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Case Report

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A Rare Case of Isolated Splenic Vessel Gas Post Infarction

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Abstract

Despite the improving trends in managing cases of acute abdomen, gases found in the splenic vein, portal vein or hepatic portal vein usually after imaging depicts grave outcome for patients with mesenteric ischemia or ischaemic bowel disease. This paper reports a rare case of isolated splenic vein gas in a 51-year-old man with a history of alcohol abuse and pancreatitis, presenting with acute abdomen. Computerised tomography scan showed nonsurvivable pan gastro-intestinal ischemia and isolated gas in the splenic vein which is very rare in its entirety.

Keywords

Portal venous gas, Splenic vessel, Pneumatosis

Introduction

51-year-old male presented at the A&E with severe abdomen pain, acute confusion and agitation. On examination, he was tachypnoec and had distended tender abdomen. He has a history of recent treated gastric outlet obstruction secondary to grove pancreatitis, teratoma for which he was treated 30 years ago and heavy alcohol user (40 units a week). In addition, has small right paravertebral mass that is under observation. An urgent computerised tomography (CT) scan of abdomen and pelvis with contrast at A&E identified localised perforation of gall bladder and features consistent with grove pancreatitis.

On admission he was sent to high dependency unit (HDU) on account of type 1 respiratory failure. Arterial blood gases showed metabolic acidosis. Streptococcus anginosus and aspergillus fumigatus were isolated in his blood and sputum culture respectively. Mid-stream urine microscopy was negative. Ultrasound guided drainage of the perforated gall bladder and total parenteral nutrition (TPN) (for his ileus) improved his clinical status. Regular doses of metronidazole, tazocin and micafungin were prescribed. In addition, he had continuous positive airway pressure (CPAP) for his decreased respiratory effort. A nasojejunal tube (NJ-tube) was passed via oesophago-gastroduodenoscopy (OGD) to commence enteric feeding.

Post OGD he developed new onset delirium, aggression and fever. His CRP (164 mg/L) and WCC (60.4 10^9/L) were high and LFT's deranged. Another urgent CT scan of abdomen and pelvis with contrast identified four large peritoneal collections, and a further percutaneous drainage was done which improved the clinical and laboratory indices of the patient considerably. He was transferred from HDU to the ward after 2 weeks of admission. Later in the day he

had acute respiratory deterioration and developed peritonitis with metabolic acidosis. Urgent CT scan of abdomen without contrast showed all non-survivable pan gastro-intestinal (GI) ischaemia and isolated gas in the splenic vein. The patient died at theatre recovery.

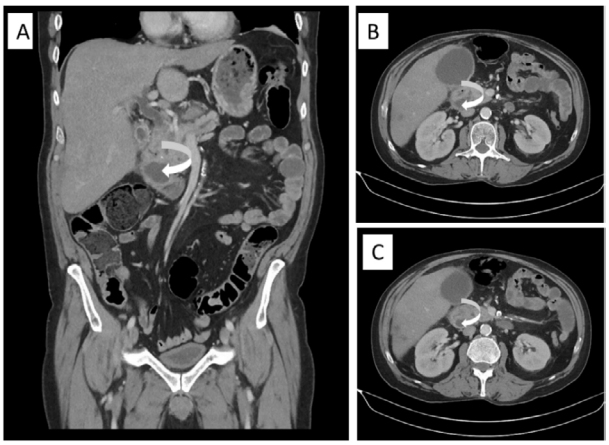

Figure 1: A coronal and axial CT abdomen and pelvis showing pancreatic head cystic lobulated mass, with a tiny focus of calcification. There is also mild stranding along the lateral border of the second part of the duodenum which may be related to grove pancreatitis as indicated by the white arrow.

