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## Hepatic portal venous gas after colonoscopy: A case report and review

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## ABSTRACT

**INTRODUCTION:** Hepatic portal venous gas (HPVG) is a rare radiological finding in which gas enters the portal venous system and it is associated in case of necrotizing colitis with a mortality of 75%. We report a case of iatrogenic HPVG with a review of literature.

**PRESENTATION OF CASE:** A 41 years old patient underwent total colectomy and ileal pouch- anal anastomosis with derivative ileostomy for a familiar adenomatous polyposis coli in June 2008. A stenosis of the pouch-anal anastomosis developed. The patient underwent several endoscopic dilations. A recurrence of the stenosis was observed. The patient underwent to several endoscopic procedure. After the last colonoscopy the patient showed a fever with abdominal pain. A CT scan showed little peri-anastomotic collections and massive hepatic portal venous gas.

**DISCUSSION:** The management of HPVG varied from surgical intervention to non-operative procedure. The surgical approach it's reserved to clinically unstable patients or those with evidence of peritonitis or bowel perforation. Stable patients, like those with an HPVG consequence of an endoscopic procedure, can be treated with non- operative management.

**CONCLUSION:** Our experience confirm that hepatic portal venous gas can be related to endoscopic procedure; thus, it can be managed on the basis of patient's general clinical conditions, and in selected cases it will disappear without therapeutic interventions with a good outcome.

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## 1. Introduction

Hepatic portal venous gas (HPVG) is a rare radiological finding in which gas enters the portal venous system and it is associated in case of necrotizing colitis [1] with a mortality of 75% [2].

In 2001 and 2009 Kinoshita [1] and Nelson [3] respectively, demonstrated a decrease of mortality up to 39%.

Different conditions are predisposing for HPVG such as, abdominal infections, bowel ischemia, gastric emphysema, Crohn's disease or endoscopic procedures. In last years thanks to the development of radiological techniques such as CT scan and ultrasonography the diagnosis of case of HPVG is increased, with a better prognosis for iatrogenic cases (Figs. 1–4). Our work has been reported in line with the SCARE criteria [5].

## 2. Presentation of case

A 41 years old patient underwent total colectomy and ileal pouch-anal anastomosis with derivative ileostomy for a familiar adenomatous polyposis coli in June 2008. Pathologic examination of the specimen showed a pT1 N1 adenocarcinoma of the rectum. The patient underwent chemo-radiation and subsequent

adjuvant chemotherapy. A stenosis of the pouch-anal anastomosis developed. The patient underwent several endoscopic dilations. The ileostomy was taken down in March 2016. A recurrence of the stenosis and a peri-anastomotic collection were observed. An endoscopic drainage of the collection was performed on October 3rd, 2016. The CT scan performed on October 7th showed a reduction of peri-anastomotic fluid collection without evidence of portal pneumatosis. The endoluminal drainage was removed and during an endoscopic procedure with CO<sub>2</sub> the fistula was closed with an OVESCO® clip on October 10th. The patient was re-admitted on October 19th with fever (38.8 °C) without leucocytosis. An endoscopic examination of the pouch showed absence of purulent discharge but many fistulous orifices around the pouch- anal anastomosis were detected (Table 1).

A CT scan showed little peri-anastomotic collections (panel B) with air-fluid levels and massive hepatic portal venous gas (panel A). The patient was in good clinical conditions, afebrile, blood tests showed: WBC: 4290/μL, Procalcitonin: 010 ng/ml.

Based on clinical findings, antibiotic treatment with meropenem (500 mg tid i.v.) was administered without further diagnostic or therapeutic interventions, assuming that the portal pneumatosis was due to the endoscopic examination. One day later a new CT scan detected a marked reduction of hepatic portal venous gas (panel C); the patient resumed oral feeding and three days later was discharged.

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Fig. 1. xxxxx.

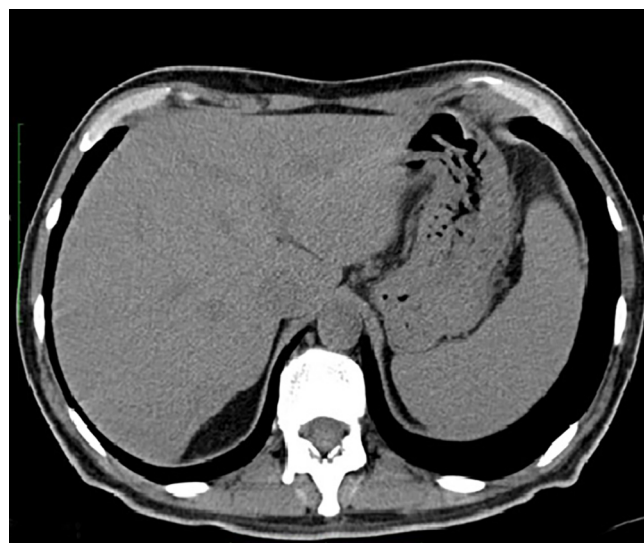


Fig. 4. xxxxx.

