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Flexible ureterorenoscopy for renal stones in ectopic malrotated pelvic kidneys: a case report on safety and effectiveness

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Abstract

Background: An ectopic pelvic kidney is a rare congenital anomaly with a high incidence of complications such as reflux, the pelviureteric junction (PUJ) obstruction, nephrolithiasis, and even renal failure. We here report a case of retrograde intrarenal surgery (RIRS) for the treatment of right pelvic kidney stones.

Case presentation: A 65-year-old male presented to the urology clinic at Life Hospital, Kalar, Iraq, on September 10, 2024, with complaints of lower abdominal pain, microscopic hematuria, and dysuria. The patient had a medical history of cardiovascular and unhealthy lifestyle-related diseases. Physical examination revealed lower abdominal pain without fever. Serum creatinine was 1.4 mg/dL and HbA1c was 8.7%, with microscopic hematuria and pyuria in urinalysis. Contrast-enhanced CT revealed an ectopic right iliac kidney with moderate hydronephrosis and two renal stones (11 mm and 13 mm). Flexible ureterorenoscopy (fURS) with Holmium: YAG laser stone dusting was performed under spinal anesthesia. The procedure lasted 50 minutes, achieving complete stone clearance. The patient was discharged the same day without complications, and follow-up confirmed successful outcomes.

Conclusion: A single-session RIRS has successfully disintegrated the stone. Proper preoperative assessment and selection of the most suitable surgical procedure are critical for successful treatment.

Keywords: Flexible Ureterorenoscopy, Renal Stones, Ectopic Pelvic Kidneys, Iraq

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Background

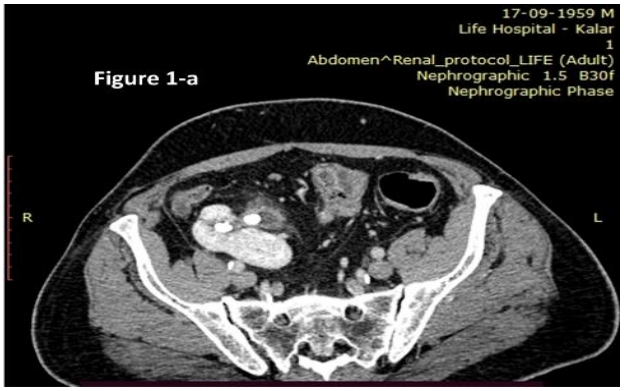
During the early stages of the embryonic process, the formation of a metanephric kidney starts in the sacral region. Then the kidneys move up to settle in the renal fossa. When the upward migration trip does not occur for any reason, the kidney is forced to stay in the pelvis, which leads to a medical condition called ectopic pelvic kidney. In every nine hundred autopsy findings there was one case of incidence renal ectopia regardless of gender type [1]. Unfortunately, patients with ectopic pelvic kidney are usually vulnerable to other structural and functional deformities with an increase in the risk of complications such as vesicoureteral reflux, obstruction of PUJ, renal stones, and even kidney failure. Anatomically, the high insertion of the ureter into the renal pelvis and the narrow UPJ contributed to renal stones causing the frequent occurrence of obstruction at the UPJ among people with an ectopic pelvic kidney [2].

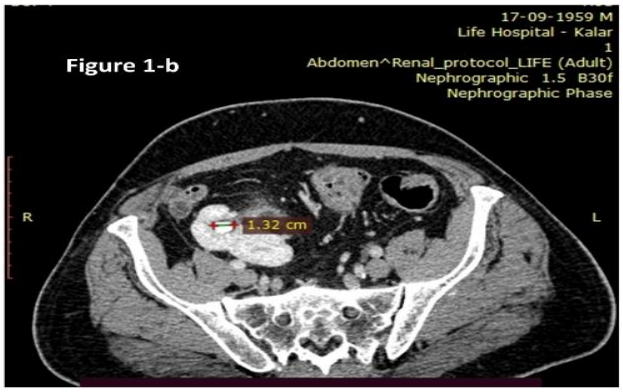
Despite different approaches known to deal with renal stones including extracorporeal shock wave lithotripsy (ESWL) [3], open pyelolithotomy, laparoscopic-assisted percutaneous nephrolithotomy (PNL), and laparoscopic pyelolithotomy, the steady development in technology sciences and the accumulation of experience in the field of ureteroscope procedures among the urologists made the flexible ureterorenoscopy (fURS) approach the main option to treat internal stones with a size of less than 2 cm [4,5]. The European guidelines for managing urolithiasis recommended fURS to treat renal stones under 2 cm as a second-line after shock wave lithotripsy (SWL). However, the recent versions of the guidelines placed fURS and SWL within the first line of renal stone treatment options, especially for stones ranging from 11 to 20 mm. This shift highlights the growing efficacy and reliability of fURS in treating kidney stones [6].

