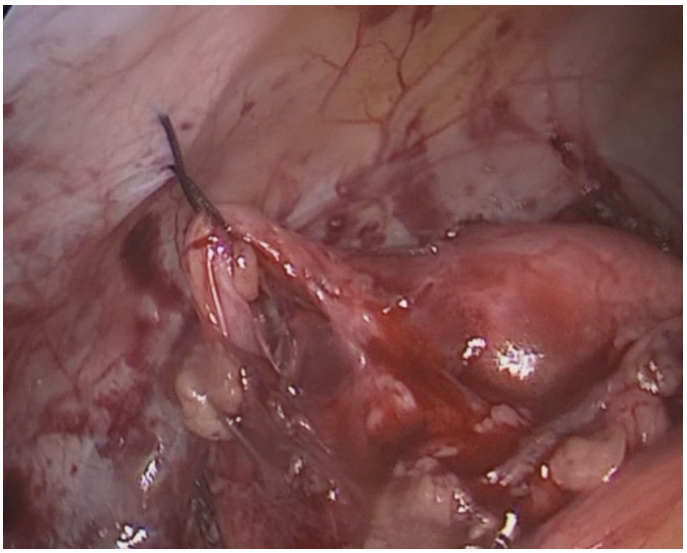

Figure 1: Suspension of the ureter on the anterior abdominal wall.

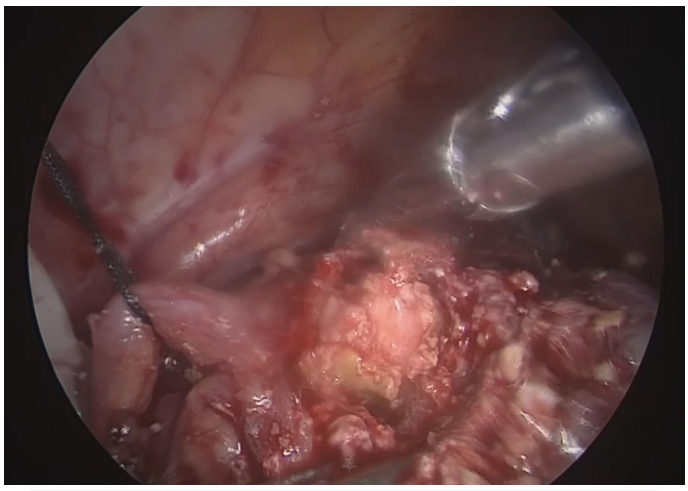

Figure 2: Staghorn stone that completely fills the renal pelvis.

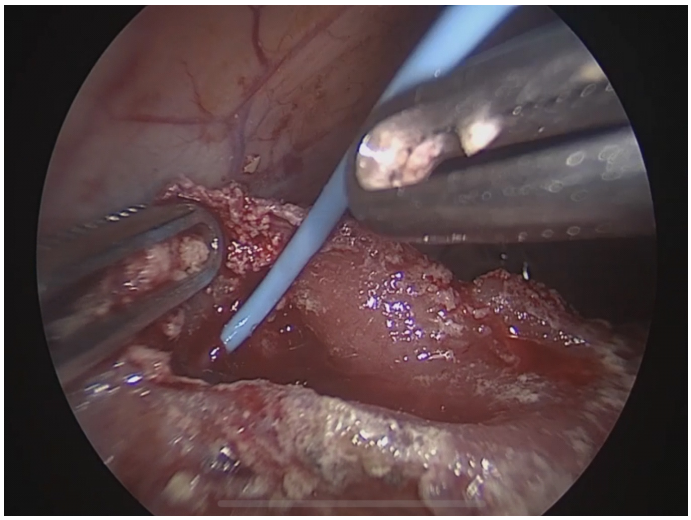

Figure 3: Placement of double-J stent into the ureter.

Discussion

Incidence of urinary system stone disease is gradually increasing in children. Urinary system stones in children are often associated with urinary tract infection, anatomical abnormalities or metabolic disorders and should always be examined [9]. Surgical treatment may be required in cases that cannot be treated with conservative treatment. However, surgical treatment of urinary system stone disease in children, especially in large stones, is technically difficult and may require multiple surgical procedures [1,10]. The safety and efficacy of Percutaneous Nephrolithotomy (PCNL) for large stones are well known in adults. However, the use of PCNL in children is controversial due to the risks of major complications, including parenchymal damage and effects on kidney function, radiation exposure, sepsis, and bleeding [11]. For this reason, laparoscopy and robotically assisted transperitoneal LP have been successfully used in the treatment of stones in children who cannot be treated with PCNL [12]. It has been shown that LP can be performed safely even in children younger than 2 years old. However, the role of laparoscopic surgery in the management of renal stones is still under development [1]. Transperitoneal LP was proposed as an alternative to open surgery in a retrospective review with a small cohort [7,9]. However, LP requires more technical skills and has a more difficult learning curve compared to PCNL [13,14]. With our case, we argue that LP can be safely applied in the pediatric population. However, due to the difficult learning curve, we need a large number cases and controls. The surgical procedure we performed is similar to the procedures in the literature. However, in order to keep the renal pelvis more visible and stable, we suspended the ureter by using a suture introduced from the outside of the abdomen. Stabilization and a better exploration was achieved and we experienced that laparoscopic manipulations were carried out more easily. We did not encounter any complication in our case in the postoperative early and late period follow-ups. However, in the limited number of studies in the literature, complications related to the procedure included urinoma (4.54%), failure (4.54%) and omental prolapse (4.54%) [15].

Conclusion

In our case and in the literature review, we think that LP may be a treatment option in pediatric cases with large kidney stones. However, verification is needed with studies on more patients.

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