

Case Report

Acute splenic rupture following laparoscopic pneumoperitoneum: A case report

Jean-Luc Delafontaine^a, Rebecca Moreci^{b,*}, Navdeep S. Samra^c^a Department of Surgery, Louisiana State University Health Sciences Center Shreveport, Shreveport, LA, USA^b Louisiana State University School of Medicine, Shreveport, LA, USA^c Department of Trauma, Acute Care Surgery, and Surgical Critical Care, Louisiana State University Health Sciences Center, Shreveport, LA, USA

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ABSTRACT

Introduction: Splenic rupture after laparoscopic surgery is a very rare complication. In this study, we report a case of a splenic laceration that occurred during a laparoscopic gastrostomy tube placement. The theorized mechanism in this case was acute disruption of a peri-splenic hematoma.

Case report: A 64-year-old African-American male presented after a motor vehicle accident with multiple injuries and was admitted to a surgical intensive care unit, where he declined from ICU days 6 through 11. The patient underwent tracheostomy and laparoscopic gastrostomy tube placement given his significant neurologic deficits. Intraoperatively, the patient developed hypotension, leading to the discovery of hemoperitoneum and necessitating an emergent open splenectomy.

Conclusion: Splenic rupture following laparoscopic procedures is a very rare phenomenon. In this case, we believe the splenic rupture was secondary to an acute disruption of a previously hemostatic splenic hematoma involving the abdominal wall during creation of capnoperitoneum.

Introduction

The first laparoscopic surgery in a human was performed in 1910 but it was not until the mid 1980s that laparoscopic surgery was widely adopted and has since become the gold standard for many abdominal procedures [1]. Serious complications of laparoscopic procedures are overall low, and approximately half of these complications result at the time of abdominal access [2,3]. The incidence of abdominal organ injury due to abdominal access is 3–5 per 10,000 procedures. The most common organ injured is the small bowel with a rate of 25.4%, followed by the iliac artery (18.5%) and colon (12.2%) [4]. However, splenic rupture following laparoscopic surgery is rare with very few cases reported in the literature [5–14]. These cases hypothesize that the presence of adhesions between the abdominal wall and the spleen is the cause of most ruptures.

Case report

A 64-year-old African American male with unknown past medical history arrived in the trauma bay following a motor vehicle accident. On initial evaluation, the patient was alert but somewhat confused and had a Glasgow Coma Scale (GCS) of 13. Focused Assessment with Sonography in Trauma (FAST) exam was performed immediately following the primary survey and found to be

* Corresponding author at: LSU Health Shreveport, 1501 Kings Highway, Shreveport, LA 71103, USA.

E-mail address: Rbudis@lsuhsc.edu (R. Moreci).

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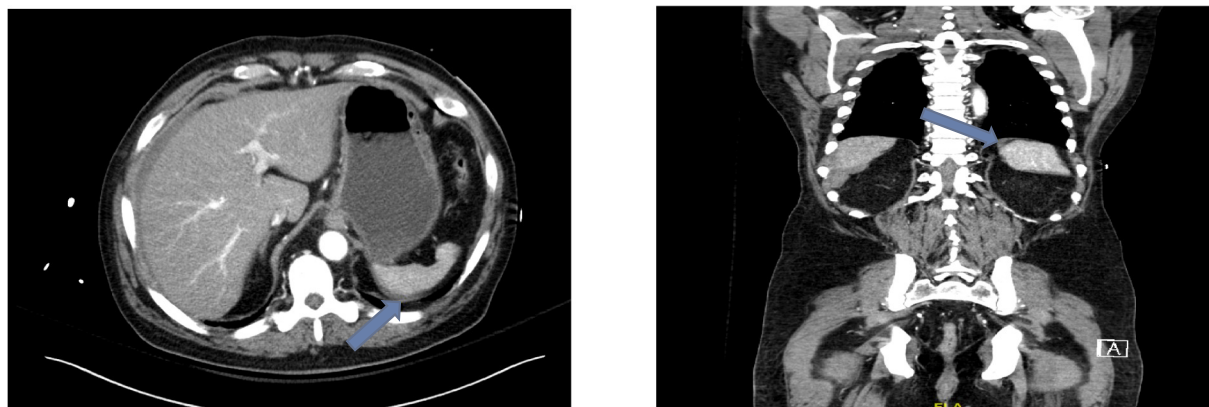


Fig. 1. Contrast-enhanced CT scans demonstrating peri-splenic hematoma (see arrows). Spleen unremarkable.