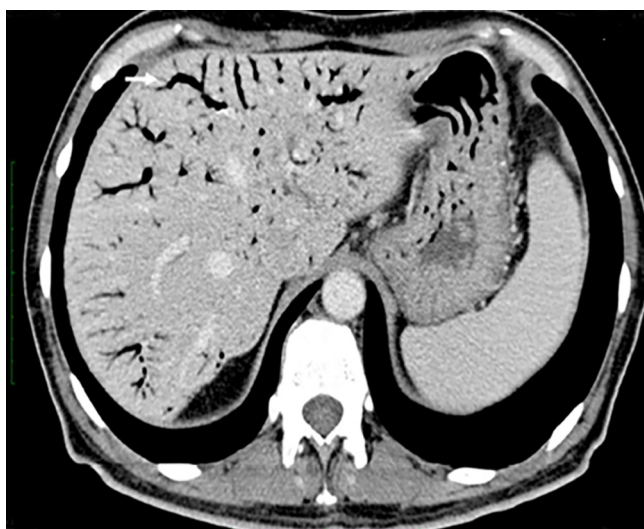


Fig. 2. xxxxx.



Fig. 3. xxxxx.

Table 1  
XXXX.

Authors- years	Underlying clinical conditions	Number of patients
Vollman [8], 1976	Necrotizing enterocolitis	1 (infant)
Bach [9], 1982	Intra-abdominal abscess	1
Birnberg [10], 1983	Ulcerative colitis	1
Merritt [11], 1984	Necrotizing enterocolitis	12 (infants)
Benson [12], 1985	Digestive tract dilation	1
Huycke [13], 1985	Complication of endoscopic procedure	1
Radin [14], 1987	Digestive tract dilation	1
Chezmar [15], 1989	Liver transplant	7
Kirsch [16], 1990	Crohn's disease	1
Lee [17], 1993	Suppurative cholangitis	n.v
Herman [18], 1995	Complication of endoscopic procedure	1
Quirke [19], 1995	Ileus	1
Mallens [20], Li 1995	Cystic fibrosis	1
Chen [21], 1997	Seizures	1
Nguyen [22], 1998	Complication of endoscopic procedure	1
Chang [23], 1999	Gastric ulcer	1
Nakao [24], 1999	Intra-abdominal abscess - tumor	1
Saksena [25], 2003	Colchicine toxicity	1
Sellner [26], 2007	diverticulitis	1
Sen [27], 2009	diverticulitis	1
Hussain [28], 2009	Gastric ulcer	1
Siswojo [29], 2010	Mesenteric ischemiae	1
Oehler [30], 2013	Mesenteric ischemiae	1
Cunningham [31], 2014	Crohn's disease	1
Khalaf [32], 2014	Mesenteric ischemiae	1
Maewawa [33], 2015	Mesenteric ischemiae	1
Sadatomo [34], 2015	Complication of endoscopic procedure	1
Solakoglu [35], 2016	Complication of endoscopic procedure	1
Sawano [36], 2016	Complication of endoscopic procedure	1
Castreen [37], 2016	Complication of right hemicolectomy	1
Moser [38], 2016	Complication of diverticulitis	1
Yamadera [39], 2016	Crohn's disease	1
Nevins [40], 2016	Dilatated loops of small bowel	1
Okada [41], 2016	Complication of abdominal surgery	4
Ginesu [42], 2017	Complication of left colectomy	1
Bangash [43], 2017	Complication of radical cystectomy and neobladder formation	1

Table 1 (Continued)

Authors- years	Underlying clinical conditions	Number of patients
Ghoz [44] 2017	Perforation of antral gastric ulcer	1
Mc Nicholas [45] 2017	Acute pancreatitis	1
Li [46] 2017	Complicaiton of colon cancer resection	1
Niu [47] 2018	Complication of transcatheter cardiac defibrillator implantation	1

**3. Discussion**

Wolfe [4] in 1955 first described a case of HPVG in infants associated with serious underlying disease and high mortality rate. Finding of a relevant amount of gas in portal venous system has traditionally been associated with serious clinical conditions with poor outcome, as it happens in abdominal abscess or intestinal infarction [5]. HPVG is the result of accumulation of gas in the portomesenteric system through veins or lymphatics of the intestinal wall [6].

