Simple nephrectomy in a young woman for recurrent pyelonephritis utilizing laparoendoscopic single-site surgery (LESS)

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Abstract

Minimally invasive surgery is rapidly evolving due to new technology and techniques designed to improve patient outcomes. We report a case of a young woman with an atrophic kidney secondary to reflux nephropathy, suffering from recurrent episodes of pyelonephritis. She was treated successfully using laparoendoscopic single-site surgery (LESS). We also present a review of the literature.

Case report

A 19-year-old woman presented to our urology clinic with a history of recurrent urinary tract infections over the previous year, including episodes of febrile pyelonephritis requiring intravenous antibiotics, but not admission to hospital. She was otherwise healthy with no history of urinary tract infections or vesicoureteric reflux. Investigations of her upper tracts revealed a left atrophic, hydronephrotic kidney. A voiding cystourethrogram was conducted and revealed grade 2 reflux on the left with no reflux into the right kidney. A nuclear renal scan revealed significant reduction in arterial flow to the left kidney, with an overall differential renal function of 10% on the left and 90% on the right. After a period of conservative management, during which she had a number of breakthrough infections despite antibiotic prophylaxis, she consented to have an elective simple nephrectomy using a laparoendoscopic single-site surgery (LESS) technique.

We used the single incision laparoscopic surgery (SILS) port (Covidien, Norwalk, CT) (Fig. 1). The SILS port was placed through a 2-cm incision in the umbilicus and CO2 pneumoperitoneum was obtained (Fig. 2). Three 5-mm ports were placed through the SILS port. The colon was mobilized and the kidney dissected free without incident (Fig. 3). A 45-mm vascular stapler was used to secure the renal hilum. The specimen was placed in a laparoscopic specimen retrieval bag and brought out through the umbilical incision, which was then closed with a running fascial suture and the skin closed with a running subcuticular suture (Fig. 4).

The estimated blood loss was less than 100 cc and the operative time was 3 hours and 19 minutes. The patient was discharged on postoperative day 2 after an uncomplicated recovery. She was an ideal patient for this operation due to her thin body habitus, young age and non-malignant pathology. Our patient recovered quickly and was seen in postoperative follow-up delighted with her very well-healed and inconspicuous incision. She has had no further episodes of pyelonephritis with a follow-up period of 18 months.

Discussion

Many terms and acronyms have been used to describe surgical procedures that perform laparoscopic surgery through a single incision, typically the umbilicus (SILS [single incision laparoscopic surgery], MISPORT [minimally invasive single-port surgery], SPES [single port endoscopic surgery]). Recently, it has been proposed that LESS be used as an all-encompassing term, to standardize communication in the literature.[1,2]

A recent retrospective, case-control comparison between conventional and SILS nephrectomy performed successfully in 33 patients (conventional approach in 22 and SILS in 11) was published.[3] The authors found no difference in median operative time (122 min vs. 125 min, $p = 0.78$), percent decrease from preoperative hemoglobin, analgesic use, length of stay or complication rate.[3] Raybourn and colleagues reported their initial experience of 11 LESS nephrectomies compared retrospectively to 10 patients who underwent traditional laparoscopic simple nephrectomy.[4] They found no significant difference in operative time, complications, blood loss or length of stay. Our first experience with a LESS nephrectomy appears to have had a similar outcome

Fig. 1. The single incision laparoscopic surgery (SILS) port, 5-mm camera, trocar and 5-mm ports.

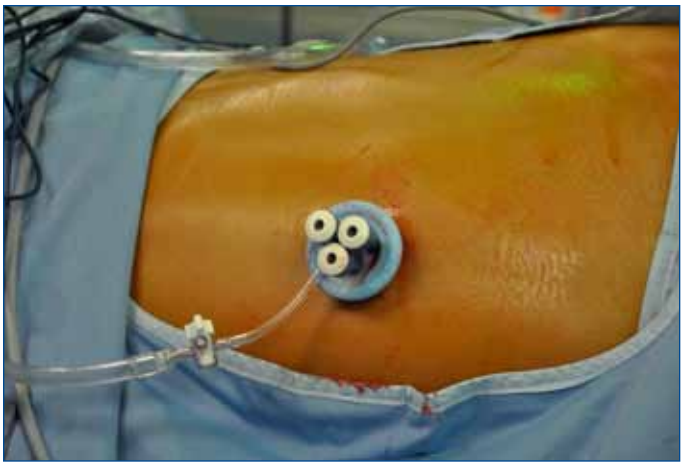

Fig. 2. The single incision laparoscopic surgery (SILS) port in the umbilicus with three 5-mm ports.

to these published series.

The SILS system uses an inverted format where the laparoscopic instruments are reversed to ensure an intra-abdominal angle appropriate for dissection. The surgeon's right hand controls the left instrument and the left hand controls the right. There are other systems that do not require instrument inversion, but incorporate unique characteristics and challenges of their own. We performed our initial LESS nephrectomy using a live porcine model to familiarize ourselves with the novel equipment and technique.

Difficulties included collision of surgical instruments, relative positioning of the operating surgeon and assistant, decreased quality of illumination and intraperitoneal visualization due to the 5-mm camera, loss of traditional triangulation obtained with multiple ports, and difficulties in obtaining optimal traction and countertraction. These challenges are documented in the literature.[4] Despite these obstacles, operative times are similar and these issues can be resolved quite readily through experience in the dry or wet laboratory setting. For example, the crossover technique can be modified by using one straight and one angled instrument in non-crossover format either as the primary approach or to ease the transition during training.

Mir and colleagues published a retrospective study examining patient characteristics between LESS nephrectomy and those performed with conventional laparoscopy. The authors found that patients undergoing LESS were significantly younger with a lower body mass index and a benign indication for surgery.[5] Our patient had similar characteristics and was selected due to a presumed decrease in operative complexity. Indications for performing LESS should expand along with a selection of a more complex patient population as surgeons become increasingly comfortable with this novel surgical technique.

The touted benefits of LESS nephrectomy, including a reduction in pain, operative stay, port-site hernias and improved cosmesis, remain to be definitively demonstrated. A recent review of the literature found the only objective

Fig. 3. The operating room setup for laparoendoscopic single-site surgery (LESS) nephrectomy.

Fig. 4. The closure of umbilical incision post-laparoendoscopic single-site surgery (LESS) nephrectomy.

benefit of LESS appeared to be cosmetic, while recognizing the poor quality of currently available evidence.[6] However, it would be reasonable to expect an improvement in certain measures due to using a single incision. The ease of the LESS technique may also improve with the continued refinement and miniaturization of the instrumentation coupled with the rapid development of robotic surgery.

Conclusion

We present a case of simple nephrectomy using LESS; this technique has the potential to improve patient outcomes through decreased pain and improved cosmesis. Prospective, randomized comparison studies are required to evaluate LESS and to ultimately determine its role in our laparoscopic surgical armamentarium.

Competing interests: None declared.

This paper has been peer-reviewed.

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