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# A shift in surgical management of perforated jejunal-ileal diverticulitis? Two case reports

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## ABSTRACT

Small bowel diverticular disease is usually asymptomatic, but complicated small bowel diverticular disease can present as an acute abdomen, manifesting as diverticulitis, perforation, abscess, obstruction or bleeding. Due to the rarity of the disease, very few studies have been conducted on complicated small bowel diverticular disease. Therefore, there are no clear guidelines on management. General peritonitis remains the best indication for surgical management due to its correlation with high mortality and prolonged hospital stay. Traditionally, perforated small bowel diverticular disease is managed with exploratory laparotomy, primary bowel resection and anastomosis regardless of acute presentation. However, more recent studies demonstrated a trend towards conservative or less invasive surgical management. Here, we report two perforated small bowel diverticulitis cases at our institution that underwent different management and had different outcomes.

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## Introduction

Small bowel diverticular disease is rare, frequently asymptomatic, and mainly discovered incidentally on imaging. However, complicated small bowel diverticular disease can present as an acute abdomen so it is important to be included in the differential diagnosis. Here, we present 2 unique cases where patients presented with acute abdomen and had CT scans that showed non-specific radiologic signs of free air or extra-luminal air. Both underwent emergent surgical management and were found to have perforated jejunal-ileal diverticulitis intra-operatively. Case report 1 revealed a unique location of perforated small bowel diverticulitis on the anti-mesenteric side and case report 2 is the first case to our knowledge reporting usage of Da Vinci robot to primarily repair perforated small bowel diverticulitis.

## Case report 1

The patient was an 83-year-old male with a history of paroxysmal atrial fibrillation not on anticoagulation, coronary artery disease with stent placed in the remote past, hypertension, previous exploratory laparotomy for small bowel obstruction 4 years prior and previous

incisional hernia repair 1 year prior who presented to the emergency room with sharp mid abdominal pain of 8 hours duration associated with nausea and vomiting. Physical exam was significant for very distended, protrusive and tympanic abdomen with positive peritoneal signs. CT demonstrated free intraperitoneal air and fluid (figure 1a) with pneumatosis in a loop of small bowel in the left mid abdomen that was surrounded by loculated extra-luminal gas (figure 1b).

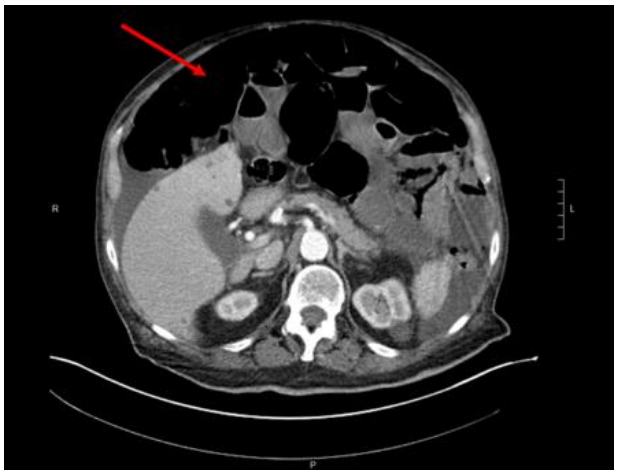

**Figure 1a:** Anterior free intraperitoneal air.

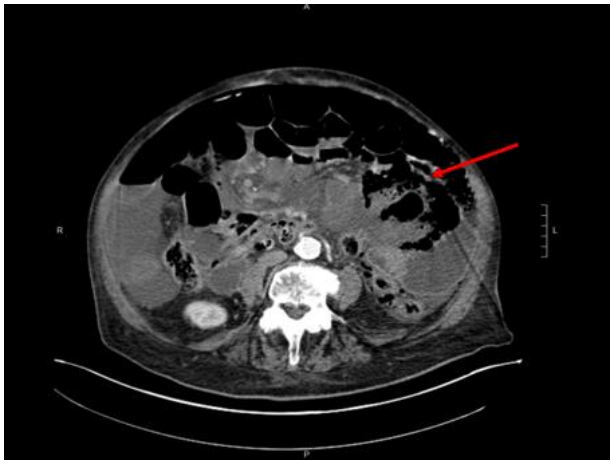

**Figure 1b:** Left mid abdomen with pneumatosis in small bowel surrounded by extra-luminal gas.

The patient underwent emergent exploratory laparotomy that revealed diffuse small and large bowel diverticulosis. In addition, a very long length of ischemic bowel that spanned the jejunum-ileum border was seen that contained a large hemorrhagic and ischemic appearing inflammatory mass on the anti-mesenteric side with signs of perforation (figure 2). More proximal to the ischemic segment, a thick adhesive band between the omentum and liver caused a loop of small bowel to be kinked and distended. Therefore, electrocautery was used to lyse the band and relieve the obstruction. Subsequently, the ischemic bowel segment was resected with an end-to-end anastomosis of the remaining ends of jejunum and ileum.

