Case Series of the Month

Retroperitoneal Laparoendoscopic Single-Site Surgery: Preliminary Experience in Kidney and Ureteral Indications

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1. Case report

Urologic laparoscopy has gained significant importance since the first nephrectomy was carried out in 1991 [1]. Nevertheless, urologists are still working on ways to reduce morbidity and the invasive nature of this type of surgery. Our attention has focused on a modification of laparoscopy, the transition from multiple port access to single port access: laparoendoscopic single-site surgery (LESS). Rane et al [2] first reported the urologic use of a single multifunctional port, while the first multitrocar single-incision transumbilical nephrectomy was reported by Raman et al [3]. In urologic laparoscopy, the retroperitoneal approach has some advantages, including more direct access to the retroperitoneal organs and a potential reduction in invasiveness. However, the experience with retroperitoneal LESS for urologic disease is very limited because it utilizes a small working space and sometime anatomic orientation can be very difficult.

Abstract

The advantages of retroperitoneoscopic technique are well known. We decided to combine this access with the emerging laparoendoscopic single-site surgery (LESS) technique. We present our preliminary data on 11 renoureteral procedures and describe our retroperitoneoscopic LESS technique.

As of March 2009, 10 patients were submitted to retroperitoneal LESS and divided into three groups: Group A, 3 patients underwent ureterolithotomy; Group B, 4 patients underwent renal cyst ablation; Group C, 4 patients underwent renal biopsy. Retroperitoneal access was obtained with an optical trocar. After retroperitoneal space blunt dissection, a multichannel port was placed. Standard and bent 5-mm instruments were used; we also used a 5-mm flexible laparoscope as a single procedure in group A. Ten of 11 procedures were completed without conversion; a single case in group A was converted to open surgery.

Retroperitoneoscopic LESS is a safe and feasible procedure for renal biopsy and renal cyst ablation, with shorter convalescence time, less postoperative pain, and better cosmetic outcomes. LESS ureterolithotomy was more challenging for the lack of triangulation, resulting in a prolonged convalescence period. In addition, bent laparoscopic instruments are not suitable for retroperitoneal space; the multichannel port leaks carbon dioxide due to the flank position. Therefore LESS pelvic trainer practice is imperative in this case.

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In this paper, we report our initial experience in 11 patients who underwent retroperitoneoscopic LESS renal and ureteral indications. As of March 2009, retroperitoneal LESS was performed in 10 patients; 3 patients were submitted to ureterolithotomy (group A), 4 patients renal cyst decortications (group B), and 4 patients underwent renal biopsy (group C). In one patient, cyst marsupialization and renal biopsy were performed simultaneously (Table 1). Data were collected retrospectively into our institutional review board-approved data registry with informed patient consent. All procedures were performed by one surgeon using the retroperitoneal approach.

Patients were placed in a full flank position under general anesthesia. Skin and fascia incisions were made in the lumbar region: a Petit triangle, formed by the intersection of the external oblique and latissimus dorsi muscles at the iliac crest (Fig. 1). Access to the retroperitoneum was carried out within this area and a Visiport laparoscopic visual trocar (Covidien, Mansfield, MA, USA) was advanced directly into the retroperitoneal under direct vision. The laparoscope was then used to bluntly dissect the retroperitoneal space and create a working space [4].

In group A, patient skin and fascia incisions were enlarged to up to 3 cm and a multichannel TriPort (Advanced Surgical Concepts, Bray, Ireland) was inserted (Fig. 2). In one patient, a 5-mm flexible laparoscope EndoEye camera system (Olympus Medical, Orangeburg, NY, USA) and a standard, reusable, 5-mm laparoscopic instrument was used. In the remaining two patients, a 5-mm laparoscope and reusable, standard, bent instruments (Olympus Medical, Orangeburg, NY, USA) were used simultaneously. A laparoscopic scalpel and a 10-mm Potts scissors (B. Braun, Tuttingen, Germany) were used to incise the ureter above the stone (Fig. 3).

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The stone was placed in a finger glove and removed at the end of the procedure. Ureteral suture was not performed because it was unmanageable through the multichannel port using a standard needle driver in one hand and bent forceps in the other hand. Then we decided to place another 5-mm trocar 6 cm from the multichannel port, in an area located between the midline and the anterior auxiliary line. This maneuver allowed us to perform ureteral suture. Three or four ureteral interrupted stitches were made with a 5-mm straight needle holder (Karl Storz, Tuttlingen, Germany) using 4-0 vicryl.

