Hepatic Portal Venous Gas in a Patient with Metastatic Pancreatic Adenocarcinoma on Chemotherapy

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Background

Hepatic portal venous gas (HPVG) is the presence of gas in the portal venous system, often a critical finding associated with a variety of conditions.

The most common causes of peripheral HPVG include mesenteric ischemia, bowel obstruction or strangulation, intra-abdominal sepsis, perforated viscus, and inflammatory bowel disease.

Traditionally is it highly associated with transmural necrosis (in 90% of cases) with a high risk of mortality up to 85% (1,2).

Case Description

A 68 year old male with metastatic pancreatic adenocarcinoma on gemcitabine and nab-paclitaxel due to progression on FOLFIRINOX therapy was admitted for shortness of breath.

His oncologic history was notable for malignant biliary obstruction requiring stent placement and thromboembolism on apixaban.

On admission he was hemodynamically stable with abdominal distension and shifting dullness.

Laboratory studies showed leukocytosis (18,000/uL), anemia (8.6 g/dL), and an elevated alkaline phosphatase (906 U/L).

Imaging revealed pneumonia, gas in the gallbladder, bile duct stent, peripheral HPVG, locally invasive pancreatic cancer with retroperitoneal metastatic, and significant ascites. No intraperitoneal gas or intestinal pneumatosis was noted.

Interventional radiology performed a paracentesis draining 8.6 L of fluid providing therapeutic relief. He was discharged with an abdominal PleurX catheter and antibiotics were continued for 4 weeks with doxycycline for pneumonia.

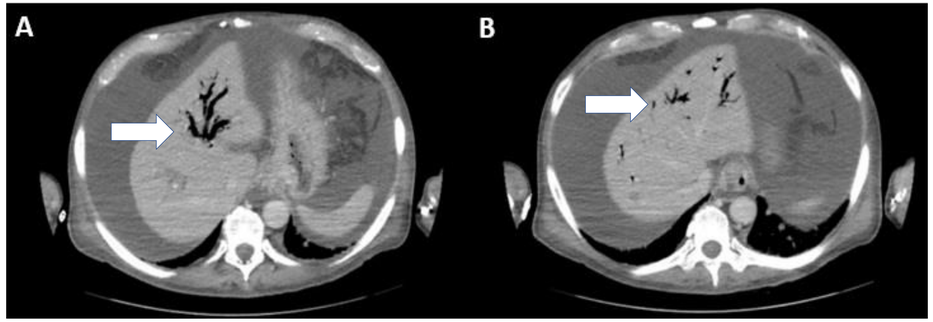


Figure 1. A and B. Axial cuts from the patient's CT abdomen and pelvis showing hepatic portal venous gas peripherally located in the liver indicated with white arrows.

Imaging Table	Definition/Appearance of hepatic portal venous gas	Key Features
Ultrasound	-Hyperechoic foci -Lines along the liver edge -Often reverberation or "ring down" artifacts	-Gas bright due to high reflectivity -Artifacts help confirm gas present -Can be obscured by bowel gas if present
CT scan	-Well defined low density/dark areas in the peripheral liver -May be linear or loculated along the capsule	-Gas easily identified due to low attenuation -Excellent anatomic detail and localization of gas to other structures -May require thin section imaging for smaller amounts of gas
Doppler ultrasound	-Gas causes acoustic shadowing -"Twinkling" artifact -Direct visualization is limited	-Color doppler can have twinkling artifact behind gas collections -Gas interferes with blood flow signal

Table 1. Comparing imaging modalities for hepatic portal venous gas appearance.

Discussion

Diagnosis of HPVG is made through abdominal x-ray, ultrasound with or without color flow Doppler, or CT scans showing peripherally located gas in the liver due to centrifugal flow.

Chemotherapy induced HPVG from irinotecan, cisplatin, and oxaliplatin has been previously reported.

Mechanism is not fully understood, irinotecan causes mucosal damage which is amplified by oxaliplatin. Compromising the gut wall leading to inflammation, ulceration, and permeability; gas then enters the portal circulation.

In our case, prompt treatment was not necessary as it was an incidental finding, but HPVG should be recognized immediately in a hemodynamically unstable patient because surgical intervention may be necessary.

Conclusion

HPVG is separated into central and peripheral, where central is most often benign or iatrogenic processes, peripheral is mostly associated in life threatening conditions although chemotherapy can rarely attribute like it did in our case.

References

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This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare of any of its affiliated entities.

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