

Duodenal Diverticulum

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Abstract

Duodenal diverticulum was once regarded as a rare disease. But with the advent of endoscopy more such cases are being diagnosed. The majority of duodenal diverticula are asymptomatic. Complications render the diverticulum symptomatic prompting surgical intervention in the majority of cases. Surgical options are variable ranging from conservative approach to an intricate surgical resection. A review of the etiopathogenesis, presentation and management of this condition is presented.

INTRODUCTION

Duodenal diverticulum was first reported by Chomall in 1710 and officially documented first by Morgagni in 1762. [1] The duodenum is the second most common part of gut for diverticula next only to colon. The majority of duodenal diverticula are asymptomatic and go unrecognized. They are either incidentally picked up during the course of investigations for other symptoms or when they develop complications. Complications developing in duodenal diverticula are many and life-threatening.

ETIOPATHOLOGY

The peak incidence is between 50-60 years of age with no specific gender distribution. However, they are more commonly seen in females. Duodenal diverticula usually occupy the inner and pancreatic border of the duodenum. The second part is the most common site. They may be single or multiple.[2] They are classified into two types - extraluminal duodenal diverticula (EDD) and intraluminal duodenal diverticula (IDD). EDD are more common and further classified into peri-ampullary duodenal diverticula and juxtapapillary duodenal diverticula. Peri-ampullary diverticula are extraluminal mucosal out-pouchings of the duodenum arising adjacent to or containing the ampulla of Vater or at times even the intraluminal portion of the common bile duct. Juxtapancreatic duodenal diverticula are usually located within a radius of 2cm of the major papilla but not containing it. The majority of EDD occur within 2cm of the ampulla of Vater. IDD or windsock diverticula are not true diverticula. They occur as a simple sac-like structure connected to the entire circumference or only a part of wall of duodenum. They are extremely rare.

Pathologically, the larger pouches are devoid of muscle coat.

In the majority, the circular and longitudinal muscle coats of the diverticulum are missing; mucosa and muscularis mucosa make up the wall of the diverticulum. [2]

CLINICAL FEATURES

The majority are asymptomatic.[3] Three main features responsible for production of symptoms are:

- A. Mechanical factors producing delayed emptying of diverticula, pressure on common bile duct or pancreatic duct and obstruction of duodenum
- B. Inflammatory causes producing symptoms simulating peptic ulcer, gall bladder or pancreatic disease, pylorospasm and perforation
- C. Neoplastic

There are no characteristic symptom complexes based on which one can make a positive diagnosis of duodenal diverticulum. [3] Upper abdominal pain radiating to back simulating peptic ulcer disease by and far is the commonest presentation. Intermittent diarrhea, constipation and weight loss due to fear of eating and steatorrhea may occur in some patients. Symptoms simulating biliary tract disease occur in diverticula located in close proximity to the ampulla of Vater. [4] Pancreatitis may also be seen in such patients. Complications arising in diverticula located in the second part of duodenum may precipitate pancreatitis or duodenal obstruction.[5] Complications are usually responsible for presentation in most cases of duodenal diverticula. [3] Jaundice, cholangitis, acute and chronic pancreatitis and duodenal obstruction are caused by mechanical compression whereas diverticulitis and perforation are caused by inflammation. Hemorrhage and perforation are life-

threatening complications necessitating urgent surgical intervention. [6]

DIAGNOSIS

Duodenal diverticulum is an incidental finding in patients who have undergone upper GI barium studies. The study has to be made in erect, recumbent and oblique position. Barium retention for 6 hours or more is diagnostic. In the IDD type of duodenal diverticulum the typical windsock sign is seen which comprises a barium-filled sac lying within the duodenum and surrounded by a narrow radiolucent line which is well seen as the barium in the duodenum passes distal to the diverticulum. [7]

Upper GI endoscopy helps in diagnosing 75% duodenal diverticula. [8] The use of a side-viewing scope further increases the success rate. However, diverticula situated in third and fourth part of duodenum cannot be diagnosed. Hemorrhage in diverticula is best diagnosed by combination of angiography and scanning with Technetium-99 labeled RBC's. [8]