Case presentation

A 65-year-old male visited the urology clinic at the Life Hospital, Kalar City, Sulaymaniyah province, north of Iraq in September 2024. The patient initially presented with lower abdominal pain, microscopic hematuria, and dysuria. He is a chronic smoker with central obesity. The medical history reported twice cerebrovascular accidents (CVA) within the past three years, hypertension, type 2 diabetes mellitus, ischemic heart disease with prior stent placement, and atherosclerosis. He was on “Clopidogrel 75 mg” and “Aspirin 100 mg” regularly for the past

three years, however, 7 days before admission these medications were discontinued following consultation with a cardiologist. The positive past surgical history was for open pyelolithotomy through lower mid-line laparotomy incision 20 years ago. On physical examination, the patient experienced lower abdominal pain without fever. Baseline hematologic parameters were normal, while biochemical findings were borderline, including a serum creatinine level of 1.4 mg/dL and an HbA1c of 8.7%. Serum electrolytes were within normal ranges. ECG demonstrated a normal rhythm with occasional ectopic beats, and echocardiography revealed left ventricular hypertrophy with an ejection fraction of 55%. Urinalysis showed microscopic hematuria and pyuria, although the urine culture was negative for bacterial growth. Contrast-enhanced computed tomography (CT) revealed an ectopic malrotated kidney situated in the right iliac fossa, accompanied by moderate hydronephrosis and two renal stones measuring 11 mm and 13 mm (Figure 1).





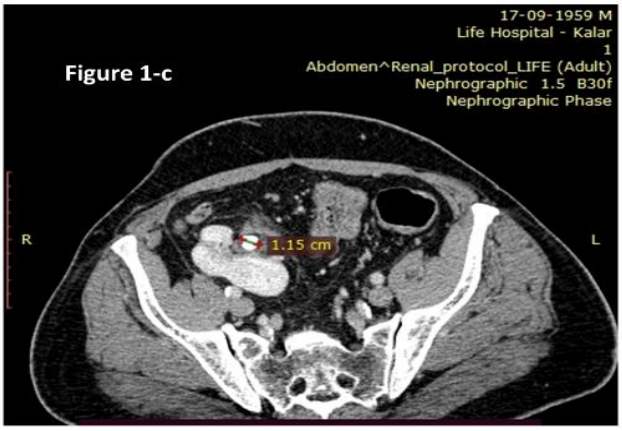
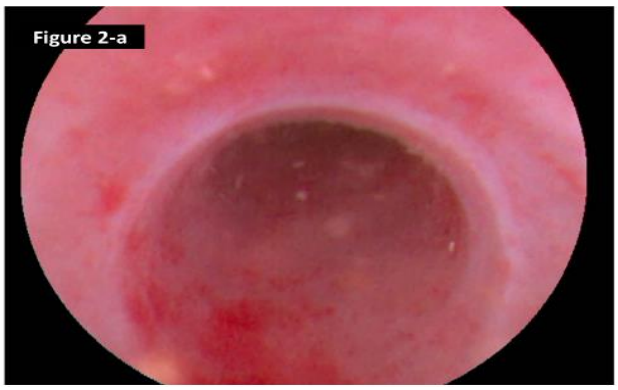


Figure 1 (a, b, c): Computed tomography (CT) revealed Right pelvic malrotated kidney with 2 obstructing stones and moderate dilatation of renal pelvis with marked thickness of urothelium (chronic infection)

Ethical approval was guaranteed by the local Ethics Committee of the Life Hospital, Kalar, (September 2024). The patient's approval and the informed consent form were taken. Detailed information about the case and the various treatment options were discussed with the patient. The flexible ureterorenoscopy (fURS) with Holmium: YAG laser with stone dusting is suggested as a more convenient approach, providing a better stone clearance with minimal operative risks than other options. Spinal anesthesia was given, and the patient received a dose of prophylactic antibiotics before being placed in the lithotomy position. A cystoscope was recruited to visualize the ureteric orifice, and a guidewire was successfully inserted. An 8 Fr Wolf semi-rigid ureteroscope (Germany) was employed to dilate the ureter. However, access to the renal pelvis could not be achieved due to the high insertion of the ureter and a kink at the ureteropelvic junction (PUJ) (Figure 2).



