Can Bowel Injury Be Prevented During Laparoscopic Surgery? A Case Report and Literature Review

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SUMMARY

Objective: Laparoscopic gynecologic surgery has gained worldwide popularity in the past few years, but complications of this technique do occur. Bowel injuries, which may occur as a result of the insertion of an insufflation needle or trocar, are a rare complication of laparoscopy. They are generally recognized either immediately or within a few days postoperatively.

Case Report: We present a case of laparoscopic perforation of the small bowel in a patient who had previously undergone surgery for an ectopic pregnancy and an adhesive ileus. After converting to a laparotomy, a jejunal loop adhesive to the anterior abdominal wall was discovered at the site of the trocar puncture. One puncture hiatus was observed and sutured. The follow-up was uneventful.

Conclusions: The incidence of bowel injuries occurring during access and surgical procedures significantly decreases with experience. Most importantly, if trocar injury does accidentally occur, laparoscopists must be alert to the possibility, detect it early, take proper action and manage the complications to reduce morbidity and mortality. \cite{2}

Key Words: laparoscopy, bowel injury

Introduction

Injuries associated with trocar insertion occur despite increasing physician experience and the use of standardized techniques. It has been estimated that diagnostic and minor surgical laparoscopic procedures are associated with a 0.08% risk of intestinal injury, while in major surgical laparoscopy, that risk increases to 0.33% \cite{1}. In a survey of Canadian gynecologists, one-quarter of the respondents reported at least one case of sharp trocar injury to the intestines \cite{2}. Some bowel injuries caused by a Veress needle may be asymptomatic. The actual frequency of these injuries is difficult to determine, since only large lacerations or those that become symptomatic postoperatively are included in statistics. Injury to the gastrointestinal tract is a serious complication of trocar insertion. Whether discovered intraoperatively or several days after surgery, bowel injuries result in unplanned laparotomies in about half of cases and may be associated with other sequelae as well \cite{2}.

We report a case complicated by small bowel injury during trocar insertion and conduct a literature review of the same situation. Further management and alternative methods are discussed.

Case Report

The patient was a 43-year-old woman (gravida 2, para 1, ectopic 1, height 158 cm, weight 55 kg) who presented with severe dysmenorrhea for 6 months. Despite medical treatment, her symptoms continued to worsen. Tracing her history, she had had an ectopic pregnancy with impending shock due to internal bleeding 18 years ago.
Emergency laparotomy had been performed at an urban hospital. Unfortunately, it was complicated by an adhesive ileus manifested by severe abdominal pain and persistent fever 1 week postoperatively. She consequently underwent another operation for adhesiolysis and bowel resection at another medical center. After the operation, she was well and delivered a term baby by the vaginal route 2 years later.

Upon presentation, ultrasonography detected an enlarged, globular uterus with diffuse heterogeneous echogenicity in the myometrium. A left ovarian cyst measuring approximately 4 × 4 cm with sand-like content was also found. Under the impression of adenomyosis and left ovarian endometrioma, surgical intervention was suggested due to persistent dysmenorrhea and failure of medical treatment. Laparoscopic surgery was arranged. The patient and family were informed of the possibility that a laparotomy might be required.

Under general endotracheal anesthesia, a Veress needle was inserted through a tiny incision over the umbilicus about 1.5 cm from the old scar. The Veress needle was inserted smoothly. A test for peritoneal entry was carried out by the aspiration method and showed nothing particular. Pneumoperitoneum was created by insufflating carbon dioxide at a setting of a maximal pressure of 12 mmHg, which also went smoothly. A surgical 5 mm trocar was then inserted into the abdomen with subsequent laparoscope insertion. Unfortunately, the bowel mucosa was viewed instead of the usual intraabdominal cavity (Figure), and bowel perforation was identified. We left the laparoscope in place to prevent leakage of bowel contents while immediately converting to a laparotomy. A general surgeon was consulted for further evaluation of the situation. During the laparotomy, we found a jejunal loop adherent to the anterior abdominal wall just beneath the umbilical area. Adhesiolysis was carefully performed, but resulted in two further iatrogenic injuries to the bowel. Primary closure was performed.

The intended total abdominal hysterectomy and left salpingo-oophorectomy were performed. At the end of the operation, the bowel was reexamined thoroughly for any further injuries. A Foley catheter was left in the vagina to act as a pelvic drain. The total operative time was 150 minutes. Blood loss was 300 mL and no blood transfusion was needed.

A nasogastric tube was inserted postoperatively for decompression and antibiotic administration (cefmetazole and gentamicin). The pelvic drain was removed 2 days later. She was discharged 1 week later with no sequelae. Histopathology revealed adenomyosis of the uterus and left ovarian endometrioma, which were consistent with the preoperative diagnosis. To the time of this writing (8 months), the patient has been followed at our outpatient clinic uneventfully.

