The Usefulness of Pancreatoscopic Examination in Patients with Mucinous Ductal Ectasia

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INTRODUCTION

Mucinous ductal ectasia (MDE) is an uncommon disorder characterized by dilatation and filling of the main pancreatic duct or its side branches with thick, viscid mucus and duodenoscopic findings often show-
the pancreatoscopic examination is discussed.

CASE REPORT

Case 1.

A 79-year-old woman was admitted to Asan Medical Center in January 1996. She had suffered from epigastric pain for 2 months before admission and was managed at a private hospital. After radiologic evaluation including abdominal ultrasonography and CT scan, she was transferred to our hospital under the impression of cystic neoplasm of the pancreas.

Physical examination on admission revealed epigastric tenderness without any palpable mass or organomegaly. Laboratory studies showed hemoglobin 12.5 g/dl, white blood cell count 6,600/mm$^3$, total bilirubin 0.9 mg/dL (normal 0.2~1.2), GOT 45 IU/L (normal <40), GPT 38 IU/L (normal <40), alkaline phosphatase 211 IU/L (normal 66~220), fasting serum glucose 95 mg/dL, amylase 35 U/L (normal 60~210) and lipase 49 U/L (normal 23~200).

Ultrasonography and CT scan revealed a $5 \times 6$ cm sized well demarcated cystic lesion in the head of the pancreas. Upstream pancreatic duct was dilated and parenchyma of the body and tail of the pancreas was atrophied. Duodenoscopic findings of the ampulla of Vater demonstrated patulous papillary orifice and extrusion of post-like viscid mucus. ERCP showed cystic dilatation of the main pancreatic duct and amorphous filling defects in the dilated duct (Fig. 1a).

A pancreatoscopy was performed using mother-babyscope (Olympus TJF M20 & CHF B20, Olympus America Inc., Melville, N.Y.) with 4.5 mm outer diameter. The motherscope with 13 mm outer diameter and 5.5 mm instrument channel was inserted to the second portion of duodenum, then 0.035 inch guidewire passed to the main pancreatic duct through the instrumental channel of the motherscope after pancreatic duct cannulation. The babyscope was easily inserted to the main pancreatic duct over the guidewire through

![Fig. 1a](image1.png) Upon balloon pancreatography, the main pancreatic duct is markedly dilated in the head of the pancreas and amorphous filling defects (arrows) are noted in the dilated duct.

![Fig. 1b](image2.png) Pancreatoscopic examination using mother-babyscope shows papillary projections of mucosa covered with whitish mucus in the uncinate portion of the pancreatic duct.
patulous papillary orifice. Sphincterotomy was not necessary due to patulous orifice.

At the head portion of the pancreatic duct where the main tumor was located, the clusters of frog egg-like mucosa covered with whitish mucus were noted and the papillary projections and hyperemic area were also shown (Fig. 1b). Biopsy specimen from the head portion showed mucin-producing tall columnar cells forming papillary ex crescence and cellular atypism. Although the duct of the body area was diffusely dilated and mucin was shown, there were no definite abnormal mucosal projections. The Whipple procedure was performed. Histopathologic examination revealed papillary hyperplasia with cellular atypism and the resection margin was clear.

Case 2.

A 57-year-old man was admitted in December 1995 with right upper abdominal discomfort of 1 month duration. Physical examination on admission revealed mild right upper abdominal tenderness without any palpable mass or organomegaly. Laboratory studies showed hemoglobin of 15.9 g/dL, white blood cell count 10,300/mm$^3$, serum total bilirubin 1.7 mg/dL, GOT 30 IU/L, GPT 23 IU/L, alkaline phosphatase 163 IU/L, fasting serum glucose 91 mg/dL, amylase 161 U/L and lipase 459 U/L. An abdominal CT scan showed clustered small cystic lesions in the neck of the pancreas. During ERCP procedure, a patulous orifice of papilla of Vater was noted with massive mucus extrusion. Pancreatography showed mildly dilated main pancreatic duct and markedly dilated branch ducts in the neck of the pancreas. Amorphous filling defects were noted in the branch ducts (Fig. 2a).

Pancreatoscopy was performed using a duodenoscope (Olympus TJF 200, Olympus America Inc., Melville, N.Y.) and an ultrathin pancreatoscope with 0.75 mm outer diameter (Fujikura FVS-3000, M & M Co., Tokyo, Japan). The 0.035 inch guidewire was inserted to the main pancreatic duct and the guidewire guiding

Fig. 2a. Pancreatography shows mild dilatation of the main pancreatic duct and markedly dilated branch duct in the neck of the pancreas. Amorphous filling defects are visible in the branch duct (arrow).

2b. Upon pancreatoscopy using ultrathin pancreatoscope, papillary protrusion of mucosa and irregular mucosal hyperemia with whitish mucus are noted in the neck portion of the pancreatic duct.
catheter was introduced over the wire. After removal of guidewire, the ultrathin pancreatoscope was introduced through the guiding catheter and inserted to the main pancreatic duct without sphincterotomy. On pancreatoscopy, papillary protrusion of mucosa and irregular mucosal hyperemia with whitish mucus were noted in the neck portion. However, the duct of body and tail showed no specific abnormality other than mild dilatation.

