Uncommon Diverticular Disease

Sanjay Mohanty, MD, MS¹ Shawn P. Webb, MD¹

¹Department of Surgery, Henry Ford Hospital, Detroit, Michigan
Clin Colon Rectal Surg 2018;31:258–262.

Address for correspondence Shawn P. Webb, MD, Department of Colon and Rectal Surgery, Henry Ford Hospital, 2799 West Grand Boulevard, Detroit, MI 48202 (e-mail: swebb1@hfhs.org).

Abstract

Keywords

- cecal diverticulosis
- giant diverticula
- small bowel diverticula

This article describes the epidemiology, pathogenesis, diagnosis, and treatment of three rare variants of diverticular disease: cecal and right-sided colonic diverticula, giant colonic diverticula, and small bowel diverticula.

In this article, we describe three uncommon variants of diverticular disease, including their epidemiology, pathogenesis, diagnosis, and treatment: cecal and right-sided colonic diverticula, giant colonic diverticula, and small bowel diverticula.

Though rare, these variants can present with a history suggestive of more common colon pathology, such as acute appendicitis or bowel obstruction. More often, they are noted at the time of operation while undergoing evaluation for other pathology. Knowledge of their more unique presenting signs and symptoms and pathogenesis can help in distinguishing them from more ominous conditions, such as malignancy, for which they are often mistaken.

Cecal Diverticula

Overview

The initial description of cecal diverticulitis was reported in 1912.¹ This disease entity is much rarer than sigmoid diverticulitis in North American and European populations, with an incidence estimated at 1 to 2%.² Importantly, this is in contrast to Asian series, where the incidence ranges from 22 to 50%.^{1,3}

When compared with sigmoid diverticulosis, cecal, or right-sided diverticulosis has several manifestations. In younger patients, it can occur in the form of a single, true diverticula near the ileocecal valve; in elderly patients, it can occur as a manifestation of pan-colonic diverticulosis or in association with a malignancy.⁴ While single, true diverticula are probably congenital in origin and rarer, the latter forms are more likely a result of a similar degenerative process that causes left-sided diverticulosis.⁵ This distinction, while important to recognize, might not impact subsequent therapy.⁶

Diagnosis

Cecal diverticulitis can mimic acute appendicitis in its presentation, which makes its diagnosis challenging. In contrast to acute appendicitis, this disease often presents without nausea or vomiting and is more indolent in its course.⁷ Its diagnosis should also be suspected in the setting of a prior appendectomy. It is important to rule out malignancy; right-sided perforated colon cancers can also mimic this disease and may require a different perioperative approach to diagnosing, including staging and treating.

Many cases of cecal diverticulitis are diagnosed intraoperatively. Computed tomography scan with oral and intravenous contrast is the radiologic study of choice, in addition to those studies typically ordered as part of a workup for abdominal pain (► **Figs. 1** and **2**). Though it is important to maintain a wide differential when encountering patients with right-sided abdominal pain, cecal diverticula, and their associated complications are rare in the Western populations.

Treatment

In addition to standard approaches to prevention, which include adequate daily fiber and water intake,⁸ the approach to the management of acute cecal diverticulitis is similar to sigmoid diverticulitis. Uncomplicated diverticulitis—without evidence of hemorrhage, obstruction, peritonitis, or systemic toxicity—can be treated adequately with antibiotics covering gram-negative aerobic and anaerobic bacteria.⁹ The decision to admit a patient with diverticulitis, remain nil per os, and administer intravenous fluids is largely driven by the severity of symptoms.

