

Trauma and reconstruction

Hand-assisted laparoscopic ileal ureter substitution for ureteral obstruction after right ureteral rupture: A case report

Masahiro Katsui^{a,*}, Kota Umeda^b, Seiya Hattori^c, Toshiyuki Ando^d, Maeda Takahiro^a, Satoshi Hara^a

^a Department of Urology, Kawasaki Municipal Hospital, 12-1 Shinkawadori, Kawasaki-ku, Kawasaki-city, Kanagawa, 210-0013, Japan

^b Department of Urology, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo, 160-8582, Japan

^c Department of Urology, National Hospital Organization Tokyo Medical Center, 2-5-1 Higashigaoka, Meguro-ku, Tokyo, 152-8902, Japan

^d Department of Urology, Isehara Kyodo Hospital, 345 Tanaka, Isehara-shi, Kanagawa, 259-1187, Japan



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ABSTRACT

Iatrogenic ureteral rupture is a serious complication. In the past, ileal ureter substitution was performed with open, laparoscopic, and robot-assisted procedure; however, there are problems with operation invasiveness and difficulty. We present a 72-year-old female whose ureter was completely injured at the ureteropelvic junction and torn longitudinally in full length at the time of transurethral lithotripsy. Although initially she had nephrostomy, we were able to internalize with hand-assisted laparoscopic ileal ureter substitution for obstruction over the full length of the ureter.

Introduction

Iatrogenic ureteral rupture is a serious complication. When immediate stenting or repair is difficult, nephrostomy will be required, which results in decreased QOL. The selectable method of urinary tract reconstruction depends on available ureter length and site. Simple end-to-end anastomosis, psoas hitch, and Boari flap are commonly used for reconstruction; however, if the available ureter length is short, autologous renal transplantation or ileal ureter substitution are also options. In the past, ileal ureter substitution with open, laparoscopic, and robot-assisted procedure have been reported; however, there are problems with operation invasiveness and difficulty. To date, there is no report about using hand-assisted laparoscopic surgery (HALS). HALS has the advantage that the wound is smaller than open surgery, but has the disadvantage that the operation is difficult. Compared to laparoscopic surgery, HALS has the advantage that the operation is easier, but has the disadvantage of a slightly larger wound. We report a case of 72-year-old female whose ureter was completely injured at the ureteropelvic junction and torn longitudinally in full length at the time of transurethral lithotripsy (TUL). We could internalize with hand-assisted laparoscopic ileal ureter substitution for obstruction over the full length of the ureter.

Case report

72-year-old female. Inserting an access sheath at the time of performing TUL, the ureter was completely injured at the ureteropelvic junction and torn longitudinally in full length (Fig. 1a). The ureteral stent could not be inserted and we made the nephrostomy. The ureter was obstructed beyond the rupture site (Fig. 1b and c). We performed hand-assisted laparoscopic ileal ureter substitution. The patient was placed in a 45-degree lateral position. A 12 mm port at the umbilicus, 12 mm port at the lateral border of the right rectus muscle 3–4 cm superior to the umbilicus was placed. A lower abdominal midline incision was placed and GelPort was attached (Fig. 2). The ureteral stump on the renal side was identified and dissected laparoscopically. The free ileum was created extracorporeally from the lower abdominal wound. The isolated ileum-renal pelvis anastomosis was performed using HALS (Fig. 3a and b). Finally, the isolated ileum-bladder anastomosis was performed under direct vision (Fig. 3c).

There were no intraoperative complications. Total operating time was 8 h and 23 minutes, insufflation time was 5 h and 36 minutes, and blood loss was 216 ml. The ureteral stent was placed during operation. As a lot of intestinal mucus was attached to the ureteral stent when we performed cystoscopy on day 9, replacement with a ureteral stent

* Corresponding author.

E-mail addresses: katsui.masahiro@gmail.com (M. Katsui), kota.umed@gmail.com (K. Umeda), seihat0109@hotmail.com (S. Hattori), wkmyst@gmail.com (T. Ando), takahiro6025@yahoo.co.jp (M. Takahiro), uro.s-hara.0909@kmh.gr.jp (S. Hara).

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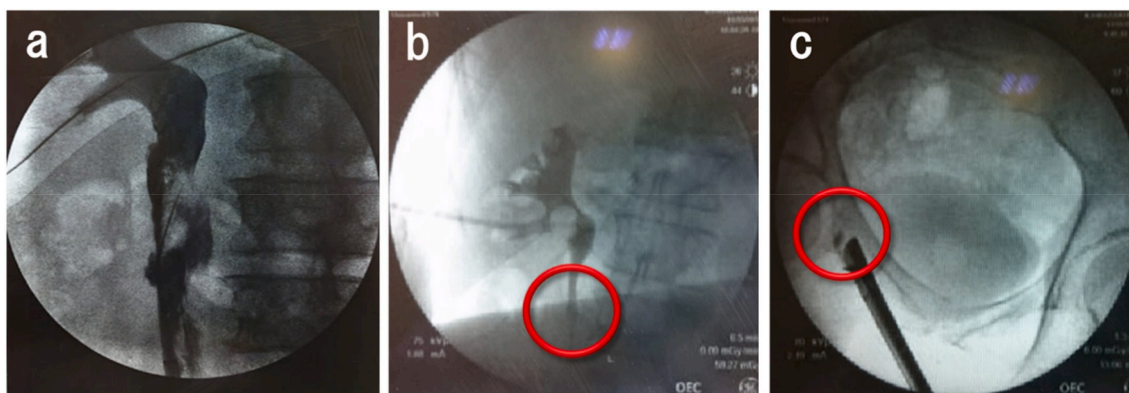


Fig. 1. a) Intraoperative fluoroscopy image of ureteral rupture showing marked contrast agent overflow.
 b) Antegrade pyelography two months after ureteral injury showing discontinuation 5 cm from pyeloureteral junction.
 c) Retrograde ureterography two months after ureteral injury showing that the central side of the ureteral orifice is obstructed.

