

Incarcerated Hernia in 11-mm Nonbladed Trocar Site Following Laparoscopic Appendectomy

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ABSTRACT

Background: Nonbladed trocars are considered less traumatic to the abdominal wall due to the lack of fascial incision. It has been suggested that closure of the abdominal fascia may be unnecessary when such nonbladed trocars are used.

Case Report: We report on 2 patients who were diagnosed with trocar-site hernias 2 days after laparoscopic appendectomy performed using 11-mm nonbladed trocars.

Conclusion: Although rare, trocar-site hernias after laparoscopic surgery with nonbladed trocars remain a cause of postoperative morbidity and require prompt intervention. Therefore, this report underscores the significance of performing meticulous closure of all trocar sites that are ≥ 10 mm.

Key Words: Laparoscopy, Hernia, Complications, Trocar-site hernia, Appendectomy.

INTRODUCTION

Trocar-site hernia following laparoscopic surgery is a rare complication with a reported incidence of 1% to 2%.¹ Nonbladed trocars, radially dilating systems, and conical blunt devices are considered less traumatic to the abdominal wall due to the lack of fascial incision. This mechanism of stretch and separation, rather than slicing, is believed to avoid large fascial defects.² Consequently, it has been suggested that closure of abdominal fascia may be unnecessary when such nonbladed trocars are used.^{2,3} We report on 2 patients diagnosed with trocar-site hernias 2 days after laparoscopic appendectomy performed using 11-mm nonbladed trocars.

CASE REPORT

Two female patients aged 62 and 75 years with a body mass index of 29 and 34, respectively, underwent an uneventful laparoscopic appendectomy, using 3 bladeless 11-mm Excel trocars (Ethicon, Cincinnati, Ohio, USA). The location of the trocars in both cases was identical: infraumbilical, left lower quadrant (LLQ), and midline suprapubic. The appendix was removed through the suprapubic incision without dilatation of the fascia or the skin in either of the incisions. Both patients were discharged one day later after an uneventful postoperative course. One day after the discharge, the patients presented to the emergency department with pain and swelling at the left lower quadrant trocar site. One patient underwent a CT scan that demonstrated an incarcerated loop of bowel at the trocar site (**Figure 1**). Diagnostic laparoscopy in both patients confirmed the diagnosis of hernia in the LLQ, and an incarcerated loop of viable small bowel at the trocar site was identified (**Figure 2**). Exploration of the surgical wound clearly demonstrated the defect involving of all the abdominal layers (**Figures 3, 4**). The hernias were reduced and the fascial defects were repaired primarily. Both patients tolerated the procedure well and were discharged home on the second postoperative day.

DISCUSSION

Bladed trocars create an incision in both the muscle and the fascia, thus predisposing trocar sites to hernias.

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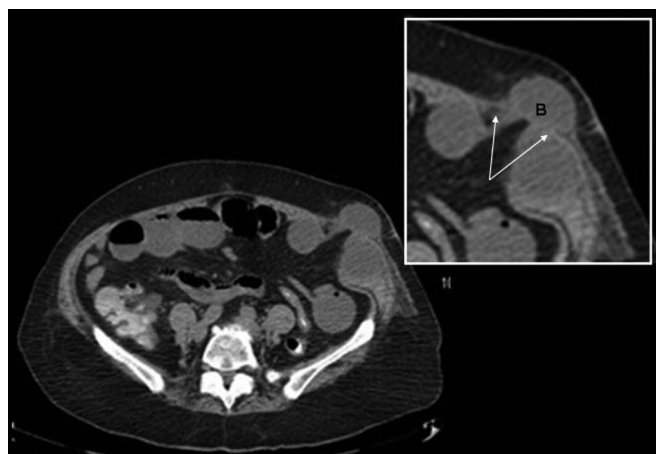


Figure 1. Computed tomography scan cross section, demonstrating incarcerated small bowel at the left lower quadrant. B = higher magnification of the hernia.



Figure 2. Incarcerated loop of viable small bowel at the trocar site identified by laparoscopy.

Tonouchi et al¹ reviewed the literature on bladed trocars and revealed a reported trocar-site hernia incidence of 0.6% to 2.8% in series with more than 120 surgeries. Most hernias appeared at the site of midline trocars, with umbilical sites the most common of all. It has been suggested that risk factors for trocar-site hernias include female sex, age >60, obesity, and longer operative time.⁴ Current studies recommend closure of all bladed trocar sites >5mm.

Nonbladed trocars include radially dilating system, conical blunt devices, and bladeless trocars. The fascial defect that these trocars create is presumably smaller in area, shorter in length and width, and has less destruc-

