CASE REPORT

Diverticulitis as a cause of septic thrombophlebitis: A literature review

Jessica Rose, Rostam Khoubary, James McClenathan

ABSTRACT

Introduction: Perforated diverticulitis, with fistula formation between the colon and inferior mesenteric vein, is a cause of portal venous gas. In contrast to more common causes of portal venous air, such as mesenteric ischemia and gangrene, the prognosis is much better for patients with perforated diverticulitis. However, the diagnosis can be difficult to make, given the wide range of nonspecific symptoms. Delays in diagnosis increase the morbidity and mortality rates. Case Report: In this report, we describe a case of perforated diverticulitis with portal venous gas in a 46-year-old male from our institution, and review the literature on this topic. Conclusion: With modern imaging technology and early diagnosis, septic phlebitis can be managed surgically, with good outcomes.

Keywords: Diverticulitis, Perforated diverticulitis, Septic phlebitis, Portal venous gas, Portal venous fistula.

INTRODUCTION

Diverticulitis is a common diagnosis with many known complications. About 8% of patients experience a perforation and 20% a fistula [1, 2]. In only 1-2% of patients the perforation extends into the mesentery [1]. Fistulas can be colocolic, colocolaneous, colocoal, coloureteral, colorenteral, colosalpingeal, colouriterine, colovesical, coloagricular, colovenous, and some other less common forms [3].

Septic phlebitis (also known as pylephlebitis or portal venous gas) is an uncommon but potentially morbid complication of diverticulitis in which the perforation extends into the mesentery and erodes into a vein. We recently saw such a patient at our institution.

CASE REPORT

Our patient, a 46-year-old male, had a past medical history of infectious colitis, hypertension, and hyperlipidemia. He came to our emergency department after two days of fever (as high as 39.4°C), chills, headache and dull left lower quadrant abdominal pain. Previously, he had been admitted to another institution with rectal bleeding and had undergone a colonoscopy which revealed resolving infectious colitis.

When he arrived in our emergency department, he was in no acute distress, was afebrile and had stable

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vital signs. His physical examination was significant for mild left lower quadrant tenderness. His initial workup included laboratory studies: WBC counts - 4.5x10^3/mm^3 with band cells, blood glucose - 232 mg/dl, total bilirubin - 1.8 mg/dl, AST - 96 IU/L, ALT - 110 IU/L and INR - 1.5. Secondary to his elevated liver function test findings, he underwent an abdominal ultrasound examination, which revealed innumerable echogenic foci in the liver. Those foci were thought to reflect calcification but other causes were not excluded. His ultrasound examination also revealed nonspecific gallbladder wall thickening, without cholelithiasis.

To better elucidate the ultrasound findings, we ordered computed tomography (CT) scan of the abdomen and pelvis. It showed portal venous gas, as well as gas within branches of the inferior mesenteric vein (IMV) extending from the sigmoid colon, with sigmoid diverticulitis (figures 1-6).

The patient underwent an exploratory laparotomy. During the operation, we found an inflamed sigmoid diverticulum with erosion into the mesentery. The liver appeared grossly normal. A sigmoid resection and a Hartmann procedure with a left colostomy was performed. His postoperative recovery was uneventful. The pathology report showed diverticulitis with rupture and acute serositis, diverticulosis and vascular congestion.

**DISCUSSION**

To more fully understand the case history of our patient, we performed a literature search, using PubMed. We identified and read all English-language articles on septic phlebitis, pylephlebitis, portal venous gas and colovenous fistulas that resulted from perforated diverticulitis. In light of the variety of clinical presentations, perforated diverticulitis needs to be considered in the differential diagnosis of septic patients. Without proper management of this disease, it can be fatal. In fact, one series reported a mortality rate of 65%, with the majority of diagnoses occurring at autopsy [4].

Diverticulitis with fistula formation to mesenteric vessels was the only diagnosis that we included in our literature review; however, pylephlebitis has other causes. Any condition involving infection or inflammation of the region drained by the IMV and portal vein can cause pylephlebitis [5]. The most common causes of portal venous gas include ulcerative colitis, Crohn’s disease, bowel ischemia with necrosis, peroxide enemas, hemorrhagic pancreatitis, bowel obstruction, gastric ulcers, appendicitis, abscesses, toxic ingestions and trauma; it can also be iatrogenic, after certain procedures [6-11]. Gas in the portal venous system is due either to gas under pressure in the bowel lumen or to transmigration of gas-forming bacteria; transmigration patients have a poorer prognosis [7].

