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Case report

A case of mucinous carcinoma of Vater's ampulla with a unique extension along the main pancreatic duct

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A short title: Mucinous carcinoma of of Vater's ampulla

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Abstract

We report a case of mucinous carcinoma of Vater's ampulla with a unique extension along only the main pancreatic duct (MPD) and micro-invasion to the pancreas. A 52-year-old man was referred to our hospital for the evaluation and treatment of acute pancreatitis. Abdominal CT demonstrated the swelling in the head of the pancreas with a mass in the duodenum. Hypotonic duodenography and endoscopic examination revealed a well-defined mass measuring about 25 mm in size of Vater's ampulla. A biopsy specimen of the tumor showed moderately differentiated adenocarcinoma. A pylorus-preserving pancreaticoduodenectomy with a regional lymphadenectomy was performed under a preoperative diagnosis of adenocarcinoma of Vater's ampulla which had direct invasion into the head of the pancreas. The resected specimen of the duodenum confirmed the presence of the mass which measured 22 X 15 mm in size at Vater's ampulla. The tumor microscopically consisted of two components which are moderately differentiated adenocarcinoma in the periampullary region and mucinous carcinoma in the central region of the tumor (Vater' ampulla). The mucinous carcinoma component was uniquely extended along only the MPD with micro-invasion to the pancreas. Immunohistochemically, the expression of cytokeratins in both moderately differentiated adenocarcinoma and mucinous carcinoma was positive for cytokeratin 20 (CK20) and negative for cytokeratin 7 (CK7) which are the pattern of intestinal type of carcinoma of Vater's ampulla. We concluded that the possible original site of this tumor may have been the duodenal epithelium (originally moderately differentiated adenocarcinoma) which thereafter changed into mucinous carcinoma, which extended along only the MPD with micro-invasion to the pancreas.

Introduction

Because of their often dramatic clinical presentation and potentially curable nature, malignant tumors in Vater' ampulla have received considerable attention in the literature, even though they are not common. Within the ampulla, there is a transition from the pancreatobiliary type epithelium of the distal common and pancreatic ducts to the intestinal type epithelium of the periampullary duodenum. According to the WHO classification of tumors, carcinoma of Vater's ampulla are summarized under the carcinomas of the extrahepatic bile duct system (1). Kimura et al (2) for the first time distinguished pancreatobiliary type and intestinal type of ampullary carcinoma. Albores-Saavedra et al (3) defined the pancreaticobiliary and intestinal types as main types and added so-call "unusual types", such as signet-ring cell carcinoma or undifferentiated carcinoma. Less than 10% of ampullary carcinoma are mucinous; however, focal mucinous area are found in 20% of intestinal type of adenocarcinoma, mucinous areas are rare in pancreatobiliary type adenocarcinoma (3). Recently, Zhou H et al (4) separated intestinal-type and pancreaticobiliary-type carcinoma by the immunohistochemical expression pattern of cytokeratin 7 (CK7) and cytokeratin 20 (CK20) (Table 1). We herein present a patient who underwent a pylorus-preserving pancreaticoduodenectomy (PPPD) for carcinoma of Vater'a ampulla in a preoperative diagnosis. Mucinous carcinoma component of Vater's ampulla was uniquely extended along only the main pancreatic duct (MPD) with micro-invasion to the pancreas. We speculated the possible origin of the tumor to be the duodenal epithelium due to the pattern of the cytokeratin profile in the tumor.