positive in the hepatorenal space. The patient was hemodynamically stable and was taken for further imaging including CTs of the head, cervical spine, chest, abdomen and pelvis that revealed multiple injuries including subarachnoid hemorrhage, anterior left 3rd–8th rib fractures, right posterior 1st–3rd rib fractures, peri-hepatic and peri-splenic hematomas [Fig. 1], and a left lower quadrant mesenteric hematoma with active extravasation. The patient was admitted to the ICU and underwent conservative management of mesenteric, peri-hepatic, and peri-splenic hematomas. On hospital day 6, the patient's mental status began to deteriorate, prompting an immediate CT of his head and EEG, which were both negative. A repeat CT abdomen and pelvis study was not ordered at this time. The patient was thought to be experiencing post-traumatic encephalopathy and eventually declined to GCS 3T. After discussion with family, the decision was made to perform tracheostomy and laparoscopic gastrostomy tube placement. The patient was prepped and draped in usual sterile fashion and the tracheostomy was performed first. We then turned our attention to the patient's abdomen for laparoscopic gastrostomy tube placement. We began by gaining access to the abdomen with a Veress needle through Palmer's point. The abdomen was insufflated to 15 mmHg. The patient then developed significant hypotension without a decrease in end tidal carbon dioxide. We partially evacuated the capnoperitoneum with no improvement in hemodynamic status. At this point, we rapidly inserted the laparoscope which showed widespread hemoperitoneum. We were unable to identify the source laparoscopically and elected to convert to an open procedure. Upon opening the abdomen, we were easily able to identify an active splenic hemorrhage; the splenic capsule was not specifically noted at this time. The spleen was rapidly medialized and the hilum was controlled manually with an immediate improvement in blood pressure. The spleen was removed using a GIA stapler and the remainder of the abdomen was inspected with no further injury noted. The patient was transfused two units of packed red blood cells and taken to the surgical intensive care unit. The patient recovered and was ultimately discharged 16 days later. Pathology report of the spleen described a “capsular laceration with focal parenchymal hemorrhage” — this is approximated as a grade 1 splenic injury according to the AAST-OIS splenic injury scale.

Discussion

In this study, we reported a case of splenic rupture that occurred during laparoscopic gastrostomy tube placement. During this procedure, there was no direct penetration of the spleen. However, abdominal inflation during the procedure is believed to have resulted in sudden separation of the peri-splenic adhesions formed after initial trauma and bleeding.

On arrival to the ED, the patient had a CT abdomen and pelvis study which noted a peri-splenic hematoma and unremarkable spleen. However, the patient spent 2 weeks in the ICU prior to laparoscopic surgery and we did not repeat the study during this time. We cannot confirm or deny any evolving splenic injury or worsening peri-splenic hematoma which may have occurred between the time of MVC and laparoscopic intervention. Therefore, we postulate an acute disruption of the splenic capsule occurred while insufflating the abdomen. The disruption may have been initiated by the peri-splenic hematoma, adhesions, and/or a splenic injury.

Up to 40% of all splenectomies are the result of iatrogenic splenic injury [15]; the rate of splenectomy varies depending on the procedure. A recent review conducted at the Mayo Clinic reported of 13,897 colectomies, 58 (0.4%) patients had a splenic injury, and of those patients, 44 (76%) underwent splenectomy [16]. Other studies reported (1–8%) risk of splenic injury during left hemicolectomy and the rate of splenectomy can increase up to 21–60% in surgeries involving the proximal abdominal aorta and its branches [15]. A review by the Mayo Clinic reported a 0.8% incidence of splenectomies during left sided nephrectomies [17], while others reported a higher incidence of 2.6%–13.2% [18].

We were only able to identify 10 prior cases of splenic injury following laparoscopic procedures in the literature (Table 1). Four of these cases [5,6,11,12] occurred within 36 h of laparoscopy, two cases [7,8] occurred on the fifth postoperative day, and one case occurred the third postoperative week [9]. All except two cases were treated with midline laparotomy and splenectomy. The other two cases were treated with fibrin glue and splenorrhaphy respectively [11,14]. Splenic rupture is postulated to be due to sudden separation of adhesions between the parietal peritoneum and splenic capsule resulting in subcapsular hematoma rupture after abdominal wall stretching during creation of capnoperitoneum.

Table 1
Splenectomy cases following laparoscopic surgery.

Author	Surgery indication	Management	Time of diagnosis	Location of lesion
[5]	Laparoscopic cholecystectomy	Laparoscopic exploration + Midline laparotomy with splenectomy	36 h postoperative	4-cm sub-capsular hematoma
[6]	Laparoscopic cholecystectomy	Midline laparotomy with splenectomy	12 h postoperative	3-cm sub-capsular hematoma
[7]	Laparoscopic surgery for perforated duodenal ulcer	Midline laparotomy with splenectomy	Fifth postoperative day	Posterior sub-capsular hematoma
[8]	Diagnostic laparoscopy	Midline laparotomy with splenectomy	Fifth postoperative day	Sub-capsular hematoma
[9]	Laparoscopic cholecystectomy	Midline laparotomy with splenectomy	3 weeks postoperative	Unable to obtain
[10]	Left laparoscopic salpingectomy	Repaired with Fibrin glue	Unable to obtain	Unable to obtain
[11]	Diagnostic laparoscopy	Midline laparotomy with splenectomy	5 h postoperative	Posterior splenic lesion
[12]	Laparoscopic sterilization	Midline laparotomy with splenectomy	3 h postoperative	Lower pole of spleen
[13]	Pelvic laparoscopy	Midline laparotomy with splenectomy	Unable to obtain	Unable to obtain
[14]	Exploration laparoscopy for ovarian mass with history of LUQ trauma	Midline laparotomy with splenorraphy	Unable to obtain	Unable to obtain

Conclusion

Splenic rupture is a rare complication of laparoscopic procedures. It likely results from acute separation of peri-splenic adhesions that form after an initial trauma involving the left upper quadrant. It requires a high degree of suspicion to accurately diagnose and treat this potentially life-threatening complication. The spleen is not an honest organ; if a splenic injury has occurred, it may evolve with time. Delayed splenic rupture is well known phenomenon and one may consider a post-operative ultrasound evaluation in patients with known hematoma and/or splenic injury.

Previous presentations

None.

Declaration of Competing Interest

Authors have no personal or financial disclosures.

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