CT is the best investigation for diagnosis of a complicated duodenal diverticulum. [9] CT findings include a mass-like structure interposed between the duodenum and pancreatic head containing air, air fluid levels, fluid contrast material or debris. In perforated cases, duodenal wall thickening and surrounding free air, fluid and fat stranding may be noted. Location and presence of small amount of intradiverticular gas may aid in establishing the diagnosis. [10]

MRCP is specifically helpful to demonstrate the relationship of the diverticulum to biliary and pancreatic duct and associated pathology in biliary system and pancreas. [9, 11]

TREATMENT

Duodenal diverticulum, in the majority of cases, is asymptomatic. Asymptomatic duodenal diverticulum incidentally detected during imaging does not require any surgical intervention. It is only when they develop complications that they require surgical intervention. Surgical intervention is not without complications. It has a mortality rate of about 30% whereas untreated they can cause a mortality rate of 90%. [3, 12]

Review of literature reveals various schools of thoughts for treating complicated duodenal diverticulum:

Localized perforation without symptoms and signs of septicemia can be treated by conservative methods.[13] Close monitoring of patient along with antibiotics and

aggressive supportive care may help in resolution. The same can be followed for a bleeding duodenal diverticulum provided the patient is hemodynamically stable. However, if the response to treatment is suboptimal with worsening of abdominal signs along with laboratory evidence of advancing shock, then exploratory laparotomy is indicated.

At laparotomy, the pathology needs to be evaluated meticulously. The duodenum has to be kocherized in order to study the second and the proximal portion of the third part. The fourth part needs to be evaluated by approaching it via the infra-colic compartment. Diverticula in close proximity to the ampulla of Vater and common bile duct demand careful judgment and meticulous dissection. [14] Being surgically aggressive in this area could have disastrous complications. When a diverticulum is encountered in this region, it should be dissected as much as possible keeping a safe distance from vital structures. The diverticulum should be opened and the position of the ampulla confirmed. After excision of the diverticulum, the duodenal wall is closed in two layers. However, in presence of common bile duct obstruction, dissection around the ampulla of Vater may prove to be dangerous. In such circumstances, choledochoduodenostomy may be a safer option than directly treating the diverticulum. In a situation in which the diverticulum is deeply buried in the pancreatic head or if the papilla lies deep in the diverticulum, it is advisable not to attempt any heroic dissection. In such cases, division of the duodenum distal to the pylorus with drainage by Roux-en-Y duodeno-jejunostomy may be performed. Another option in such complicated cases is diverticulization of the duodenum in order to bypass the diverticulum. This can be done either by a combination of antrectomy, vagotomy, choledochostomy and Billroth II anastomosis or by triple tubostomy comprising of biliary diversion (t-tube), decompression of duodenum (tube duodenostomy) and enteral nutrition by tube jejunostomy.[15]

In case of an intraluminal duodenal diverticulum, curative treatment consists of removal of the diverticulum by laparoscopy and duodenotomy or endoscopically.[16] If the diverticulum is not circumferentially attached, it can be resected endoscopically by electrocautery snare.[17] If attached circumferentially, it can be inverted with the endoscope and partially resected.[18,19] In complicated cases of this variety with anatomical identification being difficult, duodenostomy is performed.[20] If difficulty is still encountered, then choledochotomy and placement of a bile duct probe to localize the papilla should be performed prior

to diverticular resection.[21]

CONCLUSION

Duodenal diverticulum poses both a diagnostic and therapeutic dilemma. Asymptomatic diverticula should be best left alone whereas symptomatic diverticula by virtue of complications should be treated surgically at the earliest.

