

## Case Report

# A novel method of transvesicoscopic ureteral reimplantation of an ectopic ureter with a mate ureter in a duplex kidney

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### Abbreviations & Acronyms

DMSA = dimercaptosuccinic acid  
DRF = differential renal function  
UR = ureteral reimplantation  
UTI = urinary tract infection  
VCUG = voiding cystourethrography  
VUR = vesicoureteral reflux

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**Presentation:** A summary of this study was presented at the 27th Annual Meeting of the Japanese Society of Pediatric Urology (June 28, 2018, Kanazawa, Japan), where it won the Best Poster Award.

**Introduction:** The reimplantation of an ectopic ureter is still performed as an open surgery, although laparoscopic or robot-assisted laparoscopic surgery has gained popularity as a minimally invasive treatment for pediatric urological disorders.

**Case presentation:** A 15-day-old Japanese boy was referred to our hospital with right hydronephrosis. A detailed examination revealed complete ureteral duplication on the right side and a dilated ectopic upper pole ureter, opening into the prostatic urethra. Since the patient had recurrent febrile urinary tract infections, we performed plication and ureteral reimplantation of the dilated ectopic ureter using a transvesicoscopic surgical method at the age of 2 years and 5 months.

**Conclusion:** We safely performed transvesicoscopic ureteral reimplantation for an ectopic upper pole ureter with a mate ureter in a duplex kidney, following the detection of an ectopic ureter within the bladder, due to the prior understanding of the wrapping of both ureters in a common sheath.

**Key words:** common sheath, duplex kidney, ectopic ureter, transvesicoscopic ureteral reimplantation, ureteroplasty.

## Keynote message

The reimplantation of an ectopic ureter is still performed as an open surgery. However, we safely performed transvesicoscopic ureteral reimplantation for an ectopic upper pole ureter with a mate lower pole ureter in a duplex kidney. We believe that this method should be considered a new surgical option for an ectopic ureter in a duplex kidney as a minimally invasive treatment.

## Introduction

Laparoscopic or robot-assisted laparoscopic surgery has gained popularity as a minimally invasive treatment for pediatric urological disorders.<sup>1,2</sup> However, having a customized approach and method of reconstruction for each case is important because of extensive variations in congenital anomalies of the kidneys and urinary tract.

A duplex kidney is one of the most reported urinary tract anomalies in the pediatric population. There are considerable variations among patients, including anatomic variation, degree of VUR, functional disparities between the renal moieties, and presence or absence of UTIs; therefore, the surgical management of this entity is complex.<sup>3</sup>

Herein, we report a case of a dilated ectopic ureter in a duplex kidney that was successfully treated with ureteroplasty and UR using a transvesicoscopic surgical method.

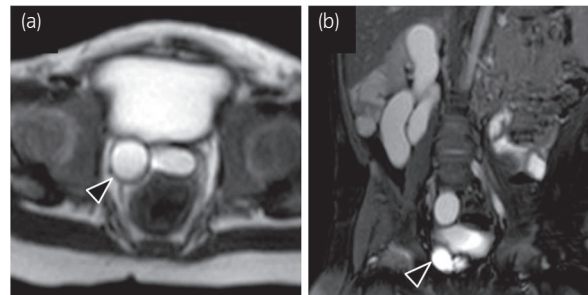
## Case presentation

A 15-day-old Japanese boy was referred to our hospital with right hydronephrosis, which was detected on ultrasonography during the gestational period. The patient was afebrile and had normal vital signs. Urine examination showed normal results.

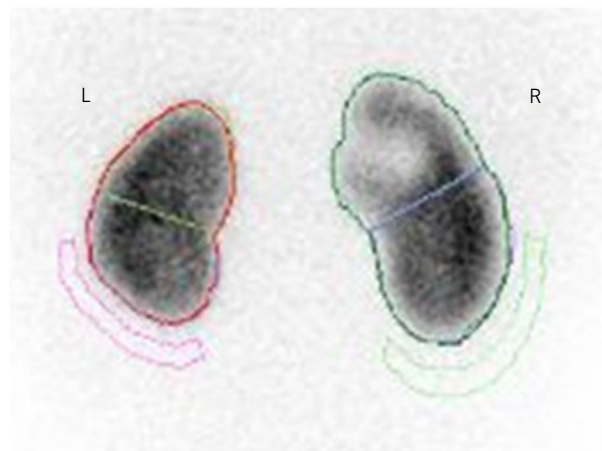
Magnetic resonance imaging revealed complete ureteral duplication on the right side and a dilated upper pole ureter (Fig. 1). VCUG did not reveal any evidence of VUR or urethral obstruction. DRF, assessed using a DMSA scan, was 53.1% for the right kidney, of which 20.4% was related to the upper pole moiety (Fig. 2). Urethral cystoscopy revealed a right lower pole ureteral orifice and left ureteral orifice, while retrograde pyelography revealed that the dilated ectopic upper pole ureter was opening into the prostatic urethra (Fig. 3). Since the patient had two consecutive episodes of

febrile UTIs for which we suspected the ectopic upper pole ureter to be the predisposing factor, a transvesicoscopic UR was performed at the age of 2 years and 5 months.

