

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Perforated duodenal diverticulum case report

Julie Glener^{a,*}, Stephenie Poris (MD)^b, Brandon Foles (MD)^b, Rhonda Harmon (MD)^b^a University of Central Florida College of Medicine, 6850 Lake Nona Blvd, Orlando, FL 32827, USA^b Florida Hospital, 601 E Rollins St., Orlando, FL 32803, USA

ARTICLE INFO

Article history:

Received 4 September 2016

Received in revised form 5 October 2016

Accepted 21 October 2016

Available online 23 October 2016

Keywords:

Duodenal diverticulum

Perforation

Case report

ABSTRACT

INTRODUCTION: The duodenum is the second most common location of intestinal diverticula following the colon (Juler et al., 1969) [1]. Only 1–5% of patients with duodenal diverticula become symptomatic (Oukachbi, 2013) [2]. The least common but most serious complication of duodenal diverticula is perforation, which has a mortality rate of 20% (Oukachbi, 2013; Yin et al., 2001; Song, 2015; Schnueriger et al., 2008) [2–5].

PRESENTATION OF CASE: A 65 year old female presented with sudden onset periumbilical and epigastric pain. Her abdomino-pelvic CT without contrast revealed a duodenal perforation of the anterior wall of the duodenum. After attempting a laparoscopic approach, the operation was converted to an open procedure to enhance visualization. A wide Cattell-Braasch maneuver was performed, mobilizing the duodenum, which revealed an inflamed diverticulum. Following a pyloric exclusion, a gastrojejunostomy and a Braun enteroenterostomy were completed in addition to a jejunostomy tube on the efferent limb.

DISCUSSION: Clinical presentation of duodenal diverticula is vague and often varies. Although difficult to elucidate on imaging, the most sensitive exam to detect a duodenal diverticulum perforation is an abdominal CT scan, which can reveal thickened bowel wall, mesenteric fat stranding, and an extraluminal, retroperitoneal collection of air or fluid (Song, 2015) [4]. Due to the rareness of perforated duodenal diverticulum, surgical treatment guidelines are lacking.

CONCLUSION: Ultimately, it is necessary to have a high index of suspicion to detect a duodenal diverticulum perforation. The perforation usually necessitates operative treatment that consists of a diverticulectomy and two-layer closer of the duodenum, Kocher maneuver, and drainage of the retroperitoneum.

© 2016 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

The duodenum is the second most common location of intestinal diverticula following the colon [1]. Ninety percent of the duodenal diverticula are extraluminal, and 62% of them are found in the second portion of the duodenum [2]. Duodenal diverticula appear in 2.5% of upper gastrointestinal examinations and up to 22% of endoscopic retrograde cholangiopancreatography (ERCP) and autopsies [3,5]. Only 1–5% of patients with a duodenal diverticulum become symptomatic, presenting with bleeding or inflammation [2].

Complications of duodenal diverticula include obstruction of duodenum or biliary-pancreatic duct, fistula formation in the bile duct, bezoar formation inside the diverticulum, and perforation, which is the least common and most serious complication with a mortality rate of 20% [2–5]. Duodenal diverticulum perforation often presents with acute onset of severe epigastric pain that

radiates to the back or right shoulder. Nonspecific findings of nausea, vomiting, fever, and leukocytosis make diagnosis difficult [2].

We present a case of symptomatic patient with a perforated duodenal diverticulum that was found intraoperatively.

2. Case report

A 65 year old morbidly obese female presented to the emergency department with sudden onset periumbilical and epigastric pain. For the week prior to her admission, she had symptoms including diarrhea that progressed to include nausea and vomiting. Her vital signs upon admission were unstable with a blood pressure of 99/49 mmHg, a heart rate of 104 beats/min, and a body temperature of 36.7 °C. On abdominal physical exam, the patient was tender to palpation with localized peritonitis in the epigastric region. Laboratory values were remarkable for a white blood cell count of 13,220/mm³ and a creatinine of 6.7 mg/dL. Following an abdomino-pelvic CT without contrast, which revealed a duodenal perforation of the anterior wall of the duodenum (Fig. 1), she was taken emergently to the operating room.

