Transumbilical single port surgery with conventional laparoscopic instruments in horseshoe kidney


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Abstract

Introduction: Laparoscopic surgery is following a natural course as it decreases surgical aggression on the abdominal wall without undermining the curative and functional results. Although it is still being developed, single port surgery has meant an advance in this sense.

Material and methods: We present the first single port laparoscopic pyelolithectomy surgery in horseshoe kidney, using conventional rigid instruments. The case of an 18-year old patient with BMI of 19 in whom the imaging tests (urogram and computed tomography) showed a horseshoe kidney with left coralliform lithiasis and discrete calyceal ectasia is presented. The lithiasis was extracted using umbilical access with single port device and conventional rigid instruments.

Results: The surgery was performed without complications. Surgery time was 110 min and bleeding 50 cc. On incision of the urinary system, there was purulent urine extravasation that conditioned fever of 38 °C in the post-operative period. During the intervention, a double J stent was placed via percutaneous approach. The patient was discharged on the third day of hospitalization.

Conclusion: Single port laparoscopic access for pyelolithectomy surgery in horseshoe kidney is a reasonable alternative. The use of conventional rigid instruments facilitates the performance of this surgery with good triangulation, without conflict regarding hands and safety for the patient.

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Cirugía de puerto único transumbilical con instrumentos laparoscópicos convencionales en riñón en herradura

Resumen

Introducción: La cirugía laparoscópica está teniendo una evolución natural a disminuir la agresión quirúrgica sobre la pared abdominal sin merma de los resultados curativos y funcionales. Aunque en desarrollo, la cirugía monopuerto ha supuesto un avance en este sentido.

Material y métodos: Presentamos la primera cirugía de pielolitescitomía laparoscópica por puerto único en riñón en herradura, usando instrumentos rígidos convencionales. Paciente de...
Introducción

The first laparoendoscopic single-site surgery (LESS) experience was described by Rane et al. in 2007 using the R-Port device of extra-umbilical placement to perform retroperitoneal radical nephrectomy and ureterolitotomies. Then, the group of Raman et al. performed the first single-port transumbilical surgery. Multiple acronyms have been used to refer to this type of LESS surgery, transumbilical endoscopic surgery (TUES), natural orifice transluminal endoscopic surgery (NOTUS), embryonic NOTES (e-NOTES), single port laparoscopy/single port access (SPL/SPA), single-incision laparoscopic surgery (SILS), single-port laparoscopy (SIL), robotic-assisted natural orifice transluminal or transluminal endoscopic surgery (R-NOTES), umbilical natural orifice transluminal endoscopic surgery (U-NOTES), one-port umbilical surgery (OPUS), etc. Finally, it was decided to call LESS surgery to laparoscopic/endoscopic abdominal accesses performed by a single incision, either through multichannel instruments or multiple ports in a single location.

The progress in accesses has led laparoscopic surgeons to seek a reduction in the holes of the abdominal wall as typical evolution of this minimally invasive surgery.

Single-incision accesses are having a remarkable development in recent years, especially in their umbilical location. The navel allows the surgeon to give the patient what has come to be called scarless surgery, being able to perform complex procedures with good cosmetic results. An important role within LESS surgery appears to be linked to robotics, since 13% of the procedures are carried out with DaVinci.

The progress of this surgical material from the first R-Port to the multiple multichannel devices available on the market (Octoport, Sils, QuadPort, Gelpoint, EndoCone, KeyPort). The same thing happened with laparoscopic forceps, developing new pre-curved flexible or rigid instruments.

In comparative series, LESS surgery offers oncological and functional results comparable to standard laparoscopic surgery in living donor procedures, nephrectomy, pyeloplasty, or ureterolithotomy. The initial excisional indications of this approach have been extended and there are now many complex and reoperative procedures that are performed by LESS surgery: colposacropexy, living donor, pyeloplasty, and enterocystoplasties, among others.

Resultados: La cirugía se completó sin complicaciones. El tiempo quirúrgico fue 110 minutos y el sangrado 50 cc. Al abrir el sistema urinario hubo extravasación de orina purulenta que condicionó fiebre en el postoperatorio de 38 °C. Durante la intervención se colocó catéter doble J por abordaje percutáneo. Fue dada de alta al tercer día de estancia.

Conclusión: El acceso laparoscópico monopuerto para la cirugía de pielolitotomía en un riñón en herniatura es una alternativa razonable. El uso de instrumentos convencionales rígidos facilita el desarrollo de esta cirugía con una buena triangulación, sin conflicto de manos y seguridad para el paciente.

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Casuistry

It is an 18-year-old female patient studied due to repeat lower urinary tract infections and hematuria. Intravenous urography shows a horseshoe kidney with incomplete rotation of the left kidney and left staghorn lithiasis that conditions calyceal ectasia, with altered morphology of the calyces, without preventing the contrast removal. The tomography showed a horseshoe kidney with left staghorn lithiasis that takes up the group of middle and lower calyceals and renal pelvis, and determines dilation of the upper calyceal group. Both renal pelves present anteroposterior direction, with greater degree of malrotation in the left hemikidney (Fig. 1). The urine culture resulted in Candida albicans infection sensitive to fluconazole.

