

Delayed Presentation of a Bowel Bovie Injury After Laparoscopic Ventral Hernia Repair

Jasneet Singh Bhullar, MD, MS, Jennifer Gayagoy, MD, Sushant Chaudhary, MD, MS,
Ramachandra B. Kolachalam, MD

ABSTRACT

Introduction: Bowel injury during laparoscopic surgery is a rare but serious complication. A Bovie injury to the bowel can cause delayed perforation of the viscus, thus increasing the possibility of a preventable morbidity. Patients presenting with perforation peritonitis within 24 hours and up to 2 to 3 weeks after laparoscopic Bovie injury to the bowel have been reported in the literature.

Case Description: A 74-year-old woman underwent a laparoscopic ventral hernia mesh repair. Intraoperatively, a small area of superficial Bovie injury to the small bowel was repaired with Lembert sutures and tissue glue. Postoperatively, the patient recovered well, but she presented with perforation peritonitis 3 months after surgery. An exploratory laparotomy showed a jejunal perforation in the same area that was injured with cautery and repaired during the previous surgery. The patient was only using inhaled steroids for asthma on and off but had a remote history of chemotherapy and radiation for colorectal cancer.

Conclusion: Bovie injury to the bowel has a hidden depth, causing a slow transmural tissue necrosis, and it might also impair local healing and eventually lead to perforation. Thus, the patient may present later than the usual period for wound healing and remodeling as previously reported. Given the disastrous consequence, it is imperative to perform a good surgical repair of even a minor Bovie injury to the bowel. This is the first report of a delayed presentation (>1 month) of a Bovie injury of the bowel.

Key Words: Laparoscopic injury, Ventral hernia, Thermal injury, Small bowel injury, Bovie injury, Cautery injury.

Department of Surgery, Providence Hospital and Medical Centers, Southfield, MI, USA (all authors).

Address correspondence to: Jasneet Singh Bhullar, MD, MS, Department of Surgery, Providence Hospital & Medical Centers, 16001 W 9 Mile Rd, Southfield, MI 48075, USA, Telephone: (248) 849-7638, Fax: (248) 849-5380, E-mail: drjsbhullar@gmail.com

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INTRODUCTION

Bowel injury during laparoscopic surgery is a rare but serious complication. A meta-analysis of publications from 1973 to 2001 calculated the incidences of bowel injury and bowel perforation to be 0.13% and 0.22%, respectively.¹ Despite the increased number of laparoscopic surgeries performed throughout the years, as well as increased operative experience for the surgeons, it is a complication that has not become obsolete. Furthermore, the consequences of bowel injury can be catastrophic. A delay in diagnosis of bowel perforation can lead to sepsis and even death if not diagnosed and treated promptly. There has been a proposed association between a delay in diagnosis and poor outcome.²

Intestinal perforations due to thermal injuries during laparoscopic procedures are fundamentally different from Veress needle or trocar insertion injuries. They are usually not apparent at the time of surgery. Therefore, presentation may be delayed, obviating simple primary closure as an option and increasing the chance of diffuse peritoneal soiling or abscess formation.³ Bowel cautery injuries, both contact and conductive, usually occur in proximity to the field of dissection. Contact burn injuries may be recognized at the time of surgery and treated appropriately. In contrast, conductive burns either are not recognized at all or are recognized remotely when perforation occurs 1 to 2 weeks after the initial procedure.⁴ Presentations have been reported from 8 days to 2 to 3 weeks after the time of actual injury.⁴⁻⁷ Although many of these injuries may be missed during the initial laparoscopic procedure, intestinal enterotomies are usually immediately obvious when the abdomen is opened at reoperation.⁸

However, Bishoff et al.⁷ discussed the difficulty in diagnosing a patient with bowel injury due to a laparoscopic injury because of the unusual patient presentation. Such patients do not show classic peritoneal signs on physical examination and are more likely to be afebrile and leukopenic.

We report a patient whose clinical presentation was unusual for a bowel perforation. The preceding surgery that had led to the perforation was performed 3 months earlier. There have been previous reports in the literature of

patients presenting with perforation peritonitis due to a Bovie injury to the bowel within a few hours to weeks after the initial surgery. To our knowledge, this is the first report of a patient with a delayed presentation (>1 month) of a laparoscopic Bovie injury to the bowel.