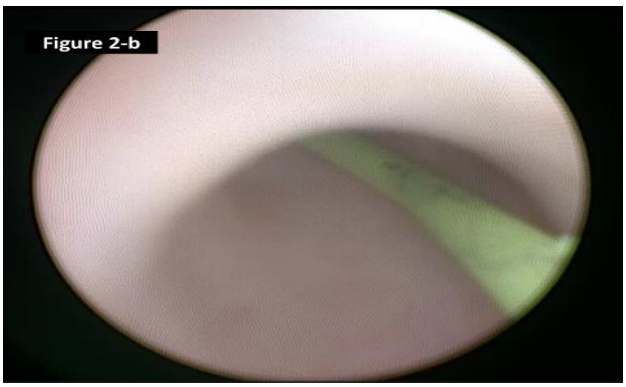


Figure 2 (a, b): Endoscopic view of PUJ which revealed highly inserted ureter in renal pelvis with marked kink with inability to pass the ureteral access sheath into renal pelvis.

The guidewire was directed toward the renal pelvis under the control of the fluoroscopic guidance, and confirmed by a retrograde pyelogram. The attempt of insertion using a 10 Fr ureteral access sheath under C-arm guidance to pass through the PUJ was unsuccessful. Subsequently, a 7.5 Fr digital flexible ureteroscope (Hug-Med Company, China) was inserted over the guidewire without the use of an access sheath. Stone dusting was performed (Figure 3) by using Holmium: YAG laser 200-micron fiber 10 frequency 1.5 Joule energy setting using 35 watts from Litho Qunta system, Italy, while maintaining a slow irrigation flow to ensure low intrarenal pressure and reduce the likelihood the risk of postoperative sepsis.

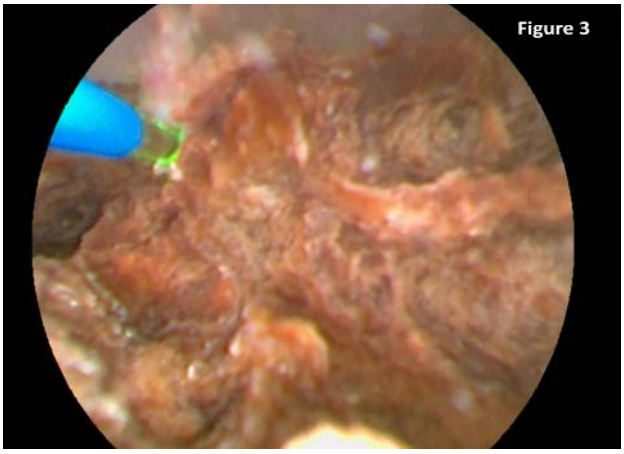


Figure 3: Endoscopic view during stone laser dusting by using flexible ureterorenoscopy and Holmium laser.

Stone clearance has been verified using fluoroscopy and careful inspection of the renal pelvis and calyces (Figure 4).

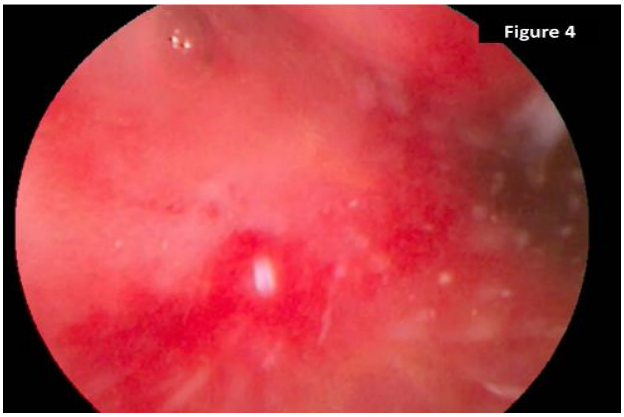


Figure 4: At the end of the procedure endoscopic view showing the renal pelvis with complete clearance

Finally, the 5 -Fr -JJ stent (Figure 5) was placed, along with a Foley catheter for postoperative management. The surgery was performed in 50 minutes, and the patient was discharged on the same day (zero days) without any instant postoperative complications. During the follow-up visit one week later, an abdominal ultrasound confirmed complete stone clearance with no evidence of hydronephrosis. The JJ stent was successfully removed two weeks after discharge.

