Endourology

Sheathless synchronous flexible ureterorenoscopy with holmium laser lithotripsy in complete duplex renal collecting system with stones

Dharmender Aggarwal, Kalpesh Parmar *, Jeni Mathew, Santosh Kumar

Dept of Urology, PGIMER, Chandigarh, India

ARTICLE INFO

Keywords:
Calculus
Flexible ureterorenoscopy
Laser
DJ stent
Duplex system

ABSTRACT

Duplication of renal system is one of the commonest renal anomalies. It is infrequently associated with renal calculus, ureterocele and vesico-ureteric reflux. We report a 29-year male with right complete duplex system having upper moiety multiple ureteric calculi and lower moiety inferior renal calculus. Single sitting fURS was done and calculi in both systems were tackled one at a time. Calculi were dusted with holmium laser and double J stent placed in upper moiety ureter. Calculus management in anomalous kidney is challenging. Single sitting flexible ureterorenoscopy is feasible option in duplex renal system with low burden calculi.

Introduction

Duplication of upper urinary tract is one of the commonest congenital anomaly. It is associated with multiple complications higher than their normal counterparts. These include ureterocele, vesico-ureteral reflux and obstruction. Although less frequent, renal calculus is well documented in these patients. We present a case of complete duplication of urinary tract with calculi in both systems and their management in a single sitting by fURS with laser lithotripsy. The work was carried out in line with SCARE 2020 criteria.

Case presentation

A 29-year old male presented with right flank pain of 6 months duration. There was no history of fever, dysuria, lower urinary tract symptoms or hematuria. Past history was insignificant. General physical and systemic examination was normal. His haemoglobin was 14.5 gm/dl, blood urea 24 mg/dl, serum creatinine 1.1 mg/dl and urine analysis showed 4-6 pus cells and culture was sterile. Ultrasonography (USG) of abdomen showed 12 mm calculus in right pelvi-ureteric junction with grade 1 hydroureteronphrosis. Intravenous pyelography (IVP) revealed right duplex renal system with calculus 8 × 15 mm in lower pole of lower moiety and 2 calculi in upper ureter of upper moiety with hydroureteronphrosis (Fig. 1A–D). Right upper moiety double J stent was placed in view of obstructing calculus and proximal hydroureteronphrosis. Computed tomography (CT) scan confirmed the findings (Fig. 2A–D).

Patient was planned for fURS for upper moiety ureteric stone and Mini perc for lower moiety renal stone. On cystoscopy, 2 ureters were visualised, suggestive of complete duplex system. Right upper moiety ureter was medial and lower than the lower moiety ureter. Double J stent was replaced with 0.032 inch terumo guide wire. Olympus flexible ureteroscope URF-P6R 7.9 French (fURS) was cannulated over the guide wire and calculi localised in upper ureter. Ureteric access sheath was not used in view of risk of stretch injury to adjacent lower moiety ureter. Calculi were dusted with Holmium-YAG laser, 200 μm fibre and double J stent placed. The lower moiety retrograde pyelogram showed the stone had migrated from inferior calyx to renal pelvis. In order to avoid repositioning and complication of Mini perc, a gentle attempt to pass semirigid ureteroscope 6/7.5 French was made. The stone was visualised in renal pelvis. Over terumo guide wire, semirigid ureteroscope was replaced by flexible ureteroscope without the access sheath. Stone was dusted with Laser lithotripsy and complete clearance achieved (Fig. 3A–F). Post-operative course was uneventful. Follow up X-ray showed with no residual calculus. Double J stent was removed after 2 weeks of surgery. At 6 months follow up, patient is doing well and has no recurrence on imaging.

Discussion

Duplication of renal collecting system is the most common congenital anomaly of upper urinary tract with incidence of 0.3–0.8% (about 1 in 125 cases). Duplication is bilateral in 15% cases and complete in
17–20% cases. This anomaly occurs due to formation of accessory ureteric bud or division of single ureteric bud before it reaches nephrogenic ridge. Common complications of collecting system duplication includes ectopic ureteric opening, ureterocoele, upper moiety urinary obstruction or lower moiety vesico-ureteric reflux or pelviureteric junction narrowing.

