Case report

Current diagnostic and treatment aspects of duodenal diverticula: report of two polar cases and review of the literature

C.I. Fotiades[1], I.A. Kouerinis[2], I. Papandreou[1], C. Pilichos[1], G. Zografos[2], A. Mahairasi[1]

SUMMARY

Duodenal diverticula are not unusual in the general population and it is well-documented that their incidence increases with age. Nevertheless, their clinical diagnosis is difficult for the surgeon since, when symptomatic, their symptoms are non-specific. The clinical importance of duodenal diverticula is mostly based on the complications relating to the periampullary region; recurrent pancreatitis or cholangitis added to the commonly observed duodenal obstruction, bleeding and perforation, which may prove life-threatening because of delay in diagnosis due to the unsuspected underlying condition.

In this report we present two polar cases of duodenal diverticula and review the literature concerning the current diagnostic and therapeutic aspects.

Key-words: diverticula, duodenum, periampullary, diagnosis, complications, treatment

INTRODUCTION

Duodenum is the most common site of diverticulum formation following the colon.[1,2] Their incidence varies from 10 to 20 % in among various autopsy series, while it has been reported that 1 to 5 % of upper gastrointestinal x-ray examinations will reveal duodenal diverticula.[3,4,5] According to macroscopic histologic criteria they are divided into congenital and acquired. The congenital are true diverticula and include all the layers of the intestinal wall, differentiating from the acquired in which mucosa and submucosa protrude through a defect in the muscle coat of the bowel wall.[6] Commonly, such defects develop in portions of the intestinal wall which show reduced resistance to pressure like the area around blood vessels.[7,8] The symptoms of duodenal diverticula are usually nonspecific and their complications may be related to their location. Periampullary diverticula are complicated with cholangitis, pancreatitis and stone disease[9], while obstruction, bleeding, perforation and diverticulitis can be observed in any of its portions.[10] Diagnosis is seldom made preoperatively and diverticulor are most commonly found intraoperatively or during by chance outine endoscopic or radiographic examinations.[11] Surgical treatment is not an option for asymptomatic cases and should be reserved only for the control of complications[12]

[1]Third Propaudeutic Surgical Department, University of Athens, Greece, [2]First Propaudeutic Surgical Department, University of Athens, Greece

Author for correspondence:

Ilias Kouerinis, Kipselis 17, 11257 Athens, Greece,
e-mail: ikouerinis@hotmail.com

CASE REPORT

Case 1

A 58 year-old man presented in our department with diffuse abdominal pain, nausea and vomiting. According to his history he had experienced several similar symptoms for the past two years. Physical findings revealed a mild tenderness in the right upper quadrant without any other signs. Laboratory tests were within normal limits and plain x-rays of the abdomen as well as abdominal ultrasonography revealed no special pathology. He was admitted to our department and underwent upper gastrointestinal endoscopy and x-ray examinations which set the diagnosis of duodenal diverticulum (picture 1). He was managed conservatively and dismissed three days later free of symptoms.

