CASE REPORT

Robotic partial nephrectomy for duplex kidney with ectopic ureter draining in the vagina in an adult patient with urinary incontinence

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SUMMARY

A duplex kidney system with an ectopic ureter draining into the vagina is a congenital malformation that typically presents as refractory urinary incontinence. Diagnosis is often difficult to establish and delayed due to a low incidence. We present the case of a patient aged 26 years with a life-long history of persistent urinary incontinence. Initial presentation was at childhood; however, the diagnosis went undetermined for 22 years. CT urography revealed a duplex kidney with an atrophic upper pole associated with an ectopic ureter that drained into the vaginal vault. This is the first description of such a case being managed successfully via a robot-assisted partial nephrectomy approach. Ectopic ureteral duplication should be considered in the differential diagnosis for young women with refractory urinary incontinence. Robotic partial nephrectomy is a safe and effective technique to manage such cases.

BACKGROUND

Ureteral duplication forms a diverse group of congenital anomalies characterised by the presence of two independent ipsilateral pelvicalyceal systems, otherwise termed duplex kidneys. The prevalence of such an abnormality is reported as 1 in 125.¹ The upper pole moiety is often observed as dysplastic and poorly functional.^{1 2} Importantly, duplex kidneys are understood to be associated with ureterocele, vesicoureteral reflux and ectopically positioned ureters.¹ Consequently, individuals typically present with symptoms of voiding dysfunction, urinary tract infections and urinary incontinence.¹ Very rarely, an ectopic duplex ureter may drain directly into the female genital tract. This often requires surgical management which also involves careful planning with the primary objectives to preserve anatomical function. Ureteric reimplantation is generally preferred when the renal moiety has good function. However, partial nephrectomy should be considered when poor or no function is present. With regard to surgical management, conventional laparoscopic upper pole partial nephroureterectomy has previously been described for the management of an ectopic ureter draining into the vagina.¹

Herein, we report the case of an adult woman with an ectopic duplex ureter draining into the vagina resulting in persistent incontinence. Moreover, to the best of our knowledge, we provide the first published description of a robot-assisted laparoscopic surgical approach for an

upper moiety partial nephrectomy for the management of a duplex kidney system comprising of an ectopic ureter in a woman.

CASE PRESENTATION

A Caucasian woman aged 26 years presented to us with a life-long history of constant urinary leakage. Furthermore, she denied any previous urinary tract infections or other lower urinary tract symptoms since birth. As a child, she sought medical assistance numerous times for her incontinence and was diagnosed on several occasions with urinary tract infections. She completed several courses of antibiotics and received no improvements in her symptoms. At the age of 17, having been unsuccessful with attaining the correct diagnosis and successful treatment of her symptoms, she abandoned pursuing medical assistance. Moreover, for over 5 years, she managed with her continuous urinary leakage through using incontinence pads. At the age of 22, she was referred to a specialist and was subsequently diagnosed with ureteral ectopia. Initial surgical planning was postponed due to pregnancy. Her medical history was only that of an emergency caesarean section for the birth of her first child.

INVESTIGATIONS

CT urography illustrated a complete left duplex ureteral system and normal right upper urinary tract anatomy. The lower pole moiety was unremarkable and its ureter had an ordinary course inserting in a normal position in the bladder. The atypical upper pole moiety noted appeared atrophic measuring 20×22×23 mm and its ureter could not be delineated completely through its course. However, a tubular structure was noted in close proximity to the left adnexal region. This was thought to be the upper pole moiety's ureter in view of it opacifying with contrast, which was subsequently observed to track into the vaginal vault (see figure 1). A DMSA scan was not deemed necessary in this case due to the small size of the upper pole (97×60×60 mm) and normal enhancing appearance of the remaining lower kidney.

Speculum examination of the vagina under anaesthesia revealed a small prominent tubular structure in the proximal left vaginal vault. This was assumed to be the ectopic ureteric orifice; however, an opening could not be appropriately visualised for cannulation.