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References

1. Afridi SA, Fichtenbaum CJ, Taubin H: Review of duodenal diverticula. *Am J Gastroenterol*; 1991; 86(8): 935-8.
2. Eggert A, Teichmann W, Wittmann DH: The pathologic implication of duodenal diverticula. *Surg Gynecol Obstet*; 1982; 154(1): 62-4.
3. Psathakis D, Utschakowski A, Muller G, Broll R, Bruch HP: Clinical significance of duodenal diverticula. *J Am Coll Surg*; 1994; 178(3): 257-60.
4. Zeeb T, Zeeb DS, Arnold JC, Benz C, Riemann J: The relationship between juxtapapillary and duodenal diverticula and disorders of the biliopancreatic system. Analysis of 350 patients. *Gastrointest Endosc*; 2001; 54:56-61.
5. Uomo G, Manes G, Ragozzini A, Cavallera A, Rabbiti PC: Periapillary extraluminal duodenal diverticula and acute pancreatitis. An underestimated etiological association. *Am J Gastroenterology*; 1996; 91: 1186-8.
6. Mehdi A, Closset J, Houben JJ, Taton G, Mendes da Costa P, Lambilliotte JP: Duodenal diverticula – diagnosis and management of complicated forms: report of two clinical cases and review of the literature. *Acta Chir Belg*; 1994; 94(6): 311-3.
7. Materna R: The duodenal windsock sign. *Radiology*; 2001; 218: 749-50.
8. de Perrot T, Poletti PA, Becker CD, Platon A: The complicated duodenal diverticulum: retrospective analysis of 11 cases. *Clin Imaging*; 2012; 36(4): 287-94.
9. Balci NC, Akinci A, Akon E, Kler HV: Juxtapapillary diverticulum: findings on CT and MRI. *Clinical Imaging*; 2003; 27: 82-8.
10. Ames JT, Federle MP, Pealer KM: Perforated duodenal diverticulum: clinical and imaging findings in eight patients. *Abdom Imaging*; 2009; 34(2): 135-9.
11. Christoforidis E, Goulimaris I, Kanellos I, Tsalis K, Dadoukis I: the role of juxtaduodenal diverticula in biliary stone disease. *Gastrointest Endosc*; 2002; 55(4): 543-7.
12. Schnueriger B, Vorbuerger SA, Banz VM, Schoepfer AM, Cardinas D: Diagnosis and management of the symptomatic duodenal diverticula: a case series and short review of the literature. *J Gastrointest Surg*; 2008; 12(9): 1571-6.
13. Martinez Cecilia D, Ajona Sanches A, Gomez-Alvarez M, Torres-Tordera E, Lugne-Molina A, Valenti-Azcarate V, Briceno-Delgado, Padillo FJ, Lopez-Cillero P, Rufian-Pena S: Conservative management of perforated duodenal diverticulum: a case report and review of the literature. *World J Gastroenterol*; 2008; 16(12): 1949-51.
14. Teven CM, Grossman E, Roggin KK, Mathews JB: Surgical management of pancreaticobiliary disease associated with juxtapapillary duodenal diverticula: case series and review of the literature. *J Gastrointest Surg*; 2012; 16(7): 1436-41.
15. Fujikini N, Tanabe K, Yamamoto H, Suzuki T, Tokumoto N, Ohdan H: Triple tube ostomy: a novel technique for the surgical treatment of iatrogenic duodenal perforation. *Case Rep Gastroenterol*; 2011; 5(3): 672-9.
16. Reichert MC, Bittenbring JT, Fries P, Zimmer V, Lammert F, Dauer M: Recurrent pancreatitis caused by a huge intraluminal duodenal diverticulum. *J Gastrointest Liver Dis*; 2012; 21(2): 126.
17. Mathis KL, Farley DR: Operative management of symptomatic duodenal diverticula. *Am J Surg*; 2007; 193(3): 305-8.
18. Scundamore CH, Harrison RC: Management of duodenal diverticulum. *Can J Surg*; 1982; 25: 311.
19. Gottschalk U, Becker C, Stohr M, Zinner T: Duodenal diverticulum - a therapeutic challenge. *Z Gastroenterol*; 2010; 48(5): 551-4.
20. Thorson CM, Paz Ruiz PS, Roeder RA, Sleeman D, Casillas VJ: The perforated duodenal diverticulum. *Arch Surg*; 2012; 147(1): 81-8.
21. Dell'Osso A, Creti P, La Cava M, dell'Agli P, Salvatelli M: Duodenal diverticula. *Minerva Med*; 1986; 77(12): 469-78.

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