




Case Report

Transvesicoscopic ureteral reimplantation and ureteroscopy for management of primary obstructed non-refluxing megaureter with ureteral calculus

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Abbreviations & Acronyms

CT = computed tomography
PCNL = percutaneous nephrolithotomy
PONM = primary obstructed non-refluxing megaureter
URS = ureteroscopy
US = ultrasonography
UVJO = ureterovesical junction obstruction
VCUG = voiding cystourethrography

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How to cite this article: Kato T, Mizuno K, Matsumoto D *et al.* Transvesicoscopic ureteral reimplantation and ureteroscopy for management of primary obstructed non-refluxing megaureter with ureteral calculus. *IJU Case Rep.* 2022; 5: 327–329.

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Received 1 January 2022;
accepted 1 May 2022.
Online publication 20 May 2022

Introduction: Primary obstructed non-refluxing megaureter, a type of congenitally dilated ureter, often resolves spontaneously. Surgery may be indicated in symptomatic cases; however, there are no reports of transvesicoscopic ureteral implantation and ureteroscopy for ureteral stones. Therefore, we describe the treatment of primary obstructed non-refluxing megaureter and ureteral calculi using this technique.

Case presentation: A 6-year-old Japanese girl was referred for abdominal pain and gross hematuria due to right megaureter with multiple stones in the renal lower-pole calyces and ureter. She was diagnosed with primary obstructed non-refluxing megaureter and ureterovesical junction obstruction. The stones were removed using mini-percutaneous nephrolithotomy and transvesicoureteroscopic surgery, respectively. A narrow segment of the right ureter was cut, and transvesicoscopic ureteral plication and reimplantation were performed. The procedures were successful without postoperative complications.

Conclusion: Transvesicoscopic ureteral reimplantation with ureteroscopy may be a safe, effective and minimally invasive surgical option for ureterovesical junction obstruction with ureteral stones.

Key words: child, transvesicoscopic, ureteral reimplantation, ureteroscopy, urinary calculi.

Keynote message

Primary obstructed non-refluxing megaureter (PONM) can occasionally cause urinary stones. We performed transvesicoscopic ureteroscopy to extract ureteral calculi during ureteral reimplantation without postoperative complications. This procedure may be a useful surgical option for the management of PONM with ureteral stones.

Introduction

PONM is a type of congenitally dilated ureter that is usually asymptomatic and requires only conservative management.¹ However, it can cause abdominal pain and urinary stones. Therefore, we describe a case of PONM with urinary stones treated with transvesicoscopic ureteral reimplantation with ureteroscopy (URS) under pneumovesicum.

Case presentation

A 6-year-old Japanese girl was referred to our hospital for gross hematuria and intermittent abdominal pain that began at age 4. Urinalysis revealed numerous erythrocytes with no leukocytes. Serum creatinine levels (0.37 mg/dL) were normal. Abdominal ultrasonography (US) showed a Society of Fetal Urology grade 3 hydronephrosis. Computed tomography (CT) revealed right hydronephrosis and megaureter with three stones in the right renal lower-pole calyces (diameter: 6 mm) and one ureteral stone (5 mm) (Fig. 1a,b). Voiding

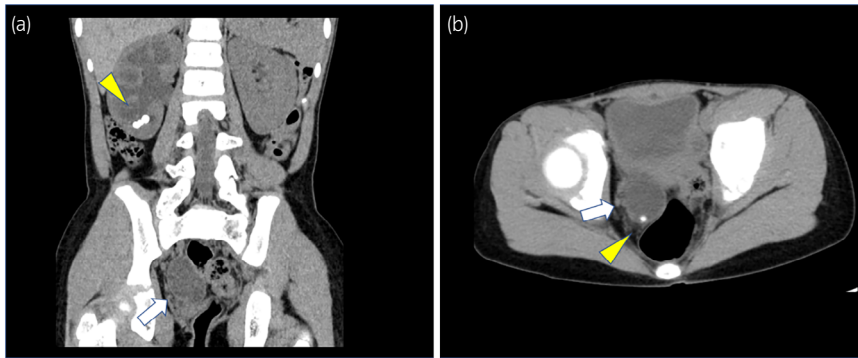


Fig. 1 Abdominal computed tomography (CT). (a) Coronal CT showed right hydronephrosis with three stones in the renal lower pole calyces (arrowhead). (b) Axial CT revealed right megaureter (arrow) with one ureteral stone (arrowhead).