Patients who present with complicated disease warrant an intervention, which may include percutaneous drainage of an amenable intra-abdominal abscess or abdominal exploration

Fig. 1 Right-sided diverticulitis.

and colon resection. The operative indications are the same as when approaching a patient with sigmoid diverticulitis. Some authors advocate for aggressive surgical resection, which results in a right hemicolectomy in most cases, done either open or with minimally invasive techniques.^{10,11} Importantly, at the time of urgent operation, it can be difficult to distinguish cecal diverticulitis from a neoplastic process. Using components of the patient's demographics (e.g., age), history, and relevant risk factors can, in some cases, avoid a right hemicolectomy. This more measured approach to colon resection has been advocated by others, such as an ileocectomy, diverticulectomy, or appendectomy.^{6,12–15}

Several Asian series have examined the role of nonoperative therapy of cecal diverticulitis as it relates to the risk of recurrence.^{9,16,17} The incidence of recurrence is lower when compared with sigmoid diverticulitis, estimated at 3 to 18%

Fig. 2 Coronal of right-sided diverticulitis.

after conservative treatment. A series from Korea retrospectively reviewed 158 patients with a mean follow-up of 37 months and documented a recurrence rate of 17%.¹⁸ Given this recurrence rate, the authors argue for an approach similar to left-sided disease when deciding on surgery.

Giant Colonic Diverticula

Overview

Giant colonic diverticula refer to diverticula that are larger than 4 cm. It is a rare iteration of diverticular disease; a recent systematic review through 2015 identified 166 cases in the literature.¹⁹

It primarily affects patients between the ages of 40 and 60, similar to another diverticular disease, with a male predominance. The majority (90%) of giant diverticula are localized to the sigmoid colon with 85% occurring in concurrence of other diverticula.^{20,21} The etiology of the giant diverticula has not been described, though there are several hypotheses.

In terms of their pathogenesis, some have proposed that giant diverticula represent a complication of diverticular disease by way of a so-called “ball-valve” mechanisms wherein a diverticulum’s communication with the true colon lumen is first formed and then narrowed by inflammation.^{22–25} This inflammatory tissue forms a false wall at the diverticular neck, allowing air to enter but not leave, yielding a progressively larger, and more cyst-like outpouching.²⁶ Others have suggested that many giant diverticula are true congenital diverticula.²⁷ Another theory involves the action of gas-forming organisms.²⁸

Incorporating these varying theories behind their pathogenesis and based on histopathology, McNutt et al developed a classification scheme for giant colonic diverticula in the 1980s.²⁹ Type 1 are pulsion diverticula, similar to the more common sigmoid diverticular disease, with the diverticular wall containing portions of muscularis mucosa and muscularis propria, both of which end at the colonic border. Evidence of chronic inflammation can be found in the diverticular wall. Type 2 are giant colonic diverticula that are the result of a subserosal perforation which leads to a contained perforation and abscess that gradually grows in size. Type 3 are true diverticula, containing all layers of the bowel wall; these likely have a congenital origin.^{20,29–31}

Diagnosis

Patients with giant colonic diverticula have a wide spectrum of presentations, with some remaining asymptomatic and others presenting with acute abdominal pain (69%), abdominal mass (17%), constipation (17%), vomiting (12%), diarrhea (11%), and gastrointestinal bleeding (9%). Others can present with more indolent signs of symptoms, such as intermittent abdominal discomfort, bloating, and constipation associated with a palpable abdominal mass.^{22,32} Up to 15% of patients can present with a complication, such as obstruction, perforation, abscess, or fistula.^{33,34}

Abdominal X-ray imaging demonstrates a large cyst-like structure which may contain an air-fluid level and regular walls. Computed tomography is the preferred imaging modality. Barium enemas can also be useful in select cases (—Figs. 3–5).

Fig. 3 Giant diverticulum 1 from sigmoid.

Treatment

The treatment of uncomplicated giant colonic diverticula includes surgical resection of the diverticula along with adjacent colonic tissue, particularly because of the high rate of complications—up to 19%—without surgical treatment.³⁵ Primary colonic anastomosis can be achieved. In complicated cases, a Hartmann's resection can be performed. Most authors in the reported case series argue against simple diverticulectomy, noting that the diverticular neck is typically wide and surrounded by chronically inflamed tissue, increasing the risk of dehiscence.

Nonsurgical treatments have also been reported, including percutaneous drainage, stent placement, and antibiotics, but these options should be limited to those refusing surgery

Fig. 4 Giant diverticulum 2 from sigmoid.

