Experience with LithoVue single use flexible ureteroscope

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ABSTRACT

Introduction: Digital flexible ureteroscopy represents nowadays the preferred treatment method for intrarenal calculi under 2 cm. We present our experience with Lithovue single use flexible digital ureteroscope in the treatment of pyelocaliceal lithiasis

Material and methods: Between may 2018 and may 2023 in Gral medical private hospital we treated 20 patients with pyelocaliceal lithiasis using the Lithovue flexible ureteroscope. The calculi were located in the renal pelvis in 4 cases (2 over 3.5 cm), 8 in inferior calyx, 3 pelvic and inferior calyx and 5 in inferior and middle calyx. Calculi dimension ranged from 5mm to 3.5 cm. In one patient with middle and inferior calyx we discovered a pelvic superficial tumor about 3 mm treated by laser vaporization after biopsy. In all cases the lithotripsy was performed by HyPHO and Auriga Ho:YAG laser using dusting and fragmenting settings

Results: In all cases we considered "stone free" status residual fragments under 1mm. In 3 cases we performed 2 procedures (calculi over 3 cm and one case with complex lithiasis)
Immediate complications were represented by renal cholic in 5 cases, hematuria, resolved in 24 h in 11 cases, in 4 cases the patients had mild fever. In one case, after 2 weeks postoperatory, the patient developed Guillan Barré syndrome and was admitted in a neurology clinic with complete recovery in 5 months.

Conclusions: Lithovue single use digital flexible ureteroscope confers a good comfort by its low weight (200g), excellent maneurability, good flexibility and good image quality. Ho: YAG laser lithotripsy has been used to obtain fragments under 1 mm no matter what the biochemical composition of the stone, ESWL resistant calculi being easily fragmented. The single use of Lithovue flexible ureteroscope gives the surgeon some kind of relaxation, knowing that the damage of the device implies a much smaller cost than the reusable one.

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Introduction

In recent years, the field of urology has seen a significant advancement with the introduction of the single-use flexible ureteroscopes. This innovative medical device has revolutionized the way we approach endoscopic procedures, particularly in the realm of ureteroscopy. The LithoVue ureteroscope offers numerous advantages, including improved patient outcomes, enhanced procedural efficiency, and cost-effectiveness. [1]

One of the standout features of the LithoVue ureteroscope is its flexibility, allowing for easy manoeuvrability through the complex urinary tract. Its design ensures minimal trauma during insertion and navigation within the ureter, optimizing patient comfort and reducing the risk of complications. [2] The single-use nature of this device eliminates concerns regarding cross-contamination and reprocessing, ensuring a consistently high standard of hygiene and patient safety.

Furthermore, the LithoVue single-use flexible ureteroscope has demonstrated its imaging capabilities. The high-definition visualization provided by the device enables urologists to precisely identify and target stones, strictures, or other pathologies within the urinary tract. This clarity enhances diagnostic accuracy and aids in making well-informed decisions during the procedure. [3]

Digital flexible ureteroscopy represents nowadays the preferred treatment method for intrarenal calculi under 2 cm. We present our experience with LithoVue single use flexible digital ureteroscope in the treatment of pyelocaliceal lithiasis at Gral Medical Private Hospital, Bucharest.

Material and methods

The LithoVue single-use flexible ureteroscope is constructed from advanced materials to ensure optimal performance and safety. The primary components include a flexible shaft, optics, a light source, and control handles. The flexible shaft is designed to navigate the intricate anatomy of the urinary tract, allowing for precise and minimally invasive procedures. High-quality optics and a reliable embedded light source ensure clear visualization, enabling accurate diagnosis and effective stone fragmentation. The ergonomic control handles facilitate ease of use, enhancing maneuverability within the urinary system.

Between may 2018 and may 2023 in Gral medical private hospital we treated 20 patients with pyelocaliceal lithiasis using the LithoVue flexible ureteroscope.