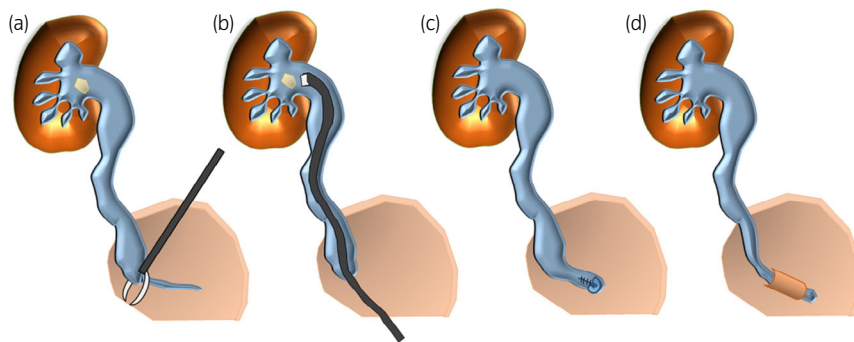


Fig. 2 Schematic of the transvesicoscopic surgery. (a) The narrow segment was cut. (b) The flexible ureteroscopy was inserted from the urethra through the dilated ureter to remove the urinary stone. (c) Ureteral plication. (d) Reimplantation with Cohen's technique.

cystourethrography (VCUG) showed no vesicoureteral reflux. Renal dynamic scintigraphy with Tc-99 m diethylenetriaminepentaacetic acid showed 50.8% right renal split function with a cumulative curve. These findings were consistent with the diagnosis of right PONM and ureterovesical junction obstruction (UVJO) with right renal and ureteral stones.

A two-stage surgery was performed, consisting of (1) right mini-percutaneous nephrolithotomy (PCNL) for renal stone extraction and (2) transvesicoscopic ureteral reimplantation for right UVJO and URS for ureteral stone extraction.

The operational time for mini-PCNL was 28 min, with minimal bleeding. Transvesicoscopic surgery was performed 4 months after mini-PCNL. Preoperative US revealed that the right ureteral stone had migrated to the pelvis. The surgery was performed under general anesthesia in the lithotomy position. Cystoscopy revealed normal bilateral ureteral orifices. The bladder was fully filled with saline and fixed percutaneously to the abdominal wall with 2–0 absorbable sutures between the umbilicus and superior pubis. An 8-mm midline incision was made 1 cm below the suture. The bladder was punctured with a 21-gauge spinal needle with a 4–0 absorbable filament string loop in the incision. This was repeated near the first needle position. Using the biopsy forceps of the cystoscope, the suture was retrieved and pulled through the loop of the suture and out of the bladder to stretch the bladder wall.

A 5-mm short trocar (VesaOne; Covidien, USA) was used as a laparoscope camera port. The second and third trocars were inserted into the bladder. The distance between adjacent trocars was set at 35 mm. After the saline solution was drained, CO₂ gas was inflated in the bladder to achieve

pneumovesicum (pressure: 10 mmHg). A 5-cm, 4-Fr infant feeding tube was fixed into the right ureteral orifice with 5–0 absorbable sutures. Transvesicoscopic ureteral mobilization was performed, and the suture line was lifted to facilitate circumferential cutting of the bladder epithelium and Waldeyer's sheath using a monopolar hook electrode and laparoscopic dissector. Approximately 35 mm of the tube was pulled out from the right orifice and revealed a 20-mm stricture present in the ureter from the ureteric orifice. The narrow segment was cut and extracted.

