Flexible Ureterorenoscopy Management of Calyceal Diverticular Calculi

Houmeng Yang, Xuping Yao, Chunbo Tang, Yuxi Shan, Guobin Weng*

Objective: To introduce flexible ureterorenoscopy with holmium laser lithotripsy in the management of symptomatic caliceal diverticular calculi.

Materials and Methods: The records of 26 patients who underwent flexible ureterorenoscopy and lithotripsy with holmium laser to manage symptomatic caliceal diverticular calculi from January 2012 to June 2016 were retrospectively reviewed.

Result: Flexible ureterorenoscopy lithotripsy was successfully placed in all 26 patients. Twenty-two cases accepted lithotripsy at the same time, and the success rate was 84.6%. The stone-free rate was 76.9%.The mean operative time was 48 ± 16 minutes. The mean hospital stay was 4.8 ± 1.6 days. There was no evidence of stone regrowth or recurrence at a mean follow-up of 11.5 months.

Conclusion: Flexible ureterorenoscopy with holmium laser lithotripsy is safe and effective, and it can be offered as a first line therapy for symptomatic caliceal diverticular calculi.

Keywords: flexible ureterorenoscopy; stone disease; caliceal diverticula; ultrasound; puncture

INTRODUCTION

Calyceal diverticula are rare renal anomalies in the renal parenchyma that result in nonsecretory, urothelial-lined cavities that are filled with urine refluxing from an adjacent collecting system[1,2]. The connection between diverticula and the collecting system may be often very small and has limited drainage, resulting in infection and stone formation. Diverticula are more commonly associated with the upper and mid-calyceal systems. Although mostly asymptomatic, the indications for treatment of the calyceal diverticular calculi are related to flank pain, hematuria, and recurrent infection[3]. Current treatment options for the stone-bearing diverticula include extracorporeal shock wave lithotripsy (SWL)[4,5],percutaneous nephrolithotomy (PNL)[6,7], flexible ureterorenoscopy lithotripsy (F-URSL)[7,8], and laparoscopic approaches[9]. In recent years, F-URSL has been most commonly accepted by urologists for treating the stone-bearing diverticula because it iss less invasive and more efficient.

MATERIALS AND METHODS

The records of 26 patients who underwent flexible ureterorenoscopy (7.5F Storz) with holmium laser lithotripsy to manage symptomatic calyceal diverticular calculi from January 2012 to June 2016 were retrospectively reviewed. The demographic data and medical information were obtained from their medical records and charts (**Table 1**). All patients were evaluated by medical history, physical examination, complete blood count, plasma urea and creatinine values, coagulation profiles, urinalysis and urine cultures. Urinary infection was treated with appropriate antibiotics before the operations. Six patients received a JJ stent through cystoscopy outpatient two weeks before F-URSL, but the other patients refused the procedure. For 5 patients, prior treatment with SWL was unsuccessful. All patients underwent CT urography before the operation (**Figure 1**).

F-URSL procedures were best performed under general anesthesia with the patient placed in the lithotomy position. Rigid ureteroscopy (8/9.8F Wolf) was routinely performed before flexible ureterorenoscopy in all patients to dilate the ureter and place a hydrophilic guidewire into the renal pelvis. Thereafter, a ureteral access sheath (12-14F Cook) was passed over the hydrophilic guidewire as far as the ureteropelvic junction. When the access sheath could not be advanced easily, the stent was remained for 2 weeks before repeating the procedure. The flexible ureterorenoscopy was inserted through the ureteral access sheath to identify the diverticular neck. If necessary, it was guided by ultrasound (**Figure 2**)or used the Blue Spritz technique. The diverticular neck was gradually incised with a 200μm holmium laser probe and the stones were fragmented until they were deemed small enough to be passed spontaneously (**Figure 3**). The small fragments were flushed out of the diverticulum or extracted using Nitinol stone baskets (1.7 F Cook). A JJ stent was placed at the end of the procedure, if possible, it was placed with the upper segment within the diverticulum or the calyces, which was removed approximately 2-4 weeks postoperatively. A KUB was obtained to observe the position of the JJ stent□Renal ultrasound was conducted to observe per

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Table 1. Demographic characteristics and surgical statistics

Variable	Value
Gender(n)	
Male	11
Female	15
Age (years)	35.2 ± 13.6 (25-62)
Stone burden(mm)	12.3 ± 4.8 (0.8-18.6)
Location of diverticula (n)	
Upper pole	12
Middle pole	9
Lower pole	5
Surgery time (min)	48 ± 16 ± (37~84)
Success rate	84.6%
Symptomatic success	84.6%
Stone-free rate	76.9%
Hospitalization time (day)	4.8 ± 1.6 (4~9)
Complications(Clavien I-II) (n)	4
Fever	3
urine leak	1

inephric effusion or hematoma two days after surgery. A spiral CT was performed 1 month postoperatively to evaluate the status of the stones. Symptom-free status was assessed at 2 months postoperatively. Evaluation and scoring of complications were based on the modified Clavien-Dindo classification[10].

