Case-based management of acute colonic pseudo-obstruction

**Introduction**
Acute colonic pseudo-obstruction (ACPO) is a syndrome characterized by signs and symptoms of colonic obstruction without mechanical blockage. ACPO is an important cause of morbidity and mortality, with an overall mortality rate of 25–31% and 40–50% in the setting of ischemia or perforation (1). Early detection and prompt management are critical to minimize morbidity and mortality. The decision to intervene with medical therapy, colonoscopy or surgery is dictated by the patient’s clinical status. The case discussed below highlights the typical presentation of this disorder including coexisting factors which complicate the diagnosis and management, the appropriate diagnostic approach to the acutely dilated colon, and the optimal timing and use of colonoscopic decompression in the management.

**Case presentation**
The gastroenterology service was asked to consult on a 64-year-old Caucasian male, who developed progressive abdominal distention approximately one week following bilateral lung transplantation for pulmonary fibrosis. His post-operative course had been complicated by renal failure (serum creatinine of 2.4 mg/dL), respiratory insufficiency (related to possible infection and/or lung rejection) and atrial fibrillation with rapid ventricular response (requiring rate control with calcium channel antagonists). His post-operative medications included anti-rejection medications, hydromorphone for pain, broad-spectrum antibiotics for nosocomial pneumonia, and lactulose for constipation. He had a personal history of chronic constipation. A screening colonoscopy performed 18 months prior to transplant was normal. At the time of consultation, he was passing occasional flatus but minimal stool and admitted to nausea without vomiting and mild generalized abdominal discomfort. Physical examination revealed an ill-appearing male in moderate respiratory distress. Vital signs were notable for a blood pressure of 110/60, an irregular heart rate of 90 to 110 beats/minute, and a respiratory rate of 18-20 times per minute with a oxygen saturation of 93% on 3-4 liters of oxygen by nasal cannula. He was afebrile. Abdominal examination revealed a distended but soft abdomen with diminished but high-pitched, “tinkling” bowel tones, and mild diffuse tenderness without peritoneal signs.

**Breaking point**
The primary problem illustrated by this case is acute colonic distention in a critically ill post-operative patient with ongoing multi-organ failure.

*The main issues for the clinician to consider are:*

1. What is the correct diagnosis?
2. Is ischemia or perforation present?
3. What is the appropriate evaluation and management?
The differential diagnosis of acute colonic distention occurring in the intensive care unit (ICU) includes mechanical obstruction, toxic megacolon due to severe inflammatory bowel disease or C. difficile infection, and ACPO. Mechanical obstruction would be unlikely given his previously normal colonoscopy; however computed tomography may be reasonable if the diagnosis is considered. The patient had received broad spectrum antibiotics throughout his ICU course and was, therefore, at risk for C. difficile infection.

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<th>TABLE 1. Conditions Associated with the Development of Acute Colonic Pseudo-obstruction</th>
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<tr>
<td><strong>POST-SURGICAL</strong> Orthopedic, obstetrics/gynecologic, abdominal/pelvic, urologic/thoracic/neurosurgery</td>
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<td><strong>TRAUMA</strong> Non-operative, spinal cord injury, pelvic trauma</td>
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<td><strong>INFECTION</strong> Pneumonia, sepsis</td>
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<tr>
<td><strong>CARDIOVASCULAR</strong> Myocardial infarction, heart failure, stroke</td>
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<td><strong>NEUROLOGIC</strong> Parkinson’s, multiple sclerosis</td>
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<td><strong>METABOLIC</strong> Electrolyte disturbance, liver or renal failure</td>
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<td><strong>MEDICATION-INDUCED</strong> Anti-depressants, opiates, phenothiazines</td>
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<tr>
<td><strong>NEOPLASIA</strong> Retroperitoneal tumor, leukemia</td>
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ACPO occurs almost exclusively in hospitalized or institutionalized patients with serious underlying medical and surgical conditions. It most often affects middle age patients (mean of 60 years of age), with a slight male predominance (60%) (2). Abdominal distention usually develops over three to seven days but can occur as rapidly as over a 24 to 48-hour period. In surgical patients, signs and symptoms develop at a mean of five days postoperatively. The vast majority of patients (95%) with ACPO have an identifiable predisposing factor or clinical condition (Table 1).

**Such factors in our patient include:**

1) immobility (following major surgery); 2) exacerbating medications, either in slowing colonic transit (narcotic analgesics, calcium channel antagonists) or contributing to gas formation (lactulose); and 3) electrolyte or metabolic disturbances (i.e., hypocalcemia, hypokalemia, hypomagnesemia) potentially related to the renal insufficiency and critical nature of his illness.

**Case presentation**

Plain abdominal radiographs revealed moderate, diffuse colonic dilation and mildly dilated small bowel loops (Figure 1). Dilation of the colon was particularly prominent on the right side with a cecal diameter of approximately 10-12 cm. Air was present down to the recto-sigmoid segment. No free intraperitoneal air, or bowel wall “thumbprinting” or pneumatosis was present.