Fig. 5 Scout of the giant diverticulum.

and in prohibitively high-risk patients who may be candidates for elective partial colectomy after any acute inflammatory process has resolved.^{21,36,37}

Small Bowel Diverticula

Overview

The true incidence of small bowel diverticula, excepting Meckel's diverticula, is unknown. The largest series, which include autopsies as well both asymptomatic and symptomatic patients undergoing radiologic imaging estimate the incidence at between 1 and 7%, with the majority occurring in the duodenum in the periampullary region, followed by jejunoileal involvement, the latter being more common in the sixth and seventh decades of life.^{38–43}

Their pathogenesis is not clear, though it likely involves abnormalities in peristalsis and high intraluminal pressures, similar to another diverticular disease.

Diagnosis

Most small bowel diverticula are asymptomatic and not suspected clinically. They are discovered incidentally during endoscopic interventions and imaging studies obtained for other reasons. Patients with jejunal diverticula are more likely to present with symptoms.⁴⁴

The most common presenting symptoms include crampy abdominal pain, which may be related to meals; nausea and emesis; biliary colic and obstruction; malabsorption due to bacterial overgrowth; complete bowel obstruction; diverticulitis; and gastrointestinal bleeding.^{45–47} Rarer presenting complications can include blind loop syndrome.⁴⁸

The best diagnostic tools for small bowel diverticula are contrasted imaging studies. Computed tomography with intravenous and oral contrast or magnetic resonance imaging are the imaging studies of choice. Both are adept at diagnosing diverticular disease and its complications throughout the

small bowel and colon. Endoscopy also has a role, largely in patients who present with gastrointestinal bleeding.

Treatment

In asymptomatic patients who are found to have the incidental diverticular disease of the small bowel, no intervention is indicated. In patients who present with signs and symptoms of malabsorption due to bacterial overgrowth, antibiotics covering aerobic and anaerobic enteric bacteria are indicated.⁴⁹ Patients who present with small bowel diverticulitis can be managed similarly to those who present with colonic diverticulitis, with intravenous antibiotics and either bowel rest or clear liquids. Due to its rarity, data on the prevalence of recurrent small bowel diverticulitis is not reported in the literature; theoretically, this is a risk that should be considered when deciding on treatment. Surgery is indicated for any patients who present with complications of diverticular disease, including obstruction, perforation, abscess, and refractory bleeding. When surgery is indicated, the treatment of choice is resection of the involved bowel with primary anastomosis.

Conclusion

These relatively uncommon diverticular disease variants are important to keep in mind when working up patients with abdominal pain. Though in some cases, their diagnosis may prevent unnecessary or aggressive surgery, the approach to management uses many of the principles of managing the more common kinds of diverticular diseases.

In most cases, when surgery is indicated, resection of the involved colon with primary anastomosis where feasible is the appropriate treatment. In select cases, more limited surgical resections, such as diverticulectomy or ileocecectomy, can be performed with good results. Fundamentally and as with any surgical disease, the approach to management should be driven by anatomy and physiology.