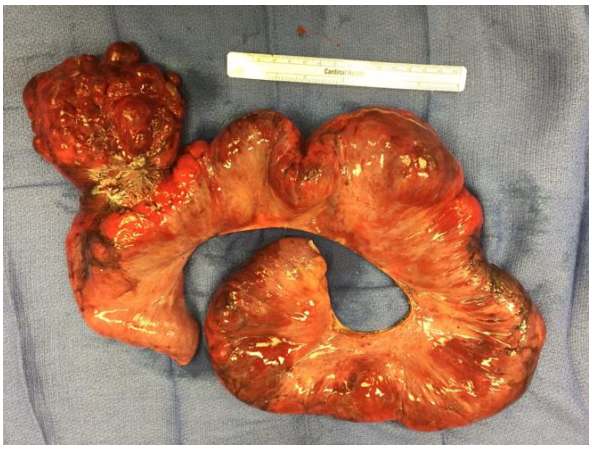

**Figure 2:** Jejunum-ileum border with large hemorrhagic and inflammatory mass on anti-mesenteric side.

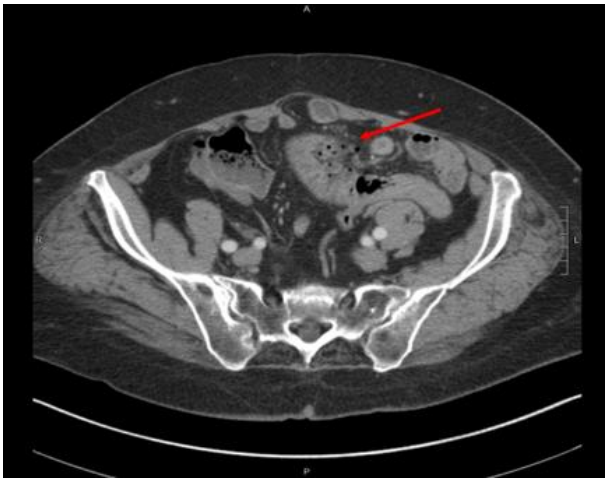

**Figure 3:** Extra-luminal air adjacent to the jejunum and jejunal diverticulosis

The patient originally recovered well, but on postoperative day 3, he became tachycardic to the 140s, tachypnic and less responsive. The patient was transferred to the ICU for intubation and mechanical ventilation. Lactic acid was found to be 7.2. Repeat CT showed increasing free intraperitoneal fluid with high density concerning for hemoperitoneum and dilated small bowel loops in the left abdomen at the surgical staple line. Unfortunately, the patient developed septic shock and lactic acid trended up to 14.8. After prolonged discussion with the family, the decision was made to withdraw care and patient expired shortly after on postoperative day 4.

## Case report 2

The patient was a 79-year-old female with a past medical history of hypertension and atrial

fibrillation. The patient was on Coumadin with two unsuccessful attempts of AV node ablation and subsequent permanent pacemaker placement. She presented to the emergency room with constant abdominal pain of 1 day duration associated with nausea and vomiting. CT demonstrated extra-luminal air adjacent to the jejunum and jejunal diverticula (figure 3).

The patient underwent urgent robotic assisted diagnostic laparoscopy. Due to supra-therapeutic INR at 2.7, patient received FFP prior to the case. A 12 mm trocar was placed through the umbilical incision, and 2 more Da Vinci trocars were placed on either side at the mid clavicular lines. Upon entering the abdomen, a loop of small bowel traversing the lower aspect of the abdomen appeared inflamed and the mesenteric side of the jejunum appeared thickened with fibrinous material. Upon further dissection, multiple intact jejunal diverticula were seen (figure 4a) and the area with fibrinous material appeared to have perforated (figure 4b). The decision was then made to oversew the perforated diverticulitis across the base. Postoperative recovery was unremarkable and patient was discharged on postoperative day 4.

