



Case Report

Pneumatosis Intestinalis as a Manifestation of Ischemic Bowel in Surgical Intensive Care Unit

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Abstract

Pneumatosis intestinalis (PI) is an uncommon radiographic sign due to a wide spectrum of diseases. Most of the confirmed cases of PI are discovered in patients with gastrointestinal symptoms seeking medical attention in the emergency department or outpatient clinic. PI in the surgical intensive care unit (SICU) follows neurological surgery is rarely reported. We report here two mortality cases which might relate to osmotic diuretic-mannitol in the SICU.

Keywords: Pneumatosis intestinalis; Ischemic bowel disease; Mannitol

Introduction

Pneumatosis intestinalis (PI), defined as gas and free air in the extra luminal space of the intestines, is an uncommon radiographic sign due to a wide spectrum of diseases. The significance of PI depends on the nature and severity of the underlying condition. When ischemic bowel disease presents with PI, it usually indicates irreversible injury and transmural necrosis and carries high mortality rate [1]. In addition to ischemic cause for PI, there are many nonischemic causes such as chronic obstructive pulmonary disease, connective tissue disease, and infectious enteritis, and leukemia, complication from organ transplantation, steroid use, chemotherapy, and HIV [2]. Therefore, PI is a complication resulted from a wide spectrum of conditions, ranging from benign diseases to abdominal sepsis with a high mortality. We report here two post-neurological surgery PI cases in the SICU.

Case Report

Case 1

An 84-year-old Taiwanese woman with a history of hypertension, diabetic insipidus, and chronic kidney disease was admitted to SICU under the impression of meningioma (Figure 1). On the 4th admission day, she received craniotomy and removal

of meningioma. The initial postoperative course was uneventful, but on the 6th postoperative day, her feeding status became worse and coffee ground substance from the nasogastric tube was noted. Under the impression of stress ulcer with bleeding, we held nasogastric tube feeding and changed H2 blocker to proton pump inhibitor to treat bleeding stress ulcer. A few hours later, her abdomen became progressively distended and rebound tenderness was noted. Therefore, computed tomography angiography (CTA) was done which revealed Pneumatosis intestinalis with hemoperitoneum likely due to ischemic bowel disease (Figure 2). The gastrointestinal surgeon was consulted and the patient received emergent exploratory laparotomy with small bowel resection of gangrenous bowel and anastomosis. Unfortunately, the patient's condition deteriorated rapidly and developed acute on chronic renal failure and refractory septic shock. Hemodialysis was recommended, but the family refused and Do Not Resuscitation (DNR) was signed, the patient expired within 72 hours after surgery.

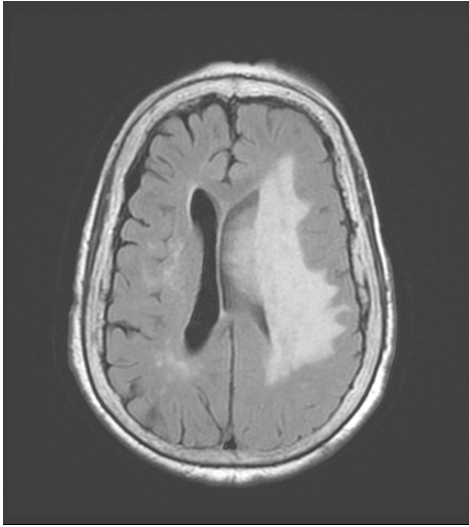


Figure 1: Left frontal meningioma with perifocal edema and mass effect.



Figure 2: Abnormal air collection in small bowel wall (Pneumatosis intestinalis) with hemoperitoneum suspected ischemic bowel disease.

Case 2

A 69-year-old Taiwanese woman with a history of hypertension, hyperlipidemia, and hypothyroidism was brought to the emergency department due to sudden collapsed at home. A brain CTA revealed subarachnoid hemorrhage due to posterior communicating artery aneurysm ruptured (Figure 3). She was admitted to SICU and received trans-arterial embolization on the next day. Five days later, she received external ventricular drain implant with intracranial pressure monitoring due to

hydrocephalus. On the 13th day, her consciousness suddenly deteriorated with Glasgow Coma Scale dropping from E2M4VT to E1M1VT. Her abdomen was distended. We arranged emergent CTA which revealed multiple air in the portal venous system, including liver and bowel walls due to ischemic bowel (Figure 4). The gastrointestinal surgeon was consulted, who recommended no surgery due to high risk of mortality. Patient's condition deteriorated rapidly with multiple organ failure and expired within a few hours.



Figure 3: Diffuse acute SAH with ruptured right P-com aneurysm.



Figure 4: Pneumatosis intestinalis with multiple air in the portal venous system, including liver and bowel walls suspected ischemic bowel disease.

Discussion

Most cases of pneumatosis intestinalis due to ischemic bowel diseases require medical attention because of abdominal symptoms. However, for unconscious patients who cannot clearly express themselves, it is difficult to make an accurate diagnosis at early stage. Both of our patients were found to have sudden abdominal signs on physical examination during their SICU stays, accompanied by abnormal laboratory results showing leukocytosis with extreme bandemia. They required emergent CTA to confirm the diagnosis.

Numerous causes and pathogenic mechanisms of ischemic bowel disease have been proposed [3]. None of our patients has pre-existing GI condition and both patients have the risk factor of hypertension. Another possible risk factor for patients with PI was dehydration caused by the frequently use intravenous osmotic diuretics-mannitol for reducing the brain swelling during their SICU stay.

In the first case, biochemical data showed substantial increase serum urea (BUN), creatinine, and urea: creatinine ratio, and progressive hypernatremia. In the second case, biochemical data also showed substantial increase BUN: creatinine ratio but the creatinine remained normal. The CBC showed rising thrombocytosis. The laboratory data are compatible with dehydrated status [4, 5] that may eventually lead to ischemic bowel disease.

Although animal study had shown that mannitol administration might protect the small intestine from ischemia–reperfusion (I-R) injury [6] but no human study has shown the same beneficial effects.

Conclusion

It is essential to recognize that pneumatosis intestinalis is a radiographic sign and not a disease by itself. Because it is

caused by a wide spectrum of diseases, timely identification of the cause of PI may be difficult. An efficient recognition of the clinical scenario, including the current status, co-morbid conditions, physical examination findings, laboratory data, and radiographic studies [7], might assist the intensivist to reach the correct diagnosis and offer immediate and effective treatment. Furthermore, accurate assessment of intravascular volume may be warranted for neurological patients who are admitted to SICU to prevent ischemic bowel disease.

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