Case report

A 52-year-old man was referred to our hospital for an evaluation and treatment of an acute pancreatitis. He had epigastric pain while the pancreatic swelling and formation of a psudocyst in the head were detected by abdominal CT. He had past history of diabetes mellitus and stones of the gall bladder. A laboratory examination on admission showed increased serum levels of glucose (215 mg/dl) and CRP (14.3 mg/dl), although serum levels of amylase, lipase and calcium were normal. In addition, carbohydrate antigen 19-9 showed normal ranges while the carcinoembryonic antigen (6.8 ng/ml) and elastase-I (430 ng/dl) were slightly elevated. Abdominal CT demonstrated a swelling in the head of the pancreas with a mass in the duodenum (Fig. 1A). Hypotonic duodenography (Fig. 1B) and endoscopic examination (Fig. 1D) revealed a well-defined mass measuring about 25 mm in size of Vater's ampulla. Biopsy of the tumor showed moderately differentiated adenocarcinoma. On magnetic resonance cholongiopancreatography (MRCP) showed slight dilatation of the main pancreatic duct (Fig. 1C). We did not try endoscopic retrograde pancreatocholangiography (ERCP) due to the history of acute pancreatitis. A PPPD with a pancreaticogastrostomy and a regional lymphadenectomy were performed under a preoperative diagnosis of adenocarcinoma of Vater's ampulla which had invasion into the head of the pancreas. The resected specimen confirmed the presence of a mass which measured 22 X 15 mm in size at Vater's ampulla (Fig. 2 A and B). Microscopically, the tumor consisted of two components which included moderately differentiated adenocarcinoma in the surrounding area and mucinous carcinoma in the central of the tumor (Vater' ampulla) without any invasion. Although the distal end of the common bile duct (CBD) and MPD were both separately opened up to Vater's

ampulla, the mucinous carcinoma component extended along only the MPD with minimally invasion to the pancreas within about 5 mm from the MPD (Fig. 3 and 4). Both strong fibrosis and infiltration of inflammatory cells were observed under the epithelium of Vater's ampulla. We could not detect any neoplastic lesions in the distal end of the CBD. Immunohistochemically, the tumor was positive for CK20 and negative for CK7 which are the pattern of intestinal type of carcinoma of Vater's ampulla (4). In addition, no metastasis to the resected lymph nodes was detected. As a result, we finally diagnosed the tumor to be mucinous carcinoma of Vater's ampulla uniquely extended along only MPD with micro-invasion to the pancreas. The postoperative course was uneventful and the patient has since survived for two years without any evidence of either recurrence or metastasis.

Discussion

It was not easy to detect the tumor origin in this case because mucinous carcinoma widely extended to Vater's ampulla and MPD with minimally invasion in the head of the pancreas. Zhou H et al (4) found a distinctly different cytokeratin expression of ampullo-duodenal part and other portions of ampulla using the cytokeratin pair CK7/Ck20 (Table 1). The expression pattern of negative for CK7 and positive for CK20 in this carcinoma suspected that this tumor was derived from the duodenal epithelium and extended along only MPD with minimally invasion to the pancreas. Kimura W et al (5) showed that the most frequent site for atypical epithelium and possible origin of carcinoma was the common channel, where pancreatic juice and bile mix physiologically but there was no common channel because CBD and MPD individually opened to Vater's ampulla in this case. The reason why the tumor originated in the duodenal epithelium extended only to the MPD and was also invaded in the head of the pancreas could not be clearly explained. An intraductal papillary mucinous neoplasm, which has such characteristics as extensive intraductal spread, was excluded in this case because origin of the tumor was considered to most likely be the duodenal epithelium.

The optimal management of neoplastic diseases of Vater's ampulla remains controversial, including the use of pancreatoduodenectomy (6), transduodenal local excision (7), and endoscopic snare excision (8). In this case, although we did not suspect the tumor extension along MPD preoperatively, endoscopic ultrasonography speculated the tumor had invasion directory to the pancreas (data not shown). Intraoperative ultrasonography could not show the clear margin of the tumor in the head of the pancreas which was hard probably due to fibrosis. The portal vein was

tightly adhesive to the pancreatic head. We performed PPPD with a regional lymphadenectomy and portal vein resection. The postoperative course was uneventful and the patient has since survived for two years without any evidence of recurrence or metastasis. In general, the prognosis of patients with intestinal type was better than that of patients with the pancreaticobiliary type (5).

