

The Use of Blunt-tipped 12-mm Trocars Without Fascial Closure in Laparoscopic Live Donor Nephrectomy

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ABSTRACT

Objectives: Blunt-tipped trocar placement may eliminate the need for fascial closure in transperitoneal laparoscopic live donor nephrectomies (LDN). The process of 12-mm blunt-tipped trocar insertion through the abdominal wall involves fascial and muscle spreading, not incision. Coaptation of the tissue layers occurs during withdrawal of the trocar, preventing volume gaps that can be prone to herniation.

Methods: We retrospectively assessed the safety and efficacy of fascial nonclosure after 12-mm blunt-tipped port insertion in 70 transperitoneal LDNs performed between October 1998 and March 2001. Five ports (two 12-mm blunt-tipped and three 5-mm blunt-tipped) were used in all cases. The 12-mm trocars were inserted at the lateral border of the rectus muscle, approximately 8 cm below the costal margin and also along the anterior axillary line approximately 8 cm below the costal margin. Fascial nonclosure was performed in all 70 patients. Postoperative data were analyzed regarding complications and long-term outcomes.

Results: Three major and 7 minor complications occurred in this series. No patient developed clinically detectable trocar-site hernias or other complications related to blunt-trocar placement.

Conclusions: Our data shows that fascial nonclosure after transperitoneal 12-mm blunt-tipped trocar insertion is safe. Visualization of the tissue layers during port placement facilitated the insertion process. Further application of this

method in a larger number of patients is needed to confirm its clinical applicability.

Key Words: Laparoscopy, Renal transplantation, Hernia.

INTRODUCTION

Laparoscopic nephrectomy was initially described as an alternative to open surgery for treating benign renal disease.¹ Reduced postoperative analgesic requirements, decreased convalescence, and equivalent surgical outcomes when compared with those in open nephrectomies have encouraged a broadening of laparoscopic applications to other urological procedures,²⁻⁴ including laparoscopic donor nephrectomy (LDN). As in open surgery, LDN can be performed through either a transperitoneal or retroperitoneal approach.^{5,6} One of the disadvantages of the transperitoneal approach is port-site related complications, especially port-site herniation. Past studies have shown an incidence of herniation through 12-mm extraumbilical port sites created with sharp-tipped trocars up to 3.1%.⁷ As a result, these sites typically undergo fascial closure. Five-mm sites, which have a negligible incidence of herniation, have not been closed. Theoretically, the use of blunt-tipped trocars (compared with the use of sharp-tipped trocars) may decrease the risk of port-site hernias because the blunt tip avoids muscle and fascial incision. Tissue spreading occurs with trocar insertion, followed by spontaneous muscle coaptation after trocar removal.

The goal of this retrospective study was to assess the safety and efficacy of fascial nonclosure (FNC) following the insertion of blunt-tipped, 12-mm trocars for transperitoneal LDN.

MATERIALS AND METHODS

Between October 1998 and March 2001, 70 patients underwent transperitoneal left-sided LDN. None of them underwent fascial closure of the 12-mm port sites that were created with blunt-tipped trocars. Trocar placement for all patients in this cohort was performed as follows. Patients were placed in a lateral decubitus position. A 12-

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mm skin incision was made at the lateral edge of the rectus muscle approximately 8 cm below the costal margin. The Optiview 12-mm blunt-tipped trocar (Ethicon Endo-Surgery, Cincinnati, OH), with a 10-mm-0 degree lens was introduced at this site angled perpendicularly to the abdominal wall, allowing visual control of progression.⁸ A continuous rotating motion applied with steady pressure over the blunt trocar resulted in the spreading of the fascial and muscle layers. The peritoneum was then traversed and omentum or bowel was visualized once the peritoneal cavity was entered. A pneumoperitoneum of 14 mm Hg was then established through the trocar. Subsequently, an additional 12-mm blunt-tipped trocar and three 5-mm blunt-tipped trocars were placed under direct vision. The second 12-mm blunt-tipped trocar was inserted at the anterior axillary line approximately 8 cm below the costal margin. The 5-mm trocars were placed approximately 5 cm below the rib cage at the lateral edge of the rectus sheath, in the midline just inferior to the umbilicus, and along the mid axillary line approximately 5 to 10 cm below the rib cage after medial reflection of the colon. The donor kidneys in the first 43 cases were removed through an infraumbilical midline incision with an EndoCatch bag (Auto Suture, Norwalk, CT). In the last 27 cases, we used a modified Pfannenstiel incision⁹ with direct manual retrieval of the donor kidney.

Once specimen retrieval had been completed, patients were repositioned if necessary (ie, rotated) to ensure that all trocars could be visualized in their entirety. All trocars were then removed under direct vision, except the last 12-mm trocar, through which the 30°, 10-mm scope was inserted to confirm adequate hemostasis and absence of tissue herniation at other port sites. Finally, the 30° scope was replaced by a 10-mm-0° scope, and desufflation was completed. The remaining 12-mm trocar was removed by back loading the trocar on the scope while keeping the scope approximately 2 cm within the peritoneal cavity. The scope was then removed slowly to allow visualization of the tissue layers from within to confirm that no active bleeding or entrapment of peritoneal contents had occurred in the final port site. All incisions were infiltrated with 0.25% marcaine with epinephrine, and a running 4-0 Vicryl subcuticular suture was used for skin closure of the 12-mm incisions. The 5-mm skin incisions were closed only with Steri-Strips. Postoperatively, breathing exercises, incentive spirometry, and early ambulation were encouraged. After discharge, a physical examination was performed at 4 weeks. Patients had a follow-up visit

at 6 months or were contacted by phone for an update and asked specifically about any discomfort, bulging, or both, at trocar sites.

