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CASE REPORT

Feasibility of a single session retrograde endoscopic laser lithotripsy of two large stones located in a bifid urinary tract. Presentation of a rare case

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Summary ***A 76 year-old male presented with urosepsis and acute renal injury secondary to obstruction by a 13 mm stone located in the common segment of a bifid left ureter. A second 10 mm stone was detected in the mid calyx of the lower moiety of the kidney. Drainage of both moieties with two double-J stents was initially performed. Following recovery from urosepsis a retrograde endoscopic semirigid and flexible laser lithotripsy of the distal and proximal stone respectively was performed resulting in stone clearance. Although retrograde ureterolithotripsy has been presented in the past, to the best of the authors' knowledge, this is the first description of flexible retrograde intrarenal lithotripsy performed through a bifid ureter.***

KEY WORDS: Bifid ureter; Lithiasis; Lithotripsy; RIRS; Ureteroscopy; Duplication.

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CASE REPORT

A 76 year-old male presented in the emergencies due to fever (up to 39° C), chills, mild hematuria and cloudy urine that lasted for 48 hours and also dyspnea of 24 hours duration. He had a history of non-insulin dependent diabetes mellitus, hyper-lipidemia and arterial hypertension; all of them under control with oral treatment. The diagnostic work-up revealed urosepsis due to *E. Coli* with acute renal injury due to obstruction by a 13 mm stone in the common segment of an incomplete duplicated left ureter. Another 10 mm stone was detected in the mid calyx of the lower moiety of the ipsilateral kidney. Incidentally, an atrophic contralateral kidney was detected. Intravenous administration of antibiotics and drainage of both moieties was performed using two double-J stents (Figure 1). Recovery from urosepsis and renal injury was quick and uneventful.

Fifty days later the patient was readmitted for lithotripsy. Prior to treatment he signed informed consent and also gave a written permission to record the procedure and to use the material for scientific presentations.

The procedure and the conduct of the study were approved by the *Institution's Scientific Committee*.

Fragmentation of the proximal stone was performed using a 8/9.5F semirigid scope with a 30W Ho:YAG laser and a 325 micron laser fiber (Figure 2). The catheterization of the second limb of the bifid ureter was made under direct vision of the joint by the ureteroscope (Figure 3). Then *retrograde intrarenal surgery* (RIRS) of the 10 mm intrarenal stone was performed using a 7.5F flexible scope and 200 micron fiber for stone fragmentation facilitated by a 45 cm long, 10/12 F access sheath (Figure 4). Two stents were postoperatively placed in each ureter. Surgical time was 67 minutes. After 36 hours of hospital staying, the patient was discharged. Postoperative recovery was uneventful. The stents were left in place for 14 days. Three months after lithotripsy the patient was stone free having normal renal function.

DISCUSSION

Complete and incomplete (bifid) *ureteral duplication* (UD) represent different clinical manifestations of the same embryologic disorder. During the 4^{th}-5^{th} gestation week, the mesenchymal ureteral bud starts its development to form the ureter. If two buds arise separately from the mesenchyme, two different ureters are developed and complete ureteral duplication is encountered. If a single bud splits later during various stages of metanephric tissue development a bifid collecting system is generated (1). UD usually has an uneventful clinical course, though obstruction of a bifid ureter by stones has been reported in the literature.

A recent case report underscored the role of the contrast enhanced *computed tomography* (CT) imaging in the correct diagnosis of ureteral duplication. Plain *kidney ureter bladder* (KUB) X-ray is unreliable in detecting this anatomical disorder. Only in CT scan images the bifid ureter can be recognized, and the size and location of stones if any, can be clearly determined contributing to the appropriate delivery of treatment (2).

In our case, due to the patient's critical condition, the CT scan was performed in emergency settings. Although a contrast agent was not administered due to renal dysfunction, the anatomy of the dilated collecting system was adequately delineated and the presence of ureteral duplication was identified.

Bhatia and Biyani reported on 8 lithiasic cases in UD, five of which were located in a bifid ureter. All of them were treated with *shock wave lithotripsy* (SWL) with excellent

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Figure 1.
Preoperative KUB X-ray of stented ureters. The intrarenal stone is not clearly shown.

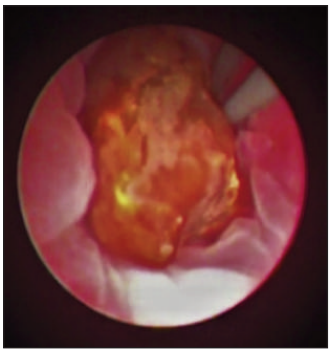

Figure 2.
A 13 mm hard stone (mean 970 Hounsfield units) located in the common segment of the bifid ureter.

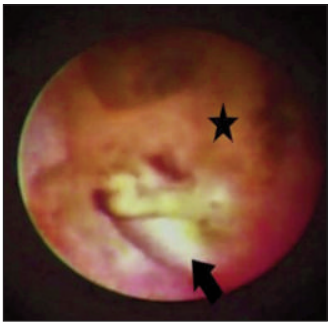

Figure 3.
Appearance of joint of the bifid ureter under endoscopic vision with the semirigid ureteroscope. The arrow shows the entrance to the other limb of the ureter. The asterisk shows lithiasic dust.

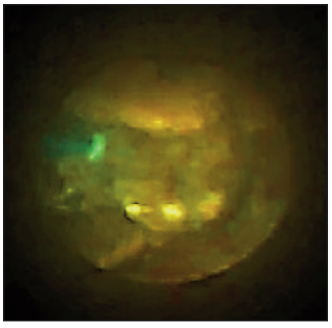

Figure 4.
An intrarenal 10 mm stone (mean Hounsfield units 785).

results (2). Migliari and Usai were the first to perform endoscopic treatment in incomplete UD in 1991. They used a semirigid scope to gain access to a 1 cm stone located in the pelvic portion of the lower limb of a bifid ureter. Fragmentation was performed using an ultrasonic lithotripter with optimal stone clearance (3).

To the best of our knowledge, the present study is the first to report on flexible *retrograde intrarenal surgery* (RIRS) and laser lithotripsy with the scope inserted into the kidney through the joint of a bifid ureter. Initially, to ensure adequate drainage, both moieties of the kidney had to be decompressed with stents. The presence of a double-J stent also facilitated the retrograde endoscopic treatment. Intraoperatively, a safety guidewire was inserted in each limb of the ureter and after the disintegration of the distal stone, an access sheath was advanced up to the ureteropelvic junction of the moiety hosting the stone. The use of the sheath allowed an easy detection of the stone and a safe and quick operation under low intrarenal pressure. The sheath also facilitated the immediate removal of stone fragments.

Despite the large lithiasic burden, the duration of the procedure was approximately one hour. This brief operation time eliminates the risks of surgical complications, particularly postoperative sepsis, and shortens the duration of hospital staying.

In conclusion, the present study is the first to report the performance of flexible RIRS in a bifid collecting system. Preoperative CT scan, stenting of both limbs, use of safety guidewires and placement of ureteral access sheath under fluoroscopic guidance were crucial for a successful outcome. With the use of semirigid and flexible ureteroscopy the disintegration of a large lithiasic burden in the ureter and in the pyelo-calyceal system is feasible to be performed in one session, within a reasonable operation time and a minimum risk of complications.

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