Case 2

A 64 year-old woman admitted to our department

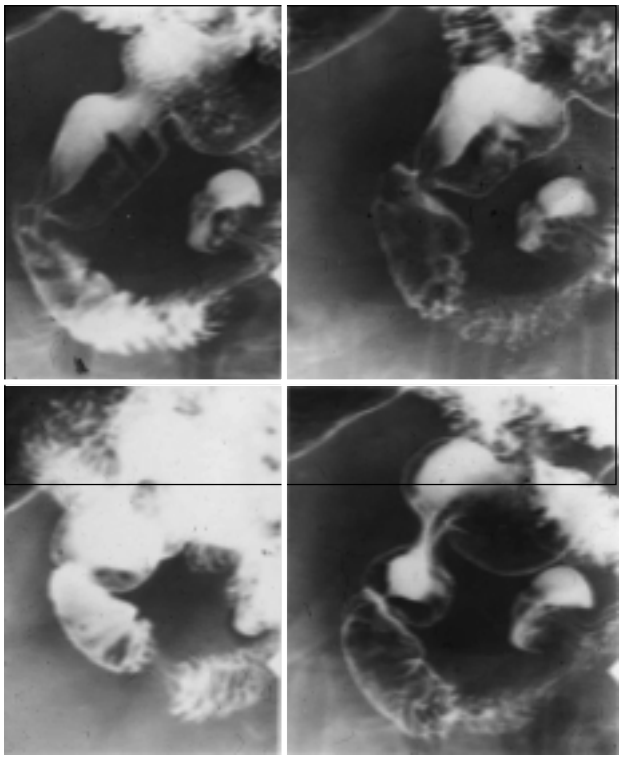

Fig. 1. Upper gastrointestinal series set the diagnosis of duodenal diverticulum

with hematemesis and diffuse abdominal pain. She had a history of laparoscopic cholecystectomy for cholelithiasis three years ago but she was never relieved of symptoms. A nasogastric tube was inserted and the patient stabilized hemodynamically in the emergency room. Digital rectal exam proved negative for blood and abdominal x-rays and ultrasound were not diagnostic. She then underwent upper gastrointestinal endoscopy which revealed a bleeding duodenal diverticulum (picture 2). Intraoperatively, a laparotomy was performed through a midline incision and a wide Kocher manoeuver exposed the diverticulum. The bleeding vessel within the lesion was ligated, as well as the pancreatoduodenal artery, and the diverticulum was excised. Finally the duodenal was closed longitudinally and a tube drainage was placed properly. The patient experienced an uneventful recovery and she was discharged six days later in excellent condition.

DISCUSSION

Duodenal diverticulum is a rather common pathology in patients over 40 years of age and a predominance of women to men to 2:1.[4,5,13] Nevertheless, most of them are usually silent and are discovered during examination or several surgical procedures for other diseases.[14,15] According to recent studies more than 90% of these patients are asymptomatic and less than 5 percent will require some form of surgical intervention due to a complication of the diverticulum itself.[12] Diffuse gastrointestinal symptoms, vague and abdominal pain have been attributed in many cases to duodenal diverticula, as they are often encountered during examination, but only in a few of them are they the real causes of these symptoms. The diagnosis can be established endoscopically and/or by upper gastrointestinal series. However, the latter has poor sensivity since the diverticular pouch may not be filled by the contrast material, resulting in false negative results.[2]

The complications of duodenal diverticula are similar to those of other gastrointestinal diverticula including colonic ones since they can be the source of bleeding, inflammation, obstruction and perforation. In about one third of the cases bleeding is the main complication,[10] while perforation and abscess formation are uncommon, especially in comparison to other diverticula of the small intestine.[4]

The obstruction of the bowel resulting from duodenal diverticula is unusual, in comparison to the obstruction of the ampulla of Vater which is more common. The

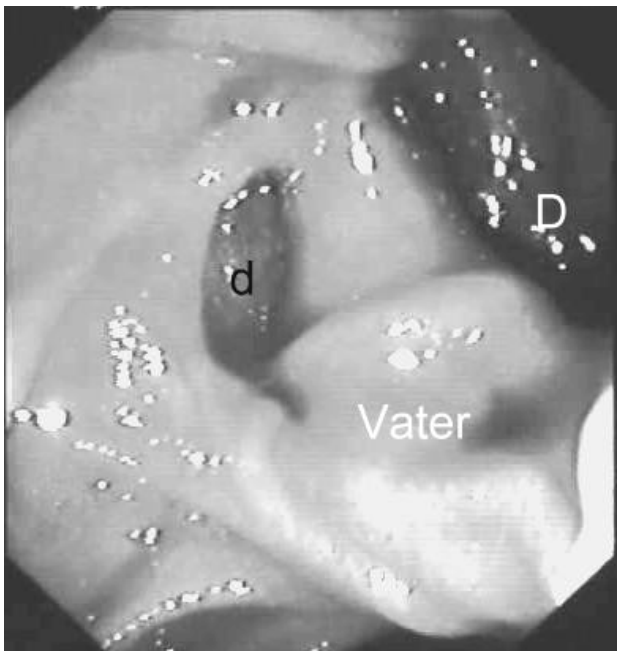

Fig. 2. Endoscopic examination showing the duodenal diverticulum.