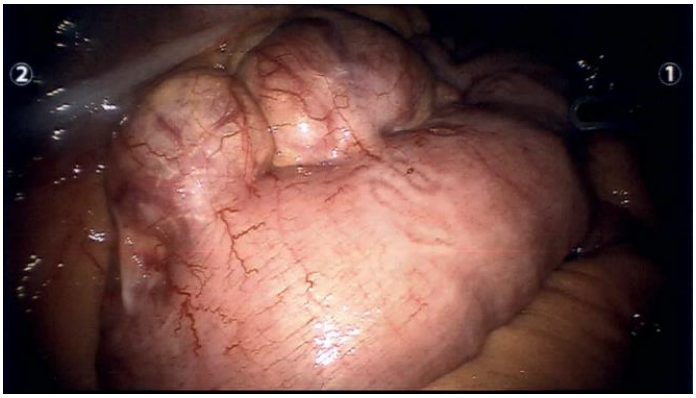


**Figure 4a:** Multiple jejunal diverticulosis.

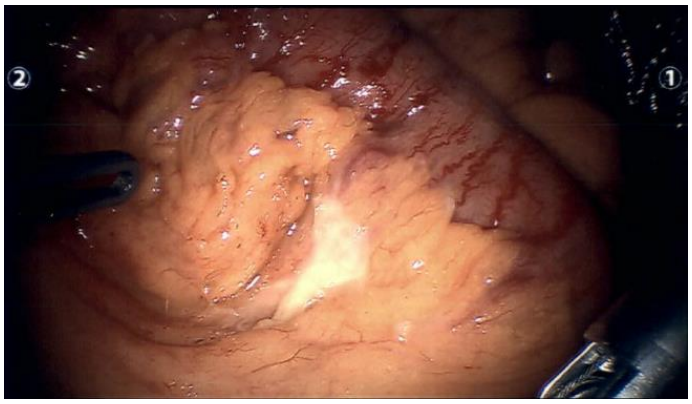


**Figure 4b:** jejunal diverticulosis perforation site with fibrinous material.

## Discussion

Unlike colonic diverticular disease, small bowel diverticular disease is rare. The incidence of jejunal-ileal diverticulosis is found to be less than 2% on both autopsy studies and small bowel studies [1]. It is mostly found in the elderly population, and could be found co-existing with colonic diverticulosis 35-75% of the time [2]. In addition, symptoms rarely occur with non-complicated jejunal-ileal diverticulosis and it is usually found incidentally on imaging. However, 6-20% of the time patients develop complications including diverticulitis, perforation, abscess, obstruction and bleeding [3].

Small bowel diverticular disease is categorized as acquired and pulsion type, involving only the

mucosa and submucosa. The location is usually on the mesenteric side because the muscle layer, where the vasa recta inserts into the mesentery, is relatively weak [4]. The pathophysiology behind small bowel diverticular disease is thought to be related to small bowel dyskinesia secondary to myenteric plexus dysfunction [5]. The distorted peristalsis can lead to intra-luminal pressure changes, that eventually lead to formation of enterolith and cause obstruction [6]. Intestinal stasis can also cause mucosal edema, diverticular bacterial overgrowth, inflammation and eventually necrosis of the mucosa, leading to diverticulitis and perforation [7]. What is unique about our case is that we demonstrated the perforation location of jejunal-ileal diverticulitis to be on the anti-mesentery side. The working proposal is that the thick band of omental adhesion attached to the liver caused obstruction and additional increase in intraluminal pressure, leading to a change in location of the weakest point in the small bowel wall.

For non-complicated small bowel diverticular disease, conservative management is appropriate [8]. However, due to the rarity of complicated small bowel diverticular disease, very few studies have been conducted in this field [9]. Therefore, there are no clear guidelines on the surgical management of complicated small bowel diverticular disease [9]. Due to a high mortality rate of almost 40% associated with delayed diagnosis leading to perforation [10, 2], early recognition is considered important. Both of our cases were taken to the operating room in a timely matter despite different approaches, open vs robotic assisted laparoscopic approach, and both patients did well in the immediate postoperative period. Unfortunately, the patient reported in case report 1 developed septic shock and expired after family withdrew care, demonstrating that despite early surgical intervention, patient's condition could deteriorate acutely.

Traditionally, an open approach of exploratory laparotomy, primary bowel resection and anastomosis is the consensus for management of perforated small bowel diverticular disease regardless of any acute presentations [2]. However, recent studies showed no difference in mortality rates or length of hospital stay between diagnostic laparoscopy and open exploration groups after an accurate diagnosis is made in patients without general peritonitis [11]. The idea is that laparoscopic lavage and drainage is sufficient for diagnosis once the typical abdominal pathology is identified including fibrin deposits in the small bowel mesentery, and it is feasible

to abandon the exploration and proceed with conservative measures [11]. The pathophysiology of pneumoperitoneum secondary to small bowel diverticulitis could be the underlying reason of this proposed shift in management. Recent literature proposed that the distended small bowel wall can act as a semi-permeable membrane and cause extra-luminal air without major perforation [12]. In other words, pneumoperitoneum does not necessitate a definitive operation when the etiology is small bowel diverticulitis and when patients do not have general peritonitis, especially in the elderly population where there is extra burden of age and comorbidities. Our report of the first successful case of robotic assisted diagnostic laparoscopy with primary repair of perforated small bowel diverticulitis provides supportive evidence.

## Conclusion

Small bowel diverticular disease is rare and usually asymptomatic, but should be included on the differential diagnosis when presented as an acute abdomen. The traditional management of perforated small bowel diverticulitis is emergent exploratory laparotomy, small bowel resection and primary anastomosis regardless of any acute presentations. However, more recent data indicate a less invasive approach as acceptable. Specifically, recent studies have shown no difference in mortality rate and length of hospital stay between conservative / diagnostic laparoscopy and aggressive / definitive open exploration group once an accurate diagnosis is made in patients without acute presentations, indicating a potential shift in therapeutic strategies. Our two cases represent both approaches and had

different outcomes. Nevertheless, more research is needed to study this potential shift in therapeutic strategies further.

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