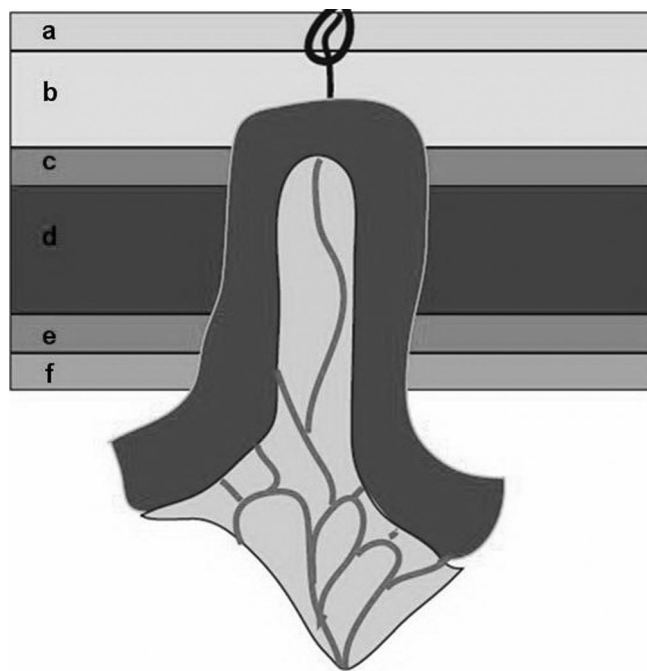


Figure 3. A diagram showing an incarcerated loop of bowel penetrating the fascia.

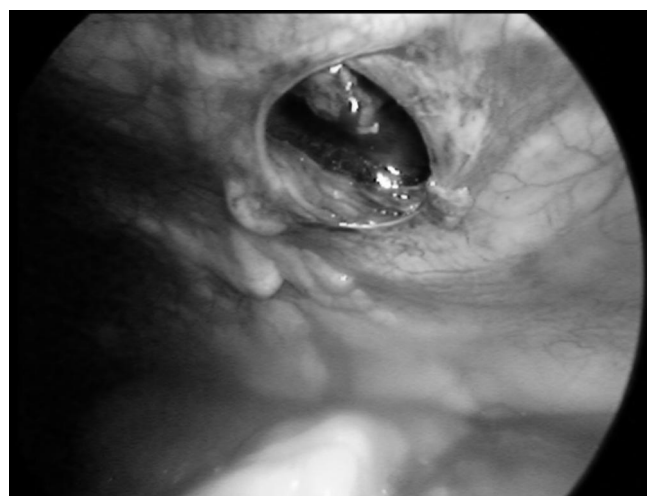


Figure 4. The hernia defect involving all the abdominal layers as demonstrated by laparoscopy.

tion of fascial tissues compared with bladed trocars. Furthermore, it is the separation of tissues rather than slicing and transection that increases re-approximation after trocar removal.⁵ Despite the proposed different mechanism and design of nonbladed trocars, no statistically significant differences in the associated risk of bleeding, hematoma formation, postoperative pain, or

cosmetic results have been established. In addition to nonbladed trocars, alternative methods of entry in laparoscopic procedures that reduce trocar-site herniation have been reported, for instance, Ternamian's visual entry cannula (Ternamian EndoTIP cannula visual)⁶ and the Semm's "z"-track method of trocar insertion.⁷ However, these methods have not gained wide acceptance and have not been assessed in a prospective randomized study.

To date, only several studies have reported on the incidence of trocar-site hernias following nonbladed trocars without fascial closure. Siqueira et al⁸ reported a retrospective study of 70 laparoscopic donor nephrectomies with 140 12-mm bladeless trocars and no clinically detectable hernias. Liu et al² conducted a prospective study involving 70 patients with 110 10-mm to 12-mm bladeless trocar sites. No hernias were identified. In both studies, none of the patients underwent fascial closure. In a prospective study of 244 patients undergoing elective laparoscopic procedures comparing nonbladed trocars without fascial closure versus cutting trocars with fascial closure with trocar size >10-mm, Bhojru et al⁹ found no trocar-site hernias. Johnson et al¹⁰ described a retrospective series of 747 patients who underwent Roux-en-Y gastric bypass surgery with 1494 12-mm VersaStep trocars, 2241 5-mm VersaStep trocars, and 747 supraumbilical Hasson port sites. They reported a 0% incidence of herniation in the nonbladed trocar sites without suture closure, and the hernia incidence was 1.2% at the supraumbilical Hasson port site, despite fascial closure. On the other hand, in an extensive review, Helgstrand et al¹¹ identified a total of 9 reported trocar-site hernias in 2900 patients in whom 12-mm nonbladed laparoscopic trocars were used without fascial closure. Rosenthal et al¹² summarized 849 laparoscopic Roux-en-Y gastric bypass procedures that were performed using 12-mm bladeless visual-entry trocars without fascial closure. Two trocar-site hernias were identified among 74% of the patients available for follow-up. Chiong et al¹³ retrospectively identified 1055 patients who underwent laparoscopic urologic oncology surgery. A total of 7 patients (0.66%) were identified with trocar-site hernias. All hernias occurred when 12-mm nonbladed trocars were used without fascial closure.

Two more reports^{14,15} have been published about similar LLQ trocar-site hernias. None of the cases occurred following an appendectomy. As in the 2 previous published reports, our patients presented with hernia stran-

gulation shortly after surgery and required emergent re-operation.

Since the introduction of nonbladed trocars, at our institution we have used over 1800 10-mm trocars in a variety of cases and in over 340 laparoscopic appendectomies to account for 0.1% trocar-site hernias with nonbladed trocars. Although trocar-site hernias after laparoscopic surgery are uncommon, they remain a significant cause of postoperative morbidity and require prompt intervention. The cases serve as an important reminder that trocar-site hernias are possible even after the use of nonbladed trocars. This report underscores the significance of performing meticulous closure of all trocar sites that are ≥ 10 mm. Emerging techniques offer secure and efficient trocar-site closure and may put an end to this unsolved issue.

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