

## SKILL AND TALENT

### Transumbilical single-incision laparoscopic ureterolithotomy

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#### KEYWORDS

LESS;  
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#### Abstract

**Introduction:** Laparoendoscopic single-site surgery (LESS) using transumbilical access and conventional laparoscopic instruments is a very attractive alternative to perform ureterolithotomy for ureteral stone with failed endourological management.

**Material and method:** A 29-year-old woman presented with chronic right lumbar pain and a 1.2 cm impacted calculus localized at transition of abdominal to pelvic ureter. Semi-rigid ureteroscopy had failed to fragment the stone and shockwave lithotripsy was not available. Double-J ureteral catheter had been inserted preoperatively. We performed a transumbilical single-incision laparoscopic ureterolithotomy. Three conventional trocars were inserted in a single semi-circular umbilical incision. Right colon was detached and the ureter was identified. Calculus was extracted and the ureteral incision was closed with intracorporal sutures.

**Results:** Ureterolithotomy was successfully completed, with all the operative steps performed transumbilically. Operative time was 180 minutes. No single-port device or articulating and bent instruments were utilized. Estimated blood loss was less than 50 mL. No intraoperative, access-related and postoperative complications took place. The duration of hospitalization was 24 hours and scarless appearance was observed on postoperative day 15.

**Conclusion:** Transumbilical single-incision laparoscopic ureterolithotomy is feasible and safe. This approach offers an inherent cosmetic advantages and few postoperative discomfort. Additional experience and continued investigation are warranted.

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**PALABRAS CLAVE**

LESS;

Ureterolitotomía;

Incisión transumbilical

**Ureterolitotomía laparoscópica con incisión única transumbilical****Resumen**

**Introducción:** La cirugía laparoendoscópica por puerto único (LESS) con incisión transumbilical empleando instrumental laparoscópico convencional es una alternativa atractiva para la realización de ureterolitotomía de cálculo ureteral con tratamiento endourológico fallido.

**Materiales y métodos:** Una mujer de 29 años se presenta con dolor crónico en la zona lumbar derecha y un cálculo impactado de 1,2 cm, localizado en el punto de transición del uréter abdominal al pélvico. Una ureteroscopia semirrígida no consigue fragmentar la piedra y no se dispone de litotricia por ondas de choque. Se inserta catéter ureteral doble J anteriormente a la intervención. Realizamos una ureterolitotomía laparoscópica con incisión única transumbilical. Se insertan tres trocares convencionales en una incisión umbilical semicircular, se desprende el colon derecho y se identifica el uréter. Se extrae el cálculo y la incisión ureteral se cierra con suturas intracorporales.

**Resultados:** Se completa con éxito la ureterolitotomía con todos los pasos operatorios realizados transumbilicalmente. La duración de la intervención fue de 180 minutos. No se empleó ningún instrumento articulado o arqueado. La pérdida de sangre estimada fue de menos de 50 ml. No hubo ninguna complicación interoperatoria o postoperatoria relacionada con la incisión. La estancia en el hospital fue de 24 horas y se observó un aspecto sin cicatriz el día 15 postoperatorio.

**Conclusión:** La ureterolitotomía laparoscópica con incisión única transumbilical es viable y segura. Este abordaje ofrece ventajas cosméticas inherentes y pocas molestias postoperatorias. Se requiere de experiencia adicional e investigación continuada.

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**Introduction**

Historically, urologists have long experience with minimally invasive technologies and implemented new techniques that provide effective treatment while limiting morbidity. In many instances, this has been achieved by operating via natural body openings (e.g., cystoscopy, transurethral resection, ureteroscopy).<sup>1,2</sup> Urologists have also pioneered novel techniques to address clinical situations where access through natural body openings was impossible, such as percutaneous stone surgery, laparoscopy, and robotics.<sup>3-5</sup> With the advent of urologic laparoscopy in the 1990s, urologists have effectively ranged procedures that once used one large incision to procedures that now use one small incision.<sup>6,7</sup>

