Endourology

Retrograde intrarenal surgery in atretic calyceal diverticular stone, a case report

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ABSTRACT
Renal calyceal diverticulum is congenital outpouchings of the renal calyx and communicate with the main collecting system via a narrow channel. Stones have reportedly been found in up to 50% of diverticulum. Surgical intervention is indicated for symptomatic stone. Stenotic infundibulum had been reported but seldom literature reported of calyceal diverticular atresia. Here we presented a case of atretic calyceal diverticular stone which successful managed by retrograde intrarenal surgery safely.

Introduction
Renal calyceal diverticulum is a relative rare renal congenital abnormalities. It is congenital outpouchings of the renal calyx and communicate with the main collecting system via a narrow channel. The prevalence is reported to be 0.21–0.6% of intravenous pyelography (IVP). It is more common located at the upper pole kidney, stones have reportedly been found in up to 50% of diverticulum. Surgical intervention is indicated for symptomatic stone. Retrograde intrarenal surgery (RIRS) is a better option due to great stone free rate than extracorporeal shockwave lithotripsy (ESWL), as well as lower complication rates than percutaneous nephrolithotripsy (PCNL) or laparoscopic surgery. Stenotic infundibulum had been reported but seldom literature reported of calyceal diverticular atresia. Here we presented a case of atretic calyceal diverticular stone which successful managed by RIRS safely.

Case presentation
This is a 44-year-old female healthy patient, who was referred to our urology department due to incidentally finding of right renal stone during health examination. She denied previous renal stone or therapy history. The X-ray of Kidney-Ureter-Bladder (KUB) revealed a stone about 1 cm located at right renal upper calyx. After confirmed by IVP, therapy of ESWL was arranged. One week later, the post-ESWL KUB revealed that the stone had been fragmented and split but stood still within the upper calyx (Fig. 1). Under suspicious of calyceal diverticular stone with stenotic infundibulum, we discussed the further management including surveillance since she was asymptomatic, PCNL or RIRS. She felt psychological discomfort since right renal stone was diagnosed, and she favored RIRS due to no additional operative wound. So we arranged the surgery 1 week later. During the operation, neither stone nor stenotic calyceal opening can be identified under flexible ureteroscope, even the Blue Spritz technique. So we used mobile C-arm fluoroscopy X-ray to locate the stone, then finally we found the exact stone location. It stood behind to a sealed calyceal opening, which looked like an erythematous membrane wall (Fig. 2). Holmium laser which prepared for lithotripsy was get ready for incise the atretic wall. Then we found much of fragmented stones inside the cavity. Therefore, the diagnosis was confirmed: right renal calyceal diverticulum atresia with stone. So we keep dusting those fragmented stones inside the cavity. After complete dusting, we were intended to place the proximal end of double J stent into the diverticulum. However, post-operative KUB revealed it was just placed at the renal pelvis. The surgery was performed uneventful. She was discharged the next day of surgery, and removed JJ stent 2 weeks later. The follow up KUB at 2 and 4 weeks later showed no more visible right renal stone. At last, we planned to follow up KUB 6 months later, then annually.

Discussion
Renal calyceal diverticulum is classified as two type: type 1 communicating with minor calyx or infundibulum, and type 2 emanating from the renal pelvis or major calyx. Type 2 diverticulum is larger, located in the kidney central part and tend to be symptomatic. Our
patient is asymptomatic type 2 calyceal diverticulum, which located at upper pole. Asymptomatic cases can be managed with surveillance or minimal invasive therapy. The treatment of symptomatic calyceal diverticular stone including ESWL, PCNL, RIRS and laparoscopic surgery, according to such factors as diverticulum location, stone burden and size. In general, ESWL can be the first line therapy for all calyceal diverticular stones, wherever stone location. In case of ESWL failure, PCNL is indicated for lower and posterior diverticulum which the puncture must be directly targeted to the stone. RIRS is indicated for upper and middle, anterior, or posterior diverticulum. Laparoscopy surgery can be indicated for anterior, middle, and lower or upper diverticulum. The stone free rate is improving under RIRS in recent years, and it is a trend to perform RIRS for all type of diverticular stone.

For our patient, her stone located at upper pole which can be easily approach by flexible ureteroscope in theory, but we found nothing in every calyces. A method called Blue Spritz technique, where methylene blue is instilled into the collecting system and then suctioned out. Once saline irrigant is reinstilled, residual blue dye in the diverticulum wound escape, aiding to identifying the ostium of diverticulum. However, it was failure in our patient too. Zhang et al. reported a method when the diverticulum was still not found under Blue Spritz technique. Instillation of methylene blue into the diverticulum via the ultrasonography guidance puncture. Then diverticulum ostium would be identified. However, the surgical position had to place in oblique supine lithotomy position, which is more difficult and time consuming than traditional lithotomy position. Although the ostium cannot be identified, there was a mild erythematos membrane like wall just located at the suspicious upper calyceal region. Atretic calyceal diverticulum was impressed. So we called mobile C-arm fluoroscopy X-ray and success identify the exact diverticular stone location finally, followed by Holmium laser incision and stone dusting. The mobile C-arm cannot be regular use in every RIRS due to our hospital policy and lack of facilities.

Conclusion

There was limited case report picture of atretic calyceal stone managed by RIRS. We share a case and picture of atretic calyceal diverticulum with stone and successful managed by RIRS under assistance of mobile C-arm X-ray. It is safe and feasible using RIRS to performed lithotripsy in calyceal diverticular stone.

Statement of no conflict of interest

All the authors (Woei Ming, Ng) do not receive payment or services from a third party (government, commercial, private foundation, etc.) for any aspect of the submitted work and do not have financial relationships (regardless of amount of compensation) with entities as described in the instructions and do not have any patents, whether planned, pending or issued, broadly relevant to the work.
Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.eucr.2019.100840.

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