

Case Report

Duodenal Carcinoma from a Duodenal Diverticulum Mimicking Pancreatic Carcinoma

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An 81-year-old man was found to have a pancreatic head tumor on abdominal computed tomography (CT) performed during a follow-up visit for sigmoid colon cancer. The tumor had a diameter of 35 mm on the CT scan and was diagnosed as pancreatic head carcinoma T3N0M0. The patient was treated with pylorus-preserving pancreaticoduodenectomy. Histopathological examination showed that the tumor had grown within a hollow structure, was contiguous with a duodenal diverticulum, and had partially invaded the pancreas. Immunohistochemistry results were as follows: CK7 negative, CK20 positive, CD10 negative, CDX2 positive, MUC1 negative, MUC2 positive, MUC5AC negative, and MUC6 negative. The tumor was diagnosed as duodenal carcinoma from the duodenal diverticulum. Preoperative imaging showed that the tumor was located in the head of the pancreas and was compressing the common bile duct, thus making it appear like pancreatic cancer. To the best of our knowledge, this is the second report of a case of duodenal carcinoma from a duodenal diverticulum mimicking pancreatic carcinoma.

Key words: duodenal carcinoma, duodenal diverticulum, pancreatic carcinoma

An 81-year old man treated for sigmoid colon cancer 11 years ago was diagnosed with a pancreatic head tumor on abdominal computed tomography (CT). He had no family history of colorectal cancer. Abdominal unenhanced CT showed a large (35-mm), hypodense mass in the pancreatic uncus. Administration of contrast media showed that the tumor was hypodense in the arterial phase and gradually enhanced in the delayed phase. The CT scan also showed a linear lucency surrounding the tumor (Fig. 1A). Magnetic resonance imaging (MRI) showed a

hyperintense area surrounding the tumor on T2-weighted image, which was attributed to intestinal fluid displaced ventrally from the duodenal diverticulum (Fig. 1B). The patient was diagnosed as having pancreatic head carcinoma T3N0M0 and underwent pylorus-preserving pancreaticoduodenectomy. The gross pathology of the lesion showed that the tumor was located within the duodenal diverticulum and had partially invaded the pancreas (Fig. 2). Histopathological examination showed that the tumor had grown within the hollow structure that was contiguous with the duodenal diverticulum (Fig. 3A-C), and had partially invaded the pancreas (Fig. 3D). The diverticulum was covered by intestinal mucosa, had muscularis mucosa and Brunner glands, and lacked the muscu-

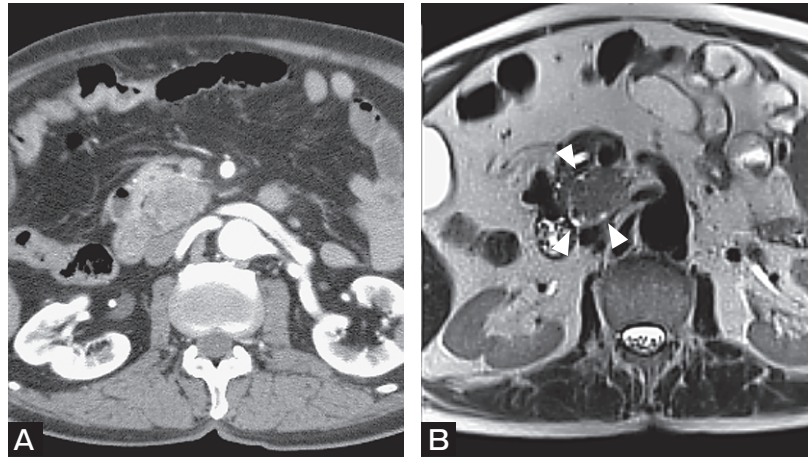


Fig. 1 A, Computed tomography (CT) with administration of contrast media showed a hypodense mass (3.5 cm in diameter) in the pancreatic head; B, Hyperintense area surrounding the tumor on T2-weighted image was attributed to ventrally displaced intestinal fluid from the duodenal diverticulum.