**Breaking point**

Evaluation of a patient with acute colonic dilation requires exclusion of mechanical obstruction and other causes of a toxic megacolon (such as C. difficile), assessment of the extent and duration of colonic dilation and to determine whether ischemia or perforation is present. If plain abdominal radiographs do not show air throughout all colonic segments (including the rectosigmoid colon), a computed tomography of the abdomen/pelvis or water-soluble contrast enema should be performed to exclude a distal obstruction. Stool should be submitted for C. difficile toxin assay. Limited sigmoidoscopy to search for pseudomembranes or empiric treatment for C. difficile while awaiting stool results are reasonable if the patient’s illness mandates an immediate diagnosis.

The assessment for ischemia or perforation includes both clinical examination and imaging studies. Fever, abdominal tenderness, and
leukocytosis are more common in patients with ischemia but may also occur in its absence. Plain abdominal radiographs and computed tomography should be assessed for evidence of free peritoneal air and pneumatosis of the bowel wall.

**Case Presentation**

Computed tomography of the abdomen in our patient showed gaseous distention involving the entire colon without evidence of mechanical obstruction. Stool studies were negative for C. difficile. ACPO was diagnosed and supportive therapy instituted. Supportive therapy includes nothing by mouth, maintenance intravenous fluids and correction of any electrolyte imbalances. Nasogastric suction limits swallowed air from contributing further to colonic distension. A rectal tube should be inserted and attached to gravity drainage. Medications that can adversely affect colonic motility, such as opiates, anticholinergics and calcium channel antagonists are discontinued if possible. Ambulation and mobilization of the patient are encouraged.

**Breaking point**

The initial management of ACPO should be directed towards eliminating or reducing the factors noted above that may exacerbate the problem. Although the utility of these recommendations has not been studied in a randomized trial, these measures are successful as the primary treatment in the majority of patients. Retrospective series show resolution by clinical and radiologic criteria in 77-95% of patients with the median time to improvement of 1.6 days (3, 4).

**Case presentation**

Despite supportive measures, the patient’s clinical status the following day remained unchanged. Repeat abdominal radiographs showed persistently marked colonic dilation measuring up to 10-12 cm.

**Breaking point**

In ACPO, the risk of colonic perforation is greatest with cecal diameter exceeding 12 cm [2] and when distention has been present for more than 6 days [5]. Therefore, patients with marked cecal distension (>10 cm) of significant duration (>3–4 days) and those not improving after 24–48 hours of supportive therapy are considered to be candidates for further intervention. In the absence of signs of ischemia or perforation, medical therapy with neostigmine should be considered the initial therapy of choice if there are no contraindications to its use (6). Neostigmine, a reversible acetylcholinesterase inhibitor, indirectly stimulates muscarinic receptors, thereby enhancing colonic motor activity, inducing colonic propulsion and accelerated transit. The only randomized controlled trial evaluating an intervention for ACPO studied the use of neostigmine (7) and showed successful decompression in over 90% of patients with a recurrence rate of 11%.

**Case presentation**

Our patient had not shown improvement after 24 hours of supportive therapy and had significant colonic distention for over 72 hours. Therefore, further intervention was indicated. The presence of both renal and respiratory insufficiency were both considered relative contraindications to neostigmine use (Table 2) and a decision was made to proceed with colonoscopy.

**Breaking point**

Colonic decompression is the initial invasive procedure of choice when neostigmine either fails to work or is contraindicated (6). Non-surgical approaches to mechanical decompression include: 1) radiologic placement of decompression tubes; 2) colonoscopy with or without placement of a decompression

**TABLE 2. Contraindications to Neostigmine Use in Acute Colonic Pseudo-obstruction**

<table>
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<th>Contraindication</th>
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<td>Mechanical bowel obstruction</td>
<td>Active bronchospasm or respiratory compromise</td>
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<tr>
<td>Presence of bowel ischemia or perforation</td>
<td>Renal insufficiency (serum Creatinine &gt; 3 mg/DL)</td>
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<td>Uncontrolled cardiac arrhythmias</td>
<td>Pregnancy</td>
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tube; or 3) endoscopic or radiologic percutaneous cecostomy. Colonoscopic decompression is preferred among these invasive, non-surgical options given the reported experience in the literature which now totals hundreds of patients.

There is no well-defined standard of care regarding the optimal colonoscopy technique for ACPO. While colonoscopic decompression can be helpful, it may also be associated with procedural complications, may not be completely effective and can be followed by recurrence of the condition (8). Colonoscopy in ACPO is technically difficult and should be performed by experienced colonoscopists – probably not a case for a first week GI Fellow! The perforation and death rates associated with colonoscopy for treatment of ACPO have been reported to be as high as 3% and 1%, respectively. These complication rates are much higher than in patients without pseudo-obstruction (3, 9). Colonoscopy should not be performed if signs of peritonitis or radiologic findings of intestinal perforation are present.