We could therefore hypothesized that the tumor origin of Vater's ampulla which was a unique pattern of extension along the MPD with micro-invasion to the pancreas based on the cytokeratin profile of the tumor.

Figure legends

Figure 1. (A) Abdominal CT demonstrated the swelling in the head of the pancreas with a mass in the duodenum. Hypotonic duodenography (B) and endoscopic examination (D) revealed a well-defined mass measuring about 25 mm in size of Vater's ampulla. (C) Magnetic resonance cholongiopancreatography showed slight dilatation of the main pancreatic duct.

Figure 2. The resected specimen of the duodenum confirmed the presence of a mass which measured 22 X 15 mm in size at Vater's ampulla. CBD; common bile duct, MPD; the main pancreatic duct

Figure 3. Low-magification view (A) of histological section of the tumor shows the location of the tumor, common bile duct (CBD) and the main pancreatic duct (MPD). Microscopically, the tumor consisted of two components, moderately differentiated adenocarcinoma (E and F) in the preampullary area and mucinous carcinoma (B) in the center. Although the distal end of the common bile duct and the main pancreatic duct were separately opened to Vater's ampulla, mucinous carcinoma component uniquely extended along only the main pancreatic duct with micro-invasion to the pancreas (G and H). Both strong fibrosis and infiltration of inflammatory cells (D) was observed under the epithelium at Vater's ampulla. However, no neoplastic lesions were observed in the distal end of the common bile duct (C). H&E, A Low-magification view, B x40, C x40 D x40, E x10, F x100, G x10, H x100

Figure 4. The location of the tumor is summarized in this schematic drawing. Immunohistochemically, both moderately differentiated adenocarcinoma and mucinous carcinoma were positive for cytokeratin 20 (CK20) (B and D) and negative for cytokeratin 7 (CK7) (A and C), thus indicating the pattern of intestinal type, carcinoma

