



REVIEW ARTICLE

# Hepatic Portal Venous Gas: Review of the Literature and Sonographic Implications



Chun-Yen Huang<sup>1</sup>, Jen-Tang Sun<sup>1</sup>, Kuang-Chau Tsai<sup>1</sup>,  
Hsiu-Po Wang<sup>2</sup>, Wan-Ching Lien<sup>3\*</sup>

<sup>1</sup> Department of Emergency Medicine, Far Eastern Memorial Hospital, New Taipei City, Taiwan,

<sup>2</sup> Department of Internal Medicine, National Taiwan University and National Taiwan University Hospital, and <sup>3</sup> Department of Emergency Medicine, National Taiwan University and National Taiwan University Hospital, Taipei, Taiwan

Received 18 June 2013; accepted 15 April 2014

Available online 17 June 2014

## KEY WORDS

hepatic portal venous gas,  
ischemic bowel,  
pneumatosis intestinalis,  
ultrasound

To review the clinical data and sonographic implications of hepatic portal venous gas (HPVG), we collected 447 cases of HPVG from the MEDLINE database and the National Taiwan University Hospital, Taipei, Taiwan database and analyzed etiology, radiographic findings, diagnostic tools, and outcome of all the cases. Among them, 61% of cases were nonischemic bowel disease. Mortality rates are significantly influenced by bowel ischemia and pneumatosis intestinalis. Ultrasound-diagnosed HPVG was more frequently reported after 1980 and associated with etiology. In conclusion, the number of cases with ultrasound-diagnosed HPVG is increasing. The etiology of HPVG should be searched and coincident imaging findings, including pneumatosis intestinalis, should be evaluated.

© 2014, Elsevier Taiwan LLC and the Chinese Taipei Society of Ultrasound in Medicine.

Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

## Introduction

Hepatic portal venous gas (HPVG) is considered an ominous sign, referring to an abdominal catastrophe. It was first

described in 1955 by Wolfe and Evans [1] in six infants dying from necrotizing enterocolitis. Four of them had a vascular pattern of gas in the liver seen on plain films prior to death. In 1978, Liebman et al [2] reported 64 cases of HPVG with a mortality rate of 75%. Moreover, the mortality rate might be as high as 90% in patients with mesenteric artery occlusion when complicated with HPVG [3]. Recently, HPVG is also found in a more extended spectrum of clinical settings as a result of improvements in imaging modalities such as diverticulitis, ventral hernia without ischemic bowel [4], hypertrophic pyloric stenosis [5], chronic obstructive pulmonary disease (COPD) [6], iatrogenic gastric dilatation [7],

Conflicts of interest: The authors did not receive any financial support and have no conflicts of interest.

\* Correspondence to: Dr Wan-Ching Lien, Department of Emergency Medicine, National Taiwan University Hospital, Number 7, Chung-Shan South Road, Taipei 100, Taiwan.

E-mail address: [temer17@yahoo.com.tw](mailto:temer17@yahoo.com.tw) (W.-C. Lien).

<http://dx.doi.org/10.1016/j.jmu.2014.04.008>

0929-6441/© 2014, Elsevier Taiwan LLC and the Chinese Taipei Society of Ultrasound in Medicine. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

ileus [8], blunt abdominal trauma without ischemic bowel [9], extracorporeal shockwave lithotripsy [10], Crohn disease [11], appendicitis [12], liver abscess [13], superior mesenteric artery syndrome [14], enterovascular fistula [15], perforated gastric ulcer [16], jejunal feeding tube [17], nonocclusive mesenteric ischemia [18], and hydrogen peroxide ingestion [19]. Not all the conditions require surgical intervention. Benign HPVG is that which is caused by a condition other than ischemic bowel disease. Additionally, the mortality rate of HPVG decreases to 25% [20].

Sonography is a noninvasive, easy-to-perform, and readily accessible diagnostic tool. HPVG detected by ultrasound (US) was first reported by Fataar et al [21] in 1986. They described a 55-year-old man with sigmoid diverticulitis whose ultrasonogram showed some small hyperechoic foci in the region of the dome of the liver and then throughout the liver 2 days later, referring to HPVG. US is frequently used for diagnosing HPVG and has a well-established role in detecting the presence of HPVG and distinguishing it from gas in the bile ducts [22–24]. Furthermore, HPVG detected by US can predict poor outcome in out-of-hospital patients in cardiac arrest [25]. However, previous studies were limited by case reports and sonographic implications were not thoroughly investigated.

This review analyzes the clinical data from cases of this entity from the literature, including 19 patients we treated, and investigates sonographic implications of HPVG.