In some cases, venous hepatic gas is an incidental finding and it has been described as a consequence of diagnostic or therapeutic invasive procedures such as surgery, hepatic artery embolization, operative endoscopic procedures [7].

The management of HPVG varied from surgical intervention to non-operative procedure. The surgical approach it's reserved to clinically unstable patients or those with evidence of peritonitis or bowel perforation. Stable patients, like those with an HPVG consequence of an endoscopic procedure, can be treated with non-operative management. In our case, an abdominal abscess was present but clinical serious signs of sepsis were absent. Probably in our patient the cause of HPVG was related to mucosa injury during the endoscopic procedure with consequent quick absorption of gas from the intestine into the mesenteric, then portal, venous system. Generally, this condition has been related to acute intestinal ischemia, as a consequence of a bacterial translocation through a wall defect.

**4. Conclusion**

Our experience confirm that hepatic portal venous gas can be related to endoscopic procedure; thus, it can be managed on the basis of patient's general clinical conditions, and in selected cases it will disappear without therapeutic interventions with a good outcome.

**Conflicts of interest**

All authors disclose any financial and personal relationships with other people or organisations.

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No sources of funding was used for this research.

**Ethical approval**

This study is exempt from ethnical approval in our institution.

**Consent**

“Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy

of the written consent is available for review by the Editor-in-Chief of this journal on request”.

**Author contribution**

G.T. Capolupo MD PhD. – G. Mascianà MD – F. Carannante MD: Patient care and management; image contribution.

M. Caricato MD PhD FACS: revision and final approval of the manuscript.

**Registration of research studies**

N/A.

**Guarantor**

M. Caricato MD, FACS.

**References**

- [1] H. Kinoshita, M. Shinozaki, H. Tanimura, Y. Umemoto, S. Sakaguchi, K. Takifuji, et al., Clinical features and management of hepatic portal venous gas: four case reports and cumulative review of the literature, *Arch. Surg.* 136 (2001) 1410–1414.
- [2] P.R. Liebman, M.T. Patten, J. Manny, J.R. Benfield, H.B. Hechtman, Hepatic–portal venous gas in adults: etiology, pathophysiology and clinical significance, *Ann. Surg.* 187 (1978) 281–287.
- [3] A.L. Nelson, T.M. Millington, D. Sahani, R.T. Chung, C. Bauer, M. Hertl, et al., Hepatic portal venous gas: the ABCs of management, *Arch. Surg.* 144 (2009) 575–581.
- [4] J.N. Wolfe, W.A. Evans, Gas in the portal veins of the liver in infants; a roentgenographic demonstration with postmortem anatomical correlation, *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 74 (1955) 486–488.
- [5] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, for the SCARE Group, The SCARE Statement: consensus- based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186.
- [6] C. Sebastia, S. Quiroga, E. Espin, et al., Portomesenteric vein gas: pathologic mechanisms, CT findings, and prognosis, *Radiographics* 20 (5) (2000) 1213–1224.
- [7] P.A. Shah, S.C. Cunningham, T.A. Morgan, et al., Hepatic gas: widening Spectrum of causes detected at CT and US in the interventional era, *Radiographics* 31 (2011) 1403–1413.
- [8] J.H. Vollman, W.L. Smith, R.C. Tsang, Necrotizing enterocolitis with recurrent hepatic portal venous gas, *J. Pediatr. (Rio J)* 88 (1976) 486–487.
- [9] M.C. Bach, L.G. Anderson, T.A. Martin Jr, R.E. McAfee, Gas in the hepatic portal venous system. A diagnostic clue to an occult intra-abdominal abscess, *Arch. Intern. Med.* 142 (1982) 1725–1726.
- [10] F.A. Birnberg, R.M. Gore, B. Shragg, A.R. Margulis, Hepatic portal venous gas: a benign finding in a patient with ulcerative colitis, *J. Clin. Gastroenterol.* 5 (1983) 89–91.
- [11] C.R. Merritt, J.P. Goldsmith, M.J. Sharp, Sonographic detection of portal venous gas in infants with necrotizing enterocolitis, *AJR Am. J. Roentgenol.* 143 (1984) 1059–1062.
- [12] M.D. Benson, Adult survival with intrahepatic portal venous gas secondary to acute gastric dilatation, with a review of portal venous gas, *Clin. Radiol.* 36 (1985) 441–443.
- [13] A. Huycke, D.D. Moeller, Hepatic portal venous gas after colonoscopy in granulomatous colitis, *Am. J. Gastroenterol.* 80 (1985) 637–638.
- [14] D.R. Radin, R.S. Rosen, J.M. Halls, Acute gastric dilatation: a rare cause of portal venous gas, *AJR Am. J. Roentgenol.* (148) (1987) 279–280.
- [15] J.L. Chezmar, R.C. Nelson, M.E. Bernardino, Portal venous gas after hepatic transplantation: sonographic detection and clinical significance, *AJR Am. J. Roentgenol.* 153 (December (6)) (1989) 1203–1205.
- [16] M. Kirsch, J. Bozdech, D.A. Gardner, Hepatic portal venous gas: an unusual presentation of Crohn's disease, *Am. J. Gastroenterol.* 85 (1990) 1521–1523.
- [17] C.S. Lee, Y.C. Kuo, S.M. Peng, D.Y. Lin, I.S. Sheen, S.M. Lin, S.K. Chuah, R.N. Chien, Sonographic detection of hepatic portal venous gas associated with suppurative cholangitis, *J. Clin. Ultrasound* 21 (1993) 331–334.
- [18] J.B. Herman, M.S. Levine, W.B. Long, Portal venous gas as a complication of ERCP and endoscopic sphincterotomy, *Am. J. Gastroenterol.* 90 (1995) 828–829.
- [19] T.E. Quirke, Hepatic-portal venous gas associated with ileus, *Am. Surg.* 61 (1995) 1084–1086.
- [20] W.M. Mallens, R. Schepers-Bok, J.J. Nicolai, F.A. Jacobs, H.G. Heyerman, Portal and systemic venous gas in a patient with cystic fibrosis: CT findings, *AJR Am. J. Roentgenol.* 165 (1995) 338–339.
- [21] K.W. Chen, J.S. Shin, C.H. Chi, L. Cheng, Seizure: a rare and transient cause of portal venous gas, *Am. J. Gastroenterol.* 92 (1997) 351–352.