of Vater’s ampulla. A x200, B x200, C x200, D x200

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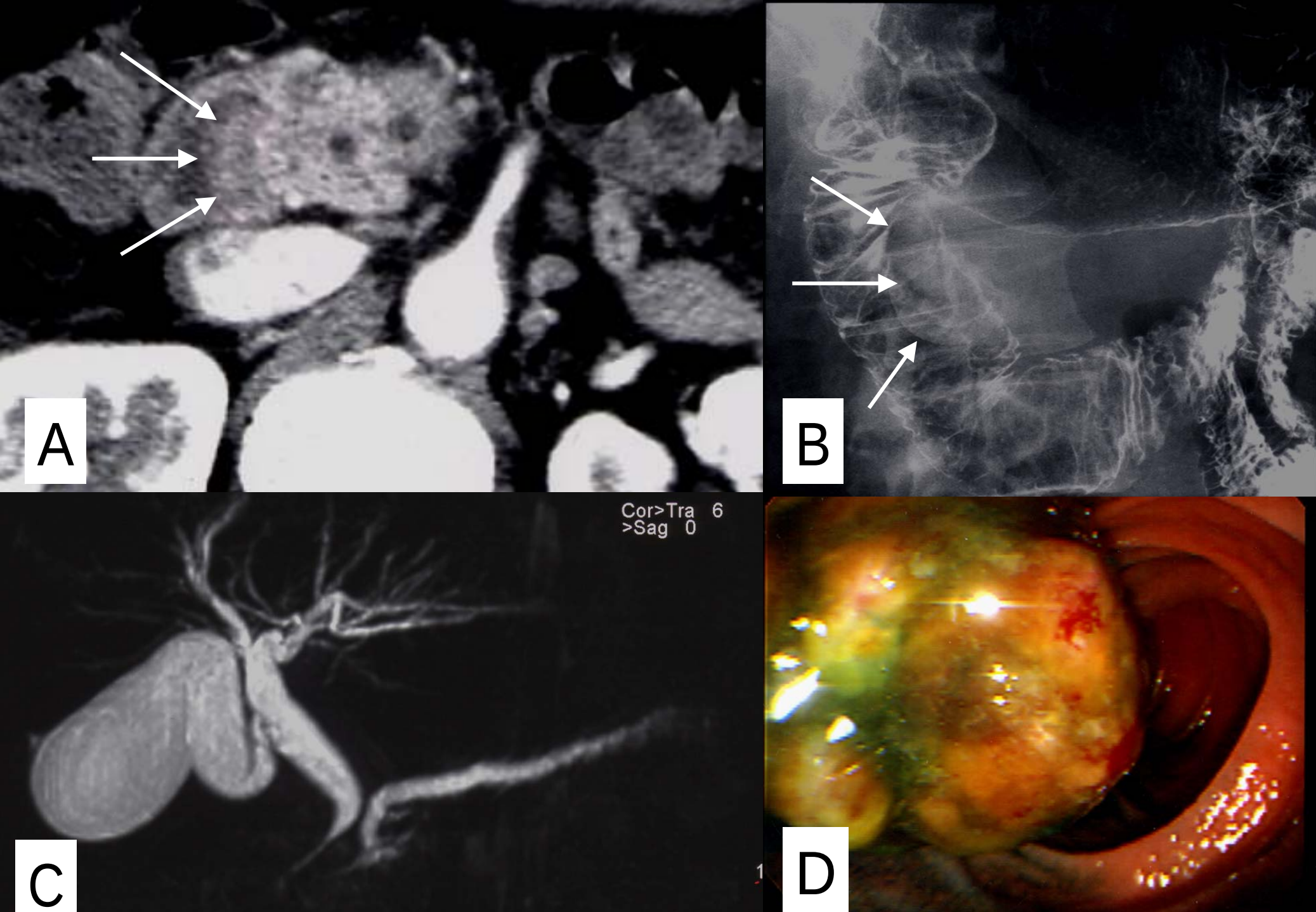