Surgical technique

The patient was placed in right lateral decubitus. The procedure was performed under general anesthesia. The Octoport® single-port device was used, which consists of a 5-mm port which thanks to a telescopic shutter may reach 10 mm, 3-5-mm ports, and 2 insufflation connections. It has 2 pieces, a base that fits the abdominal incision, and a rotating lid with working and CO₂ channels. The surgery was performed with conventional rigid laparoscopic instruments, a 30° lens, bipolar coagulation forceps (Microfrance®), and ultrasonic harmonic scalpel Scalpel Endo-Surgery, Johnson & Johnson® (Fig. 2).

We performed renal decollation and exposure of Gerota’s fascia. We found that the ureter was anchored to the renal pelvis anteriorly. We identified the renal vein and proceeded to release pre-pelvic adhesions to dissect the ureteropelvic junction. After incision of the pelvis, urine of purulent appearance leaks and pyelic lithiasis of great size is extracted and smaller ones in the renal calyces, with the help of a conventional straight dissector clamp.

Double J catheter was placed percutaneously through a 2-mm incision in the abdominal wall. With percutaneous
nephrostomy needle and laparoscopic grasping forceps, a conventional guide wire is pocketed through the ureter. Using this guide wire, the double J catheter passes through the urinary tract, which was performed after suture of the renal pelvis with interrupted sutures. The drainage was left through the ureteral stent placement opening and the skin was closed with intradermal continuous suture.

Results

There were no complications during the surgery, and the duration thereof was 110 min, with minimal bleeding of 50 cc. The patient had fever in the immediate postoperative period requiring prolonged antibiotic therapy. The drainage was removed at 24 h and she was discharged on the third postoperative day. The patient has been satisfied with the cosmetic results, leaving a nearly imperceptible scar (Fig. 3).

Comment

The anatomical anomaly of horseshoe kidney is a risk factor for kidney lithiasis formation. The treatment options that the urologist has for the treatment of these stones are multiple. Although laparoscopic surgery plays an important role in these special cases of urolithiasis, there are no comparative studies with other techniques. The percutaneous approach provides similar results in the stone-free rate in kidneys with anatomical anomalies regarding normal kidneys, although the rate of failure in the access to the urinary system and the surgical time are longer in anomalous kidneys. Currently, the endoscopic retrograde treatment of stones in horseshoe kidneys has become a reasonable alternative.

Single-port surgery is complex, requires prior learning in specific training devices, and it must be performed by experienced laparoscopic surgeons. Currently, the variety of materials available for this technique allows us to choose what best suits our needs. In our case, we have developed single-port surgery using the same instruments as in conventional laparoscopy. There is only one previous case published by Ponsky et al. of a radical nephrectomy in an 86-year-old patient using these instruments. Although the single-port Octoport device has the working ports separate enough to allow for proper triangulation of the surgeon in the surgical field, the surgeon has a lower mobility than the conventional laparoscopy and they should work well with the helper. We must be especially careful in handling the forceps to avoid collision of hands; this possibility would be even lower if we used a long-branch lens that took the workspace of each of the laparoscopists to 2 different planes. We aim to alleviate the technical difficulty for the surgeon to use flexible or precurved instruments taking advantage of the prior learning in
conventional laparoscopy. Other LESS experiences combine the use of pre-curved rigid instruments with conventional instruments.\textsuperscript{19}

Cabrera et al.\textsuperscript{20} have published the first case of laparoendoscopic pyelolithotomy by means of a new system (KeyPort, Richard Wolf). This same group has shown that the use of the specific Keyport\textsuperscript{6} material and DuoRotate\textsuperscript{6} clamps is safe, with few complications, less pain, and fewer positive margins in 31 radical prostatectomies by single-port umbilical surgery.\textsuperscript{21} In this system, the working procedure of the surgeon is different, as there is a crossing of instruments in the surgical field, similar to what happens in the single-port robotic surgery, and it requires prior training.\textsuperscript{22}

The result of our surgery was successful. The patient developed 38 °C fever probably related to infected urine leakage into the peritoneal cavity. The single-port device umbilical placement allowed to hide the scar with excellent esthetic results. As we have pointed out, in 2011, the Getafe group reported the first case of LESS pyelolithotomy using the mentioned specific material for single-port surgery.\textsuperscript{23} Regarding this first experience, our operative time is shorter (110 min vs. 280 min), this could be related to a higher initial technical difficulty with crossed instruments. While we placed the double J catheter during the surgery and left the drainage at the end, the Getafe group placed the ureteral stent previous to the surgery and left no further drainage.

In summary, single-port umbilical pyelolithotomy may be a reasonable alternative for the treatment of large lithiasic masses in horseshoe kidneys. Our pioneering experience in the treatment of this condition shows that the use of conventional instruments with the currently available single-port devices offers safety in this type of surgery, proper triangulation in the surgical field, and without conflict of surgeons’ hands. Large series are needed to confirm the results of this initial experience.

Conflict of interest

The authors declare that they have no conflict of interest.

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