periampullary location of the diverticula is of special interest as for as their complications are conarned.[1] Their incidence is as high as 75% and apart from obstruction, bleeding and perforation they may cause recurrent episodes of pancreatitis, cholecystitis and common biliary duct stones even after cholecystectomy.[16] The exact mechanism of this phenomenon is not clear but is believed that the insufficiency of the sphincter of Oddi can lead to the development of mostly bilirubin bile duct stones. An interesting theory exists which relates to the development of bilrubin common bile duct stones and the existence of periampullary diverticula.[17,18] According to this theory bacterial overgrowth in the diverticular pouch and around it promotes the colonization of the common bile duct from bacteria that produce b-glycuronidase through the insufficient sphincter of Oddi. This enzyme dissolves the conjugated bilrubin to the unconjugated form, which binds with bile Ca^{++} and generates insoluble stone-forming cores. This may be the reason why primary and recurrent common bile duct stones are more frequent findings in patients with duodenal diverticula than in those who are free of disease.[18] Interestingly, cholecystectomy doesn't seem to protect the patients with duodenal diverticula from the development of common bile duct stones, as most of them are prone to the development of primary rather than secondary stones of the common bile duct.[18] This remark is not accepted by all authors, as a recent study showed no relation between the two conditions, when age and sex were also taken into consideration.[17]

The relation ship of pancreatitis and duodenal diverticula remains uncertain.[19] The distention of a diverticulum due to the inspired intestinal content can lead to compression of the pancreatic duct resulting in acute pancreatitis.[20] The dysfunction of the sphincter of Oddi, which develops secondary to duodenal diverticula, can be also related to the etiology of acute pancreatitis. According to one study duodenal diverticula must be taken into consideration as a possible causal factor for acute pancreatitis in the elderly and should always be ruled out before it is attributed to an unknown cause (idiopathic pancreatitis).[21]

It is well-established that silent diverticula should not be surgically managed. Nevertheless, the surgeon may be called upon to deal with emergencies resulting from complications of duodenal diverticula.[12] Hemorrhage, as described above is the most usual complication. Following stabilization of the patient, endoscopy should be performed, not only to evaluate the condition, but if possible to control the bleeding. If another source of bleeding cannot be found and there is visible blood around the ampulla of Vater, the possibility of a duodenal diverticulum is strong. In cases where the endoscopist manages to enter the diverticulum, he may be able control the bleeding by injection or coagulation. Where the bleeding is found to be in close proximity to the ampulla of Vater it is advisable to place a stent before performing each the above procedures. If the endoscopic management fails, arterial angiography may follow in order to point out the bleeding vessel and embolize it with foam or coils.

Surgical management should pursue when all of the above attempts fail. The pouch can be accessed by performing a wide Kocher maneuver, unless the diverticulum contains the ampulla of Vater.[14,16] Following this , the diverticulum can be resected and primarily over sewn, controlling any possible site of blood loss. To cope with massive bleeding, the suture ligation of a bleeding vessel within the diverticulum should be accompanied by ligation of the pancreatoduodenal artery. If the diverticulum cannot be mobilized the lateral part of the duodenum can be opened, and when it is located near the ampulla of Vater, it is advisable to place a stent in it before any management. Pancreatoduodenectomy could be used in extreme cases of bleeding, but only a few reports of this procedure have been reported.

Perforation and abscess of a duodenal diverticulum should always be treated surgically. Any of difficulty for the surgeon to approach the site of the lesion can be managed with bypass surgery using a Roux-en-Y intestinal loop and attaching the resected bile duct to the distal end of the loop and the pylorus to the proximal end.[22] The outcome of this procedure depends on the condition of the pancreatic duct. A pancreatic fistula is unfortunately a common complication.

In many cases supportive measures will manage to control the above complications raised from duodenal diverticula. Diverticulitis can be initially treated with antibiotics, when there is no perforation present. Bleeding will also probably stop without surgical intervention, although most of these patients will need blood transfusion.[2]

Surgical management is likewise needed for patients with a complicated the biliary system. Diverticulotomy is proposed by certain authors for the treatment of patients with jaundice and duodenal diverticula, while transduodenal sphincteroplasty is considered to be a relatively safe method for the treatment of co-existent common bile duct lithiasis.[23] Nevertheless the long term results of

these surgical procedures in the global management of duodenal diverticula are yet to be elucidated.

In conclusion duodenal diverticula rarely cause symptoms and their existence is not an indication for surgery. Surgical intervention should be restricted to major complications of duodenal diverticula when it is not possible to control those using supportive or endoscopic measures.

