Trapped Flexible Ureteroscope in Ureteral Access Sheath During Retrograde Intrarenal Surgery: An Unexpected Problem

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Abstract

Background: Instrument-related complications occur occasionally with the use of flexible ureteroscopes. In this study, we present a unique problem related to instrument malfunction of flexible ureteroscope during retrograde intrarenal surgery.

Case Presentation: A 60-year-old male patient with a 1.2 cm left upper ureteral stone initially underwent semirigid ureteroscopic laser lithotripsy and during the procedure the stone got repulsed into middle calix of the kidney. Subsequently, a 9.5F (internal diameter) ureteral access sheath was placed and using URF P6R flexible ureteroscope (Olympus) the stone was completely dusted with holmium laser. At the end of the procedure, the operating surgeon was unable to remove the ureteroscope out of the ureteral access sheath as it was getting stuck inside. On careful inspection under fluoroscopy, it was noticed that there was a partial break in the outer surface of the flexible ureteroscope at the level of the junction of the distal flexible part of the ureteroscope with the shaft. Since multiple attempts to retrieve the ureteroscope into the access sheath failed, a decision was made to pull the ureteroscope and ureteral access sheath as a whole over a 0.035" terumo guidewire. Gentle traction was applied on the entire assembly and the instrument was withdrawn out of ureter over the guidewire under fluoroscopic guidance. A lateral angulation of the distal flexible portion with the shaft of the flexible ureteroscope caused by breakage of the fiber-optic cables led to this problem intraoperatively.

Conclusion: Breakage of fiber-optic cables caused by excessive manipulation of flexible ureteroscope during retrograde intrarenal surgery can lead to entrapment of the ureteroscope within the ureteral access sheath. This problem might be solved by gently withdrawing the whole assembly out of the ureter over a guidewire.

Keywords: flexible ureteroscope, ureteral access sheath, instrument

Case Presentation

A 60-YEAR-OLD male patient with no known comorbidities presented to us in emergency with severe left flank pain for 5 days duration. On evaluation he was found to have a 1.2 cm left upper ureteral stone. His blood work-up was within normal limits and initially a 4.8F Double-J stent was placed (Fig. 1). After 2 weeks he was planned for ureteroscopic stone removal. During ureteroscopic laser lithotripsy with 6/7.5F semirigid ureteroscope, the upper ureteral stone got repulsed into middle calix of the kidney. The procedure was converted to retrograde intrarenal surgery by placing a 35 cm Flexor® UAS (COOK) of 9.5F internal diameter into the ureter. Using fiber-optic flexible ureteroscope (fURS [URF P6R; Olympus]) the stone was ablated with Holmium laser using 200 µm laser fiber at 0.6 J energy and 10 Hz frequency.

During the final stage of dusting the stone the operating surgeon noticed development of multiple black spots on the screen (Fig. 2a). After complete dusting of the stone while trying to remove the fURS the surgeon found that it was getting stuck in the ureteral access sheath (UAS). On careful inspection under fluoroscopy, it was noticed that there was a partial break in the outer surface of the fURS at the level of the junction of the deflecting distal part of fURS with the shaft (Fig. 2b). Multiple attempts to gently pull the fURS into the UAS failed as every time the fURS was getting stuck at the distal end of the UAS. Then a 0.035" Terumo guidewire was passed through the working channel of fURS and under fluoroscopy guidance the whole fURS and UAS assembly was gently pulled out of the ureter over the guidewire. The procedure was finished after placing a 4.8F Double-J stent over the guidewire.

FIG. 1. X-ray kidney, ureter, and bladder radiograph showing left upper ureteral stone with Double-J stent *in situ*.

We noticed that a lateral angulation of the distal flexible portion with the shaft of the fURS being the reason for the ureteroscope getting stuck in the UAS (Fig. 3a). On leak testing we also noticed an air leak at the same site (Fig. 3b).

Discussion

Flexible ureteroscopy and laser lithotripsy has been increasingly used nowadays for management of upper tract stones. Owing to the high cost of digital fURS, still fiber-optic fURS are the most frequently used ureteroscopes for treatment of renal stones. Unlike semirigid ureteroscopes, flexible ureteroscopes have some unique instrument-related problems while performing ureteroscopy. There are instances where the fURS got stuck within the urinary tract because of various reasons. Huynh et al.¹ reported two cases of retained

digital flexible ureteroscopes while treating upper ureteral calculus caused by accordion-like distortion of the outer sheath of the ureteroscope. For removing the fURS, they used orthopedic bolt cutters in one case and in another the procedure was even converted to open surgery. Gadzhiev et al.² reported a “Valve Type” retainment of fURS in distal ureter caused by impaction of stone fragments between distal ureter and fURS. Use of muscle relaxants and gentle rotational, back and forth maneuvers with moderate traction helped them in retrieving the fURS.

The fURS used in the index case was a reusable fiber-optic ureteroscope, which had been in use with us for more than a year. After the last repair, it has been used in around 15 cases without any problem. The fURS was perfectly normal before using in the index case, as it was checked by the attending nurse for any air leak or any bent in the distal flexible portion of the ureteroscope. The fURS got entrapped within the UAS because of lateral angulation of the fURS at the junction of the distal flexible portion and the shaft of the fURS. Damage to fiber-optic cables because of excessive manipulation of the ureteroscope while reaching the stone in the middle calix led to lateral angulation of the ureteroscope and multiple black spots on the image.

Withdrawing the fURS and UAS in one piece over a guidewire with gentle traction and rotational movement helped us in retrieving the ureteroscope. Suppose even with gentle traction the entire assembly does not come out, then the entire assembly can be kept *in situ* in the ureter and the procedure abandoned for the moment. After 48 hours the patient can be taken up again under anesthesia and a repeat attempt of pulling the entire assembly can be done as by this time the ureter could have dilated passively. If this fails, then orthopedic bolt cutters can be used to cut the ureteroscope at the junction of the shaft and handle of the ureteroscope and then attempt to pull the entire assembly out of the ureter over a guidewire. As a last resort open exploration should be done if everything fails.

Canales et al.³ in their independent analysis of Olympus flexible ureteroscope repairs reported that the distal segment was the most common repair site requiring repair (30%), with 87% of these repairs requiring replacement of the bending rubber. Similarly, in this case also the bending rubber sheath over the distal segment was also at fault as confirmed by air leak test. Although we were able to salvage the situation without compromising the patient's safety, it becomes pertinent to thoroughly check the fURS before and after using

FIG. 2. (a) Showing multiple black dots seen on the screen. (b) Intraoperative fluoroscope image showing discontinuity/break in the distal flexible portion of the fURS (arrow). fURS, flexible ureteroscope.

FIG. 3. (a) Showing lateral angulation defect of the distal flexible portion of the fURS with the shaft. (b) Showing air leak at the site of the lateral angulation defect of the ureterscope.

the same. Based on the aforementioned problems faced during ureteroscopy we caution endourologists doing flexible ureteroscopy to be vigilant while withdrawing the ureterscope at the end of the procedure and whenever they feel resistance do not try to pull the ureterscope with force or else they can land up in a major complication such as ureteral avulsion.⁴

Conclusion

Breakage of fiber-optic cables caused by excessive manipulation of flexible ureterscope during retrograde intrarenal surgery can lead to entrapment of the ureterscope within the ureteral access sheath. This problem might be solved by gently withdrawing the whole assembly out of the ureter over a guidewire.

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Abbreviations Used

fURS = flexible ureterscope
 UAS = ureteral access sheath

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