References

- Portier F. Diverticulite et appendicite. *Bull Mem Soc Anat Paris* 1912;37:29–31
- Radhi JM, Ramsay JA, Boutross-Tadross O. Diverticular disease of the right colon. *BMC Res Notes* 2011;4:383
- Lohsirawat V, Suthikeeree W. Pattern and distribution of colonic diverticulosis: analysis of 2877 barium enemas in Thailand. *World J Gastroenterol* 2013;19(46):8709–8713
- Sugihara K, Muto T, Morioka Y, Asano A, Yamamoto T. Diverticular disease of the colon in Japan. A review of 615 cases. *Dis Colon Rectum* 1984;27(08):531–537
- Stollman N, Raskin JB. Diverticular disease of the colon. *Lancet* 2004;363(9409):631–639
- Papaziogas B, Makris J, Koutelidakis I, et al. Surgical management of cecal diverticulitis: is diverticulectomy enough? *Int J Colorectal Dis* 2005;20(01):24–27
- Fischer MG, Farkas AM. Diverticulitis of the cecum and ascending colon. *Dis Colon Rectum* 1984;27(07):454–458
- Stollman N, Smalley W, Hirano I; AGA Institute Clinical Guidelines Committee. American gastroenterological association institute guideline on the management of acute diverticulitis. *Gastroenterology* 2015;149(07):1944–1949
- Park HC, Lee BH. Suspected uncomplicated cecal diverticulitis diagnosed by imaging: initial antibiotics vs laparoscopic treatment. *World J Gastroenterol* 2010;16(38):4854–4857
- Fang J-F, Chen R-J, Lin B-C, Hsu YB, Kao J-L, Chen MF. Aggressive resection is indicated for cecal diverticulitis. *Am J Surg* 2003;185(02):135–140
- Li JC, Ng SS, Lee JF, et al. Emergency laparoscopic-assisted versus open right hemicolectomy for complicated cecal diverticulitis: a comparative study. *J Laparoendosc Adv Surg Tech A* 2009;19(04):479–483
- Hildebrand P, Kropp M, Stellmacher F, Roblick UJ, Bruch H-P, Schwandner O. Surgery for right-sided colonic diverticulitis: results of a 10-year-observation period. *Langenbecks Arch Surg* 2007;392(02):143–147
- Keidar S, Pappo I, Shperber Y, Orda R. Cecal diverticulitis: a diagnostic challenge. *Dig Surg* 2000;17(05):508–512
- Harada RN, Whelan TJ Jr. Surgical management of cecal diverticulitis. *Am J Surg* 1993;166(06):666–669, discussion 669–671
- Lane JS, Sarkar R, Schmit PJ, Chandler CF, Thompson JE Jr. Surgical approach to cecal diverticulitis. *J Am Coll Surg* 1999;188(06):629–634, discussion 634–635
- Yang HR, Huang HH, Wang YC, et al. Management of right colon diverticulitis: a 10-year experience. *World J Surg* 2006;30(10):1929–1934
- Park HC, Chang MY, Lee BH. Nonoperative management of right colonic diverticulitis using radiologic evaluation. *Colorectal Dis* 2010;12(02):105–108
- Kim MR, Kye B-H, Kim HJ, Cho H-M, Oh ST, Kim J-G. Treatment of right colonic diverticulitis: the role of nonoperative treatment. *J Korean Soc Coloproctol* 2010;26(06):402–406
- Nigri G, Petrucciani N, Giannini G, et al. Giant colonic diverticulum: clinical presentation, diagnosis and treatment: systematic review of 166 cases. *World J Gastroenterol* 2015;21(01):360–368
- Steenvoorde P, Vogelaar FJ, Oskam J, Tollenaar RA. Giant colonic diverticula. Review of diagnostic and therapeutic options. *Dig Surg* 2004;21(01):1–6, discussion 6
- Singh AK, Raman S, Brooks C, Philips D, Desai R, Kandarpa K. Giant colonic diverticulum: percutaneous computed tomography-guided treatment. *J Comput Assist Tomogr* 2008;32(02):204–206
- de Oliveira NC, Welch JP. Giant diverticula of the colon: a clinical assessment. *Am J Gastroenterol* 1997;92(07):1092–1096
- Mehta DC, Baum JA, Dave PB, Gumaste VV. Giant sigmoid diverticulum: report of two cases and endoscopic recognition. *Am J Gastroenterol* 1996;91(06):1269–1271
- Walters KJ. Giant diverticulum arising from the transverse colon of a patient with diverticulosis. *Br J Radiol* 1981;54(644):683–688
- Gallagher JJ, Welch JP. Giant diverticular of the sigmoid colon: a review of differential diagnosis and operative management. *Arch Surg* 1979;114(09):1079–1083
- Boijesen E. Giant diverticulum of the sigmoid [in German]. *Fortschr Geb Rontgenstr Nuklearmed* 1956;84(06):760–761
- Hughes WL, Greene RC. Solitary air cyst of peritoneal cavity. *AMA Arch Surg* 1953;67(06):931–936
- Salazar-Ibargüen J, Escárcega RO, Pérez Chávez G. Giant sigmoid colon diverticulum. *Dig Surg* 2007;24(01):17–18
- McNutt R, Schmitt D, Schulte W. Giant colonic diverticula—three distinct entities. Report of a case. *Dis Colon Rectum* 1988;31(08):624–628
- Barlow B, Goodhue WW, Schullinger JN. Giant congenital diverticulum of the sigmoid colon. *J Pediatr Surg* 1975;10(04):549–550
- Custer TJ, Blevins DV, Vara TM. Giant colonic diverticulum: a rare manifestation of a common disease. *J Gastrointest Surg* 1999;3(05):543–548
- Majeski J, Durst G Jr. Obstructing giant colonic diverticulum. *South Med J* 2000;93(08):797–799
- Bharucha AE, Parthasarathy G, Ditah I, et al. Temporal trends in the incidence and natural history of diverticulitis: a population-based study. *Am J Gastroenterol* 2015;110(11):1589–1596