In group B patients, skin and fascia incisions were enlarged up to 2 cm and a multichannel SILS port (Covidien, Mansfield, MA, USA) was used in three patients. A standard 5-mm laparoscopic rotidulator (Covidien, Mansfield, MA, USA) forceps and scissors (Fig. 4) were used for cyst marsupialization and a 5-mm bipolar forceps was used (Fig. 5). In the fourth patient, a 10-mm operative laparoscope (Karl Storz, Tuttlingen, Germany) similar to a nephroscope was used with a 6-mm working channel (Fig. 6). With this single trocar technique we were able to simultaneously ablate the renal cyst and carry out renal biopsy.

In group C, all procedures were performed using a single trocar technique, as described above. Biopsy was done with 5-mm biopsy forceps: two bites placed in the renal cortex and one or two deeper bites in the renal medulla. Argon beam probe was used for hemostasis. Drainage was left in place for 24 h in all patients.

2. Discussion

After the introduction of laparoscopy for the surgical treatment of human diseases, this technique has been shown to result in less postoperative pain for the patient, shorter hospitalizations, and improved cosmetic outcomes compared with open procedures. Laparoscopic surgery typically uses three to six ports for a given procedure, with each port increasing the potential morbidity from bleeding, port site hernia, internal organ damage, and decreasing the cosmetic outcomes [5,6]. As a result of the risks associated with additional ports, there has been a surge of interest in a less invasive alternative. In the last three years, several applications have been described using urologic LESS. A cumulative experience has yielded significant improvement in benefits and potentiality of the LESS technique [7].

What does LESS need to be competitive with conventional laparoscopy? There are three main problems. The first is triangulation, which allows proper tissue retraction. Placing several parallel instruments makes triangulation more difficult. However, using at least one flexible or curved instrument may offset the shafts adequately to accomplish a satisfactory degree of triangulation. In our series, only during ureterolithotomy suture did we not achieve good triangulation in the retroperitoneal space. We believe that the bent instruments we used are bent for a transperitoneal approach; in a retroperitoneal access the distance of the “surgical target” from the skin incision is shorter, therefore bent instruments will not fit in this space.
The second problem is retraction: The lack of additional assistant trocars limits correct exposition of the structures. This can be achieved by intra-abdominal sutures fixed to the parietal peritoneum or transcutaneous sutures grasped with extracorporeal handling. Only in ureterolithotomy we use a transcutaneous thread to lift the ureter cranially to the stone. This enables us to have better angulations for sutures and reduces the risk of stone migration to the kidney.

The third problem is instrument crowding, due to the parallel placement and close proximity of the instruments. Clashing of instruments could be avoided by using instruments that are bent, articulated, and of different lengths, as is the equipment used in obese and pediatric patients. In addition, the new types of laparoscopes (ie, EndoEye, Olympus, Hamburg, Germany) have a streamlined profile compared to the standard laparoscope in which the light cable is placed 90° to the lens, so the interaction with other instruments is greatly limited.

Retroperitoneoscopic LESS is safe and feasible in procedures like renal biopsy and renal cyst ablation, showing better convalescence, less postoperative pain, and better cosmetic results compared with standard laparoscopy. In group B, we used SILS ports, which are similar to a cork stoppers, allowing a perfect carbon dioxide (CO2) sealing and therefore guaranteeing a good working space. Within this port, three inline trocars can be placed; a standard laparoscopic instrument is prohibitive and at least one roticulator instrument is necessary to achieve some triangulation. Bent instruments cannot be used because SILS ports use 5-mm trocars for instrument access and bent instruments will not pass. TriPort will offer better triangulation, but this use in a flank position will leak CO2, compromising the small retroperitoneal working space. We believe that transverse and lumbar muscles offer a curved surface and CO2 can leak. The internal ring port does not have a flat muscle surface like the rectal muscle in a transperitoneal access.

Retroperitoneal LESS has surgical challenges. Our technique may offer subjective cosmetic benefits and show the feasibility of performing renal cyst ablation and renal biopsy safely and in a reasonable operating time. Additional improvement of instruments and intense pelvic trainer work to improve surgical techniques are warranted to include more complex procedures and reconstructive urological surgery.

Conflicts of interest: The authors have nothing to disclose.

References

EU-ACME question

Please visit www.eu-acme.org/europeanurology to answer the following EU-ACME question online (the EU-ACME credits will be attributed automatically).

Question:
What does LESS need to be competitive with conventional laparoscopy technique?
A. Instrument triangulation
B. Five-mm instrumentation
C. Bigger working space
D. Good endoscopic experience