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Pelvic Kidney Stone Management with Exclusive Retrograde Flexible Uretroscopy: Subjective Evaluation of Two Different Endoscopes

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Abstract

Purpose: We are presenting a single institution experience in managing ectopic pelvic kidney stones through minimally invasive flexible ureteroscopy procedure with a surgeon's subjective evaluation of two F-URS.

Patients and Methods: Nine cases of pelvic kidney had been treated with retrograde flexible ureterorenoscopy over the last 7 years in Tenon Hospital, Pierre Marie Curie University Paris, France. The prospectively selected cases included seven males and two females. Types of stones identified were brushite calculi in two patients and calcium oxalates in the rest. All of the patients were followed up by Non-contrast CT scan one month afer the operation.

Results: The mean operative time was 82 minutes. The stone-free rate was 91% (9 patients). One patient had a residual caliceal fragment that was treated with shockwave lithotripsy. There were no complications. The mean hospital stay was 48hr.

Conclusion: Flexible Ureterorenoscopy with holmium laser is feasible, safe, and effective for the treatment of stones in pelvic kidneys.

Introduction

Ectopic pelvic kidney can develop when a kidney fails to ascend to its normal location in the renal fossa and remains opposite to the sacrum and below the aortic bifurcation. It has been reported that one out of 2200 to 3000 live births will have a pelvic ectopic kidney [1]. Anatomical anomalies that can take place throughout the renal system can potentially cause a major impact on renal function and ectopic kidney is no exception. In the case of ectopic kidney total or partial obstruction of ureter or vessels can occur due to malrotation of the pelvic ectopic kidney and renal pelvis being positioned anteriorly [2].

Urolithiasis being fairly common presentation, it can cause a major negative impact on the quality of life for the patient. Hence, huge advancements were introduced to shiG the stone management from an open to a minimally invasive approach.

The challenge in case of pelvic kidney stone lies in the management approach with regard to the kidney location. Pelvic kidneys lie in the retro-peritoneum space which will be protected between Bowel loops and abdominal wall anteriorly and the pelvic bone posteriorly. In addition to the abdominal vessels and anomalous vasculature which will escalate the challenge even more. Traditionally, a calculus in a pelvic ectopic kidney has been approached by open surgery due to abnormal position and potential risk of injuring adjacent structures. Alternatively, Extracorporeal shock wave lithotripsy (ESWL) and percutaneous nephrolithiotomy (PCNL) with laparoscopic assistance have been described in many studies as feasible modalities of treatment in pelvic kidney stones [3]. Some studies reported the outcome of flexible ureteroscopy (F-URS) in treating stones in ectopic pelvic kidneys. However, in this study our aim is to compare the flexible ureteroscopes to evaluate which scope provides surgeons with the best maneuverability.

Patients and Methods

Study Design

This is a prospective cohort study carried over 7 years. During the study period, 9 cases of pelvic kidneys. These cases were managed by F-URS with holmium laser by a single surgeon (O.T). Inclusion criteria included any patient with pelvic kidney stones and fit to undergo general anesthesia and surgery. Two patients underwent ureteroscopy 6 years prior to their pre-

sentation. Pre-operative work-up was conducted in all patients which included blood, urine as well as renal ultrasound or CT scan.

Procedure Description

F-URS was performed for all patients under general anesthesia in a lithotomy position. Prophylactic parenteral antibiotics were administered to all patients. The used access sheaths were 9.5/11Fr and 12/14Fr (Flexor). Holmium laser was carried out using fibers (200 μm and 273 μm), which were used according to stone location if repositioning was impossible. Double-J stent was installed postoperatively for all patients. Double-J stent was removed within 10-14 days postoperatively. Renal Ultrasound or CT scan was performed in those patients 6 weeks post removal of Double-J stent as a follow-up.