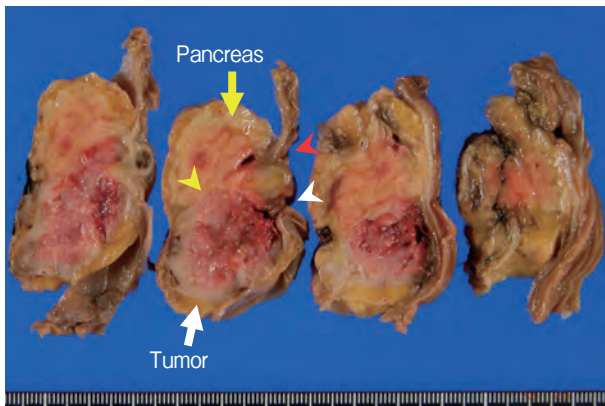


Fig. 2 Gross pathology of the lesion showing the entrance of the duodenal diverticulum (white arrowhead), the tumor (white arrow) located within the diverticulum, and the partial invasion (yellow arrowhead) of the pancreas (yellow arrow), and the ampulla of Vater (red arrowhead).

laris propria. Immunohistochemistry showed that the tumor was CK7 negative, CK20 positive, CD10 negative, CDX2 positive (Fig. 4), MUC1 negative, MUC2 positive, MUC5AC negative, and MUC6 negative (Fig. 5). A diagnosis of duodenal adenocarcinoma from the duodenal diverticulum was made based on the results of histopathological examination and immunohistochemistry. According to the TNM classification system, the final pathological stage for duodenal carcinoma was pT4N0M0, pStage IIB. The patient was alive without recurrence at 30 months after the surgery.

Discussion

Duodenal diverticula are very common, mostly occurring in the second or third positions of the duodenum and within 2.0 cm of the ampulla of Vater. Because of their proximity to the head of the pancreas, fluid-filled duodenal diverticula can be confused with cystic pancreatic neoplasms on diagnostic images [1-3]. Primary duodenal adenocarcinoma is an uncommon tumor, accounting for approximately 0.3% of all digestive tract cancers [4]. The second and third portions of the duodenum are commonly involved. Preoperative planning of the surgical treatment of duodenal tumors is extremely important, because surgery usually involves major operations such as pancreaticoduodenectomy [3]. Duodenal carcinoma from a duodenal diverticulum is extremely rare. A search in the MEDLINE database via PubMed (<http://www.ncbi.nlm.nih.gov/pubmed/>) at the time of the study yielded only 1 case report [5]. Dennison *et al.* [5] described the case of a 71-year-old man, previously treated for cholangitis and pancreatitis, who later developed biliary obstruction due to an adenocarcinoma arising in a diverticulum. Adenocarcinoma of a non-Meckelian diverticulum is also rare. Tsuji *et al.* [6] described an adenocarcinoma with extensive neuroendocrine differentiation arising in an ileal diverticulum.

In our case, we could not correctly diagnose the duodenal carcinoma and misdiagnosed the tumor as

