A patient with duodenal diverticulitis who was initially misdiagnosed with stromal tumor of the duodenum is presented. This case is of interest because it illustrates difficulties in the interpretation of auxiliary investigations and the choice of the best treatment option. US and CT images revealed two large ovoid masses of fluid density in the duodenal wall which may have suggested stromal tumor of the duodenum as well as periampullary cystic neoplasm, the more so because intramural tumor of the duodenum was seen in duodenoscopy. A similar picture may also be seen in duodenal diverticula, especially in diverticula which are not filled with gas or a combination of fluid and gas. This case demonstrates one such entity.

Key words: duodenal diverticulum, GIST

Duodenal diverticula are very common. In clinical analysis their presence is described in about 25% of people (1). Most duodenal diverticula are asymptomatic and autopsy studies have revealed their prevalence to be as high as 22% and in an upper gastrointestinal series, duodenal diverticula were found in 6% and in 9-23% of ERCP procedures (2). Approximately 5% of patients with duodenal diverticula develop clinical symptoms most commonly because of complications such as hemorrhage, acute diverticulitis, or perforation, but the symptoms are usually nonspecific and can mimic other intra-abdominal processes (1). Duodenal diverticula are most frequently located in the second or third portion of the duodenum and because of this it is difficult to distinguish between pancreatic and duodenal pathologies in preoperative diagnostic images (2-5).

CASE REPORT

Patient L. T., a 52-year-old man (med. record no. 704/09, 730/09) was admitted to the hospital with an initial diagnosis of stromal duodenal tumor. The patient presented several episodes of nausea and dyspepsia, occasional epigastric pain, and other nonspecific upper abdominal symptoms such as eructation and vomiting associated with a 12 kg weight loss. He had no history of alcohol or tobacco abuse and his family history was noncontributory. So far he had no history of health problems.

Clinical examination revealed no cardiac, respiratory, or urinary disorders. On physical examination he was tender in the right epigastrium, but without peritoneal signs. The only laboratory abnormality was PLT of $506 \times 10^3/\mu l$.

An intramural tumor below the duodenal bulb with an intact mucosa over the mass was revealed by fiberoptic gastroduodenoscopy. Moreover, narrowing of the duodenal lumen and numerous mucosal erosions were seen below the tumor. The remaining part of the duodenum was normal. Barium gastrointestinal examination showed a widened duodenal bulb with barium retention and with narrow-
ing below as long as ca. 3 cm (fig. 1). Upper-abdominal ultrasound revealed: in the duodenal wall directly adjacent to the right liver lobe, cystic masses measuring 4.3 x 2 cm. Contrast-enhanced computerized tomography showed two large ovoid masses of fluid density closely associated with the second portion of the duodenum (possibly duodenal stromal tumor) (fig. 2). The diagnosis of stromal tumor of the duodenum was made after discussion with radiologist and on the basis of radiological and endoscopic examinations mentioned above.

The patient was operated. The duodenum was mobilized by the Kocher maneuver. Periduodenal and peripancreatic lymph nodes were taken for intraoperative histopathology. Pathology examination revealed reactive lymph nodes. The duodenum was turned medially and an inflamed diverticulum came to view. Then a longitudinal duodenotomy through the anterior duodenal wall between the second and third portion of the duodenum was made. An elongated sac of inflamed duodenal diverticulum surrounding three quarters of the duodenal wall as long as 3-4 cm, narrowing the duodenal lumen, could be identified. To avoid injury to the papilla of Vatera, a catheter was inserted into its opening and partial resection of the duodenum by means of a Roux-en-Y was made. The resection encompassed the pylorus, proximal portion of the duodenum along with the diverticulum and narrowing below. The duodenal stump was closed with two layers. After the operation, small leakage of the duodenal stump was observed. The complication was successfully treated conservatively. Histopathological examination of the specimen after the operation revealed a duodenal diverticulum with chronic inflammatory process. Furthermore, active deep inflammation and multiple erosions in the duodenal wall were revealed below the diverticulum.

**DISCUSSION**

In the first reports by Chomall in 1710 and Morgagni in 1762, duodenal diverticula were considered an anatomical curiosity. Almost 200 years later, Case was the first who demonstrated them in radiological examination (4). Upper gastrointestinal and US studies, CT, and MRI showed that duodenal diverticula are present in about 25% of people (1). From an anatomic and histopathological point of view there are two basic types of duodenal diverticula: 1) acquired or false and 2) congenital or true, i.e. containing all layers of the duodenal wall. Moreover, congenital diverticula occur in two forms: intraluminal and extraluminal (6). Acquired diverticula are more common, of which there are two subtypes: the so-called primary acquired and the secondary...
Duodenal diverticulum mimicking duodenal stromal tumor

acquired. The first is caused by protrusion of the duodenal mucosa through the weak points of the duodenal wall (near the common bile and pancreatic duct or blood vessels). The secondary occurs as a result of outpouching of the duodenal wall near a healing duodenal ulcer (3, 6). The most common site of duodenal diverticulum formation is the second (62%) and the third (30%) portion of the duodenum. Only about 8% of diverticula develop in the fourth portion (3, 6).

