

# Small Bowel Injury During Laparoendoscopic Single-Site Surgery for Simple Nephrectomy

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## ABSTRACT

**Background and Objectives:** A 71-year-old man underwent a right simple nephrectomy via the laparoendoscopic single-site surgery (LESS) approach for intractable right flank pain and gross hematuria. A postoperative diagnosis of duodenal injury was suspected by physical findings and confirmed by computed tomography imaging.

**Methods:** Emergency exploratory laparotomy revealed a <5-mm full-thickness perforation of the duodenum and an accompanying 1-cm seromuscular injury.

**Results:** The subsequent postoperative course was unremarkable except for a right intraabdominal seroma that resolved without intervention.

**Conclusion:** LESS nephrectomy is an effective surgical approach, but more data are needed regarding its surgical outcomes and complications. This case shows that the LESS approach is not without the risk of life-threatening complications, and it must be performed by experienced surgeons in select patients who are notably interested in improved cosmesis, after an informed consent that includes the potential for complications.

**Key Words:** Laparoscopy, Nephrectomy, Single-incision surgery, Intraoperative complications.

## INTRODUCTION

The use of laparoscopic nephrectomy has blossomed since its initial description by Clayman et al.<sup>1</sup> Many advances have made this procedure one of the standards of urologic surgery. Substantial gains have been made in lowering morbidity rates and convalescence time while improving the cosmetic results of these surgeries. In particular, the creation of laparoendoscopic single-site surgery (LESS) has made real the possibility of safe scarless umbilical nephrectomy.<sup>2,3</sup> Although much research has been done to elucidate the complication rates of regular and hand-assisted laparoscopic renal surgery,<sup>4</sup> the newer single-port approach still requires more clinical data to address efficacy and complication rates. We report the successful completion of a single-port laparoscopic right nephrectomy that was complicated by a duodenal perforation diagnosed postoperatively.

## CASE REPORT

A 71-year-old white man was observed for several months by urology staff for severe right-sided flank pain and gross hematuria with no definitive diagnosis aside from confirmation of a gross hematuria at the right ureteral orifice. Ureteroscopic examination revealed severe inflammation of the pelvicaliceal urothelium without any evidence of malignancy. After conservative management failed, the patient was scheduled for a laparoscopic right nephrectomy via the LESS approach.

The patient was placed in the left lateral position. A 2-cm periumbilical vertical incision was made, in which a Triport (R-Port, Advanced Surgical Concepts, Dublin, UK) single-port trocar was inserted, as has been previously described.<sup>5</sup> We performed the remainder of the operation using a flexible tip Olympus 5-mm laparoscope (Olympus, Center Valley, PA), a Cambridge Endo-hook electrode (Cambridge Endoscopic Devices, Framingham, MA), surgical scissors (United States Surgical, Norwalk, CT), an Endo-GIA stapler (United States Surgical), and a Harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH). No trocar except for the single-port trocar was used. Two renal arteries were identified posterior and inferior to the renal veins. Both renal arteries were controlled with

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Hem-o-lok polymer clips (Weck-Teleflex, Research Triangle Park, NC).

One of the 12-mm port openings was cut open, and a 15-mm EndoCatch retrieval bag (Auto Suture, Norwalk, CT) was inserted through this incision. The entrapment of the mobilized kidney was difficult because of leakage of pneumoperitoneum through the trocar site. A fresh R-port device was placed through this incision, and the laparoscope was reinserted to confirm that there was no bleeding and no visible bowel injury. The R-port was removed and the incision was closed.

The patient was stable until 10:00 PM on the same day of surgery, when a sudden onset of severe abdominal pain developed. The patient was treated with intravenous morphine and observed overnight. Physical examination at 7:00 AM on the following day revealed significant abdominal guarding and rebound tenderness. Computed tomography (CT) of the abdomen and pelvis with oral diatrizoic acid suggested a duodenal injury and spillage of oral contrast into the renal fossa (**Figure 1**).

An emergency exploratory laparotomy revealed a <5-mm full-thickness perforation of the duodenum and an accompanying 1-cm seromuscular injury. A primary 2-layered repair of the injury and peritoneal lavage with normal saline solution were performed by the general surgeons. The patient was discharged home on postoperative day 12.

At the 2-month follow-up, the patient was noted to be recovering well but admitted to some right flank discomfort and was subsequently found to have an intraabdominal seroma after CT imaging. The seroma was conservatively observed without intervention and it resolved completely by the 4-month follow-up visit.

## DISCUSSION

Laparoscopic nephrectomy provides a profound step forward in reducing patient morbidity associated with surgery when compared with the open approach. As such, research has been conducted to attempt to elucidate the major complications associated with laparoscopic surgery. A meta-analysis of laparoscopic renal surgery series studies between 1995 and 2004 was conducted by Pareek et al,<sup>4</sup> showing an overall major complication rate of 9.5%. This included small bowel injury, which ranged between 0.5% and 2.3% of the overall complication rate, depending on the laparoscopic approach that was used.

Bowel injury is a well-known potential complication of intraperitoneal surgery. Laparoscopic bowel injury has



**Figure 1.** CT reveals spillage of enteric contrast material (*white arrows*) into the right renal fossa, suggesting duodenal injury.

been characterized for more than a decade, beginning with the seminal evaluation by Bishoff et al,<sup>6</sup> who reported a laparoscopic bowel perforation rate of 0.2%, more than half of which occurred in the small bowel. As has been previously suggested for multiport laparoscopic nephrectomy, inadvertent bowel injury during dissection may be averted by the visualization of instruments at all times and by paying particular attention to adjacent structures. It is further recommended that the surgeon remain on the plane between Gerota's fascia and the bowel mesentery, thus minimizing the risk of bowel injury.<sup>7</sup>

The presentation of bowel injury after laparoscopy differs from those that present after laparotomy. These symptoms are described as persistent pain at a single trocar site without erythema or purulence, abdominal distention, diarrhea, and leukopenia. There is also a notable lack of ileus, diffuse abdominal pain, nausea, and vomiting.<sup>6</sup>

The ability to provide a scar-free surgery with decreased pain and postoperative morbidity was examined using the LESS technique by Gill et al,<sup>2</sup> who had an excellent surgical outcome in their initial cases. However, little is currently known about the likelihood of encountering various surgical complications as a result of single-port surgery.

Apart from improved cosmesis with a single incision in the umbilicus compared with multiple visible incisions during conventional laparoscopy, there is little benefit for the patient.<sup>8,9</sup> The learning curve and limitations of LESS, including the lack of triangulation of instruments, inadequate retraction and exposure, and instrument collision, could result in inadvertent injury to neighboring struc-

tures, as demonstrated in the patient presented here. This complication occurred after we had completed 7 LESS nephrectomies at our institution by a single surgeon who had previously performed more than 1000 laparoscopic renal surgeries. As more institutions and surgeons begin their experience with LESS nephrectomy, the risk of similar complications increases. The LESS nephrectomy is therefore not without the risk of life-threatening complications and must be performed only by highly experienced surgeons in carefully selected patients who are particularly interested in improved cosmesis, after an informed consent that includes the potential for complications.

To our knowledge, this is the first published report of a major bowel complication resulting from LESS nephrectomy. Further research and clinical experience will help elucidate the balance between potential benefits and the potential for major complications in single-port nephrectomy.

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