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Case Report

An Unusual Presentation of Crohn's Disease and Novel Use of Direct Peritoneal Resuscitation

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ABSTRACT

Crohn's disease is an inflammatory bowel disease characterized by transmural inflammation, with the majority of patients having small bowel involvement, usually the distal ileum. Typical manifestations include a prolonged course of abdominal pain, diarrhea, fatigue, and weight loss. We report a case of a 21-year-old male who presented with an acute abdomen and was in profound shock resulting in cardiac arrest. The patient underwent damage control, exploratory laparotomy complicated by acute hypoxic respiratory failure requiring veno-venous extracorporeal membrane oxygenation and the novel use of direct peritoneal resuscitation in the setting of an acute abdomen with an uncontrolled enterotomy and bowel spillage. Our case report illustrates the importance of prompt surgical intervention and critical care with the application of novel surgical techniques to minimize mortality in an unusual presentation of Chron's disease.

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Introduction

Crohn's disease is an inflammatory bowel disease (IBD) characterized by transmural inflammation involving any portion of the gastrointestinal tract [1]. About 80% of patients have small bowel involvement, usually the distal ileum, and about 50% have ileocolitis [2]. Patients typically experience progressive worsening symptoms over multiple years with cardinal symptoms of abdominal pain, diarrhea (with or without hematochezia), fatigue, and weight loss. Abdominal pain is usually characterized as crampy pain in the right lower quadrant. Some patients will present with constipation versus obstruction due to luminal narrowing or strictures caused by recurrent inflammation. Crohn's disease also has a bimodal distribution with age ranges of 15 to 30 years and 60 to 70 years [1].

Direct peritoneal resuscitation (DPR) has been introduced within the past decade as a viable solution to improve visceral blood flow, reduce bowel edema to allow earlier abdominal closure, and lessen serum levels of inflammatory cytokines, in addition to other mediators [3]. DPR consists of the intraabdominal instillation of the hypertonic solution to facilitate abdominal closure following damage control laparotomy. The technique has been extensively studied for patients in hemorrhagic shock without

contamination; however, no literature could be identified that discusses the use of DPR in an uncontrolled and contaminated field [3]. We believe this to be the first case report of the novel use of DPR in an acute abdomen.

Case Report

This is a case of a 21-year-old male with no past medical history who presented to our emergency department (ED) with intense abdominal pain. On arrival, he was noted to have agonal respirations without palpable pulses. His physical exam was remarkable for a firm and distended abdomen, and a pale and cachectic appearance with a body mass index of 12. Code resuscitation was initiated with point of care (POC) glucose demonstrating severe hypoglycemia of 18. His mother reported that the patient had been experiencing nausea, emesis, anorexia, and weight loss of a few weeks' duration. He previously presented to urgent care a few days prior with the concern of malnutrition of unknown etiology and was instructed to increase his protein uptake. On further chart review, it was discovered that the patient reported to our facility a 5-months prior with computed tomography (CT) findings consistent with IBD (Figure 1). Unfortunately, general surgery was not consulted at that time for management recommendations.

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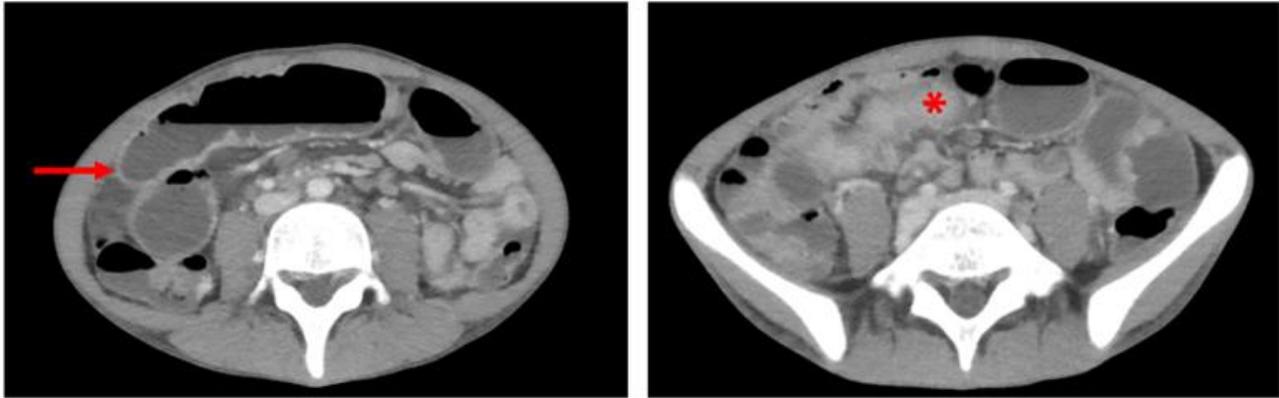


Figure 1: CT abdomen/pelvis (axial view) with 80 cc of Omnipaque 350 intravenous contrast using 3 mm increments obtained 5-months prior to admission. Arrow demonstrates diffusely thickened, dilated small bowel with air-fluid levels. Asterisk shows luminal narrowing of the distal ileum.

Return of spontaneous circulation (ROSC) occurred in the ED. During resuscitation, femoral vein cannulization for central access was unsuccessful with a note of purulent effluence of a likely intraabdominal source. Focused assessment with sonography was positive for free fluid. Initial labs revealed leukocytosis of 34.4, haemoglobin of 8.8, hyperkalemia of 7.8, and lactic acidosis of 6.2. Concern for intraabdominal pathology was highest on our differential and we proceeded emergently to the operating room for exploratory laparotomy.