**Clinical Presentation:** Pylephlebitis of the IMV is difficult to diagnose, given the variety of possible clinical presentations. Nonspecific symptoms include fever, leukocytosis, jaundice, generalized abdominal pain and sepsis [1, 2]. Such symptoms can also be associated with bacteremia and a history of diverticulosis [4]. Some patients have acute viral infections with fever, shaking chills and abdominal pain [6]. Others have an acute abdomen along with symptoms that are more consistent with perforated...
spleen but with further workups that reveal colovenous fistulas [12]. Seemingly mild cases of fever and abdominal pain can lead to the unexpected, incidental finding of fistulas on imaging, sometimes even in patients who had undergone conservative treatment for diverticulitis. [2, 13] (Supplementary material - Table 1: url - http://www.ijcasereportsandimages.com/archive/2011/012-2011-ijcri/007-12-2011-rose/tableone.php)

Patients with pylephlebitis can have laboratory values that are consistent with infection with leukocytosis and left shift. They also can harbor bacteremia with blood cultures that grow fecal bacteria such as Escherichia coli, Bacteroides, Proteus, group B streptococci, Enterococcus, Pseudomonas, and others [2, 4, 6, 8, 14]. Secondary to the involvement of the portal veins and subsequent inflammation of the liver, such patients can also have hyperbilirubinemia, transaminitis, and elevated alkalkine phosphatase and gamma-glutamyltransferase levels [8].

**Imaging Studies:** Multiple imaging techniques can be used to diagnose colovenous fistulas. Most commonly CT is performed which is beneficial because it can not only reveal portal venous gas but also illustrate its cause [15]. If a colovenous fistula is present the sigmoid colon has the typical diverticulitis appearance with inflammation of the pericolonic fat and mesentery, thickening of the bowel, signs of abscess, fistula formation or perforation (figures 1, 2) [16]. CT can reveal gas emboli in the IMV, in the portal vein and in the liver [9], and may show thrombus (figures 3, 4) [11]. Portal venous gas associated with colovenous fistulas can be distinguished from aerobilia by the pattern of gas in the liver. In aerobilia the gas accumulates in the common bile duct and in the perihilar ducts; in contrast, in pylephlebitis, the gas goes out into the periphery of the liver (figures 5, 6).
and in the inferior vena cava (IVC) [18]. In our own patient, this was the study that prompted the CT scan and final diagnosis.

Celiac angiography, although not a first-line study, will also show septic thrombophlebitis [1]. The affected mesenteric vein will have a filling defect within the lumen, illustrating the thrombus [20].

**Treatment:** Most patients with colovenous fistulas are septic when they arrive for medical care, but they all must be aggressively resuscitated and placed on IV antibiotics. However, definitive care requires surgery. In our own experience, we have found that despite the clinical severity of this condition, the intraoperative findings are deceptively mild and can lead one to question the need for resection. Most of the literature that we reviewed recommends a sigmoid resection or a left hemicolectomy with a colostomy and rectal stump (Hartmann procedure) [2, 12]. Some authors also advocate as an additional step, resecting the distal IMV [19]. Early surgical intervention is necessary. In one steroid-dependent patient with pylephlebitis, survival was attributed to early surgical care [21].

Most of the literature supports combination antibiotic therapy. Drugs most frequently used are third-generation cephalosporins, beta-lactams, and aminoglycosides [2], but any group of antibiotics that cover fecal bacteria would be appropriate. Our own institution typically uses ciprofloxacin and metronidazole. In patients with significant splenomesenteric varicosities, preoperative embolization is occasionally performed to prevent variceal hemorrhage when the sigmoid colon is mobilized during resection [9]. Antibiotics and bowel rest with a delayed operation, have also been described, but we do not recommend such a strategy [18]. In patients with extensive thrombosis or progression of thrombus, anticoagulation may be indicated [14]. Advocates of heparinization state that it will prevent thrombus progression that could eventually lead to bowel infarction, an extraordinarily rare event [5].