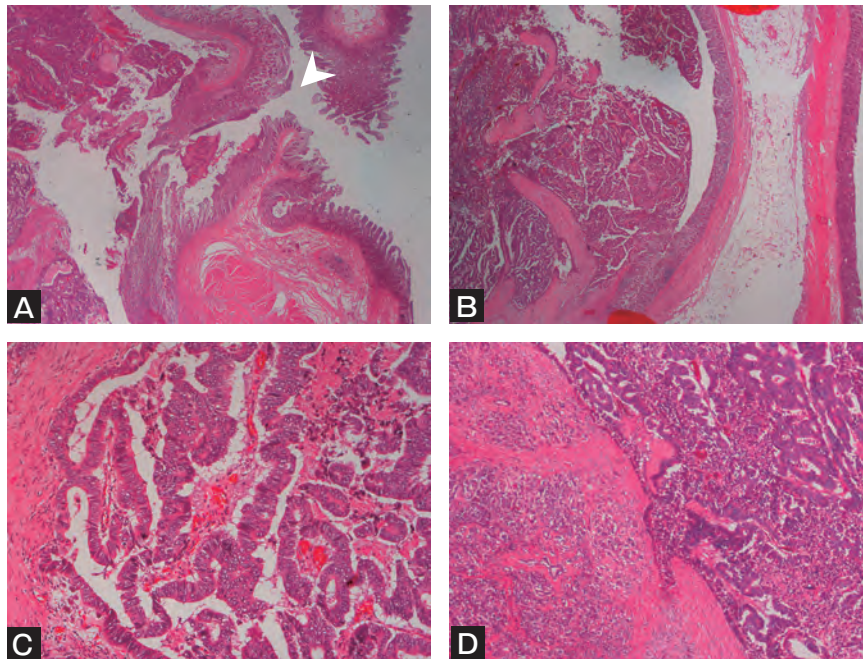


Fig. 3 Histopathological examination showed that the tumor had grown within a hollow structure, was contiguous with the duodenal diverticulum, and had partially invaded the pancreas. **A**, The entrance of the duodenal diverticulum (white arrowhead); **B**, The tumor and the wall of the diverticulum; **C**, The tumor showing an adenocarcinoma; **D**, The tumor partially invading the pancreas (hematoxylin and eosin [H&E] stain).

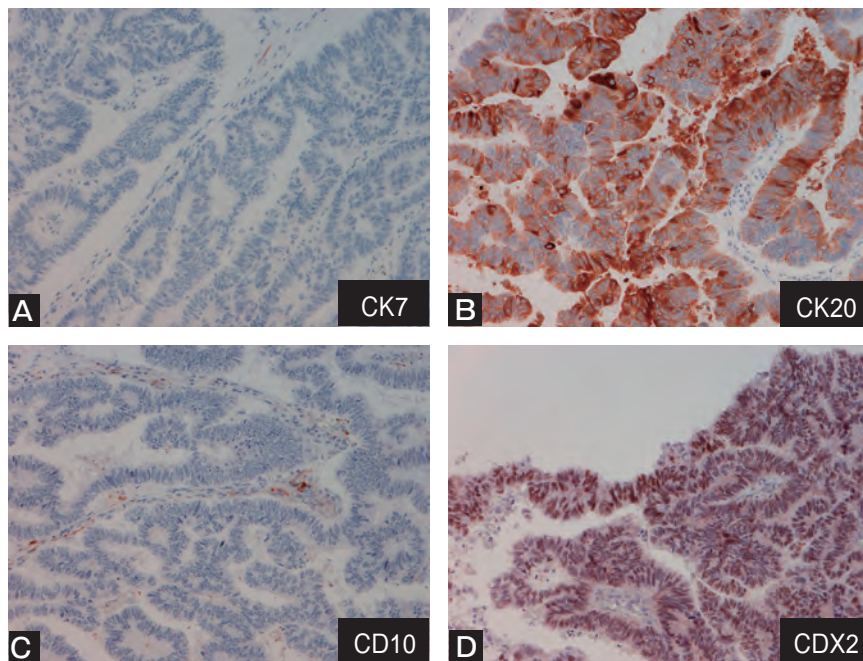


Fig. 4 Immunohistochemistry analysis showed that the tumor was CK7 negative (**A**), CK20 positive (**B**), CD10 negative (**C**), and CDX2 positive (**D**).