CASE PRESENTATION

A 74-year-old woman who had been diagnosed with an upper abdominal, midline ventral hernia (**Figure 1**) underwent an elective laparoscopic repair of the ventral hernia with mesh. The patient had previously undergone laparotomy, and extensive adhesiolysis was performed intraoperatively with Bovie and sharp dissection to expose the anterior abdominal wall hernial defects. A small Bovie burn injury of <0.5 cm on the small bowel was noted at the end of the enterolysis. The injury was judged to be superficial and was repaired with Lembert sutures by using No. 3-0 silk and was then covered with Evicel tissue glue. The rest of the surgery was uneventful, and the hernial defect was covered with Parietex mesh. Postoperatively, the patient recovered well and was discharged on the third postoperative day.

On outpatient follow-up, the patient complained of mild intermittent abdominal pain corresponding to the site of the repaired small bowel injury. Because she had no other symptoms, she was managed conservatively and was encouraged to undergo follow-up on an outpatient basis.

Three months after the initial surgery, the patient presented to the emergency department with acute onset of

abdominal pain. The pain was localized in the right upper quadrant of the abdomen. Physical examination showed localized guarding in the upper abdomen. Computed tomography of the abdomen and pelvis showed extraluminal air in the region of the falciform ligament and mid abdomen consistent with a viscus perforation (**Figure 2**).

The patient underwent an exploratory laparotomy, and intraoperatively, a jejunal perforation was found. The surgeon, who had performed the previous laparoscopic ventral hernia repair, noted that the area of perforation was at the site of the previous Bovie injury that had been repaired during the initial surgery. A small bowel resection and a side-to-side, functional end-to-end anastomosis of the jejunum were performed. Postoperatively, the patient recovered well and was discharged on the sixth postoperative day. On outpatient follow-up, she is asymptomatic.

DISCUSSION

Bowel injury due to a laparoscopic surgical procedure, though rare, is a devastating and potentially life-threatening complication. The reported incidences of bowel injury and bowel perforation are between 0.13% and 0.22%, respectively.¹

Delayed presentation of a perforated bowel injury due to a laparoscopic procedure has been described in the literature. Time frames vary from a few hours to up to 2 weeks postoperatively.^{1,5-7} The average time in cases of Bovie injury, from injury to diagnosis, was 10.4 days.⁶ Chapron



Figure 1. Axial view of computed tomography of abdomen showing midline ventral hernia (arrow).



Figure 2. Axial view of computed tomography of abdomen showing extraluminal gas (arrow), consistent with perforated viscus.

et al.² reported that approximately 75% of bowel injuries were diagnosed within the first postoperative week. Perforations that were diagnosed late generally resulted from thermal injury and were generally longer for large bowel injury than for small bowel injury.¹ Saltzstein et al.⁹ reported that the time delay from burn to perforation appears to be related to the severity of the coagulation necrosis. Our patient presented with perforation peritonitis 3 months after the initial injury, although the injury was judged to be superficial and repaired initially. She was diagnosed with and treated for an acute abdomen suspected to be due to a perforated viscus in an appropriate and timely manner. It is her delay in presentation and the presenting signs and symptoms, after her initial laparoscopic surgery, that are unusual.

Intestinal perforations due to thermal injuries during laparoscopic procedures are fundamentally different from Veress needle or trocar injuries. It is well known that thermal injury wounds can be deceiving, with the visible area of necrosis only being the tip of the iceberg. They are usually not apparent at the time of surgery. Therefore, presentation may be delayed, obviating simple primary closure as an option and increasing the chance of diffuse peritoneal soiling or abscess formation.³ However, the histologic changes of coagulation necrosis are evident hours after an ischemic injury, with most cell disintegration and necrosis occurring within 1 week, not after a few months. In addition, the injury was recognized during the initial surgery and repaired. Although the original insult to the bowel wall was a thermal injury, why the damage did not lead to bowel wall perforation until months later cannot be explained by the known basic cellular physiological process of coagulation necrosis.

It is unlikely that the patient's age and other comorbidities (colorectal cancer, treated with resection and subsequent chemotherapy and radiation 10 years previously; sarcoidosis; diabetes; and hypothyroidism) attributed to the delay in presentation. She was specifically asked about any previous or current use of steroids because steroid use has been well described in the literature to cause a delay in diagnosis of an acute abdomen.

The effects of inhaled corticosteroid treatment on wound healing and skin changes have been reported in patients with chronic obstructive pulmonary disease. A significantly higher proportion of patients taking inhaled corticosteroids as compared with placebo participants were reported to have easy bruising and slow healing of skin cuts or sores.¹⁰ However, the patients in the study were diagnosed with mild to moderate chronic obstructive pul-

monary disease requiring high doses of steroids daily. Our patient, in contrast, was using inhaled steroids once or twice a week on an as-needed basis.