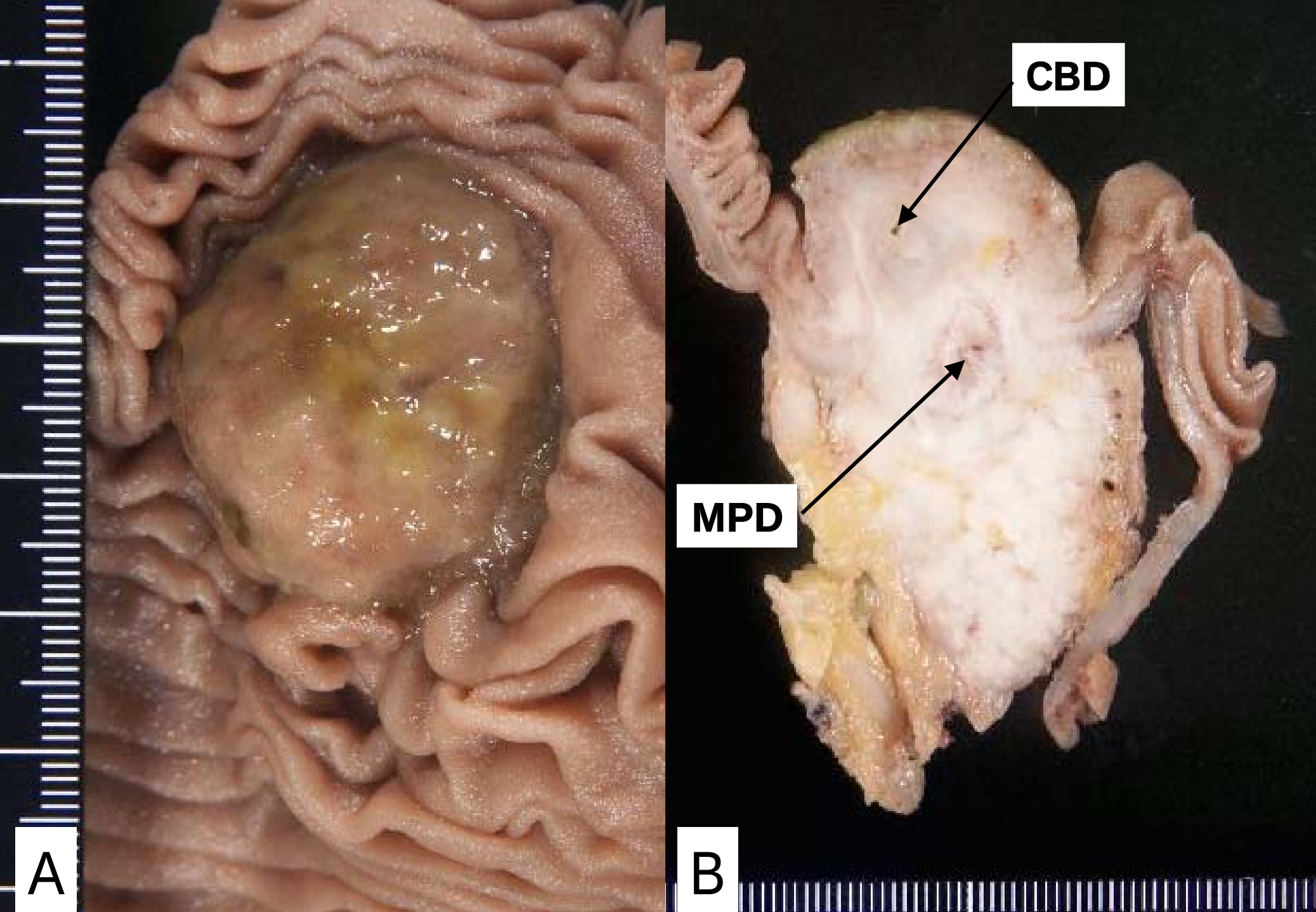
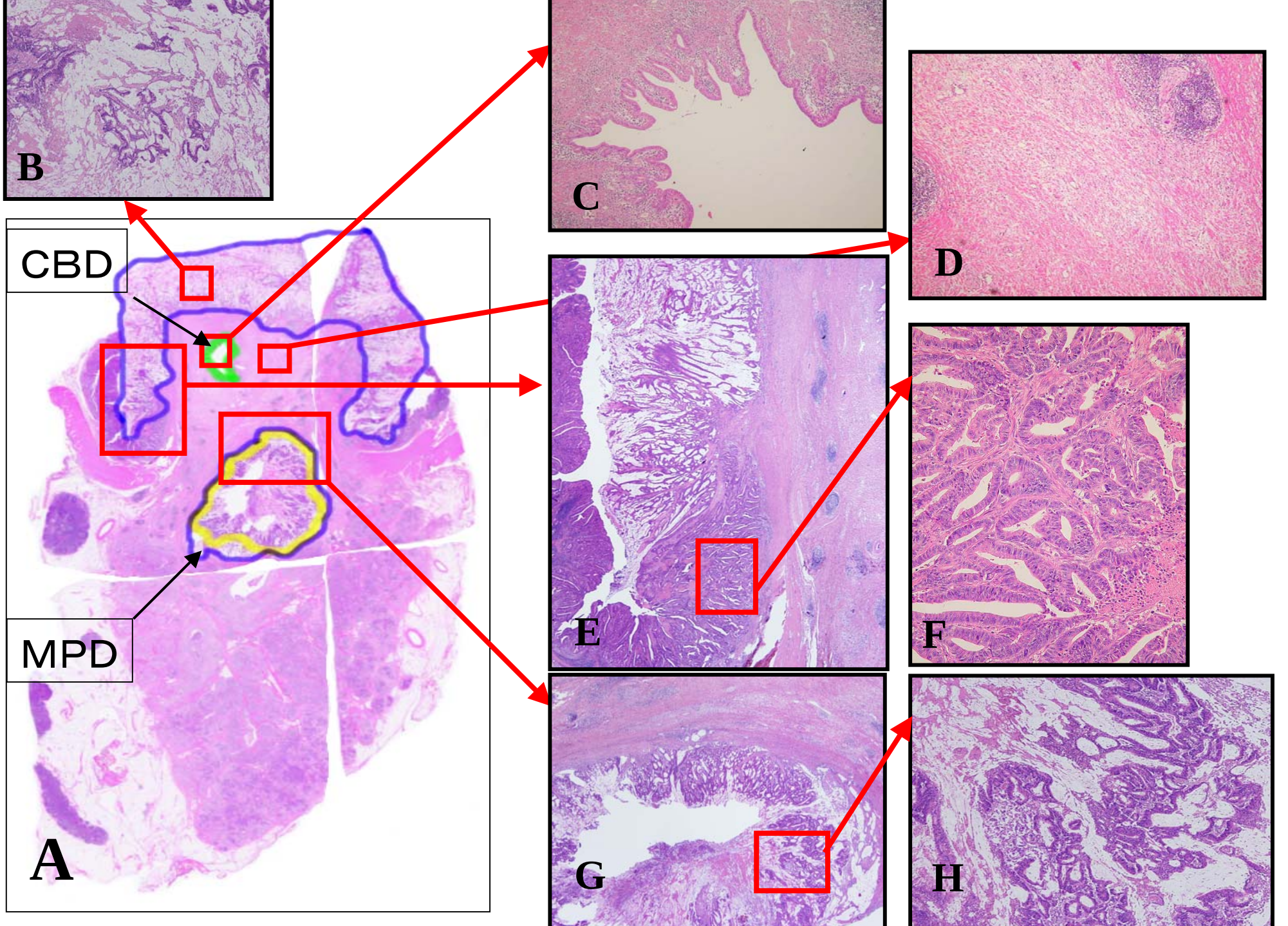
Table 1. Immunohistochemical staining charactristics of normal ampulla of Vater (Reference 4)