Laparoscopy has several advantages over traditional open surgery (including decreased postoperative pain, improved cosmetics and reduced hospital stay), and its use in urologic surgery has increased exponentially over the past decade.<sup>6</sup> One-port, single-incision laparoscopy is part of the natural development of minimally invasive surgery. Refinement and modification of laparoscopic instrumentation has resulted in a substantial increase in the use of laparoendoscopic single-site surgery (LESS) and umbilical-LESS (U-LESS) in urology over the past 3 years.<sup>6,8</sup> Since the initial report of single-port nephrectomy in 2007, urologists have successfully performed various procedures with LESS.<sup>6</sup> This approach might allow for many common laparoscopic procedures to be performed entirely through the patient's umbilicus and enable essentially scarless abdominal surgery with additional reduced wound morbidity. Importantly,

the method allows a surgeon to "convert" a one-port transumbilical procedure to a conventional laparoscopic procedure, preserving the existing standards of care. We report our initial urology-specific experience with this novel technique.

**Problem**

A 29-year-old woman presented with chronic-onset pain in right flank and symptoms of urinary tract infection. Radiologic imaging, abdominal x-Ray and ultrasonography, demonstrated impacted calculus sized 1.2 cm localized at transition of abdominal to pelvic ureter. Double J catheter was introduced and the urinary tract infection was controlled. After thirty days, semi-rigid ureteroscopy was performed and lithotripsy with pneumatic was not succeed. Shockwave lithotripsy was not available. We decided to perform a laparoscopic transumbilical single-incision ureterolithotomy (fig. 1). The patient was positioned in 60° lateral flank position (fig. 2), and thereafter a 2-cm semicircular periumbilical incision was performed. Three 5-mm trocars were placed independently and 5-mm optics was utilized. We utilized regular laparoscopic instruments, no additional technology was necessary (fig. 3).

After right colonic detachment, ureter was identified and the stone was localized following stone bulge. A band was utilized for isolation of the proximal ureter, and the ureter was incised with a cold knife. Calculus was extracted intact with grasping forceps, and the ureter was flushed with saline and double J was left inserted. The

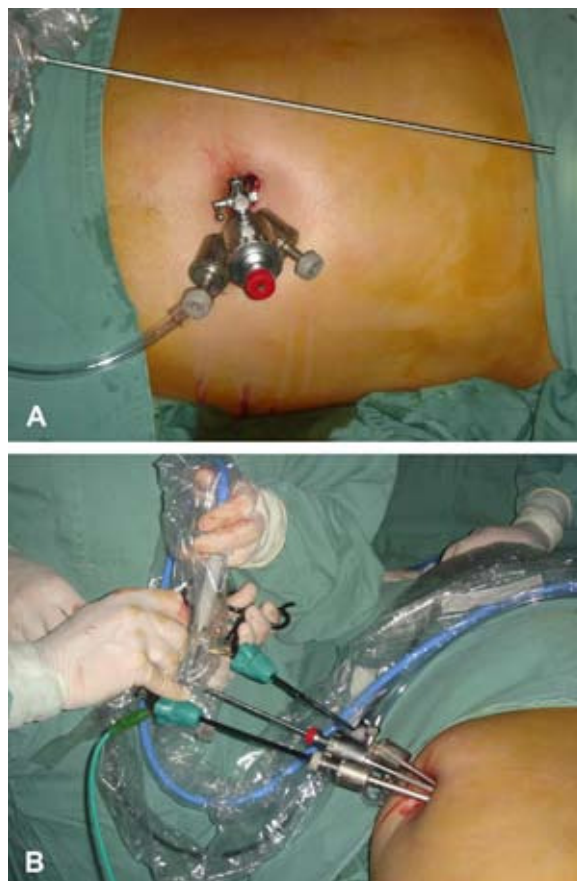


**Figure 1** Impacted calculus sized 1.2 cm localized at transition of abdominal to pelvic ureter. In detail see stone specimen after U-LESS operation.