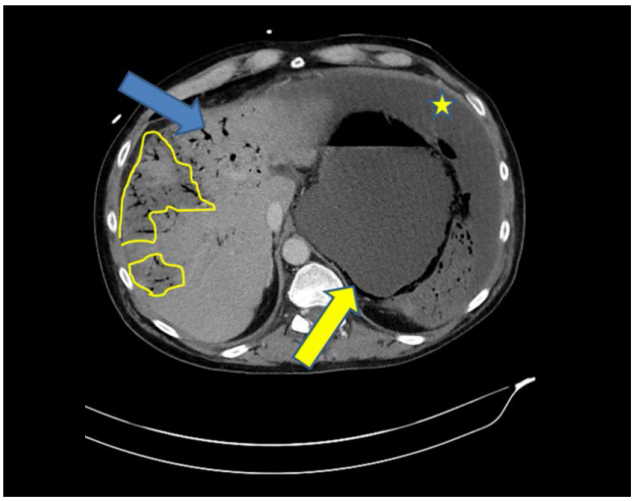

Figure 2: This image demonstrates two abnormalities in the liver. Gas in the portal vein (blue arrow) – it can be difficult to tell apart gas in the portal vein (which carries a very poor prognosis) and gas in the biliary tree (which can be an incidental finding e.g. after ERCP). Portal venous gas extends all the way to the liver capsule, but biliary duct gas won't. Secondly the gas has meant that the blood can't be supplied to the liver (80% liver blood supply is from the portal vein). As such a "geographical area" of the liver has infarcted – the darker bit. (Yellow outline). The spleen is dead (not enhancing). There is gas within the vessels of spleen. There is a left subphrenic collection (yellow star).

Discussion and Review of Literature

Increasingly the use of CT scans has improved the diagnosis of even minute volumes of gas in the portal system. The presence of gas in the portal system usually signifies severe underlying abdominal disease requiring immediate surgical intervention. Gas within the hepatic and portal system is an ominous radiologic sign that should not be missed in computer tomography/ultrasound examination. This disease phenomenon was first described by Wolf and Evans in children dying from severe abdominal diseases in 1955 [1]; however, the name hepatic portal venous gas (HPVG) was coined by Liebman et al. in 1978 [2]. Many names have been ascribed such as porto-venous gas, portal venous gas, gas embolization of the portal vein or pneumoportogram.

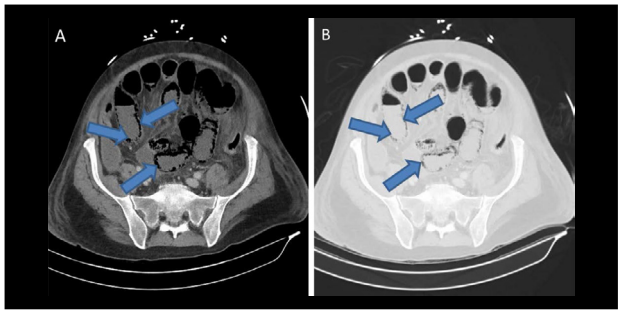

Figure 3: The entirety of the stomach and small bowel are dead and there is gas in the bowel wall (blue arrow) as shown in the abdominal **(A)** and lung window **(B)**. Importantly the gas can be seen in the dependent aspect of the bowel – when it is anterior in a loop of bowel you can't always be sure if it is just gas in the lumen close to the wall or pneumatosis, but this is on the dependent and nondependent aspects.

Mortality associated with portal venous gas was almost 100% when it was initially described by Liebman et al. [2]. The downward trend in the mortality rate is as a result of improvement in early detection rates by advanced imaging facilities and techniques, thus allowing early intervention when needed [3].

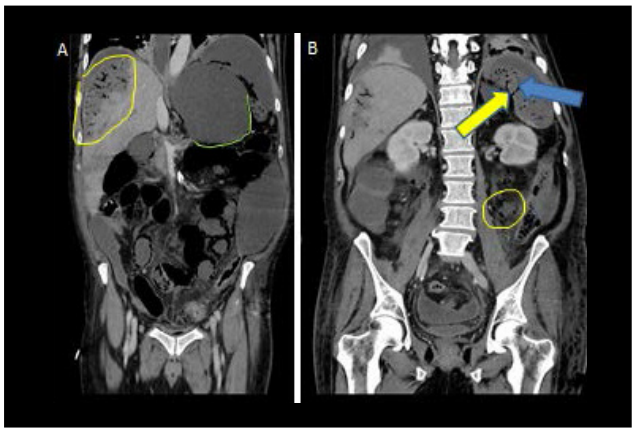

Figure 4: These coronal images show PV gas and dead liver (non-enhancing) – yellow circle in **A.** The green line is over gastric pneumatosis. There is gas within the spleen (blue arrow) and gas within a vessel outside of the spleen (yellow arrow in A). The yellow circle in **B** shows gas in the small bowel mesentery – this is within the veins, not free gas.

Many factors have been attributed to the formation of this "ominous phenomenon" even though the mechanism is not well understood. The mechanical and the bacterial theory have been used often to describe the pathophysiology and recently

less commonly migration of swallowed air via the mural capillaries. In the mechanical theory there is disruption of the mucosal membrane integrity, this result in gas moving into the mucosal walls and eventually into the portal venous system [4] via the veins or lymphatics via the veins or lymphatics [5]. Any disease process that compromise the bowel mucosa is related to this theory, examples are bowel ischaemia, gastrointestinal malignancies and ulcerations

In the bacteria translocation theory, gas forming bacteria move into the portal veins by invasion or translocation of the bowel wall. They either form gas in the portal vein or in the bowel wall which then moves into the portal veins [6].