* Corresponding author at: 601 E Rollins St., Orlando, FL 32803, USA.

E-mail addresses: jglener@knights.ucf.edu

(J. Glener), stephenie.poris.md@flhosp.org (S. Poris), Brandon.Foles.MD@flhosp.org (B. Foles), Rhonda.harmon.md@flhosp.org (R. Harmon).

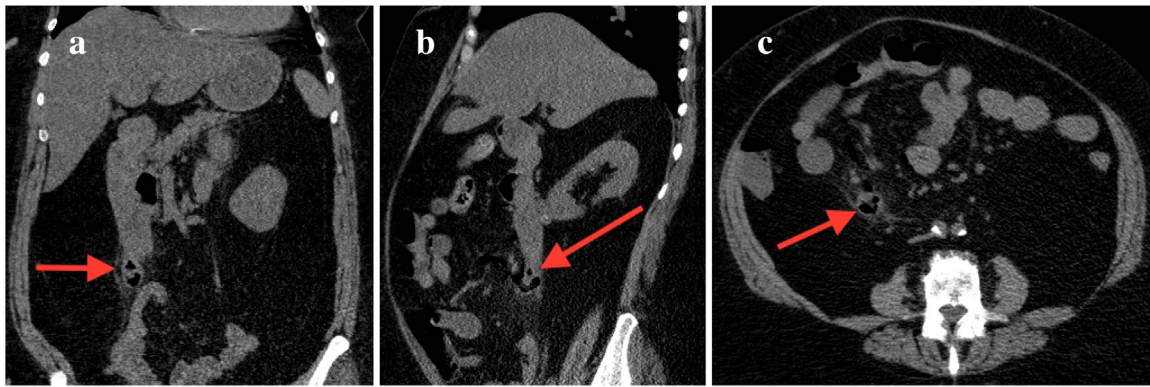


Fig. 1. (a) Perforated diverticulum with free air bubble and peridiverticular stranding (b) Free air surrounding the junction of the second and third portion of duodenum and outpouching of diverticulum (c) Inflammatory stranding and perforation site along 2/3rd portion of duodenum.

After attempting a laparoscopic approach, the operation was converted to an open procedure to enhance visualization. A mid-line incision superior to the umbilicus was made, and the abdomen was explored. A wide Cattell-Braasch maneuver was performed, mobilizing the duodenum, which revealed an inflamed diverticulum. The duodenal diverticulum was removed via sharp dissection, and the remaining defect was less than 50% of the duodenal circumference and was closed in two layers. A pyloric exclusion, gastrojejunostomy and a Braun enteroenterostomy were completed, and a jejunostomy tube was placed. The pathology report later revealed a benign duodenal diverticulum demonstrating perforation with severe acute inflammation; however the biopsy was negative for malignancy and no heterotopic tissue was identified. The patient's recovery progressed appropriately, and she was discharged on the tenth postoperative day.

3. Discussion

Although duodenal diverticula are commonly found at autopsy [5], they are rarely complicated by perforation. A duodenal perforation can be the result of peptic digestion, ulceration, enterocoliths, blunt abdominal trauma, or iatrogenic perforation during an ERCP [5,6]. The etiology of perforation in our patient is unclear; however it was most likely the result of the peptic digestive process following food retention in the diverticulum.

Most duodenal diverticula are asymptomatic with diverse and often vague presentations upon perforation, including acute onset of pain, nausea, vomiting, fever, or anorexia and steatorrhea due to duodeno-colonic fistulas [5,6]. In addition to varied clinical presentation, diagnosis is problematic because diverticular perforation can be difficult to elucidate on imaging as fifty percent of all conventional radiological exams show no abnormalities [5]. The most sensitive exam to detect a duodenal diverticulum perforation is an abdominal CT scan, which can reveal thickened bowel wall, mesenteric fat stranding, and an extraluminal, retroperitoneal collection of air or fluid [4].

