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Case Report

Iatrogenic small bowel perforation during elective laparoscopic intraperitoneal onlay meshplasty leading to intraoperative change of plan: a case report with review of literature

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ABSTRACT

Iatrogenic bowel injury during any surgery, be it open or laparoscopic; is associated with significant morbidity. Moreover, if the said injury occurs in a surgery in which a foreign material is planned to be implanted in the patient's body as a prosthesis e.g., hernia surgery; the surgical team may have to deviate from its original plan of action. Even in the best of hands, iatrogenic bowel trauma can occur inspite of following best recommended practices. This usually occurs in the setting of dense adhesions of bowel to the parietes. Herein, we present one such case of a 72-year-old lady who was planned for laparoscopic incisional mesh hernioplasty, but had to be subjected to an intraoperative change in plan, due to an iatrogenic enterotomy.

Keywords: Enterotomy, Hernioplasty, Iatrogenic, Incisional, Mesh, Prosthesis

INTRODUCTION

The first laparoscopic repair of a ventral incisional hernia (LVHR) was reported by LeBlanc and Booth in 1993.[1] The intra-peritoneal onlay meshplasty (IPOM) refers to the treatment of a ventral hernia using an intraperitoneal placed mesh. Approximately 90,000 ventral incisional hernia repairs are performed in the United States each year.[2] Intraoperative unexpected accidental iatrogenic bowel injury in patients who have dense parietal adhesions sometimes mandate a change of original surgical plan so as to avoid mesh infection.

CASE REPORT

A 72-year-old female patient presented to the surgical out patient's department (OPD) with chief complaint of swelling in the central abdomen since, 1 month. She gave history of it reducing while sleeping on the back and appearing prominently on standing/working/straining. She gave history of having undergone caesarian section through an infraumbilical midline incision 45 years back. Also, she had undergone a midline laparotomy with hysterotomy for delivering out a dead foetus (intrauterine foetal death) 47 years ago. She was a known case of well controlled diabetes mellitus (DM) on oral medicines and compliant with diet control. On general examination, she was obese with no pallor or lymphadenopathy.

A per abdomen examination revealed the scar of the previous 2 surgeries with an uncomplicated incisional hernia over the mid third of the scar. She was advised a laparoscopic surgical repair of her hernia. She underwent a routine preoperative investigational workup. Upon confirming fitness for general anesthesia, she was planned for a laparoscopic repair of her incisional hernia-intra-peritoneal onlay meshplasty (IPOM). The surgery was performed in supine position. After induction of general anesthesia, pneumo-peritoneum was established by the closed technique using the Veress' needle. The 3

working trocars were inserted on the left side roughly along the anterior axillary line. On insertion of the camera, dense parietal omental and enteric adhesions were noted along the entire length of the incision (Figure 1 A & B). Gentle attempts were initiated to clear the said adhesions. Almost 70 % adhesions were successfully lysed (Figure 1 C & D).

At 1 spot, the muscle stitch of the previous surgery was seen involving the corresponding loop of adherent small bowel. Inspite of best efforts, an iatrogenic enterotomy was caused, in the adherent small intestine, inspite of using just cold cutting and avoidance of any energy source in the vicinity; while attempting to separate it from the parietes (Figure 1 E & F).

No gross fecal leak occurred. Immediately the enterotomy was laparoscopically suture-closed using 3-0 Mersilk®, in 2 layers (Figure 2 A-D). This unfortunate event led to an intraoperative change in plan. The perceived risk of infection of the mesh was high inspite of no gross fecal leakage into the peritoneal cavity. Hence it was decided to complete the adhesiolysis, de-lineate the hernial defect and perform just suture closure in the present sitting, while avoiding inserting the mesh (which was originally planned).

Also, the intravenous antibiotics were continued into the post-operative period (instead of the standard single pre-operative shot, which was the original plan). The proposed herniorrhaphy was performed by laparoscopic intracorporeal suture closure of the hernia defect using 1-0 Prolene®, after first completing the adhesiolysis (Figure 2 E & F) and (Figure 3 A-D).

