

Intraportal Gas as a Radiologic Sign of Interstitial Ischemia: Case Report

Gas intraportal como signo radiológico de isquemia intestinal: Presentación de caso

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Portal vein
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Palabras clave (DeCS)

Vena porta
 Isquemia mesentérica
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 por rayos X

Summary

The entrapment of gas in the portal vein is a rare radiological sign that is associated with an extended bowel necrosis and a fatal outcome. A specificity of 100% is mentioned in the diagnosis of intestinal ischemia, when we have the presence of gas in portal vein. We report a case of a 42-year-old man who came to the emergency service after receiving multiple wounds with a sharp instrument in the thoracic and abdominal level. The patient had a torpid evolution with severe hemodynamic instability that raises suspicion of septic shock secondary to abdominal trauma; computed tomography of the abdomen was made, that shows as a main finding gas in the portal vein, reason for which the diagnosis of intestinal ischemia was made. A laparotomy is performed and after a few days the patient get better.

Resumen

El atrapamiento de gas en la vena porta es un signo radiológico poco común que se encuentra asociado a una necrosis extendida del intestino y a un desenlace fatídico. Se menciona una especificidad del 100 % en el diagnóstico de la isquemia intestinal cuando se encuentra gas en la vena porta. Se expone el caso de un hombre de 42 años de edad, quién acude a urgencias luego de recibir múltiples heridas en tórax y abdomen, con arma cortopunzante. La evolución del paciente es tórpida, con una grave inestabilidad hemodinámica que hace sospechar *shock* séptico secundario al traumatismo abdominal; se le practica una tomografía computarizada de abdomen en la que se encuentra gas en la vena porta como hallazgo principal, por lo que se realiza el diagnóstico de isquemia intestinal. Se le practica una laparatomía y, pocos días después, el cuadro del paciente se resuelve.



Introduction

Gas trapping in the portal vein is a condition that was described in neonates by Wolfe and Evans in 1955 (1) and in the adult population by Susman and Senturia in 1960 (2).

This finding is uncommon and is usually associated with extensive necrosis of the intestine, which is related to a fatal outcome (3). However, studies by Faberman and colleagues

(4) showed that mortality was only found in 29% of the patients with a gas-trapping tomographic finding in the portal vein, which indicates that this finding is not a predictor of mortality.

Intestinal ischemia can affect the small intestine, known as mesenteric ischemia; while that affecting the large intestine is known as colonic ischemia. When abdominal CT is performed, in acute ischemia, findings such as

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focal thickening of the intestinal wall, intestinal dilation and thrombosis of the mesenteric vessels can be found (5). Finding one of these conditions has a sensitivity of 64% and a specificity of 92% as diagnostic predictors of mesenteric ischemia (6), it is currently spoken that the specificity that has been found is 100% for the radiological sign of intestinal pneumatosis and is an excellent predictor of intestinal ischemia (7).

Causes of mesenteric ischemia include arterial and venous thrombosis, aortic dissection, hypoperfusion associated with non-occlusive vascular diseases, embolic disease and diseases secondary to intestinal obstruction (8). Clinically, the patient may have a history of cardiac arrhythmia, hypercoagulability, antecedent of a surgical procedure that triggers bowel distention and metabolic acidosis. Computed axial computed tomography findings may have relevant specifications consistent with intestinal pneumatosis, bowel dilatation, and lack of opacification in the superior mesenteric artery (9).

Intestinal resection is the only potential therapy to keep patients alive with intraportal gas, a radiological sign highly suggestive of mesenteric ischemia (10).

Case presentation

A 42-year-old male patient who entered the emergency department in a state of drunkenness, with a sharp gunshot wound in the precordial region at the abdominal level of 12 hours of evolution. At physical examination, the patient is alert, conscious, with blood pressure of 139/102 mm Hg, heart rate of 80 bpm, respiratory rate of 30 rpm, temperature of 36.8 °C, SatO₂ 98%, Glasgow 15/15. There is a left hemithorax wound of approximately 1 cm in diameter and penetrating abdominal trauma on the left flank. The rest of the physical examination is within normal limits. However, the findings on the chest X-ray show left hemothorax, which is why closed thoracostomy is performed.

The evolution of the patient is torpid, the clinical signs cause suspicion of septic shock of abdominal origin, for which a CT scan is performed in which gas is observed in the distal portal trajectories of the left hepatic lobe, a finding associated with intestinal pneumatosis, suggestive of ischemia mesenteric (Figures 1 and 2). An exploratory laparotomy is performed in which ischemic necrosis of the cecum and right colon is performed, requiring right hemicolectomy, transverse ileus, anastomosis, abdominal abscess drainage and adhesion release.

Gram is performed and culture of peritoneal fluid positive for *Escherichia coli*. During surgery, hemodynamic instability and hyperlactatemia appear, requiring large contributions of crystalloids and vasoactive support with norepinephrine. Because of the above, the patient is transferred to the ICU, where his recovery is slow, but finally the resolution of his current situation is achieved.