- [22] H.N. Nguyen, E. Purucker, J. Riehl, S. Matern, Hepatic portal venous gas following emergency endoscopic sclerotherapy of gastric varices, *Hepatogastroenterology* 45 (1998) 1767–1769.
- [23] Y.S. Chang, H.P. Wang, G.T. Huang, M.S. Wu, J.T. Lin, Sonographic “gastric corona sign”: diagnosis of gastric pneumatosis caused by a penetrating gastric ulcer, *J. Clin. Ultrasound* 27 (1999) 409–412.
- [24] A. Nakao, H. Iwagaki, H. Isozaki, T. Kanagawa, N. Matsubara, N. Takakura, N. Tanaka, Portal venous gas associated with splenic abscess secondary to colon cancer, *Anticancer Res.* 19 (1999) 5641–5644.
- [25] M. Saksena, M.G. Harisinghani, J. Wittenberg, P.R. Mueller, Case report. Hepatic portal venous gas: transient radiographic finding associated with colchicine toxicity, *Br. J. Radiol.* 76 (2003) 835–837.
- [26] F. Sellner, B. Sobhian, M. Baur, S. Sellner, B. Horvath, M. Mostegel, et al., Intermittent hepatic portal vein gas complicating diverticulitis—a case report and literature review, *Int. J. Colorectal Dis.* 22 (2007) 1395–1399.
- [27] M. Sen, A. Akpınar, A. Inan, M. Sisman, C. Dener, K. Akin, Extensive hepatic-portal and mesenteric venous gas due to sigmoid diverticulitis, *World J. Gastroenterol.* 15 (2009) 879–881.
- [28] A. Hussain, H. Mahmood, T. Ansari, S. El-Hasani, Pneumomediastinum, stomach wall and hepatic portal vein gas secondary to partial necrosis of the stomach wall, *Singapore Med. J.* 50 (May (5)) (2009) e166–169.
- [29] A. Siswojo, B.U. Ihle, Hepatic portal venous gas in a patient with intestinal necrosis, *Emerg. Med. Australas.* 22 (2010) 187–188.
- [30] E. Oehler, M.C. Deniel, B. Rouget, F. Valour, Mesenteric ischaemia with massive hepatic portal venous gas, *BMJ Case Rep.* 2013 (2013).
- [31] G. Cunningham, G. Cameron, P. De Cruz, Hepatic portal venous gas in Crohn's disease, *BMJ Case Rep.* 2014 (September) (2014).
- [32] N. Khalaf, S. Mittal, Hepatic portal venous gas: an ominous sign of mesenteric ischemia, *Clin. Gastroenterol. Hepatol.* 12 (2014), xxix–xxx.
- [33] S. Maezawa, M. Fujita, T. Sato, S. Kushimoto, Delayed intestinal stricture following non-resectional treatment for non-occlusive mesenteric ischemia associated with hepatic portal venous gas: a case report, *BMC Surg.* 15 (2015) 37.
- [34] A. Sadatomo, K. Koinuma, R. Kanamaru, Y. Miyakura, H. Horie, A.T. Lefor, Y. Yasuda, Hepatic portal venous gas after endoscopy in a patient with anastomotic obstruction, *World J. Gastrointest. Surg.* 7 (2015) 21–24.
- [35] T. Solakoglu, S.O. Sari, H. Koseoglu, M. Basaran, M. Akar, S. Buyukasik, O. Ersoy, A case of hepatic portal venous gas after colonoscopy, *Arab. J. Gastroenterol.* 17 (2016) 140–142.