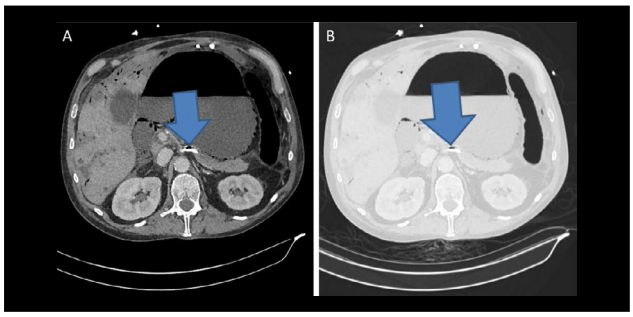

Figure 5: The heavily calcified splenic artery just after the split of the coeliac trunk. This also contains a bleb of gas (blue arrow pointing to a black speck) as shown on both abdomen and then lung windows.

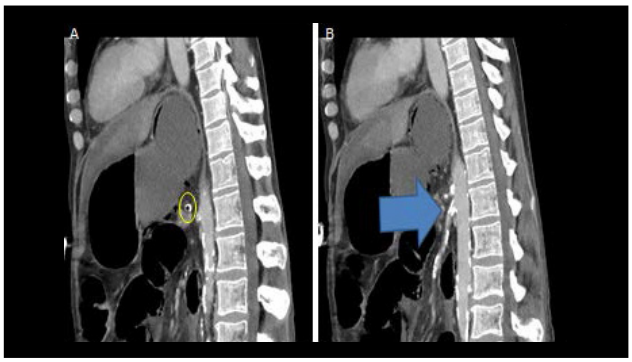

Figure 6: Sagittal views showing gas in the heavily calcified splenic artery circled in **A** and blue arrow in **B**.

Less commonly migration of swallowed gas via mural capillaries into the portal venous circulation due to high gastrointestinal luminal pressure and this happen in cases precipitated by pancreatitis and gastric outlet obstructions [7].

Bowel ischemia/infarction or necrosis is the commonest cause of portal vein gas and it's a dangerous abdominal condition in adults with high mortality [8]. Other less common causes are noted, and they cause less morbidity and mortality compared to bowel ischemia, a few examples of less common causes are diverticulitis [9], inflammatory bowel disease [10], pelvic abscess, ulcerated/necrotic bowel cancers, acute pancreatitis [11], COPD and high dose steroids [7]. In infants necrotizing fasciitis (commonest) and erythroblastosis fetalis have been implicated.

Varied clinical presentations are associated with HPVG with spectrum ranging from incidental findings through a surgical abdomen to severe sepsis. However, the clinical presentation can be broadly classified as bowel distention possibly from mechanical bowel obstruction, bowel ischaemia and a few of them the course is unknown [4].

With the advent of early identification of this disease process, many treatment algorithms have been put in place to identify patient or early surgery, delayed surgery and conservative management [4]. These algorithms not only place emphasis on only radiological findings but importantly blood pressures, laboratory indices, vital signs and physical examinations thus making management of the disease process associated with HPVG equally effective in ill resourced centres [12].

Many literatures have done exhaustive works on hepatic and portal venous gas, but none has published reports or pictures demonstrating isolated splenic venous gas. Isolated splenic vein gas is not only rare but the theory or cause also not understood considering that gas originating from bowel necrosis tract through the portal system via superior mesenteric.

Splenic vein emerges from the hilum of the spleen in the splenorenal ligament in intimate relation to the tail of the pancreas and the splenic artery. It then travels at the posterior aspect of the pancreas and joins the superior mesenteric vein to form the portal vein. A variation in its anatomy is rare and the variations can cause stagnation in the splenic vein.

Further it can also be explained by the fact that gas within the stomach tract into the stomach wall by the breach of the stomach mucosa during the OGD, this travelled into the splenic vein by one of its tributaries, the short gastric vein which drains the fundus and left part of the greater curvature of the stomach.

Less commonly perhaps positional or poor flow within the portal vein might cause the gas to tract back. The presence of grove pancreatitis also makes splenic vein outflow difficult.

Conclusion

In conclusion, the presence of gas within the splenic vein is by itself not a diagnosis but signifies underlying pathology within the abdomen. Varied reasons can be given this patient for the potential cause of isolated splenic vein gas. They include instrumentation, presence of grove pancreatitis, previous gastric outlet obstruction, variation in anatomy and less commonly hypotension.

This is the first published case on isolated splenic vein gas which is very rare in its entirety.

Conflict of Interest

The authors declared no conflict of interest.

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