ureteral incision was closed with intracorporeal sutures of 4-0 polygalactin. A tube drain was left in situ for 20 hours. The incision was closed with a subcuticular absorbable suture (fig. 4). Operative time was 180 minutes, of which 20 minutes were dedicated to obtaining peritoneal access



**Figure 2** (A) The patient position to the surgery; (B) Close view of the abdomen and references.



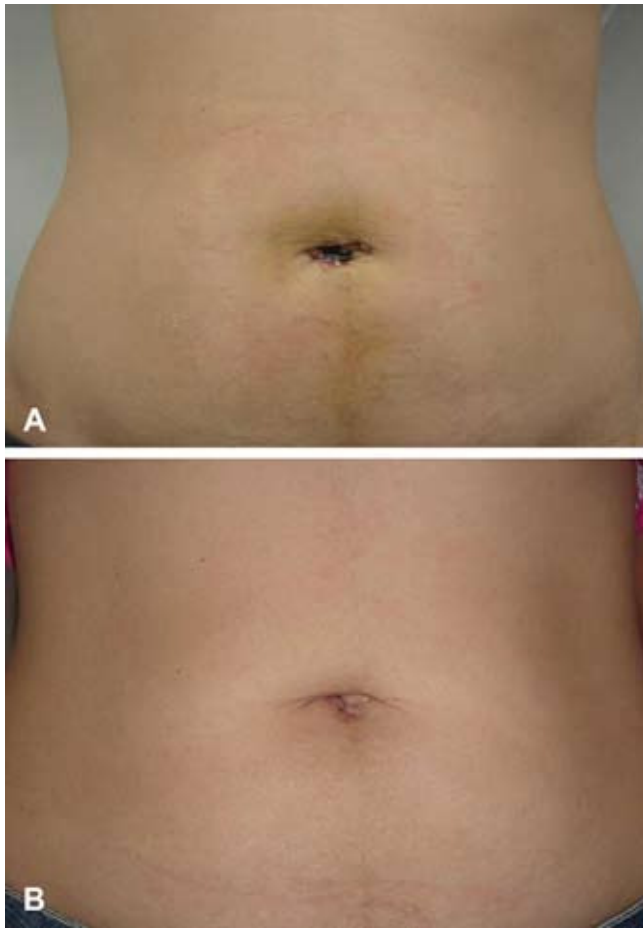
**Figure 3** (A) Transumbilical placement of the three trocars and the 5-mm optics; (B) Surgeon and auxiliary positioned with regular laparoscopic instruments.

and port placement. No additional 2 or 3-mm ports were used. The estimated blood loss was less than 50 mL. No intraoperative, access-related and postoperative complications developed. The visual analog pain scale score 12 hours after surgery was 4 of 10, and it was 1 of 10 on postoperative day 1. The patient recovered well after surgery, the time to first oral intake was 6 hours and she was discharged home on postoperative day 1.

Patient was examined at scheduled follow-up appointment at 15 days, and she exhibited a scarless appearance (fig. 4). No residual stone was demonstrated in the control radiologic study.

## Commentary

Laparoscopic ureterolithotomy (LU) was initially described by Wickhan<sup>9</sup> in 1979, and revived by Gaur et al in 1992,<sup>10</sup> utilizing the retroperitoneoscopic access. LU is not the first-line treatment; however it is a new alternative for the treatment of proximal, large, or impacted stones, and several centers have utilized this technique.<sup>11</sup> LU is a less invasive alternative to open surgery in this setting. Moreover LU has been an alternative to other minimally invasive treatments in case of unavailability or failure of previous treatment.



**Figure 4** Postoperative imagen of the patient's abdomen: (A) Just before discharge; (B) Scarless appearance at postoperative day 15.