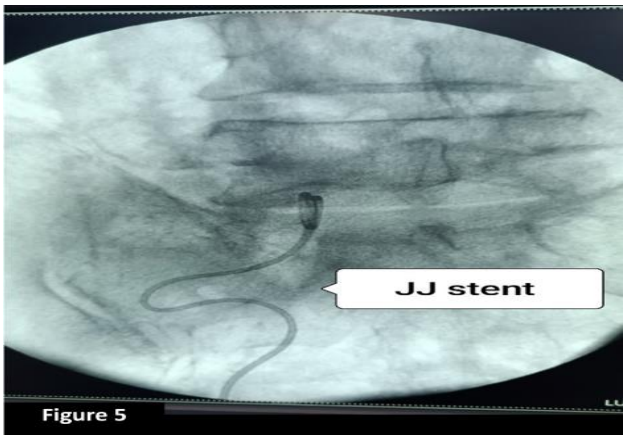


Figure 5: JJ stent placed at the end of procedure and confirmed with intraoperative fluoroscopy

Discussion

Dealing with urolithiasis in patients with anomalous kidneys including ectopic malrotated pelvic kidneys gives a special challenge to a urologist [7]. Successive innovations in equipment technology and surgical techniques coupled with significantly improved urologists' skills and experiences in ureteroscopic techniques and miniaturization of flexible ureteroscopes have greatly enhanced the safety and efficacy of fURS [8]. As a result, fURS are expected to play an increasingly pivotal role in managing urolithiasis, both in anatomically normal and abnormally positioned kidneys, in the coming years [9]. Currently, both the American Urological Association (AUA) and European Association of Urology (EAU) guidelines adopted the flexible ureteroscopy (fURS) as the primary option to treat renal stones smaller than 20 mm in diameter, while the percutaneous nephrolithotomy (PCNL) is the main option for larger stones. However, advancements in fURS techniques and equipment have led to an increasing preference for this approach over PCNL due to its lower risk profile and reduced complications [10]. Additionally, invasive procedures such as PCNL and laparoscopy most frequently cause iatrogenic damage to nearby tissues including the organs and vascular structures [8]. In contrast, the less invasive treatment like flexible ureterorenoscopy (fURS) was the suitable alternative for dealing with urolithiasis, especially in those having renal anomalies. Increasingly evidence suggests that urolithiasis can often be performed as day-procedure with a minimal complications rate [7]. Retrograde intrarenal surgery (RIRS) is characterized by its minimally invasive nature to perform a high renal stone clearance rate, coupled with excellent safety, and quick postoperative recovery. Recently, the widespread adoption of disposable electronic flexible ureteroscopes has addressed many challenges linked to traditional reusable scopes including the high cost, liability to damage, complex maintenance and disinfection process, and likelihood of cross-contamination risk [11]. Moreover, the ultra-fine 7.5 Fr flexible ureteroscope showed increased lithotripsy efficiency and reduced complication rate in treating renal stones [12].

Conclusion

In this case, two renal stones (11 mm and 13 mm) in a relatively silent right-sided pelvic renal ectopia with malrotation were diagnosed in a 65-year-old man. Findings of radiological examinations showed moderate hydronephrosis accompanied by a narrow PUJ and obstructing stone. Past medical history reported chronic cardiovascular and lifestyle-related illnesses. Past surgical history reported open pyelolithotomy through lower laparotomy incision. Several options to treat ectopic kidney stones were discussed, however, the preference was granted to flexible ureterorenoscopy (fURS). The procedure lasted fifty minutes and the patient was discharged without any post-surgical complication on the same day. Ultrasound employed one week after discharge showed complete stone clearance. Despite the fURS is a relatively new technique, however, it might be the hope for patients who are unfit for ESWL or PCNL, those who need multiple or experienced repetitive ESWL failure, obese individuals, bleeding tendency, calculi in lower calyceal or calyceal diverticular, and patients seek for single operation with higher stone clearance and lower complications rates.

Abbreviation

PUJ: Pelviureteric Junction; RIRS: Retrograde Intrarenal Surgery; fURS: Flexible Ureterorenoscopy; ESWL: Extracorporeal Shock Wave Lithotripsy; PNL: Percutaneous Nephrolithotomy; SWL: Shock Wave Lithotripsy; CVA: Cerebrovascular Accidents; ECG: Electrocardiography; CT: Computed Tomography; AUA: American Urological Association; EAU: European Association of Urology

Declaration

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Availability of data and materials

Data will be available by emailing aousjaleel@yahoo.com

Authors' contributions

Aous Abed Al-Jaleel Khaleel (AAAK) is the lead author who wrote the first draft, drew the chart, designed the table, and the research idea is his. The author read and approved the final manuscript.

Ethics approval and consent to participate

We conducted the research following the declaration of Helsinki. The ethical approval was obtained from College of Medicine, University of Diyala, Iraq.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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