**Prognosis:** Hepatic portal venous gas was once thought of as a highly morbid condition. It was most commonly associated with an ischemic and gangrenous colon. Diverticulitis is now known to be a less fatal cause. Thanks to advanced imaging technology we are now able to diagnose and treat this condition at an earlier stage. Still, some patients succumb to sepsis, with a mortality rate of about 14% [10]. Those who survive are subject to complications, notably, liver abscesses [10]. In rarer instances, thrombosis can persist, sometimes leading to bowel infarction or extension into the gonadal veins [22].

**CONCLUSION**

Septic pylephlebitis secondary to a colovenous
fistula is an uncommon sequelae of perforated diverticulitis. Although it is difficult to diagnose, a good prognosis is possible with proper surgical care. Current medical imaging has allowed for diagnosing this condition more readily. We urge early surgical treatment with a sigmoid resection and Hartmann pouch, plus a course of IV antibiotics covering common fecal bacteria. Despite the severity of the usual patient’s clinical condition, the diverticulitis typically appears to be mild per both the CT scan and the surgical specimen [7].

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Author Contributions
Jessica Rose – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published
Rostam Khoubiyari – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published
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Guarantor
The corresponding author is the guarantor of Submission.

Conflict of Interest
The authors declare no conflict of interest.

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REFERENCES
1. Juler GJ, Dietrick WR, and Elsenman JI. Intramesenteric perforation of sigmoid diverticulitis with nonfatal venous intravasation. Am J Surg 1976;132:653-6.
2. Sommenschin MA, Cone LA, Alexander RM. Diverticulitis with colovesical fistula and portal venous gas. J Clin Gastroenterol 1986;19:5-8.
3. Smith HJ, Berk RN, Janes JO, Clayton RS, Williams JL. Unusual fistulae due to colonic diverticulitis. Gastrointest Radiol 1978;2:387-92.
4. Baer HM, Sieglebaum MH, Seidmon EJ, and Kendall AR. Venous intravasation of barium into the inferior mesenteric vein mimicking a colorectal fistula: A case report and literature review. J Urol 1989;141:117-9.
5. Plemmons RM, Dooley DP, Longfield RN. Septic thrombophlebitis of the portal vein (pyelephlebitis): Diagnosis and management in the modern era. Clin Infect Dis 1995;21:1114-20.
6. Rothman BJ, Cloydman H, Wong D. Colovesical fistula complicating diverticulitis. Am J Gastroenterol 1981;75:464-8.
7. Sen M, Akpınar A, İnan A, Sisman M, Dener C, and Akin K. Extensive hepatic-portal and mesenteric venous gas due to sigmoid diverticulitis. World J Gastroenterol 2009;15:879-1.
8. Draghetti MJ, Salvo AF. Gas in the mesenteric veins as a nonfatal complication of diverticulitis. Dis Colon and Rectum 1999;42:1497-8.
9. Negro U, Verdecchia M, Paci E, Antico E, Valeri G, Risaliti A, Vecchi A, Svegliati-Baroni G, Giovagnoni A. Hepatic portal venous gas in a patient with enterovesical fistula. Abdom Imaging 2006;706-9.
10. Sellner F, Mohbain B, Baur M, Sellner S, Horvath B, Mostegel M, Karner J, Staatner S. Intermittent hepatic portal vein gas complication of diverticulitis: A case report and literature review. J Colorectal Dis 2007;22:1395-9.
11. Saxena R, Adolph M, Ziegler JR, Murphy W, Rutecki GW. Pylephlebitis: A case report and review of outcome in the antibiotic era. Am J Gastroenterol 1996;91:1251-3.
12. Rossmann MD, Burr LI, and Thorpe PE. Colovesical fistula complicating diverticulitis: CT and radiographic findings. Abdom Imaging 1997;22:513-5.