- 34 Strate LL, Peery AF, Neumann I. American Gastroenterological Association Institute technical review on the management of acute diverticulitis. *Gastroenterology* 2015;149(07):1950–1976. e12
- 35 Naber A, Sliutz AM, Freitas H. Giant diverticulum of the sigmoid colon. *Int J Colorectal Dis* 1995;10(03):169–172
- 36 Praveen BV, Suraparaju L, Jaunoo SS, Tang T, Walsh SR, Ogunbiyi OA. Giant colonic diverticulum: an unusual abdominal lump. *J Surg Educ* 2007;64(02):97–100
- 37 Anderton M, Griffiths B, Ferguson G. Giant sigmoid diverticulitis mimicking acute appendicitis. *Ann R Coll Surg Engl* 2011;93(06):e89–e90
- 38 Akhrass R, Yaffe MB, Fischer C, Ponsky J, Shuck JM. Small-bowel diverticulosis: perceptions and reality. *J Am Coll Surg* 1997;184(04):383–388
- 39 De Peuter B, Box I, Vanheste R, Dymarkowski S. Small-bowel diverticulosis: imaging findings and review of three cases. *Gastroenterol Res Pract* 2009;2009:549853
- 40 Leivonen MK, Halttunen JA, Kivilaakso EO. Duodenal diverticulum at endoscopic retrograde cholangiopancreatography, analysis of 123 patients. *Hepatogastroenterology* 1996;43(10):961–966
- 41 Greenstein S, Jones B, Fishman EK, Cameron JL, Siegelman SS. Small-bowel diverticulitis: CT findings. *AJR Am J Roentgenol* 1986;147(02):271–274
- 42 Gotian A, Katz S. Jejunal diverticulitis with localized perforation and intramesenteric abscess. *Am J Gastroenterol* 1998;93(07):1173–1175
- 43 Maglinte DD, Chernish SM, DeWeese R, Kelvin FM, Brunelle RL. Acquired jejunoileal diverticular disease: subject review. *Radiology* 1986;158(03):577–580
- 44 Chiu EJ, Shyr YM, Su CH, Wu CW, Lui WY. Diverticular disease of the small bowel. *Hepatogastroenterology* 2000;47(31):181–184
- 45 Spiegel RM, Schultz RW, Casarella WJ, Wolff M. Massive hemorrhage from jejunal diverticula. *Radiology* 1982;143(02):367–371
- 46 Mendonca HL, Vieta JO, Ling WS. Jejunal diverticulosis with massive hemorrhage. *Am J Gastroenterol* 1978;70(06):657–659
- 47 Terada T. Diverticulitis of multiple diverticulosis of the terminal ileum. *Int J Clin Exp Pathol* 2013;6(03):521–523
- 48 Donald JW. Major complications of small bowel diverticula. *Ann Surg* 1979;190(02):183–188
- 49 Singh VV, Toskes PP. Small bowel bacterial overgrowth: presentation, diagnosis, and treatment. *Curr Treat Options Gastroenterol* 2004;7(01):19–28