In 4 cases, calculi were exclusively located in the pelvic region, with 2 calculi measuring over 3.5 cm., calculi were found in the inferior calyx in 8 cases, with dimensions ranging from 5 to 15mm. [Fig 1,2] In 3 cases, there were both pelvic and inferior calyx calculi simultaneously, with dimensions between 8mm and 16mm. and there were calculi in both inferior and middle calyx in 5 cases, with dimensions ranging from 7 to 14mm.

In a specific case involving small stones in both the middle and inferior calyx, a pelvic superficial tumor of about 3mm was discovered and treated using laser vaporization after biopsy. In all cases the lithotripsy was performed by Hy PHO and Auriga Ho: YAG laser using dusting and fragmenting settings. [Fig 3] The tumor vaporization was made with Hy PHO laser.



Fig. 1. Inferior caliceal stone. Stone relocation using basket



Fig. 2 Middle caliceal stone. Basket extraction of the calculi

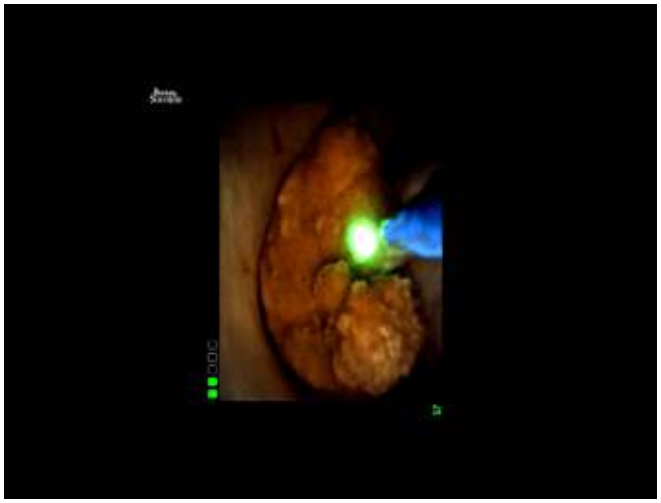


Fig 3. Inferior caliceal stone lithotripsy using Ho: YAG laser

The LithoVue ureteroscope is inserted using a Navigator ureteral sheath into the ureter and advanced under direct visualization in all cases. The flexible design allows for smooth navigation through the ureter, pelvic area and calices reaching the targeted area for examination or treatment. Optimal visualization is achieved using the ureteroscope's advanced optics and light source.

Results

In all cases we considered "stone free" status small residual fragments under 1mm. We considered that these small fragments are totally eliminated from the pelvic system in the next 3 to 4 weeks after the procedure in the presence of a double J catheter. A number of 2 procedures was imposed in 3 cases where the calculi dimension was over 2,5 cm and in one case with complex lithiasis.

We had one patient with small stones (5mm) located in the middle and inferior calyx that presented an incidental discovery of a very small tumor (3mm) located in the pelvic region. We biopsied the tumor and applied laser tumoral bed coagulation after we removed the stones. The surveillance of this case involved flexible ureteroscopy at 3, 6, 12 months that certified the tumor free status till now, and after that we will perform diagnostic flexible ureteroscopy every 6 months for 3 years.

Although the complication rate was very low there were a few immediate complications represented by renal cholic in 5 cases, hematuria in 11 cases and mild fever in 4 cases. The hematuria resolved spontaneously in the next 24 hours after the procedure.

In one case, 2 weeks after the procedure, the patient developed Guillan-Barré syndrome and was admitted in a neurology clinic. The specific neurologic treatment for 5 month was a success with complete recovery of the patient.

Discussion

The amalgamation of technological innovation and clinical acumen in the treatment of pyelocaliceal lithiasis prompts a nuanced discussion of the multifaceted aspects influencing procedural success and patient outcomes. Our utilization of the LithoVue single-use digital flexible ureteroscope stands at the forefront of this discourse, driven by its distinctive attributes.