13. Duggal A, Rankin RN, Wall WJ. Hepatic portal venous gas from perforated sigmoid diverticulitis. Can J Surg 2007;50:E19-20.
14. Van De Wauwer C, Irvin TT. Pylephlebitis due to perforated diverticulitis. Acta chir Belg 2005;105:229-30.
15. White TR, Allen HA, Ives CE. Portal and mesenteric vein gas in diverticulitis: CT findings. Am J Roentgenol 1998;171:525-6.
16. Molitch HI. Septic thrombophlebitis of the inferior mesenteric vein complicating sigmoid diverticulitis: CT findings. Am J Roentgenol 1996;167:1041-6.
17. Ames JT, Federic MP. Septic thrombophlebitis of the portal venous system: Clinical and imaging findings in thirty-three patients. Dig Dis Sci 2011: Online publication.
18. Nobl C, Uggeri F, Romano F, et al. Pylephlebitis and mesenteric thrombophlebitis in sigmoid diverticulitis: medical approach, delayed surgery. Dig Liver Dis 2007;39:1088-90.
19. Jensen JA, Tsang D, Minnis FJ, Ponn T, Merrell RC. Pneumopyelephlebitis and intramesocolic diverticular perforation. Am J Surg 1985;150:284-7.
20. Domajnko B, Kumar A, Salloum RH. Mesenteric venous thrombophlebitis—Septic thrombophlebitis of the inferior mesenteric vein: An unusual manifestation of diverticulitis. Am Surg 2007;73:404-6.
21. Cambria RP, Margolies MN. Hepatic Portal Venous Gas in Diverticulitis. Arch Surg 1982;117:834-835.
22. Lee L, Kang YS, and Aströmoff N. Septic Thrombophlebitis of the Inferior Mesenteric Vein Associated with Diverticulitis. Clin Imaging 1996;20:115-5.
23. McClanathan JH. Septic Phlebitis and Gas in the Inferior Mesenteric Vein: CT findings in Two Cases and Review of Literature. The Internet Journal of Surgery 2008;16:2.
24. Zielke A, Hasse C, Nies C, Rothmund M. Hepatic-portal venous gas in acute colonic diverticulitis. Surg Endosc 1998;12:278-280.
25. Sywak M, Romano C, Raber E, Pasieka JL. Septic thrombophlebitis of the inferior mesenteric vein from sigmoid diverticulitis. J Am Coll Surg 2003;196:326-7.
26. Cove JK, Snyder RN. Fatal barium intravasation during barium enema. Radiology 1974;112:7.
27. Graham GA, Bernstein RB, Gronner AT. Gas in the portal and inferior mesenteric veins cause by diverticulosis of the sigmoid colon. Radiology 1975;114:601-2.
28. Fataar S, Cadogan E, Sputy O. Ultrasonography of hepatic and portal venous gas due to diverticulitis. Br J Radiol 1986;59:183-185.
29. Hong J, Gadaleta D, Rossi P, Esquivel J, Davis JM. Portal vein gas, a changing clinical entity. Report of 7 patients and review of the literature. Arch Surg 1997;132:1071-5.
30. Rodning CB, Williams L. Suppurative pylephlebitis due to pseudodiverticulitis coli. South Med J 1984;77:1165-7.
31. Gage TP, Egan J, Gagnier M. Diverticulitis complicated by candida pylephlebitis. South Med J 1985;78:1265-6.
32. Frecker BE. Venous intravasation of the barium enema. Australa Radiol 1968;12:129.
33. Haak HR, Kooymans MP, von Teeffelen ME, Adhins NF, Falke TH. Hepatic portal venous gas in perforated sigmoid diverticulitis. Hepatogastroenterology 1990;37:528-9.
34. Heye S, Ghijselings L, Van Campenhoudt M. Hepatic portal venous gas as a complication of diverticulitis with a colovenous fistula: a case report. Emerg Radiol 2002;9:234-6.
35. Yoshida M, Mitsuo K, Kutsumi H, et al. A successfully treated case of multiple liver abscesses accompanied by portal vein gas. Am J Gastroenterol 1995;91:2423-5.
36. Nordahl DL, Siber FJ, Robbins AH, O’Hara ET: Non-fatal venous intravasation from the site of diverticulitis during barium enema examination. Am J Dig Dis 1973;18:253.
37. Truemner KM, White S, Vanlandingham H. Fatal embolization of the pulmonary capillaries. Report of a case associated with routine barium enema. JAMA 1960;173:1080.
38. Al-Toma A, Nix M, Brink M. Image of the month: diverticulitis of the sigmoid colon.