Results

Nine patients with pelvic kidney stone operated using F-URS which were done over the last 7 years required 14 sessions of ureteroscopy. Seven of these patients were males and 2 females. Our patients had a mean age of 46 years (ranges 25-66 years). More Patients information like demographics, stone description, history of previous procedures and current procedures details are shown in Table.1. Stone analysis revealed calcium oxalate to be the most common type of stones which was found in 7 (77.8%) of patients. Five (55.5%) of patients underwent a two-stage therapy (a total of 10 sessions) and 4 (44.5%) patients had a single session. URF-P5 (Olympus) and Flex-X2 (Storz) were exclusively used for this study. Each scope was used in 7 sessions. Uretroscopy specifications are shown in Table.2. We used a 9.5-11Fr and 12/14Fr access sheaths (Flexor). Flex-x2 was compatible with both access sheath sizes; however, URF-P5 was compatible with the 12/14Fr size only, which gave an advantage to the Flex-x2 (Storz) to be used in first stage in unprepared ureters. Complete exploration of the calyceal system was successful in all cases.

Complete clearance was achieved for 8 (88.9%) of patients. On the other hand, one patient had a residual fragment of 6 mm, which was completely asymptomatic; therefore, the patient had decided not to undergo a second session. The mean operative time was 82+/-. No complications such as false passage, bleeding or post-operative fever, pyelonephritis or major complications such as stricture, avulsion, urinoma, and urosepsis were encountered.

A single surgeon (O.T) performed all the sessions. He subjectively evaluated the maneuverability of both ureteroscopy.

Table 1. Study characterstics.

Patients number		**9**
Age (years)	Mean	46
	Range	25-66
Sex	Male	7
	Female	2
Comorbidities	Diabetes Mellitus	0
	Hypertension	0
	Cerebral vascular disease	0
Stone side	Right	2
	LeG	7
Stone location	Superior calyx	1
	Middle Superior	4
	Inferior Superior	6
Stone size	< 7 mm	1
	> 7 mm	8
Stone type	Calcium Oxalate	7
	Brushite	2
Previous treatment	Ureteroscopy	2
	SWL	0
	Open surgery	0
Mean procedure time (minutes)		81.4
Number of procedures	One stage	4 patients (4 sessions)
	Two stages	5 patients (10 sessions)
Success rate (%)		8/9 (88.89 %)
Mean hospital stay (day)		2
Complications rate (%)		0 / 9 (0%)

Table 2. Flexible ureterscopes (Flex-X2 & URF-P5) specefications.

Scope type	FLEX-X2	URF-P5
Initial Diameter	7.5 fr	5.3 fr
Terminal Diameter	8.4 fr	8.4 fr
Working Channel	3.6 fr	3.6 fr
Up deflection	270	180
Down deflection	270	275
Field View	90	90
Deep field vision	2 to 50 mm	2 to 50 mm

Figure 1. Sbjective ealuation of ureteroscopes.

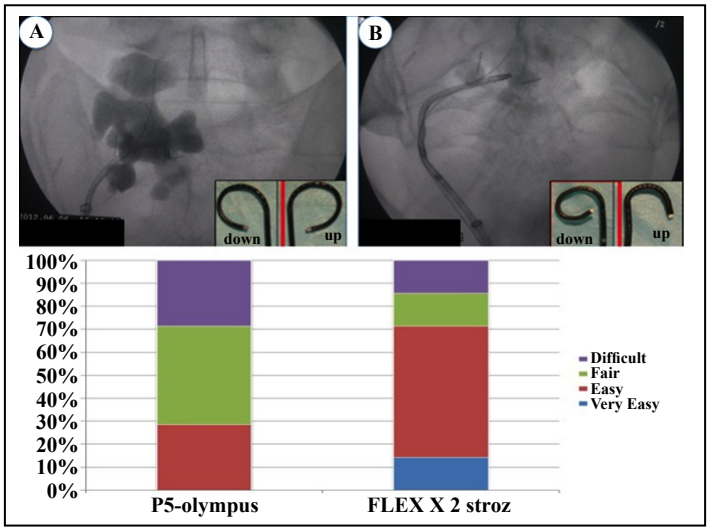
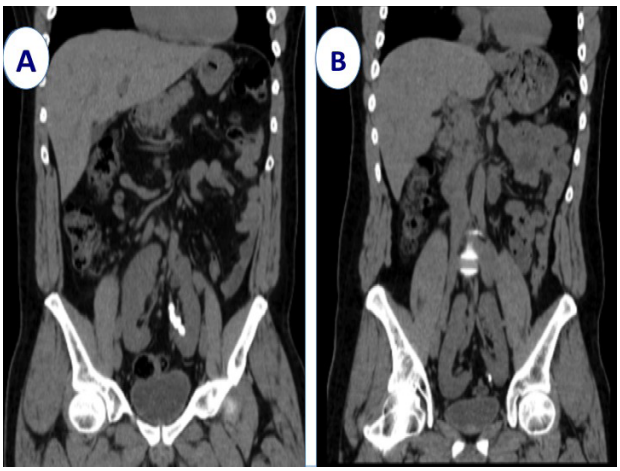


