Case

56 y/o M presented to ER c/o severe Abd Pain, N/V x 4 days

PMHx: HIV, HTN, Hep C, COPD, renal insufficiency

- VS: 98.7; 86/60; 96; 16; 99%
- Lethargic, but arousable
- Abdomen distended and tender

Labs:

- ABG: 7.13/45/282/14/-13/99%
- Lact: 6.8
Case

Imaging
Case

Imaging
Case

Imaging
Case
Case

Imaging
Case

Resuscitation in ER & OR

Ex-Lap

- Significant amount of small bowel found to be gangrenous and was resected
- 20cm of jejunum, and 120cm of distal Ileum left, some dusky patches
- Good Doppler signal throughout mesentery, no sign of venous congestion
- Left OR on Levophed, Vasopressin, & Epinephrine drips
- Skin closed, fascia left open with plan to come back to OR for second look laparotomy
Case

POD 0-1

- Aggressively resuscitated overnight in PACU
- By 6am all pressors off
- Labs:
  - 2am:
  - 6am:

![2am Lab](chart1.png)

- ABG: 7.41/45.1/85.5/28/+3.3/97%
- Lactate: 1.8

![6am Lab](chart2.png)

- ABG: 7.40/42/158/25/+1.3/99%
- Lactate: 1.1

[www.downstatesurgery.org](http://www.downstatesurgery.org)
Case

Second Look

- All remaining small and large bowel appeared viable and well perfused
- Small bowel to small bowel anastomosis created
- Abdomen Closed
Case

Hospital course

– POD 1-2, intubated in MICU, resuscitation continued
– POD 3 – Extubated
– POD 5 continued to pass flatus and had BM → liquid diet started & slowly advanced to regular
– POD 8: Discharged home
Portal Venous Gas

Hepatic Portal Venous Gas
The ABCs of Management

Objective: To review the use of computed tomography (CT) and radiography in managing hepatic portal venous gas (HPVG) at a university-affiliated tertiary care center and in the literature. Hepatic portal venous gas is frequently associated with acute mesenteric ischemia, accounting for most of the HPVG-associated mortality. While early studies were necessary dependent on plain abdominal radiography, modern high-resolution CT has revealed a host of benign conditions in which HPVG has been reported that do not require emergent surgery.

Data Sources: Patient records from our institution over the last 10 years and relevant studies from BioMed Central, CENTRAL, PubMed, and PubMed Central. In addition, references cited in selected works were also used as source data.

Study Selection: Patient records were selected if the CT or radiograph findings matched the term hepatic portal venous gas. Studies were selected based on the search terms hepatic portal venous gas or portal venous gas.

Data Extraction: Quantitative and qualitative data were quoted directly from cited work.

Data Synthesis: Early studies of HPVG were based on plain abdominal radiography and a literature survey in 1978 found an associated mortality rate of 75%, primarily due to ischemic bowel disease. Modern abdominal CT has resulted in the detection of HPVG in more benign conditions, and a second literature survey in 2001 found a total mortality of only 30%. While the pathophysiology of HPVG is, as yet, unclear, changing abdominal imaging technology has altered the significance of this radiologic finding. Hepatic portal venous gas therefore predicts high risk of mortality (>50%) if detected by plain radiography or by CT in a patient with additional evidence of necrotic bowel. If detected by CT in patients after surgical or endoscopic manipulation, the clinician is advised that there is no evidence of increased risk. If HPVG is detected by CT in patients with active peptic ulcer disease, intestinal obstruction and/or dilatation, or mucosal diseases such as Crohn disease or ulcerative colitis, caution is warranted, as risk of death may approach 20% to 30%.

Conclusion: The finding of HPVG alone cannot be an indication for emergency exploration, and we have developed an evidence-based algorithm to guide the clinician in management of patients with HPVG.

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Portal Venous Gas

Rare Radiologic Finding

– Only 182 cases documented in the literature by 2001
– 2 Reviews of CT scans in academic medical centers:
  17 / 14,000 scans
  11 / 19,000 scans


Portal Venous Gas

Described 1955 by Wolfe and Evans
- abdominal plain radiographs
- 6 Neonates who died secondary to necrotic bowel

Followed by a report in 1960 of Hepatic Portal venous gas in 5 adults who died


Portal Venous Gas

First reported survivor: 1965

Liebman & colleagues analyzed all reported cases by 1978

- Mortality 75%
- Concluded that the finding of portal venous gas demands emergent laparotomy


Portal Venous Gas

Defined by Sisk as tubular areas of decreased attenuation in the liver periphery

– Injected contrast into portal vein & detected it within 2cm of the capsule.

– Distinguished from aerobilia which is centrally located air in the biliary tree


Portal Venous Gas

50% also have Pneumatosis Intestinalis

It is generally presumed that Pneumatosis Intestinalis and Portal venous gas represent
Portal Venous Gas

Experimentally

- Air injected into submucosa or mesenteric veins of dog intestines was found in the portal venous system.
- Occlusion of mesenteric arteries in dogs resulting in infarction also results in portal venous air


Portal Venous Gas

Pathophysiology (Hypothesis)
- Microbe-derived gas production
- Absorbed Intraluminal air through disrupted mucosa

No actual experimental evidence

Portal Venous Gas

Portal venous gas has also been reported in many nonfatal conditions:

- Crohn’s Disease
- Ulcerative Colitis
- Gastric Ulcer
- Graft-vs-Host Disease
- Uncomplicated Bowel Obstruction
- Pseudo-obstruction
- Bacterial Abscesses
- Diverticulitis
- Paralytic Ileus
- Suppurative Cholangitis
- Colovenous Fistulae
- Cystic Fibrosis
- Seizures
- Colchicine Toxicity

- Iatrogenic:
  - Laparoscopy
  - Endoscopy
    - ERCP
    - Gastric Dilation
  - Liver Transplant
  - RFA
  - Arterial Cath

Portal Venous Gas

Newer data reports the mortality associated to be 39% 

- Decrease thought to be due to change in diagnostic imaging
  - CT scanning
    - More sensitive for portal venous gas
    - and also diagnostic for non fatal etiologies
  
- A direct correlation is also made with the frequency of bowel ischemia as an etiology
  - 72% in 1978
  - 43% in 2001

- When Bowel ischemia is the cause mortality remains high (~75%)

Portal Venous Gas

Portal Venous Gas

References