Success has been found with both conservative and operative treatment of perforated duodenal diverticulum depending on the comorbidities and stability of the patient. Conservative treatment, which includes fasting and broad spectrum antibiotics, has been successful in stable patients and patients with comorbidities who are poor operative candidates [2,7]. Due to the rareness of perforated duodenal diverticulum, surgical treatment guidelines are lacking. Under most circumstances, a resection of the duodenal diverticulum after Kocher maneuver is performed with a one or two-layer closure of the duodenum [5,7,8]. Our patient underwent this procedure in addition to a pyloric exclusion, gastrojejunostomy and Braun enteroenterostomy, which were done to protect

the diverticulectomy by diverting the enteric flow with a digestive bypass. This helps reduce the overall risk of duodenal leak or fistula, which is the main post-operative complication with up to a 31% mortality rate [2]. While a pyloric exclusion with diverticulectomy and primary closure can be performed, other options, including duodenal drainage, diversion or a pylorus preserving Whipple, can be adequate [9]. Understanding these surgical techniques will lead to flexibility in the management of a perforated duodenal diverticulum.

4. Conclusion

Perforated duodenal diverticula are rare and present a challenge in both diagnosis and treatment. A high level of suspicion is necessary to detect a perforation either with a CT scan or intraoperatively. A duodenal diverticulum perforation usually necessitates operative treatment with a diverticulectomy and two-layer closer of the duodenum, Kocher maneuver, and drainage of the retroperitoneum.

Conflicts of interest

The authors have no conflicts of interest to declare.

Funding

No funding sources.

Ethical approval

The hospital ORA (office of research administration) has given approval.

Author contribution

Julie Glener—study design and data collection, writing the paper.
Stephanie Poris—operating resident, writing the paper, analysis and interpretation.

Brandon Foles—operating resident, writing the paper, analysis and interpretation.

Rhonda Harmon—operating attending, writing the paper, analysis and interpretation.

Consent

Our patient has signed a consent which has been approved by the ORA.

Guarantor

Rhonda Harmon.

References

- [1] G.L.L.J. Juler, E.A. Stemmer, J.E. Connolly, Perforating duodenal diverticulitis, *Arch. Surg.* 99 (5) (1969) 572–578.
- [2] N.B.S. Oukachbi, Management of complicated duodenal diverticula, *J. Visc. Surg.* 150 (2013) 173–179.
- [3] W.Y. Yin, H.T. Chen, S.M. Huang, H.H. Lin, T.M. Chang, Clinical analysis and literature review of massive duodenal diverticular bleeding, *World J. Surg.* 25 (7) (2001) 848–855.
- [4] S. Song, Management of perforated duodenal diverticulum: report of two cases, *Korean J. Gastroenterol.* 66 (3) (2015) 159–163.
- [5] B.V.S. Schnueriger, V.M. Banz, A.M. Schoepfer, D. Candinas, Diagnosis and management of the symptomatic duodenal diverticulum: a case report and a short review of the literature, *J. Gastrointest. Surg.* 12 (2008) 1571–1576.
- [6] B.N.K. Duarte, J. Cintron, Perforated duodenal diverticulum, *Br. J. Surg.* 79 (9) (1992) 877–881.
- [7] D. Martinez-Cecilia, A. Arjona-Sánchez, M. Gomez-Alvarez, et al., Conservative management of perforated duodenal diverticulum: a case report and review of the literature, *World J. Gastroenterol.* 14 (12) (2008) 1949–1951.
- [8] S.U.E. Yokomuro, Y. Arima, Y. Mizuguchi, T. Shimizu, et al., Simple closure of a perforated duodenal diverticulum: a case report, *J. Nippon Med. Sch.* 71 (5) (2004) 337–339.
- [9] V.S.B. Costa Simões, S. Magalhães, G. Faria, D. Sousa Silva, J. Davide, Perforated duodenal diverticulum: surgical treatment and literature review, *Int. J. Surg. Case Rep.* 5 (8) (2014) 547–550.

Open Access

This article is published Open Access at sciedirect.com. It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.