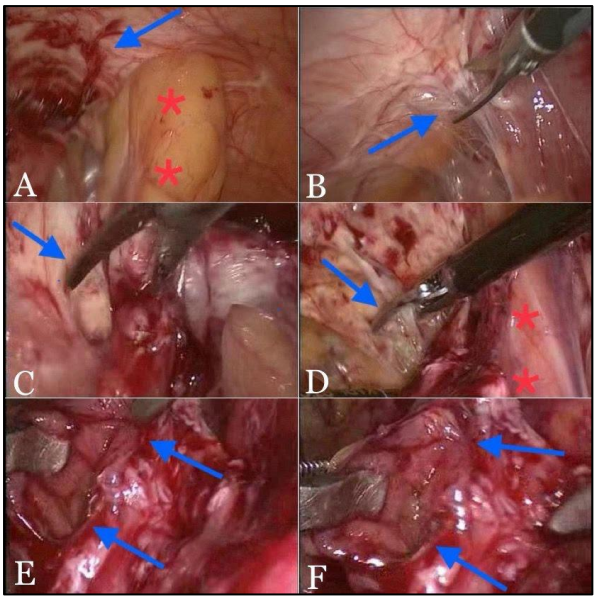

Figure 1: (A) ventral incisional entero-omentocele (red asterisks) with parietal adhesions (blue arrow) (B, C and D) adhesiolysis (blue arrow) with cold cutting, close to adherent small bowel, (E and F) iatrogenic small bowel perforation (blue arrows).

The patient had an uneventful postoperative recovery. She was continued on antibiotics for 10 days. She was discharged on postoperative day (POD) 4. A second sitting of meshplasty was planned for her under GA after 15 days of the 1st operation, for which she was readmitted.

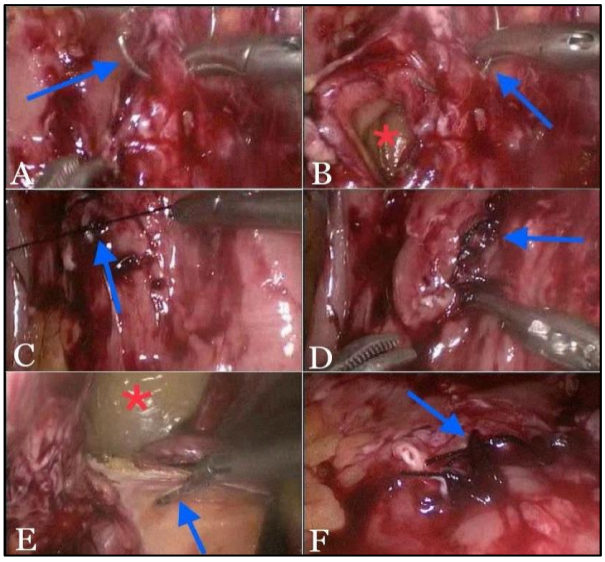

Figure 2: (A, B and C) Primary suture closure of iatrogenic perforation (blue arrow), (D) endresult (blue arrow), (E) Reduction of hernia contents (blue arrow) revealing the ventral defect (red asterisk), (F) completely reduced hernial contents, parietal adhesions and sutured small bowel (blue arrow).

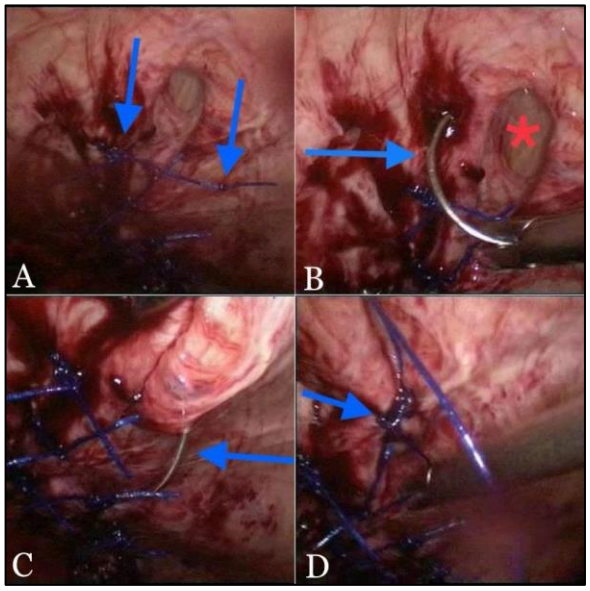

Figure 3: (A, B and C) Suture closure of ventral defects (red asterisk) in progress (blue arrows) (D) end result of ventral herniorrhaphy (blue arrow).