Intraoperatively, 4 liters (L) of succus and pus were evacuated from the abdominal cavity. Multiple small bowel enterotomies were noted with associated, dense adhesions. These were tediously dissected and primarily closed. During dissection, one enterotomy was found to be densely adherent to the aorta and unable to be repaired due to concern of aortic injury. Within the midportion of the small bowel, there was a full thickness perforation, which was controlled by resection of 10 cm of bowel. The patient remained hemodynamically unstable, and the decision was made to leave his abdomen open using a negative pressure wound system (wound vac) for a second look laparotomy in 24 to 48-hours (hrs).

Aggressive resuscitation was initiated in the ICU with a combination of crystalloid and vasopressors. His clinical status continued to deteriorate, and he became hypoxic despite bag-mask-valve ventilation. POC ultrasound showed a large pericardial effusion, and a pericardial drain was placed with the return of 65 milliliters (mL) of straw-coloured fluid without improvement in his hemodynamics. Emergent, bilateral 14 French (Fr) chest tubes were also placed without improvement. The extracorporeal membrane oxygenation (ECMO) team evaluated for worsening hypoxia and the patient was successfully cannulated to venous (VV) ECMO.

The patient underwent a second look laparotomy within 48-hrs with a note of edematous, but viable bowel and diffuse succus. The origin of the succus was believed to be from the enterotomy adjacent to the aorta and TISSEEL was placed over the enterotomy in an attempt to control the contamination. The prior resected bowel was anastomosed in a side-to-side, functional end-to-end fashion, and a 20 Fr gastrostomy tube was placed, in addition to a 19 Fr Blake drain in the vicinity of the uncontrolled enterotomy. Given the ongoing presence of succus, a wound vac was placed, and the abdomen was left open for re-exploration

within 48-hours. In the interim, DPR was initiated per our facility's protocol with installation through the 19 Fr Blake drain and evacuation through the wound vac. Our DPR protocol includes dextrose 2.5% Ca 2.5 mEq/L at 800 mL/hr for the first hour and the same solution at 400 mL/hr for every hour thereafter. DPR was successful at decreasing bowel edema and controlling the persistent contamination, therefore allowing for definitive abdominal closure after the fifth takeback. Furthermore, VV-ECMO improved the patient's hypoxia, and he was successfully decannulated after 4 days. Figure 2 illustrates the orientation of intrabdominal drain placement for utilization of DPR.

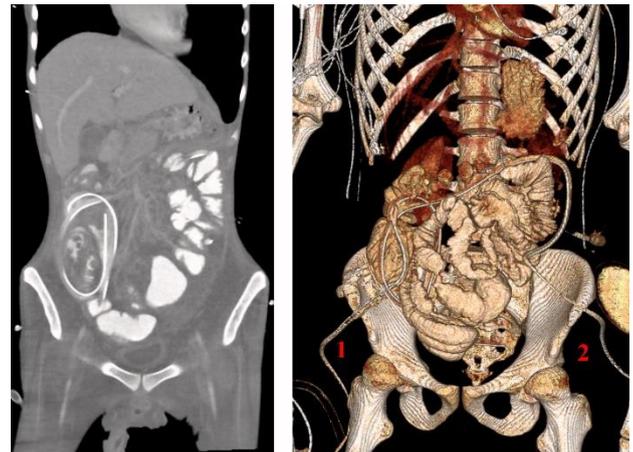


Figure 2: CT abdomen/pelvis (coronal view) with 80 cc of Omnipaque 350 intravenous contrast using 3 mm increments obtained. Figure on left illustrates the location of intraabdominal drains following closure. Figure on right is a multiplanar volume rendering technique demonstrating intraabdominal drain placement in relation to the bowel. Label 1 was the drain that instilled the DPR solution. Label 2 is an additional drain that was inserted to monitor effluent surrounding bowel perforation.

Discussion

Chron's disease is a type of IBD that requires close observation by a multidisciplinary health care team. The typical management of an acute Chron's flare-up is aggressive medical management with bowel rest, fluid resuscitation, and steroid taper, while immunosuppressants are reserved for non-responders. Regrettably, given the natural progression

of Chron's disease, approximately 75% of patients will likely undergo multiple abdominal surgeries in their lifetime for the management of complications of recurrent, transmural inflammation [4]. These surgeries usually occur in elective settings when a patient's symptoms have worsened to a point where they are no longer bearable and only a small portion of cases occur in the emergent setting.

Our patient presented in profound shock requiring emergent exploratory laparotomy with primary closure of multiple enterotomies and resection of the small bowel. Due to the presence of dense adhesions to the aorta, a single enterotomy was difficult to close and continued to leak succus. Using DPR in this setting was a novel use of a known procedural technique to facilitate closure of the abdomen to mitigate the loss of domain. Generally, hemorrhage is controlled, and perforated viscus is contained prior to initiation of DPR. The perforation was unable to be immediately closed in our patient and he likely benefited from DPR in two ways. First, it decreased small bowel edema to enable for the fascial closure of his abdominal wall. Second, it irrigated the abdomen of the succus to minimize inflammation for epithelization of the inaccessible enterotomy.

Conclusion

Heightened awareness in young patients with inexplicable abdominal pain and review of the patient's images by multiple entities at the patient's initial presentation may have resulted in earlier diagnosis and quicker intervention to prevent the late presentation of Crohn's disease in our patient. When the late presentation of Crohn's disease forces management of an uncontrolled enterotomy, using DPR is a valid option.

It works to reduce edema enough to close an abdomen and may have an added benefit of irrigating the abdomen of succus.

Conflicts of Interest

None.

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