An important facet of our study revolves around the efficacy of Ho: YAG laser lithotripsy, transcending the limitations posed by stone composition. The ability to achieve stone-free status, even in cases of ESWL-resistant calculi, underscores the versatility and potency of this laser technology. The systematic application of dusting and fragmenting settings further accentuates its role in precision lithotripsy.

The adaptability of the LithoVue device is pointed out by the dimensions of our patient cohort, ranging from pelvic to inferior and middle calyces, with different stone size, sometimes larger than 2 cm, and different stone composition. Its lightweight construction and exceptional manoeuvrability facilitate optimal navigation, ensuring comprehensive stone clearance.

The one notable complication 2 weeks after the procedure was the Guillan Barre syndrome. Guillain-Barré syndrome is an immune system disorder that attacks the peripheral nervous system, which includes all the nerves in the body outside the brain and spinal cord, sometimes as believed to be triggered by an infectious agent such as E. Coli.[4] This syndrome is a rare condition in surgical outcome, and even more rare after endoscopic urologic surgery. In our knowledge this is one of the rarest cases of Guillain Barre syndrome after ureteroscopy reported in literature. All the other reported cases happened because of urosepsis [5], in our case the infection being mild.

This notable case involving the development of Guillain-Barré syndrome postoperatively prompts a careful consideration of the potential systemic implications associated with ureteroscopy, warranting vigilance in patient monitoring and postoperative care.

Another important point of discussion is the cost-effectiveness of utilizing a single-use ureteroscope like LithoVue that cannot be understated. The cost reduction associated with reprocessing, sterilization, and maintenance of traditional reusable scopes can significantly reduce costs. This financial advantage is accompanied by the assurance of a sterile, factory-fresh device for each procedure, mitigating the risks associated with equipment contamination.

LithoVue single-use flexible ureteroscope has

exhibited impressive imaging capabilities. The high-definition visualization it offers allowed us to discern and target stones, and other pathologies within the urinary tract with unparalleled precision. This heightened clarity greatly influences diagnostic accuracy and facilitates well-informed decision-making during the course of the procedure.

This adaptability, coupled with good image quality (HD quality in the last model of LithoVue), translates into a heightened level of procedural comfort for the surgeon [6]. The comfort is created not only by the technical characteristics of the LithoVue, but also by the price of the device.

It is imperative to underscore the economic advantages conferred by the single-use nature of the LithoVue flexible ureteroscope. The smaller cost associated with potential damage to the device positions it as an attractive option in the broader landscape of reusable alternatives. This economic dimension, combined with procedural efficacy, forms a compelling narrative for the widespread adoption of this technology in routine clinical practice.

In essence, the intersection of lithotripsy techniques, technological advancements, and patient outcomes propels our discussion into the forefront of contemporary urological discourse. The LithoVue single-use digital flexible ureteroscope, in tandem with Ho: YAG laser lithotripsy, exemplifies a synergy that not only transcends traditional constraints but also heralds a new era of precision and patient-centric care in the treatment of pyelocaliceal lithiasis.

Conclusions

The experience with the LithoVue single-use flexible ureteroscope has shown enhanced procedural efficiency, patient comfort, and cost-effectiveness. Its remarkable flexibility and imaging capabilities have significantly advanced urological procedures, emphasizing a new standard of care in ureteroscopy [6].

LithoVue single use digital flexible ureteroscope offers a good comfort by its low weight (200g), excellent maneuverability, good flexibility and good image quality.

Ho: YAG [7] laser lithotripsy has been used to obtain fragments under 1 mm no matter what the biochemical composition of the stone, ESWL resistant calculi being easily fragmented. The single use of LithoVue flexible ureteroscope gives the surgeon some kind of relaxation, knowing that the damage of the device implies a much smaller cost than the reusable one. Embracing this innovative device represents a commitment to optimal patient outcomes and improved healthcare practices.

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