December 2016 Critical Care Case of the Month

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History of Present Illness

A 62-year-old lady with primary biliary cirrhosis/autoimmune hepatitis listed for liver transplantation was admitted to the general medicine floor with progressive lethargy. She had progressive fatigue for about 10 days prior to admission. She had not been able to walk for the last few days; had anorexia; had not had a bowel movement for approximately one week; and had not taken her medicines for 4 days according to her daughter. Her family was concerned with her progressive lethargy; her darkening urine; and progressive jaundice.

She had been managed for several years on mycophenolate mofetil, budesonide, and ursodiol. She had increasing problems with ascites and had paracentesis performed about every 4 days despite taking Lasix and spironolactone. She had early encephalopathy manifested by increasing problems with word finding but had not received lactulose.

Past Medical History

She has a history of esophageal varices, recurrent cellulitis and obesity.

Physical Examination

Vital Signs: P 121 beats/min, BP 102/35 mm Hg, T 37.5° C, R 25 breaths/min
General: She was lethargic, somewhat confused but oriented to time, place and person.
Lungs: shallow respirations.
Heart: regular rhythm with a tachycardia.
Abdomen: distended with a fluid wave.

Radiography

Portable chest and abdominal x-rays were performed (Figure 1).

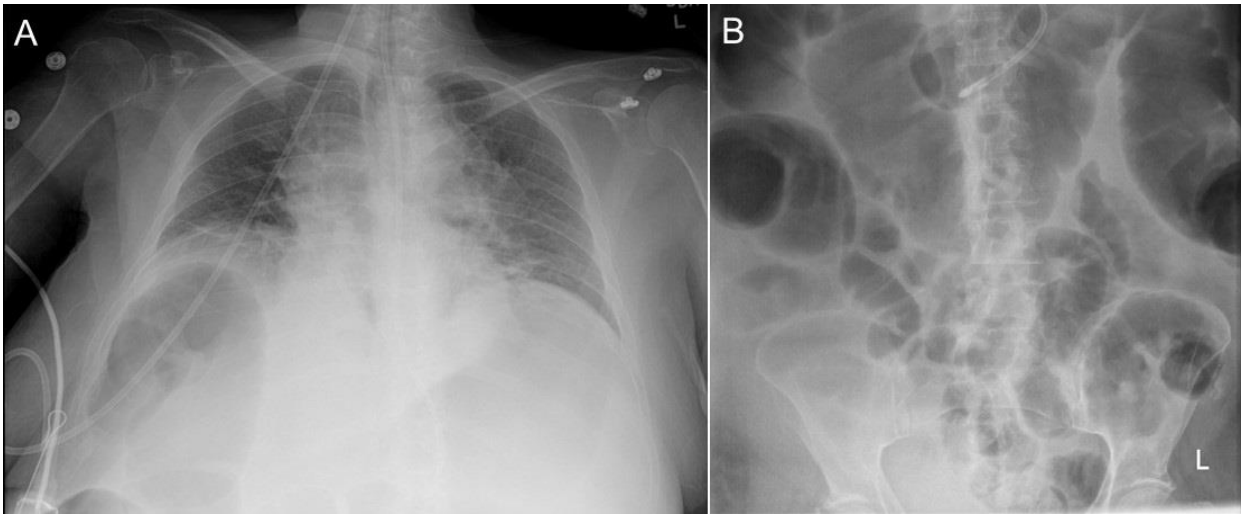

Figure 1. Admission chest (A) and abdominal (B) radiographs.

Which of the following ***best describes*** the x-rays?

1. The abdominal x-ray shows diffuse, nonspecific gaseous distention
2. The abdominal x-ray shows gastrointestinal perforation
3. The chest x-ray shows bilateral atelectasis
4. The chest x-ray shows bilateral pneumonia
5. 1 and 3
6. 2 and 4
7. All of the above

Correct!
5. 1 and 3

The lungs are compressed by her elevated diaphragms causing atelectasis especially in the lower lobes. Pneumonia or consolidation does not cause volume loss although the two may coexist. The abdominal x-ray shows the tip of a naso-gastric (NG) tube presumably in the stomach and diffuse gaseous distention of the large and small bowels. The diaphragms are not seen on the abdominal x-ray but are on the chest x-ray. There is no obvious free air under the diaphragm the most common finding with gastrointestinal perforation.

She was begun on lactulose and her mental status somewhat improved. However, she was noted to have a gradually increasing serum K^+ from 4 to 5.6 mEq/L. She was not receiving potassium supplements or angiotensin-converting enzyme inhibitors.

Which of the following is/are possible ***causes of hyperkalemia*** in this patient?

1. Acidosis
2. Addison's disease
3. Gastrointestinal hemorrhage
4. Renal failure
5. All of the above

Correct!
5. All of the above

Each is a possible cause of hyperkalemia in this patient. She was begun on sodium polystyrene sulfonate (Kayexalate) orally and her potassium decreased to below 4. However, over several hours she developed a mental status change with decreasing responsiveness to questioning, increasing tachycardia, and finally oxygen desaturation with an increase in respiratory rate and labored breathing. A rapid response team was called and she was transferred to the ICU. She was intubated and placed on mechanical ventilation. She became hypotensive and her blood pressure was supported by norepinephrine infusion. A CT scan of the brain revealed no intracerebral hemorrhage or edema.