Incidence of stone disease in duplex system is around 3–8%. Treatment of stone disease in anomalous kidneys is always more challenging due to difficulties in access. Multiple treatment options exist for stones in upper ureter and lower calyceal stones. Shock wave lithotripsy (SWL) was used by Bhatia et al. in 8 patients of stone in duplex kidneys and they were successful in clearing stones, but 50% patients required more than 1 session and 2 patients had more than 2 sessions of SWL. Although SWL is less invasive, it is not without complications. Renal hematoma occurs in 1.5% cases and SWL is generally more expensive with need for auxiliary procedures. A mini-percutaneous nephrolithotomy (mini-PCNL) is a favourable option for stones up to 15 mm size in renal pelvis or upper ureter. While it gives a high stone free rate (SFR) of 93%–98% in normal kidneys, it decreases to 85% in kidneys with congenital anomalies. However, this procedure is associated with more serious complications.

With technological advancements, availability of flexible scope and
laser, the horizons of ureterorenoscopy (URS) has expanded and proven useful even in anomalous kidneys. SFR for URS is described as high as 80–85%. Flexible ureterorenoscopy allows for deflection of 270°, feasible to reach all parts of calyceal system. While Elhadi et al. used flexible URS to clear renal calculus in one of the moieties in a duplex system; in our case we performed complete stone clearance of both moieties of complete duplex system in single procedure with laser lithotripsy using flexible URS. We have not found any previous case reports of similar experience in published English literature. Our patient had a calculus in ureter of upper moiety while another calculus in renal pelvis of lower moiety and a mini-PCNL would have required at least 2 different punctures for stone clearance.

Although URS is not without any complications, it is very low in experienced hands. Ugluru et al. report the use of ureteral access sheath (UAS) for flexible URS in 2 out of 4 patients with renal stones in duplex kidney in their series. We did not use a UAS in our case since the lower moiety was not pre-stented and for the fear of causing ureteral injury due to shear stress and ischemia. UAS facilitates access to collecting system, decreases the intra renal pressure, ease of multiple entry and re-entry, avoids buckling and protects the scope. However, placement of UAS may generate extensive shear forces to entire ureter. This may be more detrimental to adjacent ureter in duplex system. In this context, pre procedural double J stenting is associated with a significantly lower incidence of high grade UAS related ureteral injuries.5

Conclusion

Management of renal calculi can be challenging in duplex kidneys. Appropriate pre-op imaging and planning, sheathless fURS is feasible option with low complications. Pre-procedural double J stenting cut-backs UAS related high grade injuries.

Funding

No funding received during manuscript preparation.

Author contributions

DA and KP – Initial concept, design, draft. JM – collection of data, KP – revision of manuscript, SK – critical comments. All authors read the manuscript and contributed equally.

Declaration of competing interest

The authors have no conflicts of interest to declare.
Fig. 3. A: Intraoperative fluoroscopy image showing double J stent with multiple calculi. B: Intraoperative cystoscopy showing 2 ureters suggestive of complete duplex system with upper moiety ureter being more medial than lower moiety ureter with ureteric catheter in lower moiety ureter. C: Terumo guidewire placed in both the systems. D: Intraoperative image of upper moiety ureter with stone localization and Holmium laser seen dusting the stone with safety guide wire in situ. E: Fluoroscopy showing semirigid URS placed in lower moiety system for safety guide wire placement. F: Intraoperative image showing stone in lower moiety renal pelvis.
Acknowledgement

We sincerely thank Dr. Ujwal Gorsi, Consultant Radiology, PGIMER, Chandigarh for providing high quality radiology images.

References

1. Agha RA, Franchi T, Sohrabi C, Mathew G, for the SCARE Group. The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines. Int J Surg. 2020;84:226–230.

2. Fernbach SK, Feinstein KA, Spencer K, et al. Ureteral duplications and its complications. Radiographics. 1997;17:109–127.

3. Bhatia V, Biyani GS. Calculus disease in duplex system- role of extracorporeal shock wave lithotripsy. Urol Int. 1993;50:164–169.

4. Elhadi M, Bonomauly M, Sheikh MI, Marsh H. Two pelvises, one stone: a different approach for management of calculi in a duplex renal collecting system. Afr J Urol. 2018;24(1):34–36.

5. Ugurlu IM, Akman T, Binbay M, et al. Outcomes of retrograde flexible ureteroscopy and laser lithotripsy for stone disease in patients with anomalous kidneys. Urolithiasis. 2015;43:77–82.