This 2nd surgery took place through the same 3 right lateral trocars. The flimsy omento-enteric adhesions to the suture line were first lysed easily (Figure 4 A). The

herniorrhaphy suture line was found to be intact. A 15×15 cm. Proceed® mesh was then rolled, introduced inside, unrolled and placed optimally over the suture line. It was fixed in place using 4 corner trans-fascial PDS sutures and absorbable tacker (Figure 4 B-D). The recovery from the 2nd surgery too was uneventful. She was discharged on POD2. On her POD 10 OPD follow up visit, all her 3 operative wounds had healed well and she was asymptomatic. At the time of writing this paper, a telephonic interview was conducted with her, 93 months after her 2 surgeries. She continues to be asymptomatic.

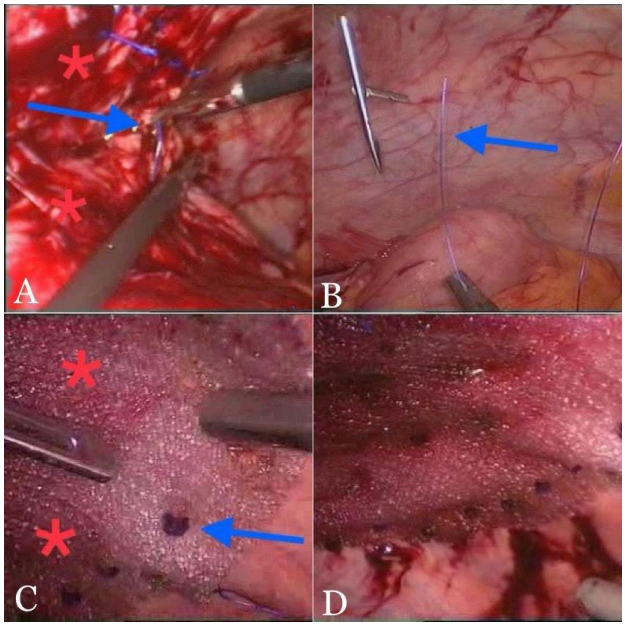

Figure 4: A) Raw area (red asterisk) seen after lysis of flimsy adhesions (blue arrow) during 2nd surgery, (B) Suture passer pulling up transfascial sutures during IPOM, (C) Dual mesh (red asterisks) being tack-fixed to parietes (blue arrow), (D) Final end result of IPOM done 15 days after the 1st surgery-herniorrhaphy.

DISCUSSION

The risk of iatrogenic bowel injury during IPOM increases if there is a need to perform concurrent adhesiolysis.[3] Small bowel is most injured.[4] Guidelines suggest further onward course of action depending on leakage of bowel contents into the peritoneal cavity and presence of surgical expertise to intracorporeally suture the perforation. If there is no leak of contents, it is suggested to primarily suture close the small bowel perforation and proceed with the remaining surgery as planned.[3]

If there is a free leak of bowel contents, then it is suggested to suture close the perforation but abandon placement of foreign material prosthesis, for high risk of infection.[5] The definitive repair of the hernia is then deferred to a later date (usually 7 days later, if no infection). In the absence of adequate surgical expertise, it is suggested to perform open surgical repair of the perforation. In our patient, there were dense small bowel and omental-mesenteric adhesions to the parietes due to the previous surgeries. However, upon injury, there was no leak of bowel contents.

Yet, we decided to deviate slightly from the guidelines in view of age of the patient and her underlying DM. Iatrogenic bowel injury is accompanied by high morbidity and mortality. However, the real incidence of bowel perforation during laparoscopy is not known. The overall incidence of laparoscopy-induced bowel perforation alone does not indicate the risk linked with specific laparoscopic procedures. There are two types of presentations of laparoscopy-induced bowel perforations. Early perforations happen during or directly after surgery while late perforations arise a couple of days later or thereafter.[4] The latter is probably caused by local inflammation or ischemia caused by damage inflicted during laparoscopy. Other important related factors to consider are the locations in the gastrointestinal tract most vulnerable to injury and types of laparoscopic instruments that are most likely to cause injury. This may help development of safer instrumentation.