Patient demographics, intraoperative data, and postoperative complications were retrospectively analyzed.

RESULTS

The mean age of the 42 women and 28 men was 39 years (range 19 to 61). Body mass index was 23.33 (22.36 to 34.13). Pneumoperitoneum was achieved with the Optiview blunt-tipped visualizing 12-mm trocar insertion in all cases, and the access technique was not modified for obese patients. None of the perioperative complications was related to the initial or subsequent 12-mm trocar insertions. No clinically detectable trocar site or specimen retrieval site abdominal wall hernias were observed at up to 3 years of follow-up.

DISCUSSION

Most laparoscopic surgeons use a Veress needle to obtain a pneumoperitoneum followed by sharp-tipped trocars.¹⁰ Sharp-tipped trocars puncture the abdominal wall by incising through the tissue layers. These trocars create a defect, which can increase the risk for hernia formation. The incidence of abdominal wall hernias in 12-mm sites after fascial closure is approximately 1% (0.02% to 5%)¹¹⁻¹³ (**Table 1**). This rate is probably underestimated, because many patients are lost to follow-up and only symptomatic patients will seek medical attention. Fascial closure can reduce but not eliminate the risk of hernias. Montz and Munro¹⁴ reviewed 933 incisional hernia cases that occurred in 4 385 000 gynecologic procedures and reported that 17.9% of hernias occurred despite fascial closure. In Montz' survey of gynecologists, the risk of herniation tended to increase with large diameter trocars, as 86.3% of incisional hernias occurred when a trocar 10 mm or larger was used. Kadar et al⁷ reported an overall incidence of extraumbilical port-site hernias of 0.23% for 10-mm trocars. However, this rate increased to 3.1% when 12-mm trocars were used. For 12-mm sharp trocars, Kadar reported that the herniation rate increased from 0.22% with fascial closure to 8% when the fascia was not closed. Therefore, the authors recommended fascial and peritoneal closure for all ports larger than 5 mm. However, secure fascial closure can be problematic because fascial closure-related complications like nerve entrapment, abdominal wall vessel injury, and bowel

Table 1.
Incidence of Incisional Hernias and Other Complications Related to Trocars Placement After Laparoscopic Surgery

| | Kadar et al ⁷ | Coda et al ¹¹ | Leibl et al ¹³ | Montz et al ¹⁴ | This Study |
|----------------------------|---|---------------------------------|--|-----------------------------------|----------------|
| Population | 3560 | 1287 | 3000 | 4 385 000 | 70 |
| Trocar size | 10/12 mm | 11/12 mm | 12 mm (Sharp) 13 mm (Blunt) | < or >10 mm | 12 mm (Blunt) |
| Incisional hernias | N=6 (0.17%) 10 mm, n=1 12 mm, n=5 | N=14 (1%) | 12 mm, n=11 (1.83%) 13 mm, n=1 (0.17%) | N=933 >10 mm, n=725 (86.3%) | None |
| Trocar site | Extraumbilical | Extraumbilical and umbilical | Extraumbilical and umbilical | Extraumbilical and umbilical | Extraumbilical |
| Fascial closure | 30 Open 3 Closed | Not mentioned | Not mentioned | 17.9% despite fascial closure | No |
| Other complications | Not mentioned | Not mentioned | 12-mm, trocar site bleeding (1.16%) 13 mm, no bleeding | Not mentioned | None |
| Incisional hernia contents | N=4 (bowel) N=2 (omentum) | Not mentioned | Not mentioned | Large and small bowel; omentum | No |
| Surgery type | Gynecology | General surgery | General surgery | Gynecology | Urology |
| Trocar tip design | Sharp | Sharp | Sharp (12 mm) Blunt (13 mm) | Sharp | Blunt |

injury can occur.¹⁵ Several devices are currently being used for this purpose (ie, Carter-Thomason), based on needle-passers that facilitate peritoneal and fascial closure, under direct laparoscopic visualization.¹⁶⁻¹⁸ Although these devices can reduce the complications related to blind fascial closure, a hernia may still occur.

Most trocar site-related hernias occur within the first 2 weeks after the procedure, with a range between a few hours to 1 year.¹² The umbilicus has been shown to be the most frequent site of herniation, representing more than 75% of the cases.¹¹ Trocars that are 5 mm or smaller create a tissue defect that is considered too small to constitute a significant risk for hernia formation in adults. Nevertheless, 9 cases of 5-mm sharp-tipped trocar insertion site hernias have been reported in the literature.¹⁴

In contrast with sharp trocars, the insertion of blunt-tipped trocars is associated with a less traumatic separation of tissue planes, as well as the ability to visualize tissue layers during port insertion. As a result, these new trocars have been shown to minimize complications associated with the insertion process.^{13,18} In addition, the blunt tissue spreading during port insertion allows coaptation of the intervening tissue layers upon trocar

removal. Except for an umbilical trocar, the closure of the fascia may not be necessary. In our series, we did not observe any hernia or any increase in morbidity at the nonfascia closed 12-mm trocar sites.

Fascial nonclosure after transperitoneal 12-mm blunt-tipped trocar insertion through muscular parts of the abdominal wall for LDN resulted in no hernias or other complications in this study. Further experience in a large number of patients will establish the clinical role for this method.

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