Initial electrolytes revealed an anion gap metabolic acidosis with a normal serum creatinine but a slightly elevated blood urea nitrogen. Her hemoglobin decreased from a baseline of 12.1 to 7.9 g/dL and her platelet count was decreased at 13,000 cells/mcL. There was no bloody discharge from her NG tube. Her serum lactate level was elevated at 6.3 mmol/L.

Which of the following need to be ***done next***?

1. Abdominal CT scan
2. Barium enema
3. Esophagogastroduodenoscopy (EGD)
4. 1 and 3
5. All of the above

Correct!
1. Abdominal CT scan

Of the choices listed an abdominal CT scan is most appropriate. Despite the presence of esophageal varices, the lack of bloody drainage from the NG tube makes an upper GI bleed less likely. A barium enema is not appropriate in this clinical situation since performance in a severely ill patient is problematic and it takes preparation. A more rapid diagnosis in this severely ill patient is needed.

An abdominal CT scan was performed (Figure 2).

Figure 2. Representative image from the abdominal CT scan.

Which of the following is the most like ***cause*** of her overall clinical picture?

1. Colon cancer
2. Gastrointestinal perforation
3. Mesenteric ischemia
4. Pancreatitis
5. None of the above

Correct!
3. Mesenteric ischemia

The CT scan shows small bowel wall pneumatosis (gas in the bowel wall). This is most likely secondary to mesenteric ischemia. At about this time she had a large bloody bowel movement mixed with blood clots. Colonoscopy, the procedure of choice for diagnosing ischemic colitis was performed (1) (Figure 3).

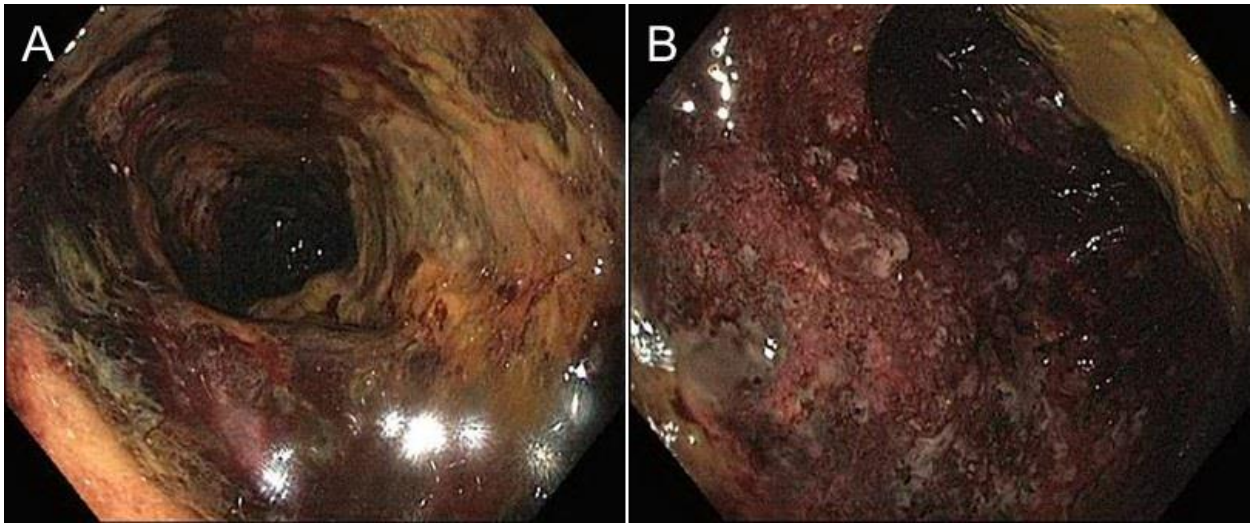

Figure 3. Colonoscopy at the hepatic flexure (A) and the ascending colon (B). The mucosa is congested, erythematous, hemorrhagic and ulcerated mucosa most consistent with ischemic colitis.

Which of the following is ***appropriate treatment*** for her ischemic colitis?

1. Anticoagulation for mesenteric thrombosis
2. Broad spectrum antibiotics
3. Colon resection
4. Conservative therapy
5. Oral sorbitol administration

Correct!
3. Colon resection

Therapy for ischemic colitis is controversial. In this patient, the choice was difficult because of her underlying disease. Most patients with left-sided colitis can be managed with conservative therapy (1). However, those with right sided colitis such as our patient have a poorer outcome and colon resection is more often performed.

The cause of her ischemic colitis is not entirely clear. However, Harel *et al.* (2) have reviewed several reports of oral sodium polystyrene sulfonate administration associated with ischemic colitis. The mechanism is not entirely clear but may be secondary to fluid and electrolyte shifts within the bowel or possibly a direct toxic effect of the sodium polystyrene sulfonate. Vasopressor administration may also have contributed to her ischemia.

She underwent a right hemicolectomy and made a quick and uneventful recovery. Later she underwent orthotopic liver transplantation and has done well.

References

1. Feuerstadt P, Brandt LJ. Colon ischemia: recent insights and advances. Curr Gastroenterol Rep. 2010 Oct;12(5):383-90. [CrossRef] [PubMed]
2. Harel Z, Harel S, Shah PS, Wald R, Perl J, Bell CM. Gastrointestinal adverse events with sodium polystyrene sulfonate (Kayexalate) use: a systematic review. Am J Med. 2013 Mar;126(3):264.e9-24. [CrossRef] [PubMed]