Discussion

We reviewed the mechanisms of two other instances of bowel injury at first puncture known to have occurred in a series of 3,115 gynecologic laparoscopic procedures performed at Show Chwan Memorial Hospital, Changhua, over the past 10 years (from January 1994 to September 2003). The incidence of bowel injuries (including the case discussed above) was 0.96 in 1,000 patients. The first case occurred during second-look surgery in a patient who had undergone previous debulking surgery for an ovarian carcinoma. The other case occurred in a patient with a tubo-ovarian abscess and severe pelvic adhesions. In both instances, injury to the bowel was caused by trocar insertion into adhesions resulting from the previous surgery. Fortunately, both of these bowel injuries were recognized during the procedure and a laparotomy was performed immediately for primary repair. With adequate treatment, they were both discharged without sequelae.

In a review of the literature, we found that the usual causes of injury to the bowel during laparoscopic surgery are thermal burns, sharp dissection and needle/trocar punctures [3]. In general, trocar injuries to the bowel occur through a careless technique or when the bowel is immobilized by adhesions. Mechanical entry into the large or small bowel can occur 10 times more often when laparoscopy is performed in patients who have had prior intraperitoneal inflammation or abdominal surgery [4]. Patients with a history of multiple laparotomies, an overdistended bowel or a disseminated carcinoma are particularly at risk for bowel adhesions to the anterior abdominal wall.

![Figure](image-url) Visualization of the mucosal lining of the bowel.
In the absence of adhesions or other predisposing conditions, the use of excessive force when inserting the trocar can also lead to bowel injury. Other factors include an inadequate umbilical incision, scar tissue from a prior surgical procedure, uncontrolled sudden entry of the trocar, and a dull trocar. Extreme thinness or obesity may also make trocar insertion difficult [5].

Trocar injury to the bowel requires prompt surgical intervention. Up to 15% of these injuries are not diagnosed during laparoscopy. Delay in identification of injury can result in significant morbidity and mortality [6]. Perioperative diagnosis and immediate repair by laparoscopy or laparotomy can reduce the likelihood of severe complications and consequent medico-legal actions [1].

We are particularly concerned about whether there are alternative techniques to prevent bowel injury during laparoscopic surgery. Audebert and Gomel performed initial microlaparoscopy through the left upper quadrant of the abdomen to inspect the anterior abdominal wall (particularly the umbilical area) for the presence of adhesions [7]. They found that the prevalence of severe adhesions with the potential risk of bowel injury upon blind insertion of the umbilical trocar was 0.42% in those without previous abdominal surgery, 0.80% in those who had had prior laparoscopic surgery, 6.87% in those who had had a previous laparotomy with a horizontal suprapubic incision, and 31.46% in those who had had a previous laparotomy with a midline incision [7]. They concluded that women who had had a previous laparotomy have a higher incidence of umbilical adhesions, especially in cases involving a midline incision. Preliminary inspection of the umbilical area with a microlaparoscope and insertion of the umbilical trocar under direct vision are recommended for patients at risk for adhesions, in order to reduce complications [7].

In cases uncomplicated by previous pelvic surgery, both the insufflation needle and the primary cannula can be inserted through the umbilicus, where the abdominal wall is the thinnest. When subumbilical adhesions are known or suspected to be present, the insufflation needle may be placed through the pouch of Douglas or in the left upper quadrant after evacuation of the gastric contents [3,8].

The cannula can also be inserted following a mini-laparotomy (open laparoscopy) in the umbilical region, thereby lowering the risk of injury to blood vessels and abdominal viscera. However, inadvertent bowel injury cannot be totally avoided even with this method [9].

If the trocar or a primary cannula penetrates the bowel, the condition is usually diagnosed when the mucosal lining of the gastrointestinal tract is visualized. If the large bowel is entered, a feculent odor may be noted. However, the injury might not immediately be recognized because the cannula might not stay within the bowel or may pass through the lumen. The injury might not be recognized until peritonitis, an abscess, enterocutaneous fistula or death occurs [10]. Therefore, when the main trocar is within the adhesive band, especially the bowel adhesive to the nearby abdominal wall, during removal of the primary cannula, it may be necessary to view the area either through the cannula or an ancillary port at the end of the procedure.

Conclusions

Factors associated with an increased risk of bowel perforation include a poor technique and the presence of bowel adhesions. Attention to consistency of technique and proper selection of patients can minimize, but not eliminate, the probability of trocar injury. However, if trocar injury does accidentally occur, laparoscopists must attempt to detect it early, take proper action, and manage the complications to reduce morbidity and mortality. Careful selection of patients for laparoscopic surgery can help reduce the complications, especially in those who have had prior surgery with pelvic adhesions.

References