- [36] T. Sawano, T. Nemoto, M. Tsubokura, C. Leppold, A. Ozaki, S. Kato, Y. Kanazawa, Asymptomatic hepatic portal venous gas with gastric emphysema as a chronic complication of gastrostomy tube placement: a case report, *J. Med. Case Rep.* 10 (234) (2016).
- [37] E.E. Castren, A.R. Hakeem, N.S. Mahmood, K. Aryal, Case of pneumatosis intestinalis and hepatic portal venous gas following a laparoscopic right hemicolectomy, *BMJ Case Rep.* 2016 (March) (2016).
- [38] A. Moser, A. Stauffer, A. Wyss, C. Schneider, M. Essig, A. Radke, Conservative treatment of hepatic portal venous gas consecutive to a complicated diverticulitis: a case report and literature review, *Int. J. Surg. Case Rep.* 23 (2016) 186–189.
- [39] M. Yamadera, Y. Kajiwara, E. Shinto, R. Hokari, H. Shimazaki, J. Yamamoto, K. Hase, H. Ueno, Small intestinal Crohn's disease with hepatic portal venous gas: a case report, *Surg. Case Rep.* 2 (1 December) (2016) 66.
- [40] E.J. Nevins, P. Moori, C.S. Ward, K. Murphy, C.E. Elmes, J.V. Taylor, A rare case of ischaemic pneumatosis intestinalis and hepatic portal venous gas in an elderly patient with good outcome following conservative management, *Int. J. Surg. Case Rep.* 25 (2016) 167–170.
- [41] S. Okada, T. Azuma, Y. Kawashita, S. Matsuo, S. Eguchi, Clinical evaluation of hepatic portal venous gas after abdominal surgery, *Case Rep. Gastroenterol.* 10 (1 May) (2016) 99–107.
- [42] G.C. Ginesu, M. Barmina, M.L. Cossu, C.F. Feo, A. Fancellu, F. Addis, A. Porcu, Conservative approach to hepatic portal venous gas: a case report, *Int. J. Surg. Case Rep.* 30 (2017) 183–185.
- [43] H.K. Bangash, S.P. McCombie, O.K. Bangash, D. Hayne, Neobladder obstruction: a non-ischemic cause for hepatic PortalVenous gas: case report, *Urol. Case Rep.* (March (12)) (2017) 31–33.
- [44] H.M. Ghaz, S.M. Sheikh, K. Khandelwal, J. Fiore, N. James, J. Weinstock, A case of hepatic portal venous gas: hypothesis of a transient direct communication between a penetrating antral gastric ulcer and mesenteric varices, *Case Rep. Gastrointest. Med.* (2017), 8185132.
- [45] D.P. McNicholas, M.E. Kelly, J.P. Das, D. Bowden, J.M. Murphy, C. Malone, Disappearing portal venous gas in acute pancreatitis and small bowel ischemia, *Radiol. Case Rep.* 12 (February (2)) (2017) 269–272.
- [46] Z. Li, Y. Su, X. Wang, H. Yan, M. Sun, Z. Shu, Hepatic portal venous gas associated with colon cancer: a case report and literature review, *Medicine(Baltimore)* 96 (December (50)) (2017).
- [47] D.G. Niu, C. Li, H.C. Fang, Hepatic portal venous gas associated with transcatheter cardiac defibrillator implantation: a case report, *Int. J. Surg. Case Rep.* 44 (2018) 57–61.

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