RESULTS

The 26 patients included 11 males and 15 females, the average patients' age was 35.2 ± 13.6 years (range, 25-62). All patients had unilateral calyceal diverticulum calculi, with 12, 9,and 5 cases having calyceal diverticular calculi in the upper pole, middle pole and lower pole of the kidney respectively. Sand-like stones were observed in some calyceal diverticula. The average diameter of the stone was 12.3 ± 4.8mm. The presenting symptoms were flank pain (80.8%), recurrent infection(34.6%) ,and hematuria(19.2%)

F-URSL was successfully placed in all 26 patients. Twenty-two cases accepted lithotripsy at the same time, and the success rate was 84.6%. The stone-free rate was 76.9%. Twenty-two patients were symptom free after the operation. The mean operative time was 48 ± 16 minutes. The mean hospital stay was 4.8 ± 1.6 days. Caliceal diverticula were not found in 4 cases under flexible ureterorenoscopy. Two cases accepted mini-PNL while 2 cases refused further treatment. There was no evidence of stone regrowth or recurrence at a mean follow-up of 11.5 months. Four patients suffered from complications (Clavien I-II). Three patients had

Figure 1. Left upper pole diverticulum .

postoperative fever, which was treated medically. One patient suffered from urine leak for the JJ stent bend, the perirenal effusion was absorbed 2 weeks later after repositioning of the JJ stent.

DISCUSSION

The pathogenesis of calculi within calyceal diverticula remains controversial and appears to be multifactorial. Although the most common hypotheses include urinary stasis and metabolic derangements, the exact mechanisms of stone development in diverticula are unknown[11,12]. Most asymptomatic calyceal diverticular calculi do not require treatment. The indications for treatment of the calyceal diverticular calculi are related to flank pain, hematuria, and recurrent infection. Current treatment options of the stone-bearing diverticula include SWL,PNL,F-URSL and laparoscopic approaches. Although technically simpler and potentially safer, stone-free rates with SWL have not been comparable with PNL and F-URSL methods[13]. Batter and Dretler utilized F-URSL in 26 patients with symptomatic calyceal diverticula, and, 18(70%) of the cases were treated successfully[1]. In recent years, more and more urologists have chosen to use F-URSL because it is less invasive and more efficient. Before performing F-URSL, urinary infection must be treated with appropriate antibiotics. Perioperatively, broad-spectrum antibiotic prophylaxis should be instituted. Imaging information (IVP or CTU) should be available to provide a road map

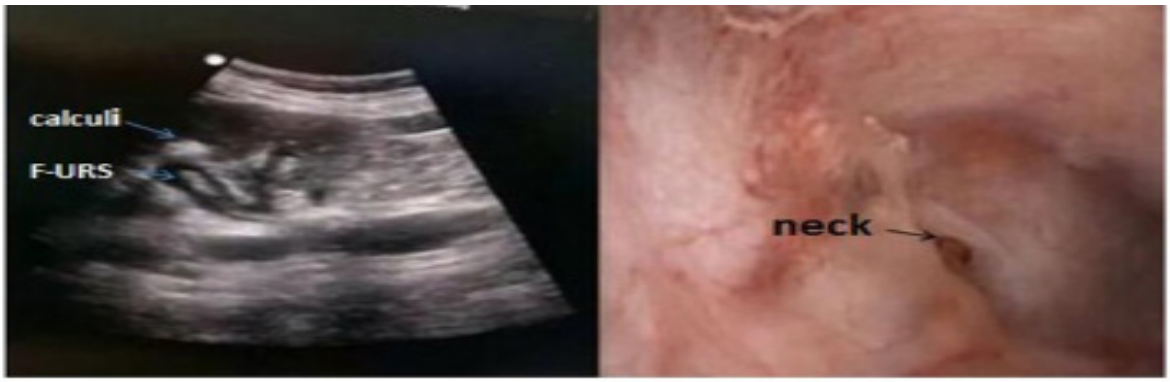

Figure 2. Look for the diverticular neck guided by ultrasound.

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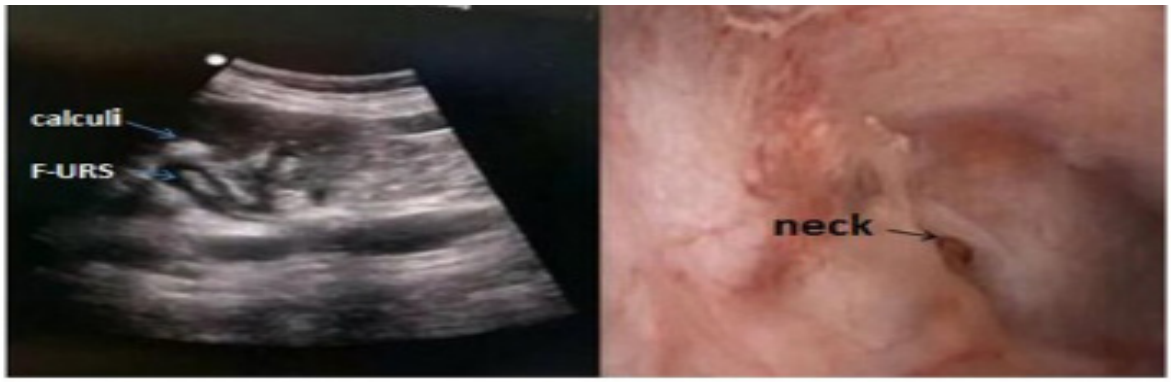

Figure 2. Look for the diverticular neck guided by ultrasound.

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