## Patients and methods

We performed a search of the MEDLINE database (National Library of Medicine, Bethesda, MD, USA) for HPVG, using “portal venous gas” and “gas in the portal vein” as keywords. Other articles were identified by cross referencing. All literature is in English. The search spanned from 1955 through September 2012. Four hundred and twenty-eight cases identified from the literature search were included in the analysis. Cases with HPVG at postmortem or cardiac arrest were excluded. We reviewed etiology, radiographic findings, diagnostic tools, and outcome of all the cases. These cases, along with the 19 cases in which the diagnosis was made at the National Taiwan University Hospital, Taipei, Taiwan were put into analysis. Statistical analyses were performed using SAS version 9.2 software. Student *t* test was performed for continuous data, as well as the Chi-square test for categorical data. A *p* value < 0.05 was considered significant.

## Results

During this review period, there were 447 patients in whom HPVG was diagnosed, including 19 cases that were treated. Among them, 257 patients (61%) were male. Their clinical data are summarized in Table 1. The age ranged from 0 years to 100 years and the mean was  $54.6 \pm 24.7$  years. HPVG resulting from ischemic bowel was frequent in patients younger than 1 year or older than 65 years. However, the age of 14 patients and the sex of 28 patients cannot be identified in the literature.

The mortality rate caused by ischemic bowel is higher than the rate caused by nonischemic bowel, especially in

**Table 1** Characteristics of the 447 patients with hepatic portal venous gas.

	Ischemic etiology	Nonischemic etiology	Total	<i>p</i>
Total number	176 (39)	271 (61)	447	
Age 1–65 y	64 (36)	161 (59)	225 (50)	
Age <1 or >65 y	103 (59)	105 (39)	208 (47)	<0.0001
Unknown age	9 (5)	5 (2)	14 (3)	
Mortality	110 (63)	48 (18)	158 (35)	<0.0001
Mortality in age 1–65 y	37 (34)	27 (56)	64 (41)	
Mortality in age <1 or >65 y	65 (59)	20 (42)	85 (54)	0.0153
Mortality in unknown age	8 (7)	1 (2)	9 (5)	

Data are presented as *n* (%).

patients younger than 1 year or older than 65 years. Among nonischemic bowel etiologies, the most common cause of HPVG is iatrogenic-related (19%, *N* = 54), such as enema, endoscopy, and interventional procedures, followed by diverticulitis (10%, *N* = 29) and ileus (9%, *N* = 26). Other etiologies include hollow organ perforation (*N* = 17), inflammatory bowel disease (*N* = 13), blunt abdominal trauma without ischemic bowel (*N* = 11), idiopathic cause (*N* = 11), acute pancreatitis (*N* = 9), shock (*N* = 9), liver transplantation (*N* = 7), enterocolitis (*N* = 7), chemotherapy (*N* = 6), cholangitis (*N* = 4), gastrointestinal volvulus (*N* = 4), gastrointestinal hernia (*N* = 4), superior mesentery artery syndrome (*N* = 4), chronic obstructive pulmonary disease (*N* = 4), gastric ulcer (*N* = 4), emphysematous gastritis (*N* = 3), hypertrophic pyloric stenosis (*N* = 3), liver abscess (*N* = 2), cholecystitis (*N* = 2), intra-abdominal abscess (*N* = 2), appendicitis (*N* = 2), acute fulminant hepatitis (*N* = 2), emphysematous pyelonephritis (*N* = 2), graft versus host disease (*N* = 2), hydrogen peroxide ingestion (*N* = 2), and infrequent causes (total number 26, *N* = 1 respectively).

With the advancement of imaging modalities, the diagnostic tools for HPVG have changed. Prior to 1990, there were only four reported cases of HPVG diagnosed by US, and HPVG was frequently detected by plain films. After 1990, there were 80 cases diagnosed by US (Table 2). Although a certain percentage of the cases of HPVG needed CT to confirm the diagnosis, some cases of HPVG were found only by US.

Table 3 shows the relationship between mortality rate and HPVG with/without pneumatosis intestinalis (PI). The presence of PI in patients of HPVG was associated with ischemic bowel and poor outcome.

Additionally, our review focused on sonographic implications of HPVG (Table 4). The etiologies of US-diagnosed HPVG were frequently associated with benign HPVG.

## Discussion

HPVG was thought to be a fatal sign and predictive of bowel ischemia [8]. However, we can find that HPVG caused by

Download English Version:

<https://daneshyari.com/en/article/4233051>

Download Persian Version:

<https://daneshyari.com/article/4233051>

[Daneshyari.com](https://daneshyari.com)