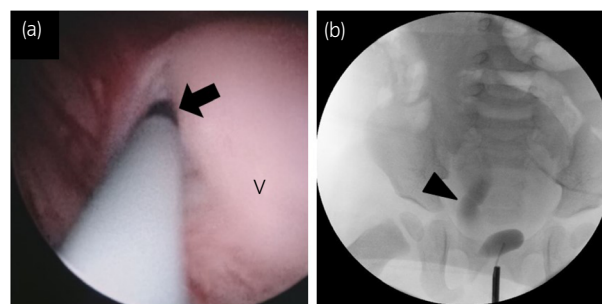
The patient was placed in the supine position with the legs separated. A 5-mm camera port and two 5-mm working ports were placed into the bladder under cystoscopic guidance using the methods reported by Yeung *et al.*<sup>4</sup> A 20-cm-long 5-F catheter was inserted into the right lower pole ureter and fixed with 5-0 absorbable sutures as a stent to facilitate subsequent ureteral mobilization and dissection (Fig. 4a).



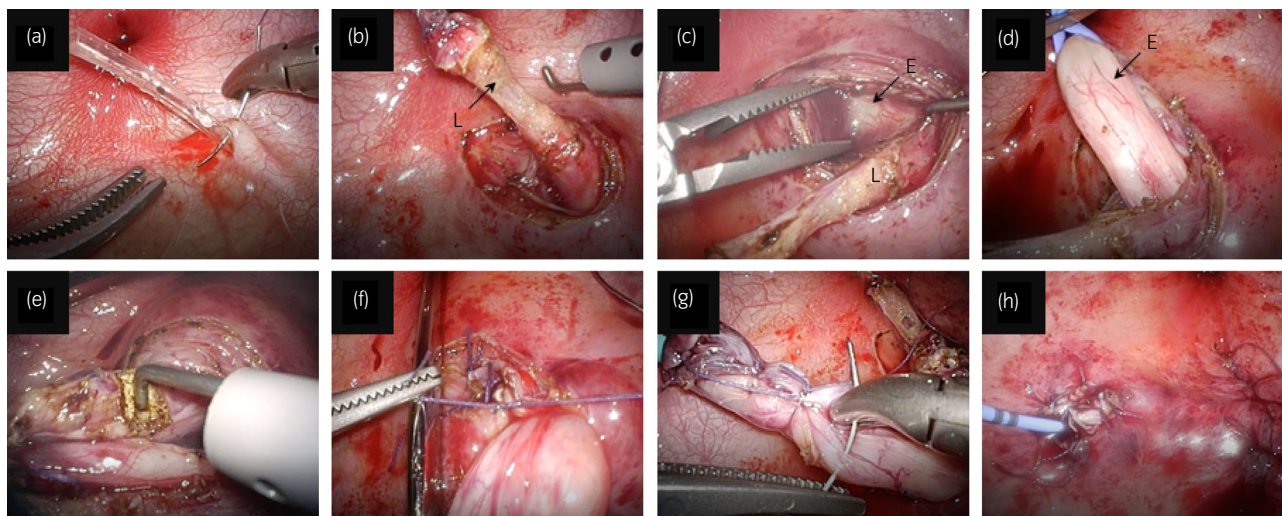
**Fig. 1** T2-weighted magnetic resonance image shows a right ectopic upper pole ureter in a duplex kidney. The ectopic ureter is dilated throughout its length. The arrowhead indicates a dilated ectopic ureter. (a) Transverse plane, (b) coronal plane.



**Fig. 2** DMSA scan shows the following DEFs: 20.4%, right upper pole; 32.7%, right lower pole; 46.9%, left kidney.



**Fig. 3** Urethral cystoscopy and retrograde pyelography findings. (a) Urethral cystoscopy findings indicate the location of the ectopic ureteral orifice of the right upper pole. The ectopic ureter opens beside the verumontanum at the prostatic urethra. The arrow indicates the ectopic ureteral orifice. V, verumontanum. (b) Retrograde pyelography shows that the right ectopic upper pole ureter is contrasted. The arrowhead indicates the dilated ectopic ureter.