Figure 2. Free stone rate.



Flex-x2 was easier to use (easy and very easy) to treat ectopic pelvic kidney stones compared to URF-P5 (71.4% vs. 28.5%). Full exploration of both ureteroscopes with detailed subjective evaluation is demonstrated in (Figure 1).

Discussion

In the field of endourology, pelvic kidney stone management has been an area of challenge. In this study used F-URS as a different approach for managing this pathology. The anomaly of the pelvic kidney has not been proven to increase the risk of disease compared to normally located kidney except in urolithiasis and hydronephrosis [4]. And the cases of urolithiasis, it is common to be associated with urinary stasis or infection [5]. Illustrated that patients with anomalous kidney have metabolic abnormalities which may help in stone formation and suggested that they have to go under metabolic screening for initiating preventive measures [6].

In one study which included six pelvic kidneys with a mean stone size of 168.83 mm^2 (+/- 101.71) reported a 66.6% free stone rate aGer a single session. Also the study reported two complications in his series which included renal colic and pyelonephritis [7]. Other study reviewed twenty-six patients with pelvic kidney stones who underwent F-URS (Flex-X2) with free stone rate 65.3%, 19.2% had residual fragments < 2mm, and 15.4% failed due to impaired passage of fragments or in-

ability to reach the stone. The study yield some postoperative complications in 5 patients which included persistent hematuria, postoperative fever, urinary tract infection and two patients with renal colic [8].

The endourological approach to stone in ectopic kidneys needs appropriate tools, skills and experience. In addition to that, Pelvic kidney has a tortuous ureter, which limits flexible ureteroscope navigation and deflection. To our knowledge There are no papers published yet about the subjective evaluation between the two types of flexible ureteroscopes in treating pelvic ectopic kidney stone. In our study we analyzed the efficacy of treating ectopic pelvic kidney stones by flexible ureteroscopy and reported the subjective evaluation of both flexible ureteroscopes. Our free stone rate was achieved in 88.9% of cases which is demonstrated by (Figure 2). Only One patient with a residual stone of 6 mm refused any auxiliary procedures aGer the first session since he became asymptomatic.

Our subjective evaluation demonstrated that Flex-x2 (Storz) was easier to use in pelvic ectopic kidney mostly because of higher range of deflection which makes it easier to navigate in tortuous ureters as well as the smaller diameters. One more advantage of using Flex-x2 is its compatibility with smallest ureteral access sheaths since these unprepared ureters in such congenital anomalies are usually more or less tighter than those found with normal kidneys [9].

Conclusion

Our results demonstrate that pelvic kidney stones can be managed by F-URS with a high success and low complication rates. Nonetheless, studies with larger sample sizes are required to draw a strong recommendation. Furthermore, advancement of F-URS and having a variety of ureteroscope options will not only help to treat stones in such difficult cases by a minimally invasive approach, but also gives more chances to individualized treatment.

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