Bishoff et al.⁷ reported that a patient with bowel injury after laparoscopic surgery may have an unusual presentation and devastating sequelae. The initial presenting complaint of all patients with unrecognized bowel injury was persistent increased pain at a trocar site without significant erythema or purulent drainage. On examination, the painful trocar site was closest to the injured bowel segment. Symptoms then progressed to abdominal distension and diarrhea, whereas ileus, diffuse abdominal pain, nausea, and vomiting were uncommon findings.⁷ These findings are similar to our patient's complaints. Although there is a small possibility that the patient could have had a contained perforation, but her long time course with no systemic symptoms makes this possibility less likely. Moreover, there have been no reports of contained small intestinal perforation leading to perforation peritonitis 3 months after the initial incident.

Our patient's initial presentation in the emergency department was for right upper quadrant abdominal pain with normal bowel habits and no fever or chills. She was hemodynamically stable, and the initial laboratory findings were normal, with a normal white blood cell count. During the follow-up after the initial surgery, she had complained of abdominal pain specific to the site of the Bovie injury, but because of her nonspecific abdominal examination, the patient was encouraged to continue follow-up as an outpatient.

Perhaps the choice to repair the initial injury with a Lembert suture and Evicel was inadequate. In a rabbit model, the outcomes of electrosurgically induced small and large bowel injury have been reported after suture repair versus tissue glue/sealant repair. The suture repair of a small bowel Bovie injury was reported to have improved outcomes when compared with glue repair.¹¹ Shirk et al.⁴ recommended that superficial bowel injuries due to enterolysis or superficial burns simply require a figure-8 suture with No. 2-0 Vicryl (Ethicon, Somerville, New Jersey) or similar material, and it was not necessary to resect the burnt injured area.

CONCLUSION

Bovie injury to the bowel has a hidden depth, causing a slow transmural tissue necrosis, and it might also impair local healing and eventually lead to perforation. Thus, the patient may present later than the usual period for wound

healing and remodeling as previously reported. Given the disastrous consequence, it is imperative to perform a good surgical repair of even a minor Bovie injury to the bowel. This is the first report of a delayed presentation (>1 month) of a Bovie injury of the bowel.

References:

1. Van der Voort M, Heijnsdijk EAM, Gouma DJ. Bowel injury as a complication of laparoscopy. *Br J Surg*. 2004;91(10):1253–1258.
2. Chapron C, Pierre F, Harchaoui Y. Gastrointestinal injuries during gynaecological laparoscopy. *Hum Reprod*. 1999;14(2):333–337.
3. Berry SM, Ose KJ, Bell RH, Fink AS. Thermal injury of the posterior duodenum during laparoscopic cholecystectomy. *Surg Endosc* 1994;8(3):197–200.
4. Shirk GJ, John A, Redwine DB. Complications of laparoscopic surgery: how to avoid them and how to repair them. *J Minim Invasive Gynecol*. 2006;13(4):352–359.
5. Abraham NE, Simon R, Shah O. Thermal injury causing delayed perforation of small bowel after transurethral resection of bladder tumor without evidence of bladder perforation. *Can J Urol*. 2011;18(4):5836–5838.
6. Brosens I, Gordon A. Bowel injuries during gynaecological laparoscopy: a multinational survey. *Gynaecol Endosc*. 2001;10(3):141–145.
7. Bishoff JT, Allaf ME, Kirkels WM, Moore RG, Kavoussi LR, Schroder F. Laparoscopic bowel injury: incidence and clinical presentation. *J Urol*. 1999;161(3):887–890.
8. Wolfe BM, Gardiner BN, Leary BF, Frey CF. Endoscopic cholecystectomy. An analysis of complications. *Arch Surg*. 1991;126(10):1192–1196, discussion 1196–1198.
9. Saltzstein EC, Schwartz SF, Levinson CJ. Perforation of the small intestine secondary to laparoscopic tubal cauterization. *Ann Surg*. 1973;178(1):34–36.
10. Tashkin DP, Murray HE, Skeans M, Murray RP. Skin manifestations of inhaled corticosteroids in COPD patients: results from Lung Health Study II. *Chest*. 2004;126(4):1123–1133.
11. Box GN, Lee HJ, Abraham JB, et al. Evaluation of the outcomes of electrosurgical induced bowel injury treated with tissue glue/sealant versus sutured repair in a rabbit model. *J Endourol*. 2009;23(3):535–540.