Hepatic portal venous gas associated with transcatheter cardiac defibrillator implantation: A case report

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Abstract

INTRODUCTION: Hepatic Portal Venous Gas (HPVG) is a rare pathological condition that may be caused by iatrogenic factors.

CASE REPORT: A 66-year-old Chinese male patient with HPVG underwent laparotomy for chronic bowel ischemia. Transcatheter cardiac defibrillator was implanted via left subclavian vein for ventricular tachycardia.

DISCUSSION: There are many hypotheses about how gas runs through the intestine into the mesenteric portal venous system. HPVG patients can be improved through comprehensive management. Patients with mesenteric ischemia should be observed in hospital and after discharge, and need surgical intervention if chronic bowel ischemia recurs.

CONCLUSION: This case proves the usefulness of comprehensive management in treating HPVG. Prognosis of HPVG should consider the pathological changes contributing to HPVG.

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1. Introduction

Hepatic portal venous gas (HPVG) is a rare clinical anomaly that can be detected by radiographic technology [1,2]. HPVG is a radiological finding and not a pathological condition.Formerly considered an ominous radiologic sign, it sometimes occurs with severe abdominal diseases, such as acute bowel necrosis [3,4]. By far the pathogenesis of HPVG remains unknown, and a number of hypotheses has been put forward [5]. HPVG has also been reported as a rare complication of surgical operations, such as endoscopic retrograde cholangiopancreatography (ERCP), liver transplantation, left colectomy, esophageal varical band ligation and percutaneous endoscopic gastrostomy (PEG) [6,7]. Here we present a case of HPVG who underwent a transcatheter cardiac defibrillator implantation via left subclavian vein with a comprehensive approach. This document was reported in line with the SCARE criteria [8].

2. Case report

A 66-year-old Chinese male patient was admitted to our institution for ventricular tachycardia. Then, he underwent transcatheter cardiac defibrillator implantation via left subclavian vein. The patient’s condition kept stable within five days after the operation. On the sixth day, the pain came on suddenly. He complained of persistent diffuse abdominal pain, distension, nausea, but there was no vomiting. The patient had no exhaust and defecation. His co-morbidities included hypertension, coronary heart disease, previous myocardial infarction, previous coronary angioplasties, type 2 diabetes. Living with his wife, he did not smoke, drink and use mobile phone.

Physical examination results: soft abdomen slightly distended, with whole abdominal tenderness in the epigastric and left upper quadrant; no involuntary guarding or rebound tenderness; no cold sweat; no bleeding fluid in the lower right side of the abdomen according to abdominocentesis. He had a blood pressure of 94/65 mmHg, a pulse rate of 110 times per min, a capillary refill time within 2s, a respiratory rate of 20 breaths per min, and a temperature of 36.0℃. Laboratory data showed white blood cell count of 9930/μL, hemoglobin level of 11.0 g/dL, C-reactive protein level of 0.26 mg/dL, lactate dehydrogen level of 352 U/L. Indicators of myocardial infarction were normal. Arterial blood gas showed no acidemia. Abdominal computed tomography (CT) scan detected the presence of extensive HPVG. The gas ran into the superior mesenteric vein, the portal venous system and its intrahepatic branches (Figs. 1A, B and 2A, B). However, we assessed the patient’s clinical condition, which was haemodynamically stable, together to – the absence of clinical and laboratory signs of acute bowel necrosis. There was no apparent evidence of intestinal pneumatosis or occlusive bowel ischemia from the CT scan. We concluded that the patient had no possibility of bowel necrosis. We informed his condition to the caregivers, and put forward a con-
servative strategy. The caregivers agreed with this strategy. With a conservative approach, the patient was treated with total parenteral nutrition and empiric antibiotic therapy to cover potential bacterial translocation. A new CT scan performed 20 h later showed slight ascites but the HPVG image completely disappeared (Fig. 3A, B). His condition gradually improved with supportive treatment. Melena and bowel ischemia were simultaneously detected on the following day. While, 20 days later, he complained of mild abdominal pain, distension, and no fart and stool from the beginning. CT scan showed thickened bowel wall, no intramural pneumatosis, mesenteric oedema and intestinal obstruction (Fig. 4A, B). There were either no specific findings of bowel necrosis. Meanwhile the abdomen was soft, slightly distended and had mild abdomen tenderness in left upper quadrant. No involuntary guarding or rebound tenderness was detected. His condition gradually improved after two weeks' conservative treatment (Fig. 5A, B). Four months later, an acute abdominal pain occurred suddenly, with muscle guarding, muscle spasm and rebound tenderness. Emergent CT scan obtained at admission found acute gastrointestinal perforation (Fig. 6A, B). Exploratory laparotomy was performed immediately, and finding a scar, a contracture of 80-cm ileum and a perforation of intestinal wall with 1-cm diameter, which was resected soon. This section of the ileum was located 50 cm away from the ileocecal region. He underwent ileostomy for avoiding anastomotic fistula caused by pus in the abdominal cavity. Another four months later, the patient underwent ileostomy closure. Nearly one year later, the patient recovered completely.
3. Discussion