Iatrogenic bowel injuries during laparoscopic surgeries can be direct or indirect. Direct injuries refer to those caused by direct contact of the culprit instrument with the vulnerable bowel. Indirect injuries refer to those caused without direct contact e.g., ischemic injuries caused by 'jumping' phenomenon of monopolar cautery current. Following are instances when iatrogenic bowel injuries can occur during laparoscopy. Insertion of a Veress needle or a trocar may damage the bowel during creation of a pneumoperitoneum. The coagulator or grasping forceps may cause bowel injury during the operation. The scissors can cause direct injury especially when being used amidst dense bowel adhesions. Also, the suction cannula is known to cause suction injuries to bowel. Injudicious and continuous prolonged use of monopolar diathermy in close proximity to bowel can potentially cause ischemic injuries which can present as late as postoperative day 7-14.[6]

Patients with adhesions or a previous laparotomy are at more risk of iatrogenic bowel injury. The incidence of bowel injury during IPOM is 0.13%.[4] The small bowel is most often traumatized iatrogenically (55·8 per cent) and it occurs mostly along the antimesenteric border.[4] Most of the laparoscopy-induced iatrogenic bowel trauma is recognized during surgery and so can be repaired immediately (as in this case), but about 10 per cent gets diagnosed after 48 hours.[4] Perforations that are not diagnosed 'on table', but after sometime during the early postoperative period, usually result from thermal injury.[7] Patients presenting with perforative peritonitis as early as within 24 hours of the primary operation and as late as up to 2 to 3 weeks; after laparoscopic Bovie (Cautery) injury to the bowel, have been reported.[7]

Table 1: Review of recent literature on iatrogenic enterotomy during IPOM.

Authors	Journal/Year of publication	Type of article/Sample size	Incidence of iatrogenic enterotomy	Most commonly injured	Associated causative factors/Conclusions
Bittner et al[3]	Surgical endoscopy/2014-19	Systematic Review-International Endohernia Society guidelines/All relevant literature till 2012+outputs of 2 consensus conferences	1.78 %	Small bowel (92%)	Adhesions, Inexperience
Kohoutek et al [9]	Rozhledy chirurgii/2018	Case series/53	7.55 %	Small bowel (100%)	Careful patient selection and operator experience important in IPOM for incisional hernia
Giuffrida et al [10]	Surgeries/2023	Case series/167	0.6 %	Small bowel (100%)	IPOM recommended for defects<5 cm, Acceptable morbidity
Sharma et al[11]	Hernia/2013	Case series/2346	1.41 %	Small bowel (100%)	Prognosis worst when iatrogenic bowel injury is recognized postoperatively

One study revealed roughly 40 per cent of the bowel injuries after laparoscopic surgeries in general, were related to initial access and caused by either the first trocar or the Veress needle.[8] History of previous open abdominal surgery can increase the risk of bowel injury during subsequent laparoscopic surgical interventions due to several factors:

Adhesions: After open abdominal surgery, scar tissue called adhesions can form inside the abdomen. These adhesions can make it difficult to visualize and manipulate the organs during laparoscopic surgery, increasing the risk of accidental injury to the bowel.

Altered anatomy: Open abdominal surgery can alter the normal anatomy of the abdominal organs. This altered anatomy can make it challenging for the surgeon to identify and avoid the bowel during laparoscopic surgery.

Previous surgical trauma: The bowel may be weakened or more fragile in areas where previous surgery has occurred. This can increase the risk of injury during subsequent surgeries, including laparoscopic procedures. Overall, surgeons performing laparoscopic surgery on patients with a history of open abdominal surgery must proceed with caution and be aware of the increased risk of bowel injury. A review of recent literature on iatrogenic bowel injury during IPOM is summarized in Table 1.

CONCLUSION

The IPOM is a popular procedure to surgically repair ventral/parietal hernias. Iatrogenic trauma to bowel is one of the known complications during IPOMs and open surgical interventions for parietal hernias in patients who have a history of previous open surgery with dense ventral bowel adhesions, as seen in this report.

If such a trauma were to happen and was identified intraoperatively, it is safer to avoid mesh use in the same sitting and defer the same to another time in the near future, as seen here.

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