Improved Durability of Flex-Xc Digital Flexible Ureteroscope: How Long Can You Expect It to Last?

Razvan Multescu, Bogdan Geavlete, Dragos Georgescu, and Petrisor Geavlete

OBJECTIVE To retrospectively analyze a significant number of flexible ureterorenoscopic procedures performed with the Storz Flex-Xc model to evaluate its durability.

MATERIALS AND METHODS Between May 2012 and May 2013, all the flexible ureteroscopic procedures performed with 3 Storz Flex-Xc flexible ureteroscopes were analyzed. Relocation of the lower pole stones was performed in all cases when possible. In the second and third series, the access sheath was retracted together with the flexible ureteroscope, thus preventing the damages, which its distal part may inflict on the flexed endoscope.

RESULTS A total of 406 procedures were performed on 372 patients: first endoscope used on 96 procedures (90 patients), second one on 151 procedures (139 patients), and third one on 159 procedures (143 patients). Ureteral access sheath was used in 71.4% of the cases. The first endoscope was used for 67.1 hours, the second for 107.7 hours, and the third one for 107.2 hours. Major repairs were needed after significant damages of the outer coating (first endoscope) and severe deterioration of the deflecting mechanism (second and third endoscopes).

CONCLUSION The digital Storz Flex-Xc seems to be a durable model of flexible ureteroscope. The use of ureteral access sheath and avoidance of overstressing the deflection mechanism by relocating lower pole stones seem to offer substantial advantages in prolonging the lifespan of these expensive instruments. UROLOGY 84: 32–35, 2014. © 2014 Elsevier Inc.

Flexible ureteroscopy is probably one of the most important additions in modern endourology. During the last decades, the initial very fragile and difficult to maneuver endoscopes were the subject of numerous innovations and technological developments, becoming very useful diagnostic and therapeutic instruments in upper urinary tract pathology. The improved durability, substantial miniaturization, and the introduction of digital endoscopes were the main goals while aiming to increase the efficacy of this type of procedures. Nowadays, flexible ureteroscopy is a routinely used method in many centers.

However, despite the recent achievements, there is still room for further improvements of these instruments and of the respective techniques. In this regard, increasing the lifespan of an expensive endoscope is a worthwhile purpose. The aim of our study was to retrospectively analyze the flexible ureterorenoscopies performed with the Storz Flex-Xc digital flexible device and to evaluate its durability and possible ways to prolong its lifespan.

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From the Department of Urology, Saint John Clinical Emergency Hospital, Bucharest, Romania

Reprint requests: Razvan Multescu, M.D., Ph.D., Department of Urology, Saint John Emergency Clinical Hospital, Vitan-Barzesti 13, Sector 4, 042122 Bucharest, Romania. E-mail: razvanmultescu@yahoo.com

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MATERIALS AND METHODS

Between May 2012 and May 2013, all the flexible ureteroscopic procedures performed with 3 new Storz Flex-Xc digital flexible ureteroscopes were analyzed.

The 3 endoscopes were used consecutively, each being new when its usage period started. The flexible ureteroscopic approach was performed by a single expert urologist (G.P.), with more than 1000 flexible ureteroscopies performed in the past and previous experience with this particular endoscope model. It was applied for diagnostic purposes, treatment of upper urinary tract urothelial tumors, or urolithiasis. All procedures were performed in a standardized manner starting with the passing of a Teflon-coated guide wire in the collecting system and the ureteral dilation when necessary. This last maneuver was applied mostly in relation with ureteral access sheath use and was performed using progressive size ureteral dilators or the access sheath itself.

The endoscope insertion was simple, on the guide wire, for the diagnostic procedures and small calculi, whereas in cases of tumor formations and larger urolithiasis, it was preceded by the indwelling of a 12/14F or 10/12F Flexor Cook ureteral access sheaths. The relocation of stones situated in the lower pole was performed in all cases in which it was possible. The only procedural difference between the series was that in the second and the third one, the access sheath was retracted together with the endoscope, thus preventing the damages, which its distal part may inflict on the flexible ureteroscope. In that regard, precautions were taken to keep the entire deflectable tip of the

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Table 1. Intraoperative characteristics of the 3 studied groups

Studied Parameter	Group I	Group II	Group III
Number of procedures	96	151	159
Diagnostic procedures	8	24	25
Mean operative time for diagnostic procedures	8	10	11
Treatment procedures	88	127	134
Mean operative time for treatment procedures	45	49	48
Mean lower pole time for treatment procedures	8	12	14
Deflection loss (up/down)	32.8/54.1%	34.5/56.7%*	33.3/58.5%*

* Before the last ureteroscopy (during the last intervention deflection was completely lost).

endoscope outside the distal part of the access sheath when extraction was performed.