A new era of laparoscopy has arrived, with the potential for scarless surgery. Standard rules for laparoscopic surgery are being challenged to allow parallel insertion of multiple instruments and scope through a single access. There has been increasing enthusiasm towards performing major abdominal and retroperitoneal procedures with no visible incision or scar. Natural orifice transluminal endoscopic surgery (NOTES) has been mostly limited to laboratory research applications in urology due to limitations in instrumentation, surgical experience, and potential complications.<sup>12-15</sup> To further minimize morbidity of minimally invasive surgery and move towards scarless surgery without the difficulties encountered in NOTES, LESS or embryonic NOTES has been recently reported, affording a virtually scar-free surgery through a hidden umbilical incision. Alternately, the transumbilical Single-Port laparoscopy (SPL) approach is practical and affords a virtually scar-free approach. Multiple transumbilical ports or a single port apparatus with multiple channels have been used for access.<sup>12,16-20</sup> Pané et al<sup>21</sup> described the first laparoscopic ureterolithotomy using one-port umbilical surgery (OPUS) with the R-Port (ASC, Wicklow, Ireland). In this regard, we now report a successful case of laparoscopic ureterolithotomy using an umbilical single-incision access with three conventional ports.

The access technique for LESS or U-LESS involves using either access ports or a series of 5 mm trocars side by side in the same incision [17]. Trocar insertion is still a dangerous technical aspect of laparoscopy.<sup>22</sup> Access-related complications during laparoscopic surgery can be placement related, procedural, and postoperative.<sup>21-23</sup> The overall incidence of complications in laparoscopic urologic surgery has been reported as 0.2%–0.27%.<sup>24</sup> Techniques to minimize access-related injuries have been devised, for example the open “Hasson” technique,<sup>25</sup> disposable trocars with safety shields, direct-view trocars, and radially dilating trocars.<sup>21</sup> We placed the first trocar by “Hasson” technique and the others by direct-view. No complications and technical difficulties related to trocar placement were observed. In our country, at the time of the surgery no single-port device was yet approved to be used in human.

A basic tenet of laparoscopic surgery involves triangulation of instruments so as to produce adequate intracorporeal working space for anatomic dissection and manipulation of tissues. LESS procedure offers several challenges to surgeons. Despite advances in surgical instrumentation, dissection through a single access is more difficult than conventional multiport laparoscopy. In order to overcome this difficulty, the instrument shafts are frequently crossed at the point of entry into the valve, such that the external right-hand instrument becomes the left instrument internally, and vice versa. As such, intraoperative dissection is often performed with the nondominant hand, requiring ambidexterity on the part of the surgeon.<sup>6</sup>

A combination of articulating and bent instruments can allow the surgeon to partially overcome the loss of triangulation and ‘clashing’ of instruments. However, these new laparoscopic instruments are most cost-effective; and it does take significant time and effort to optimize the functions of these instruments in challenging ergonomic positions.<sup>12</sup> Branco et al<sup>26</sup> described a series of six transumbilical laparoscopic surgery utilizing only conventional laparoscopic instruments. We utilized only conventional laparoscopic instruments and ports, no single-port device or articulating and bent instruments were necessary.

The aim of minimally invasive surgery is to reduce access related trauma while maintaining optimal operating conditions. Laparoscopic access offers a cosmetic outcome far superior to that with open surgery. However, surgeons have been trying to improve on the issue by using fewer and smaller ports.<sup>21</sup> U-LESS seems to offer surgeons the option of delivering a cosmetically superior, safe outcome using current instrumentation. The surgeon creates no new visible scars on the patient, using only the previously scarred umbilicus. The present report provides a proof of principle for LESS but further studies are required to clearly define the limitations of the technique and evaluate its potential benefits.

## Conclusion

Transumbilical single-incision laparoscopic ureterolithotomy is technically feasible and safe even using conventional laparoscopic instruments, and can be considered a



potential alternative for traditional laparoscopic urological procedures. U-LESS certainly provides improved aesthetics comparing to pure laparoscopic procedures. Additional studies are required to better define the future role of LESS in the management of urologic diseases.

## Conflict of interest

The authors declare that they have no conflict of interest.

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