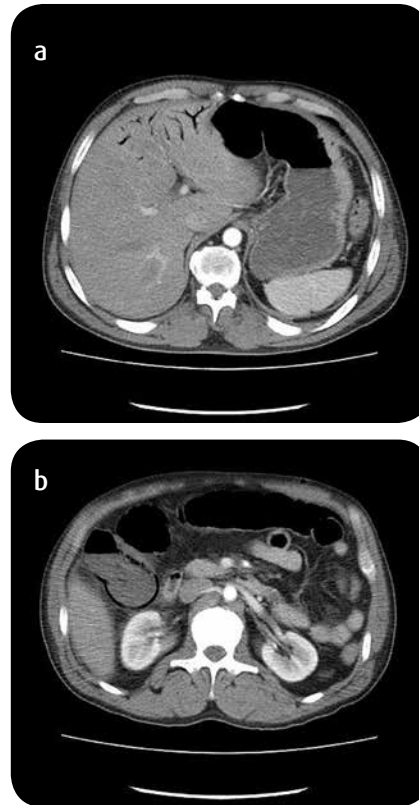


Figure 1. a) CT, axial section, phase venous portal: Intrahepatic air is identified with portal distribution linear and branched stretching to the subcapsular regions, as opposed to predominantly central pneumobilia. b) CT, axial cut in arterial phase: Radiolucent image is identified that outlines the contour of the hepatic wall angle of the colon related to pneumatosis. Note the dilation and intraluminal fluid.

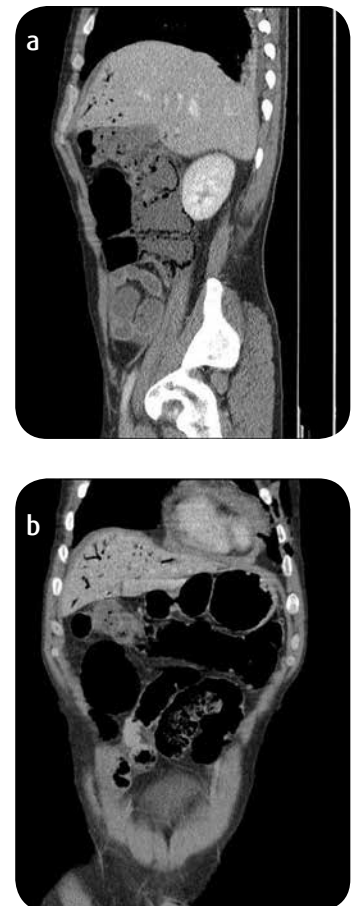


Figure 2. (a) Sagittal cut in portal vein phase: The subcapsular distribution of gas in the portal circulation and its association with extensive intestinal pneumatosis is observed. b) Coronal section: The findings are confirmed.

Discussion

Intraportal gas is a finding associated with intestinal pneumatosis, which are signs that have traditionally been linked to a fatal prognosis, since they usually indicate an acute intestinal lesion, usually ischemic or infectious. Its appearance offers a high degree of sensitivity and specificity at the time of the diagnosis of intestinal ischemia (11).

Diagnosis of intraportal gas can be made by conventional radiography, ultrasonography or by computerized axial tomography (CT). The simple abdominal radiograph can detect large amounts of intra-portal gas or intramural intestinal gas, but its efficacy is inferior to that of ultrasound or CT, which allows an early detection of small amounts of gas in the portal tract (12).

The finding of intraportal gas on a simple radiograph suggests a poor prognosis and is commonly associated with mesenteric ischemia (13).

On ultrasound, intraportal gas appears as numerous and small hyperechogenic images with intermittent acoustic shadow. The gas, within the portal venous system, has a centrifugal blood flow that appears in the hepatic periphery and extends up to 2 cm from the hepatic capsule. In contrast, gas in the biliary tract follows a centripetal direction that appears more centrally in the liver (14).

In addition, it is necessary to take into account the main differential diagnoses of this pathology, among which are inflammatory bowel diseases, celiac sprue, pyloric stenosis, gastric ulcer, scleroderma, diverticulitis, transplants or recent gastrointestinal bleeding (15).

In addition to being considered as a pathognomonic sign of intestinal necrosis, intra-portal venous gas is associated with high mortality and as an urgent indication for surgery. Recently it has been associated with several non-fatal cases, such as the one that is exposed in this case. However, intestinal ischemia remains the most common cause of this radiological finding in abdominal CT.

Conclusion

The underlying cause of intra-portal gas, as a radiological sign of intestinal ischemia, determined the therapeutic strategy and prognosis (16); as was observed in the exposed case, the underlying cause of the patient's pathology was the abdominal trauma received. The evolution of the patient was satisfactory after hemicolectomy, and treatment in the ICU where it was hemodynamically stabilized, which saved the patient's life.

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