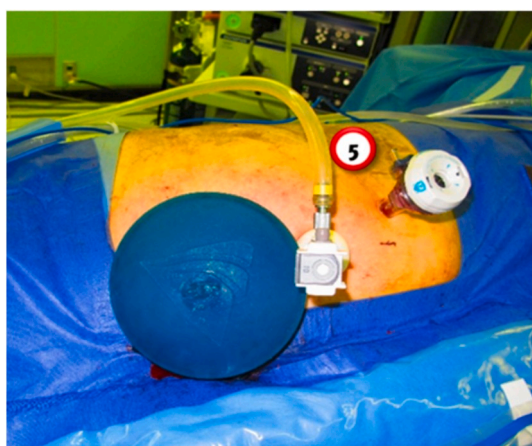


Fig. 2. Port placement. 12 mm port at the umbilicus, 12 mm port at the lateral border of the right rectus muscle 3–4 cm superior to the umbilicus. Lower abdominal midline incision was placed and GelPort was attached.

without side holes improved the passage and we clamped the nephrostomy catheter on day 16. We removed the nephrostomy catheter on day 19. She discharged the hospital on day 22 with no symptoms. After we removed the ureteral stent on postoperative month 3, she progressed without fever or renal dysfunction.

Discussion

The first laparoscopic ileal ureter substitution was reported by Gill in

2000, which was performed as a total ureterectomy for single-kidney high-volume ureteral tumor.¹ In addition, Castillo and Stein reported laparoscopy-assisted ileal ureter substitution.^{2,3} In each case, the ileum graft was made extracorporeally. After the wound was closed, the anastomosis with the urinary tract was performed laparoscopically. To our knowledge, there are no reported case performed with HALS.

There are several benefits of HALS. Since the dissecting of the renal pelvis and ureter can be performed hand-assisted from the beginning, it may be easier than the forceps operation. Intestinal manipulation can be done outside the body. The ileal-vesical anastomosis can be performed under direct vision, so it is much easier than laparoscopic anastomosis. The renal pelvis-ileum anastomosis is also easier with manual assistance. It is also possible to switch between direct operation and laparoscopic operation at any time.

We did not create anti-reflux procedure as it is reported that anti-reflux procedure is unnecessary if the intestinal use is 15 cm or more.⁴ The absence of reflux was confirmed by cystography at a later date.

Although ureteral stent placement is not always necessary, in our case we placed it for stabilization of the anastomosis. In the ileal ureter substitution, intestinal mucus was secreted from the ileal graft. Initially, we used a ureteral stent with side holes; however, intestinal mucus penetrated into the stent through the side holes, resulting in stent occlusion. Replacement with a stent without side holes improved the passage.

For cases on the left, the GELPort needs to be placed in the lower midline of the abdomen, since the isolated ileum-bladder anastomosis is performed under direct vision. Therefore, it is necessary to perform the manual operation with the right hand, and the forceps and the needle operation with the left hand. In the case of right-handed operators, it should be noted that the difficulty level is generally higher.

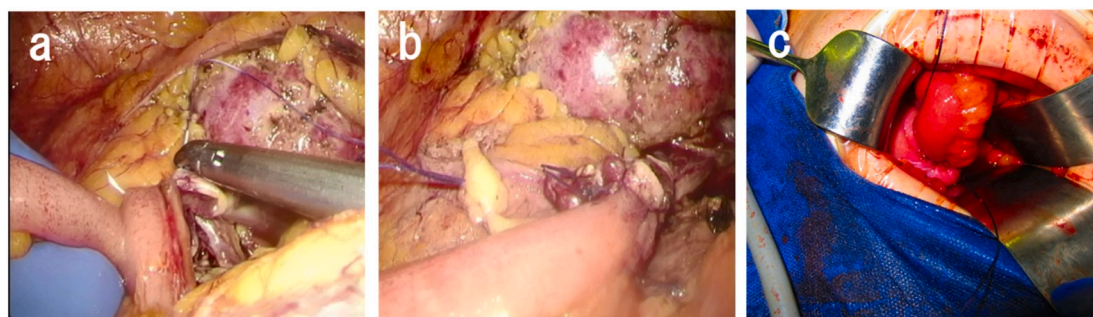


Fig. 3. a) Isolated ileum-renal pelvis anastomosis with hand-assisted technique.
 b) Anastomosis completed.
 c) Isolated ileum-bladder anastomosis was performed on the top of right side bladder under direct vision.

In this case, the time-consuming procedures were identification of the ureteral stump on the renal pelvis and mobilization from the surroundings. As the ureter was injured, we used a ureteroscope to search for a renal pelvic stump to place the stent. As a result, inflammation in the surroundings and strong adhesion were observed. Cases with strong adhesion are time-consuming and this needs to be taken into consideration when making adaptation decisions.

This case was an iatrogenic injury, and it was necessary to pay attention to cosmetic outcome. HALS has a smaller surgical wound than open surgery and may be advantageous in terms of cosmetic outcome. This may be particularly beneficial in cases where cosmetic outcome is important such as recovery surgery for iatrogenic injury.

Conclusion

Hand-assisted laparoscopic ileal ureter substitution for ureteral obstruction after ureteral rupture is an effective option in terms of

patient invasiveness and surgical difficulty.

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