**Fig. 4** Schema of the transvesicoscopic UR for an ectopic ureter with a mate ureter in a duplex kidney. (a) A 5-F catheter is inserted into the right lower pole ureter and fixed by 5-0 absorbable sutures. (b) The right lower pole ureter is dissected. L, lower pole ureter. (c) The dilated ectopic upper pole ureter is detected through the hiatus by searching immediately posterior to the lower pole ureter. E, ectopic upper pole ureter. (d) The ectopic upper pole ureter is dissected. (e) The ectopic upper pole ureter is cut off. (f) The muscular defect in the ureteral hiatus is repaired using 4-0 absorbable sutures. (g) The dilated ectopic upper pole ureter is plicated using 5-0 absorbable sutures. (h) After the creation of the submucosal tunnel, both ectopic upper pole ureter and lower pole ureter are drawn gently together through the tunnel. A 4-F catheter is inserted into the right upper pole ureter.

When mobilization of the lower pole ureter was continued into the extravascular space (Fig. 4b), we could detect the dilated ectopic upper pole ureter immediately posterior to the lower pole ureter through the hiatus (Fig. 4c). After we carefully pulled out the ectopic upper pole ureter following ureteral dissection (Fig. 4d), we cut it off using a monopolar hook to achieve hemostasis at the cut ureteral end (Fig. 4e). Once an adequate length of both ureters was obtained, the muscular defect in the ureteral hiatus was repaired using 4-0 absorbable sutures to prevent CO<sub>2</sub> leakage from the bladder (Fig. 4f). The diameter of the dilated ectopic upper pole ureter was 10 mm; therefore, it was plicated using the Starr technique with 5-0 absorbable sutures by inserting a 10-F catheter into the ureter, and the diameter of the ureter was reduced to 6 mm (Fig. 4g). After we created the site of the new ureteral orifice (above the left ureteral orifice) and a 3-cm-long submucosal tunnel, both the ectopic upper pole and lower pole ureters were drawn gently together through the tunnel. Subsequently, ureteroneocystostomy was performed with intracorporeal suturing using interrupted 5-0 absorbable sutures (Fig. 4h). Only a 4-F catheter was inserted into the right upper pole ureter, and a drain was not used. The port sites were closed using 3-0 absorbable sutures. Postoperative VCUG revealed no VUR and DRF of the upper pole moiety assessed by a DMSA scan did not decrease. Four years later, the patient does not have urinary incontinence or voiding problems, and there is no recurrence of right hydronephrosis, dilated ureter, or febrile UTIs.

## Discussion

To our best knowledge, this is the first report of an ectopic ureter with a duplex kidney that was treated with transvesicoscopic UR with a mate lower pole ureter.

The ectopic ureter usually originates from the upper pole moiety of the duplex kidney. Upper pole nephrectomy is the traditional surgical treatment for the ectopic ureter with poorly functional upper pole moiety in the duplex kidney; however, we recommend UR or ureteroureterostomy when the function of the upper pole is not substantially impaired.<sup>5,6</sup> Dismembered extravascular UR for ectopic upper pole ureters might be a feasible treatment option for patients in whom preserved function of the ectopic moiety necessitates reconstructive surgery instead of excision.<sup>6</sup>

Recently, ureteroureterostomy has been performed as an alternative reconstruction to dismembered extravascular UR. Moreover, ureteroureterostomy is performed using a laparoscopic or robot-assisted technique.<sup>2,7,8</sup> However, it is associated with complications, such as urine leakage, anastomotic stricture, “yo-yo” reflux, and UTI at the residual ureteral stump.<sup>9</sup>

In this case, we considered that transvesicoscopic reimplantation for an ectopic ureter could be completed if only an ectopic ureter could be detected transvesically. It was possible to easily detect the ectopic upper pole ureter posterior to the lower pole ureter due to the understanding that both ipsilateral ureters were wrapped in a common sheath in the duplex kidney.<sup>3,6,10</sup> Additionally, a transvesicoscopic UR for an ectopic ureter is more invasive than an extravascular UR because it does not require extensive dissection of the dorsal bladder to detach an ectopic ureter. Moreover, plication of the dilated ectopic ureter using the Starr technique could be performed inside the bladder, although the bladder was not large internally.

## Conclusion

We safely performed a transvesicoscopic UR for an ectopic ureter in a duplex kidney following the detection of an ectopic

ureter within the bladder due to the prior understanding of the wrapping of both ipsilateral ureters in a common sheath. This novel method should be recommended as a surgical treatment option for an ectopic ureter in a duplex kidney.

### Conflict of interest

The authors declare no conflict of interest.

### Approval of the research protocol by an Institutional Reviewer Board

Not applicable.

### Informed consent

Not applicable.

### Registry and the Registration No. of the study/trial

Not applicable.

### Author contributions

**Hidenori Nishio:** Writing-original draft. **Kentaro Mizuno:** Conceptualization; resources; writing-review & editing. **Daisuke Matsumoto:** Resources. **Taiki Kato:** Resources. **Hideyuki Kamisawa:** Writing-review & editing. **Satoshi Kurokawa:** Writing-review & editing. **Akihiro Nakane:**

Writing-review & editing. **Tetsuji Maruyama:** Supervision. **Takahiro Yasui:** Supervision. **Yutaro Hayashi:** Supervision.

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