Recommended equipment and materials for colonoscopic decompression of ACPO include a colonoscope with a large accessory channel (3.8mm) and a decompression tube to be placed into the right colon with aid of a guide wire (Table 3). A commercially available disposable set includes a guiding catheter (6 French, 181 cm length), guide wire (0.035 inch, 480 cm length), and decompression catheter (14 French, 175 cm length). Fluoroscopy is strongly recommended to aid tube placement.

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<tr>
<th>Table 3. Recommended Equipment for Colonoscopic Decompression in Acute Colonic Pseudo-obstruction</th>
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<tr>
<td><strong>Equipment</strong></td>
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<td><strong>COLONOSCOPE</strong></td>
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<tr>
<td>Olympus® CF-Q160AL</td>
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<td>Olympus® CF-2T160C</td>
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<tr>
<td><strong>DECOMPRESSION TUBE</strong></td>
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<td>14 French; length 175 cm</td>
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<tr>
<td><strong>GUIDE WIRE</strong></td>
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<tr>
<td>0.035 inch, 480 cm</td>
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<td><strong>FLUOROSCOPY</strong></td>
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Oral laxatives and bowel preparations should not be administered before colonoscopy. Enemas can be administered but the stool is usually already liquefied. Patients are often debilitated and confined to a bed, thus rendering the administration of enemas impractical. Standard conscious sedation is administered, primarily using benzodiazepines, titrated to patient comfort. Narcotic administration should be limited due to potential impairment of colonic motility. Air insufflation is minimized and gas is aspirated as the colonoscope is guided over the pools of stool as far as possible. During colonic intubation, mucosal appearance and viability is assessed. If significant mucosal ischemia is encountered, further advancement is only performed with extreme caution. If frankly necrotic bowel is noted, as evidenced by dusky mucosa, then the colonoscopy should be aborted. In the absence of ischemia, cecal intubation and decompression is preferable. Advancement into the right colon may be technically difficult (when the colon is elongated from the luminal distension) or may be inadvisable (when the procedure is prolonged and the patient is acutely ill). In these situations, intubation beyond the hepatic flexure is usually sufficient to decompress the right colon. After complete passage of the endoscope, the guide wire is advanced through the accessory colonoscopic channel into the cecum or ascending colon under fluoroscopic guidance. The colonoscope is slowly withdrawn with aspiration of gas and further assessment of mucosa. Some areas of colonic mucosa may be obscured by stool and the entire colonic mucosa need not be examined. After removal of the colonoscope, the decompression tube is passed under fluoroscopic guidance over the guide wire to prevent loop formation and ensure proper placement into the right colon. The guide wire is then removed and the tube is connected to gravity drainage.
Case presentation
Colonoscopy was performed to the ascending colon which revealed a diffusely dilated colon with retained liquid stool. The visualized mucosa was notable for mild-moderate ischemic changes in the right colon with superficial ulcerations, erythema, and friability (Figure 2). No gangrenous or frankly necrotic bowel was seen. A decompression tube was placed successfully into the right colon with successful colonic decompression noted on abdominal radiographs (Figure 3).

Breaking point
The efficacy of colonoscopic decompression has not been established in randomized clinical trials. Data from many retrospective series suggests that an initial colonoscopic decompression can significantly reduce cecal diameter in 61% to 78% of cases [8, 9]. Recurrent colonic dilation may occur in 18% to 33% of cases and almost occurs in patients without tube placement. Therefore, decompression tube placement at colonoscopy is strongly recommended to increase the success rate. A repeat attempt at colonoscopic decompression is reasonable when distension recurs after an initially successful procedure. Complete clinical success after one or more procedures is 73% to 88% (8-10). The therapeutic value of decompression tubes has not been evaluated in controlled clinical trials, but a retrospective study suggests that clinical success is only 25% when a decompression tube was not placed (10). Surgical decompression is reserved for patients with peritonitis, perforation or in whom endoscopic and medical therapy fails.

Case resolution
The decompression tube remained in place for 4 days with continued successful decompression. Following tube removal, the patient was administered polyethylene glycol (PEG) electrolyte solution daily with continued passage of flatus and stool without recurrent distention. He tolerated eventual advancement to a regular diet.

Breaking point
Administration of polyethylene glycol electrolyte solution (PEG) after resolution of ACPO may decrease the recurrence rate of colonic dilation (11). Therapy with PEG (29.5 g/daily) has been associated with an increase in stool and flatus output and a decrease in colonic distention by radiographic and abdominal girth measurements. Furthermore, the use of PEG in critically ill patients to promote defecation may prevent the initial development of ACPO (12).

Conclusion
ACPO is an important cause of morbidity and mortality in hospitalized or institutionalized patients. Conservative management is initially preferred. Colonoscopic decompression is performed to prevent ischemia or perforation and is the interventional procedure of choice for patients in whom conservative medical therapy fails. Colonoscopy is more challenging and associated with greater risks in this setting. With appropriate preparation and technique, however, colonoscopy with decompression tube placement can lead to resolution of colonic distension in the majority of patients, thereby minimizing the morbidity and mortality associated with this condition.
References


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Disclosure:

The author had nothing to disclose.

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