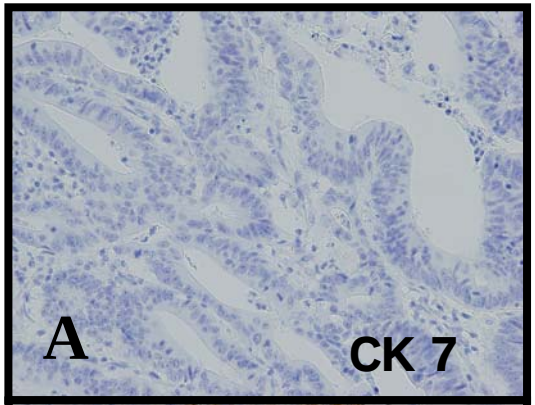
	Duodenum	Ampulla of Vater		Bile Ducts and Main Pancreatic Duct
	Surface Epthelia	Papilla	Common Channel	Surface Epithelia
CK 7	−	−	+	+
CK 20	+	+	−	−

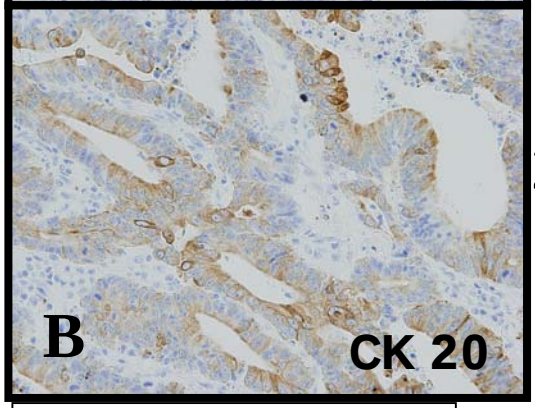
CK; cytockeratin


A
B
Cor>Tra 6
>Sag 0
C
D


A
B
CBD
MPD


B
C
D
CBD
E
F
MPD
A
G
H





Mod. differentiated adenocarcinoma

Mod. differentiated adenocarcinoma

CBD

Portion of micro-invasion

MPD

22 mm

12 mm

Mucinous carcinoma

35 mm

Mucinous carcinoma