This is a case of HPVG that occurs as an iatrogenic complication. HPVG, a rare and sinister radiological sign, appears in many underlying abdominal diseases, either benign or lethal. Pathogenesis of HPVG is unknown, and various hypotheses have been put forward [5,9,10]. With the development of highly advanced multidetector-row CT, the detection rate for small-volume HPVG has increased. HPVG in non-life-threatening cases, such as diverticulitis, gastric dilation and inflammatory bowel disease, has now been frequently diagnosed. Most of them are not dealt with surgical intervention, and unnecessary exploratory laparotomy is avoided [6,7,9]. One of the latest statistics showed the total in-hospital mortality was 27.3% [11], lower than the 39% reported by Kinoshita et al. in 2001 [12]. A number of studies have evaluated the risk factors affecting mortality rate among patients with HPVG. High APACHE II scores, long resection of the small bowel, shock at admission and PI were risk factors for HPVG-related mortality [13,14]. With the updated knowledge of HPVG, its prognosis is more likely to be affected by the etiological factors than the single hepatic portal venous gas. However, literature review has confirmed that the lasting time of HPVG is related to the severity of the disease, but its range is not positively related to the severity of the disease [15,16]. Our case also confirmed the lasting time was correlated with the severity of the disease. What is the best treatment? Can HPVG be detected early by imaging modality. For surgeons, it is critical to make an accurate diagnosis of bowel necrosis, which may be fatal. Aggressive exploratory laparotomy is vitally preferred in case of bowel necrosis. Timely CT scan for HPVG patients with stable vital signs can provide a useful aid for diagnosis and treatment. Thanks to our
Fig. 5. (A) The condition of patient was improved gradually and the mesenteric oedema disappeared (arrowed); (B) The CT scan demonstrated the chronic ischemia of the bowel (arrowed).

Close observation and timely review abdominal CT, the patient in our report with stable vital signs avoided aggressive exploratory laparotomy. Interestingly the patient suffered from an ileus, complaining of diffuse abdominal pain, but no significant tenderness. His condition was improved by conservative treatment. However, he underwent laparotomy eventually because of acute abdominal disease led by intestinal perforation and necrosis. The pathogenesis for this symptom may be explained like this: The implanted defibrillator induced cardiac mural thrombosis; then these thrombi fall off and clotted the mesenteric non-trunk arteries, leading to bowel ischemia and the complicated HPVG. So HPVG is thought to have originated from mesenteric ischemia. After this acute episode, the ensuing repeated abdominal discomfort may indicate chronic bowel ischemia that can be confirmed by CT scan. Once the diagnosis is confirmed, limited operation should be performed to resolve the patient’s pain, improve the quality of life, reduce the acute abdominal pain.

4. Conclusion

With the widespread use of CT scan, early diagnosis of HPVG can be easily achieved. HPVG is a result of complex pathological changes, so its prognosis should be decided by the progress of these changes. The association between HPVG and complicated abdominal diseases should be studied. Patients’ general condition should be comprehensively assessed. Surgeons should recommend surgery or conservative treatments. Further research should cover patients with chronic bowel ischemia.
Conflicts of interest
None.

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The study sponsors had no such involvement.

Ethical approval
Ethical approval is not required for this case report in our institution.

Consent
Written informed consent was obtained from the patient to publish this information.

Author contribution
Dong-guang Niu: Writing paper, data analysis.
Chen Li: Text edit.
Hong-chun Fang: Data collection.

Guarantor
Dong-guang Niu.

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