REFERENCES

1. Eggert A, Teichmann W, Wittman DH. The pathologic implication of duodenal diverticula *Surg Gyn Obst* 1982, 154: 62-64.
2. Akhrass R, Yaffe MB, Fischer C, Ponsky J, Shuck JM. Small-bowel diverticulosis: perceptions and reality *J Amer Coll Surg* 1997, 184: 383-388.
3. Lotveit T, Skar V, Osnes M. Juxtapapillary duodenal diverticula. *Endoscopy* 1988; 20(suppl 1): 175-178.
4. Ferri L, Feldman L. Obstructing duodenal diverticula. *J Am Coll Surg*. 2002 Dec; 195(6): 888-889.
5. Shemesh E, Friedman E, Czerniak A, Bat L. The association of biliary and pancreatic anomalies with periampullary duodenal diverticula. Correllation with clinical presentations. *Arch Surg* 1987; 122:1055-1057.
6. Ackermann W. Diverticula and variations of the duodenum. *Ann Surg* 1943; 117: 203-213.
7. Suda K. Mizuguch K, Matsumoto M. A histopathological study on the etiology of duodenal diverticulum related to the fusion of the pancreatic anlage. *Am J Gastroenterology* 1983; 78: 335-338.
8. Tomita R. Plasma gut hormone levels before and after duodenojejunonostomy in patients with juxtapapillary duodenal diverticulum. *Biomedical Research* 1993;14(suppl 3): 123-130.
9. Kimura W, Nagai H, Kuroda A, Muto T. No significant correlation between histologic changes of the papilla of Vater and juxtapapillary diverticulum. Special reference to the pathogenesis of gallstones. *Scand J Gastroenterology* 1992; 27: 951-956.
10. Yin WY, Chen HT, Huang SM, Lin HH, Chang TM. Clinical analysis and literature review of massive duodenal diverticular bleeding. *World J Surg*. 2001 Jul; 25(7):848-855.
11. .Leivonen MK, Halttunen JA, Kivilaakso EO. Dudodenal diverticulum at endoscopic retrograde cholangeiopangreatography: Analysis of 123 patients. *Hepatogastrenterology* 1996; 43: 961-966.
12. Trondsen E, Rosseland AR, Bakka AO. Surgical management of duodenal diverticula. *Acta Chirugica Scand*. 1990; 156: 383-386
13. Brian SE JR, Stair JM. Non colonic diverticular disease *Surg Gyn Obst* 1985, 161: 189-195.
14. Psathakis D, Utschakowski A, Muller G, Broll R, Bruch HP. Clinical significance of duodenal diverticula *J Amer Coll Surg* 1994, 178: 257-260.
15. Zografos GC, Kouerinis IA, Marti K, Lanaras K, Androulakis G. Lapaparoscopy of the right iliac fossa through a midline incision. *J Surg Oncol* 2001; 77:280.
16. De Koster E, Denis P, Mante M, Otero J, Nyst J, Jonas C, Van Gossum M, De Reuck M, Deltenre M. Juxtapapillary duodenal diverticula. Association with biliary stone disease. *Acta Gastrentrol Belg.* 1990; 53: 338-343.
17. Kim MH, Myung SJ, Seo DW, Lee SK, Kim YS, Lee MH, Yoo BM, Min MI. Association of periampullary divericula with primary choledocholithiasis but not with secondary choledocholithiasis. *Endoscopy* 1998; 30: 601-604.
18. Novacek G, Walgram M, Bauer P, Schofl R, Gangl A, Potzi R. The relationship between juxtapapillary duodenal diverticula and biliary stone disease. *Eur J Gastroenterol Hepatol* 1997; 9: 375-379.
19. Carey LC. Pathophysiologic factors in recurrent acute pancreatitis. *Japanese J Surg.* 1985; 15: 333-340.
20. Uomo G, Manes G, Ragozzino A, Cavallera A, Rabitti PG. Periampullary extraluminal duodenal divericula and acute pancreatitis. An underestimated etiological association. *Am J Gastroenterol*. 1996; 91: 1186-1188.
21. Shemesh E, Friedman E, Czerniak A, Bat L. The association of biliary and pancreatic anomalies with periampullary duodenal diverticula *Arch Surg* 1987, 122: 1055-1057.
22. Vassilakis JS, Tzovaras G, Chrysos E, Mouzas I, Manousos O, Xynos E. Roux-Y choledochojejunostomy and duodenojejunostomy for the complicated duodenal diverticulum *Amer J Surg* 1997, 174: 45-48.
23. Vaira D, Dowsett JF, Hatfield AR, Cairns SR, Polydorou AA, Cotton PB, Salmon PR, Russell RC. Is duodenal diverticulum a risk factor for sphincterotomy? *Gut*. 1989 Jul; 30(7): 939-942.