Although duodenal diverticula are quite common, the great majority are asymptomatic (1, 5). Symptoms, if they occur, can be nonspecific and depend primarily on the size or complications in the course of the disease (2). The clinical presentation usually includes abdominal pain in the epigastrium or right upper abdomen, nausea, vomiting, and loss of weight. In complicated cases, perforation, hemorrhage, and common bile or pancreatic duct obstruction can be seen (7). Attachment of an intraluminal diverticulum to the duodenum usually involves less than one-half of the wall circumference, although in a few cases it has been reported to be attached to the entire circumference (8). It seems probable that intermittent filling and emptying of the diverticulum with food may be responsible for the above symptoms (9).

Duodenal diverticulum is easily diagnosed in upper-gastrointestinal barium studies when the diverticular orifice is wide enough and the diverticulum is completely filled with contrast medium. As pointed out by Macari et al., CT or MR imaging can be helpful in cases in which the diverticulum is filled with air or a combination of fluid and air (2). If the diagnosis is doubtful, modern radiological techniques or endoscopic procedures should be considered, i.e. ERCP, arteriography, and scanning with Technetium 99, especially in case of bleeding (3). Miller et al. stated that on the base of radiological imaging that only 11-13% of duodenal diverticulitis is correctly diagnosed before surgery (10). A duodenal diverticulum that is entirely filled with fluid may quite frequently mimic neoplastic tumor arising from the pancreas. Cystic masses seen on CT or MR imaging adjacent to the pancreatic head and the second portion of the duodenum should lead to the consideration of a number of conditions in the differential diagnosis, such as cystic pancreatic neoplasm or pseudocyst, metastatic lymph nodes, and pancreatic abscess. Such observations were reported in numerous studies (6, 10, 11, 12). In some cases it is extremely difficult or even impossible to distinguish duodenal diverticula on CT or MR if their content is purely fluid (2).

The presented case demonstrates such an entity: large ovoid masses of fluid density in the duodenal wall simulated stromal tumor of the duodenum. In the presented case, duodenal ulcer combined with duodenitis and visible submucosal intramural tumor narrowing the duodenal lumen were seen in gastroduodenoscopy. The findings were confirmed by US and CT images suggesting stromal tumor. That was probably the main cause of misdiagnosis. Histopathological examination of the resected specimen showed an intraluminal diverticulum with chronic massive inflammation and a duodenal ulcer below. Inflammation in the diverticulum combined with the healing duodenal ulcer were perhaps the main cause of the duodenal narrowing, as seen in the gastrointestinal barium study. Also, the intensity of the inflammation was the main reason why the diverticular neck was invisible in both endoscopy and US images.

Asymptomatic diverticula do not require surgical management (4). Only 1-5% of diagnosed duodenal diverticula require surgery when complications have occurred, as in the present case. Extramural diverticula can be surgically removed from outside the duodenum (1).

Intramural diverticula are surgically removed through an incision in the wall of the duodenum, although there are reports of treatment with the use of endoscopic procedures. The best option of treatment in patients with duodenal diverticula seems to be surgical resection. The procedure consists of removal of the diverticulum by laparotomy and duodenotomy. Macari et al. indicated that surgical resection is the most appropriate treatment procedure in large diverticula and in symptomatic patients (2). However, the surgical approach in this area is difficult to perform and, as noted by Mahajan et al., is associated both with a high rate of postoperative complications and mortality (4). In the literature a mortality rate of 30% after diverticulectomy in the postoperative period has been reported. On the other hand, a delay in
diagnosis can lead to diverticulum perforation, which carries a mortality rate of 90% (5).

Surgical resection with a safe oncological margin is the best option of treatment for stromal tumor of the duodenum (13). Wedge resection is usually reserved for small tumors, although under favorable conditions, wedge resection or segmental resection of the third portion of the duodenum is also possible in very large tumors (20x30 cm) arising from the anterior wall of the duodenum, as described by Milnerowicz and Sakamoto (14, 15). However, if there is a preoperative suspicion of malignancy or for some conditions which prove to be benign, more extensive surgery is not unusual. The rate of Whipple procedures for benign lesion of the duodenum ranges to up to 9.2% (16).

REFERENCES


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