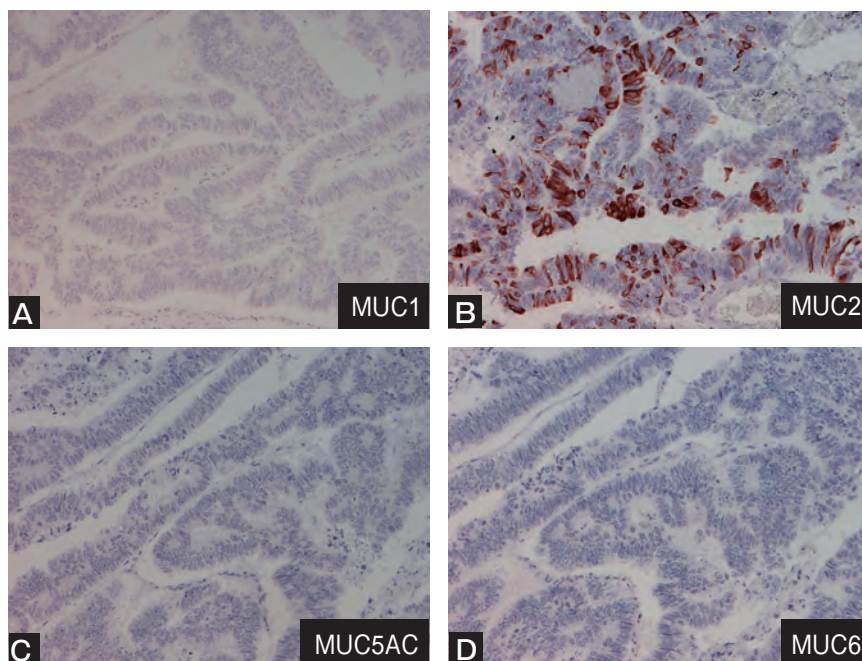


Fig. 5 Immunohistochemistry analysis showed that the tumor was MUC1 negative (A), MUC2 positive (B), MUC5AC negative (C), and MUC6 negative (D).

pancreatic carcinoma preoperatively. MRI findings suggested intestinal fluid accumulation between the tumor and the duodenal diverticulum wall; thus, a preoperative diagnosis of duodenal carcinoma arising from the duodenal diverticulum could potentially have been made.

We used immunohistochemical staining to differentiate between pancreatic and duodenal carcinoma. The tumor was negative for MUC1, the most sensitive and specific cell-surface marker for pancreatic carcinoma [7, 8]. In pancreatic cancer CK7 positivity is found in 94–96% of cases, CK20 in 19%–28%, and MUC1 in 87%. In ampullary adenocarcinoma CK7 positivity is found in 83–97%, CK20 in 44–83%, and MUC1 in 58%. In colon cancer CK7 positivity is found in 4–10%, CK20 in 68–77%, and MUC1 in 34% [7, 9]. Thus, the expression patterns of MUC1 and CK20 significantly differ between duodenal cancers and other cancers of the small intestine. Lee *et al.* [7] reported that in their case series duodenal cancers were frequently positive for MUC1 (10/14, 71.4%) and occasionally CK20 (2/14, 14.3%), whereas jejunal and ileal cancers showed an opposite expression pattern, *i.e.*, MUC1 (2/9, 22.2%) and CK20 (9/9, 100%). In another study the expression pattern of colon cancers

was MUC1 positivity in 34.3% (23/68), CK7 in 10% (7/70), and CK20 in 76.5% (52/68) [7]. In the present case, we obtained a CK7-negative/CK20-positive/MUC1-negative pattern, which is not common in pancreatic or duodenal carcinoma but is common in colon cancer. Because most of the tumor was located within the luminal diverticulum, we diagnosed it as duodenal carcinoma rather than metastasis of colon cancer. MUC2 was expressed in the goblet cells of the normal duodenum and was absent from the non-neoplastic pancreatic tissue. MUC5AC was expressed in gastric foveolar cells and was absent from the duodenal tissue. MUC6 was expressed in the non-neoplastic pancreas in both the ducts and acini. The Brunner glands of the normal duodenum also showed positive staining with MUC6 [10]. CD10 is associated with mucus-secreting cells in the pancreas and is expressed in the brush border intestinal mucosa cells. Haddad *et al.* [11] reported that CD10 expression was significantly higher in the intestinal type of ampullary adenocarcinomas than in the pancreaticobiliary type (81% vs. 51%). CDX2 is also used in diagnostic surgical pathology as a marker for gastrointestinal differentiation. Chu *et al.* [8] reported that a MUC2+/CDX2+ pattern can be used as a positive marker for intesti-

nal-type adenocarcinoma of duodenal papillary origin with a positive predictive value of 82%.

Familial adenomatous polyposis (FAP) and hereditary nonpolyposis colorectal cancer (HNPCC) are associated with colon cancer and duodenal cancer; in FAP, duodenal cancer is a complication of 3% of patients [12]. In our case, the patient was relatively old and had no family history of colorectal cancer, and the previous colon cancer was on the left side; therefore, familial disease was considered unlikely. Thus, we report an extremely rare case of duodenal carcinoma from a duodenal diverticulum mimicking pancreatic carcinoma.

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