Bilateral complete ureteral duplication with calculi obstructing both limbs of left double ureter

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ABSTRACT

INTRODUCTION: A woman with bilateral complete ureteral duplication with stones simultaneously obstructing both limbs of the left double ureter is presented. A search of the English medical literature suggests that this is the first reported case. Based on the initial difficulty accessing the stones via ureteroscopy we make recommendations regarding how this rare problem should be approached if encountered.

PRESENTATION OF CASE: A 37-year-old woman with left-sided flank pain was discovered on CT scan to have bilateral complete ureteral duplication and three stones obstructing both limbs of the left double ureter. Ureteroscopy was initially unsuccessful due to the very small calibre and unyielding nature of the ureters and both ureteral limbs were stented. Repeat ureteroscopy was easily achieved after pre-stenting and the impacted stones were completely cleared with intracorporeal laser lithotripsy.

DISCUSSION: The smaller calibre of both double ureters and their presence in a common adventitial sheath distally, made initial attempts at ureteroscopy difficult. Stenting both limbs increased ureteral compliance, passively dilated both ureters and allowed for improved manoeuvrability and retrograde passage of the ureteroscope. Based on the experience with this first reported case it is recommended that pre-stenting should be routinely performed prior to any attempt at ureteroscopy in cases of stones complicating completely duplicated ureters.

CONCLUSION: We report the first recorded case of bilateral complete ureteral duplication with stones simultaneously obstructing both limbs of the double ureter and recommend that routine pre-stenting be done prior to ureteroscopy to allow easy uncomplicated retrograde passage of the ureteroscope.

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1. Introduction

Ureteral duplication is found in 0.9% of routine autopsies and bilateral complete ureteral duplication occurs in 1 in 500 persons and is found in 0.3% of excretory urograms. Ureteral duplication is more common in females and when bilateral and complete, all four ureters may open orthotopically on the bladder trigone. In keeping with the Weigert-Meyer law the upper pole ureter typically opens medially while the lower pole ureter opens laterally. Complete ureteral duplication may be associated with other congenital anomalies such as a short lower moiety intramural ureter causing vesicoureteral reflux or an upper moiety ureter with a ureterocele (orthotopic or ectopic) causing obstruction.

Ureteral duplication is often asymptomatic but may be associated with urinary tract infections, urolithiasis and the congenital problems mentioned above. Urinary calculi are often due to relative stasis of urine but may occur due to factors unrelated to the duplication.

A case of bilateral complete ureteral duplication complicated by calculi obstructing both left ureters is presented. This is the first report, to the best of our knowledge, of bilateral double ureters with calculi simultaneously obstructing both ipsilateral ureteral limbs. The difficulty encountered in accessing the calculi retrogradely via flexible ureteroscopy is discussed and suggestions given for efficient and safe retrograde ureteral access to facilitate complete stone clearance.

2. Case presentation

A 37-year-old woman presented to the Accident and Emergency department with a history of sudden onset colicky left-sided flank pain associated with nausea and vomiting, but no fever or lower urinary tract symptoms. Physical examination revealed a middle-aged obese woman with left renal angle tenderness. Urinalysis demonstrated microscopic hematuria. Renal function tests and complete
blood count were normal. She was assessed as having left ureteral colic and investigated initially with abdomino-pelvic ultrasound.

Ultrasound demonstrated left hydronephrosis and a cystic left upper pole renal mass. The right kidney was reported as normal. An intravenous urogram demonstrated 3 radio-opacities in the left renal area, poor opacification of the left kidney and a completely duplicated right ureter of normal calibre. An abdominal CT scan confirmed the findings of a completely duplicated left collecting system with hydronephrotic upper and lower pole moieties. Three calculi, each 1 cm in diameter, one in the upper pole ureter at the level of the fourth lumbar vertebra (L4) and two in the lower pole ureter at L3 level were present on the left (Figs. 1 and 2). She was diagnosed as bilateral complete ureteral duplication with calculi obstructing both left ureters and scheduled to have flexible ureteroscopy and laser lithotripsy.

Under general anaesthesia (GA) and antibiotic prophylaxis, with the patient in the modified lithotomy position, rigid cystoscopy demonstrated four normally sited, small ureteral orifices on the interureteric ridge. Two 0.038 in. guide wires were passed retrogradely under fluoroscopy up into the renal pelvises of both left ureters. Difficulty was encountered on negotiating the guide wires past the calculi. A flexible ureteroscope (Karl Storz® FLEX-XTM 7.5F) was then passed inverted, coaxially over the medially sited guide wire. The medial ureteral orifice was small and poorly compliant and did not admit the instrument. It was withdrawn and then re-passed with difficulty up the left lateral ureteral orifice. A severe edematous ureteral reaction at the site of the calculi prevented adequate vision to safely proceed with laser lithotripsy. The ureteroscope was withdrawn and both ureters were stented with 6 French, 24 cm double-J ureteral stents. The patient had an uneventful recovery and a postoperative kidney–ureter–bladder (KUB) plain X-ray demonstrated the stents to be in good position (Fig. 3).

The patient returned for ureteroscopy after a 4-month interval with no evidence of stone progression. The procedure on this occasion was characterized by easy ureteral intubation and advancement of the flexible ureteroscope to the level of the stones which were readily visualized. Holmium laser lithotripsy was complete and the fragments removed. Both ureters were restented. Postoperative KUB X-ray confirmed complete stone clearance (Fig. 4). The stents were removed 1 week later.

3. Discussion

To the best of our knowledge this is the first report of a case of bilateral complete ureteral duplication with obstruction of both left ureters by calculi in the English medical literature. A patient with two stones simultaneously obstructing both limbs of a bifid ureter has been previously reported as well as ureteroscopic removal of a solitary calculus in two patients with bilateral ureteral duplications,
one with a bifid system bilaterally and the other with a bilateral double ureter. It is known that double ureters are surrounded terminally by a common adventitial sheath within which the outer musculature of both tubes intermingle and in the male this begins at the level of the ductus deferens. The corresponding level in the female is where the ureters cross the uterine artery. This anatomic arrangement and the smaller calibre of the ureters account for the difficulty of ureteral intubation and makes instrumentation prone to complications. Also, because of the common adventitial sheath, we feel it is ill-advised to perform active ureteral dilation with a balloon or fascial dilator due to the potential for injury to the other ureter.

Passive ureteral dilation by stenting is an important adjunct in cases of difficult ureteral access and is an established method of enhancing ureteral compliance and empirically results in significantly increased stone clearance rates while decreasing complication rates for proximal ureteral stones. The proximal location of a ureteral calculus is also an independent predictor of failure of ureteroscopic stone clearance, and when this is combined with a ureteral anomaly such as double ureters the likelihood of difficulty with retrograde ureteroscopic access is further increased.

4. Conclusion

We recommend that in the setting of calculi obstructing both limbs of a completely duplicated ureter, pre-stenting should be done before attempting stone clearance with ureteroscopy and intracorporeal lithotripsy. The enhanced compliance of both ureteral orifices and double ureters allows easy ureteral intubation and advancement of the ureteroscope with lowered risk of perforation and other complications.

Conflict of interest statement

The authors have absolutely no conflicts of interest.

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Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. The authors will provide copies of the patient’s consent if requested.

Author contribution

William Aiken conceptualized the report and wrote the paper. Peter Johnson selected the best images, wrote the paper and provided expert advice regarding the radiological aspects of the case. Richard Mayhew helped to write the paper and provided insightful comments and approved the final manuscript. All authors have read and approved the submitted version of the manuscript.

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