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Figure 1 Three-dimensional reconstruction CT urography of the left duplex kidney. The small upper pole moiety (A), its proximal ureter (B) and the left vaginal vault (C) can be seen opacified with contrast.

DIFFERENTIAL DIAGNOSIS

Differential diagnose typically includes

- ▶ urinary tract infection,
- ▶ stress incontinence,
- ▶ overactive bladder.

TREATMENT

The patient subsequently underwent a left upper moiety heminephrectomy and proximal ureterectomy. Robot-assisted (The da Vinci Surgical System) mobilisation of the colon and kidney was performed. Using an indocyanine green-based fluorescence navigation system, the upper moiety vasculature was identified and clipped. The upper renal moiety and proximal ureter were removed and routine closure was performed. The patient made an uneventful recovery and was discharged after 2 days.

OUTCOME AND FOLLOW-UP

Postoperatively, she made a good recovery and was discharged with no complications. She has since been free from the incontinence which plagued her life. Furthermore, histology of the kidney revealed chronic inflammation, fibrosis and occasional tubular dilation with surrounding spindle-cell stroma which would be in keeping with ureteric reflux of the duplex kidney system.

DISCUSSION

A duplex kidney arrangement consisting of an ectopic ureter implanting into the vagina is a relatively rare congenital malformation.^{2 3} This arrangement has previously been identified as

an explanation for continuous urinary incontinence.^{2 4} In addition, due to its relative rarity, it is a diagnosis which is frequently overlooked by many clinicians.¹

Ultrasonography (US) is considered the first-line investigation for urinary tract malformations in general.¹ However, with reference to duplex kidney systems, the dysplastic upper pole moiety and ectopic ureter may be difficult to fully evaluate with US.² CT or magnetic resonance (MR) urography have been successfully used for the identification of duplex kidney systems and ectopic ureters; however, the latter is considered superior with respect to delineating a duplex kidney system and identifying the ureteral insertion points.²⁻⁴

Laparoscopic surgical approaches have previously been described and developed for the treatment of duplex kidney systems and ectopic ureters.^{1 2 4} We demonstrated that robotic surgery can be used safely and effectively in the hands of experienced robotic surgeons for management of such cases. The lack of literature with regard to this is probably due to a combination of the rarity of these abnormalities coupled with the limited distribution of robotic surgery systems. With improved affordability and dispersal of technology, robot-assisted treatment of duplex kidney with an ectopic ureter may become more common in practice.

Learning points

- ▶ Duplex kidneys with an ectopically inserted ureter should be considered as a differential diagnosis, in particular, for chronic refractory urinary incontinence.
- ▶ Magnetic resonance urography is considered the modality of choice when investigating a duplex kidney and ectopic ureter abnormalities.
- ▶ The current standard of treatment is a laparoscopic heminephrectomy. However, ectopic urethral reimplantation may also be considered dependent on renal moiety function.

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REFERENCES

- 1 Dönmez Mİ, Yazıcı MS, Abat D, *et al.* Laparoscopic upper pole heminephrectomy in adults for treatment of duplex kidneys. *Urol J* 2015;12:2074–7.
- 2 Alkan I, Özveri H, Taş S, *et al.* Rare cause of adult female incontinence: complete duplication of the collecting system and ectopic ureter of the kidney draining into the vagina treated by laparoscopic upper pole heminephrectomy and ureterectomy. *Int Urol Nephrol* 2014;46:1477–80.
- 3 Demir M, Çiftçi H, Kiliçarslan N, *et al.* A case of an ectopic ureter with vaginal insertion diagnosed in adulthood. *Turk J Urol* 2015;41:53–5.
- 4 Challacombe B, Kelleher C, Sami T, *et al.* Laparoscopic nephroureterectomy for adult incontinence caused by functioning ectopic pelvic kidney draining into vagina. *J Endourol* 2004;18:447–8.

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