After the procedure, the endoscope was washed, cleaned, and stored with the flexible segment straight, in the case provided by the manufacturer. The sterilization method applied was complete immersion in and flushing of the working channel with Cidex.

RESULTS

In a interval of 13 months, a total of 406 procedures were performed on 372 patients: 96 procedures on 90 patients using the first flexible ureteroscope, 151 procedures on 139 patients using the second one, and 159 on 143 patients using the third one (Table 1).

The procedures were performed for diagnostic purposes in 57 cases (8 in the first series, 24 in the second, and 25 in the third one), upper urinary tract urothelial tumors treatment in 5 cases (1 in the first series, 2 in the second and third ones), and urolithiasis in 344 cases (87 in the first series, 125 in the second, and 132 in the third one).

The ureteral access sheath was used in 68.2% of the first group, in 74.8% of the second one, and in 70.4% of the third. Eleven percent of the patients were already prestented when the flexible ureteroscopic approach was attempted. Owing to difficulties to ascend the ureteral access sheath, a supplementary 8% of the cases were also prestented, and the procedure was postponed for 7 days.

Lithotripsy with a Dornier Medilas H20 Holmium: YAG laser (Dornier MedTech, Wessling, Germany) with a 270-μm fiber was applied in 90.7% of the lithiasis cases (312 cases, 83 cases with the first ureteroscope, 118 cases with the second one, and 111 with the third one). The mean number of pulses was 6945, whereas the mean energy used was 5490 J.

The tipples baskets were used in 79.4% of the lithiasis cases (273 cases) to relocate stones and/or extract fragments resulted from intracorporeal lithotripsy.

Lower pole stones were encountered in 31.4% of urolithiasis cases (108 patients, 32 treated with the first ureteroscope, 39 with the second one, and 37 with the third one), relocation before lithotripsy being performed in 77.1% of them (81 patients, 23 treated with the first endoscope, 28 with the second one, and 30 with the third one). In the rest of the cases, laser lithotripsy in situ in the lower calyx was performed, at least until extractable stone fragments were achieved.

The first endoscope was used for 67.1 hours (mean procedural time of 8 minutes for diagnostic ones and 45 minutes for therapeutic ones), whereas the second one lasted for 107.7 hours (mean procedural time of 10 minutes for diagnostic ones and 49 minutes for therapeutic ones), and the third one for 107.2 hours (mean procedural time of 11 minutes for diagnostic ones and 48 minutes for therapeutic ones).

The first flexible ureteroscope required major repairs after significant damages of the outer coating, at the distal end, in the region of the deflectable tip. The wearing of a short segment at the distal part of the outer coating (Fig. 1) was observed during postoperative processing of the endoscope after the 72nd procedure and aggravated progressively during the following interventions. A careful analysis identified the site of the damage as the point of significantly traumatic contact between the flexible ureteroscope and the distal margin of the ureteral access sheath during endoscope retraction. After the 96th procedure, a complete section of the outing coating was recorded. Owing to this incident, during the use of the second and third flexible ureteroscopes, a decision to retract en bloc the endoscope and the ureteral access sheath has been taken.

The second and third ones registered a severe deterioration of the deflecting mechanism.

Interestingly, although the number of interventions and total operating time was higher in the second and third groups, deflection loss of the 3 endoscopes was similar until deflection capabilities of the second and third ureteroscopes were completely lost.

COMMENT

The aim of our study was to analyze the durability of Storz Flex-Xc digital flexible ureteroscope and possible ways to prolong its lifespan, in the circumstances of also applying the previously learned lessons, both from our experience and published literature.

The increased fragility was a problem linked from the very beginning with the flexible ureteroscopes. Pietrow et al[1] reported in 4 models of Olympus flexible ureteroscopes an average number of 27.5 procedures per instrument (range, 19-34). That was a significant improvement from the first models of such endoscopes, which required repair after an average number of 6-15 uses, however, still remaining insufficient for such an expensive endoscope.

Owing to the technological advances, the newer fiberoptic flexible ureteroscopes demonstrated a superior