Flexible URS was performed to extract the pelvic calculus. A ureterofiber scope (URF Type V, OLYMPUS, Japan) was inserted from the urethra through the right orifice under vesicoureteroscopic guidance. The ureter was dilated because of the UVJO, making the procedure easier. The pelvic calculus was removed using basket forceps (N-Circle, COOK Medical, USA) through the urethra.

A 10-Fr catheter was placed into the right ureter and fixed with a 5–0 absorbable suture. Ureteral plication was performed wherein the redundant width was folded over the catheter and secured along its length with running sutures. Transvesicoscopic ureteral reimplantation was performed according to the Cohen technique. The ureter was fixed with six 5–0 absorbable sutures. The operational time for transvesicoscopic surgery was 4 h 42 min, with blood loss of 175 mL, including urine. The patient was discharged after 5 days postoperatively.

VCUG at the 3-month follow-up revealed no *de novo* vesicoureteral reflux. The 13-month follow-up revealed ultrasonographic resolution of the hydronephrosis with no recurrence of calculi.

Discussion

Most cases of PONM are asymptomatic and can resolve or improve spontaneously without loss of renal function.¹ However, patients with symptoms (e.g., flank pain and gross hematuria) or impaired renal function should be treated.²

Ureteric tapering and reimplantation is an established treatment for PONM. Owing to the increasing popularity of minimally invasive surgery, the use of open surgery has decreased in favor of laparoscopic, transvesicoscopic, and robotic techniques. Recently, robot-assisted laparoscopic extravesical ureteral reimplantation (RALUR) has emerged as an alternative to open surgery in children.³ RALUR was not performed in this case because it cannot be used to extract stones. As some of the stones were located in the renal lower-pole calyces, we expected that it would be difficult to reach all the stones during transvesicoscopic surgery at the same time with URS. Therefore, we first performed mini-PCNL, which is an effective and safe procedure in children.⁴ PCNL is widely recommended for the removal of stones >10 mm in the renal lower-pole calyces.^{5–7}

The Politano-Leadbetter and Cohen techniques had been used for transvesicoscopic ureteral reimplantation. In case of the Politano-Leadbetter technique, the new hiatus and submucosal tunnel are typically prepared without visual guidance, increasing the risk of peritoneal tearing, complicating the maintenance of pneumovesicum. In contrast, the Cohen technique is conducted under full visual guidance, making it the most widely used and reliable procedure.⁸ However, that technique complicates endoscopic access to the ureters, if needed, when the child is older. In this case, we believe that UVJO caused ureteral stone formation, and the patient has had no recurrence. In one study, there were no statistically significant differences in terms of the rates of success or postoperative adverse events; however, the operative time was 60 min shorter for the Cohen technique.⁹

Unexpectedly, the lower ureteral stone migrated to the renal pelvis before the second surgery; we incised the narrow segment first (Fig. 2a) and extracted the ureteral stone through the dilated ureter (Fig. 2b) during transvesicoscopic ureteral tapering and reimplantation (Fig. 2c,d). We successfully achieved complete clearance of the urinary stones and ureteral reimplantation without postoperative complications.

Conclusion

Transvesicoscopic URS during ureteral reimplantation may be a useful surgical option for PONM with ureteral stones.

Acknowledgments

We thank Editage (<https://www.editage.jp/>) for editing this manuscript.

Author contributions

Taiki Kato: Writing – original draft. Kentaro Mizuno: Writing – review and editing. Daisuke Matsumoto: Writing – review and editing. Hidenori Nishio: Writing – review and editing. Akihiro Nakane: Writing – review and editing. Satoshi Kurokawa: Writing – review and editing. Hideyuki Kamisawa: Writing – review and editing. Tetsuji Maruyama: Writing – review and editing. Takahiro Yasui: Supervision; writing – review and editing. Yutaro Hayashi: Supervision; writing – review and editing.

Conflict of interest

The authors declare no conflicts of interest.

Approval of the research protocol by an institutional reviewer board

This article is not a case series; therefore, it does not require the approval of the research protocol by an institutional review board.

Informed consent

Written informed consent was obtained from the patient's mother for publication of this case report and any accompanying images.

Registry and the registration no. of the study/trial

Not applicable.

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