Proximal pancreatectomy was performed with the diagnosis of intraductal mucin producing tumor in the neck portion of the pancreas. The resected specimen showed the tumor located mainly in the orifice of the side branch in the neck of the pancreas and marked dilatation of that side branch filled with gelatinous secretion. Histological examination revealed papillary intraductal adenoma and it consisted of papillary proliferation of various glands in loose stroma. Adjacent parenchyma presented with lesions of chronic pancreatitis, i.e., diffuse fibrosis with inflammatory cell infiltration, mostly by plasma cells. The resection margin was clear. The patient remains well 11 months after surgery without any evidence of tumor recurrence.

**Case 3.**

A 64-year-old man was admitted in May 1996 with 10 kg weight loss for 3 months. He was diagnosed as having diabetes mellitus 1 month ago and had been treated with subcutaneous injection of insulin. Physical examination on admission revealed no specific abnormality in the abdomen. Laboratory studies showed hemoglobin of 11.3 g/dL, white blood cell count 3,500/mm³, total bilirubin 0.4 mg/dL, GOT 25 IU/L, GPT 32 IU/L, alkaline phosphatase 210 IU/L, amylase 157 U/L and lipase 239 U/L. Fasting serum glucose and postprandial serum glucose showed a diabetic pattern. An abdominal CT scan demonstrated massive dilatation of the main pancreatic duct especially in the head. During ERCP procedure, a patulous orifice of

![Fig. 3a. Upon balloon pancreatography, the main pancreatic duct is markedly dilated in the head of the pancreas and pancreatic duct of body and tail is not opacified due to mucus plugging in the main pancreatic duct.](image)

![Fig. 3b. Pancreatoscopic examination using ultrathin pancreatoscope reveals numerous villous mucosal projections with gelatinous mucus in the head portion of the pancreatic duct.](image)
the papilla of Vater was noted with massive mucus extrusion. Pancreatography showed markedly dilated main duct in the head portion of the pancreas and the duct of body and tail was not opacified due to mucus plugging in the main duct (Fig. 3a).

Without sphincterotomy, ultrathin pancreatoscope (Fujikura FVS-3000, M & M Co., Tokyo, Japan) was inserted into the main pancreatic duct. Upon pancreatoscopy, numerous villous mucosal projections with gelatinous mucus were seen in the main duct of the head portion (Fig. 3b). The pancreatic duct of body and tail showed no specific mucosal abnormality other than dilatation of the duct with mucus plugging. Whipple’s operation was performed under the diagnosis of intraductal mucin hypersecreting tumor in the head of the pancreas. Histologic examination revealed the lining ductal epithelium with variable histologic features such as papillary hyperplasia, villous adenoma and multifocal areas of well differentiated adenocarcinoma. The adjacent parenchyma of the pancreas showed severe obstructive pancreatitis and diffuse peri-and intralobular fibrosis. There was no metastasis to the lymph node and the resection margin was clear. The patient is well 6 months after surgery without any complication.

DISCUSSION

Mucinous ductal ectasia has been recently recognized as a distinct pathological entity of the pancreas showing unique endoscopic findings and good prognosis.\(^2,10\) The pathology of MDE can be either hyperplasia, adenoma or carcinoma\(^5\) and surgery can be curative when resectable.\(^9\) The ampulla of MDE shows characteristic finding of patulous papilla with mucous extrusion. Therefore, the cannulation of the main pancreatic duct is easy and the insertion of pancreatoscope to the main pancreatic duct can be done without difficulty. In our three cases, the insertions of pancreatoscope were successfully performed without sphincterotomy.

The reports on the pancreatoscopic findings of MDE and the usefulness of pancreatoscopy are very scarce in the English literature. Ozkan H reported the usefulness of peroral transpapillary pancreatoscopy in the diagnosis of mucin-producing tumor of the pancreas.\(^11\) In our first case, the pancreatoscopy revealed large amount of mucin and papillary projections of mucosa in the main pancreatic duct. Clusters of frog egg-like mucosa were also noted. These findings correspond to the macroscopic and histologic findings of MDE initially described by Nagai.\(^5\) In the second case, papillary protrusion of mucosa and irregular mucosal hyperemia were noted along with whitish mucus. MDE is also termed like an intraductal mucin-hypersecreting tumor\(^3\) or an intraductal papillary mucinous neoplasm\(^5\) and as the name suggests, production of excessive mucus and papillary projections of hyperplastic mucosa are characteristic findings. These lesions can be identified by pancreatoscopy without difficulty.

In fact, the diagnosis of MDE is not so difficult because MDE has characteristic endoscopic and pancreatographic findings\(^9\) but according to our experience, pancreatoscopy can give additional informations. In patients with MDE, large amount of mucin is retained in the pancreatic duct and main pancreatic duct cannot be well delineated frequently due to mucus plug (case 1 and 3). Sometimes it is difficult to differentiate intraductal filling defect whether it is caused by mucin or neoplastic mass. Pancreatoscopy can easily differentiate intraductal mass from mucin. In our three cases, intraductal papillary or villous mucosal projections with excess mucus production were noted. For some authors, these endoscopic appearances are so characteristic that a clear preoperative endoscopic diagnosis can be made.\(^11\)–\(^13\) Secondly, biopsy can be taken from suspicious mucosal lesion under direct vision when mother-babyscope is used.
Thirdly, pancreatoscopy of MDE may provide valuable informations in determining the extent of the lesion for selection of the best surgical procedure. Abdominal CT scan and ERCP may localize the main pathologic lesion of the pancreas usually by detecting cystic dilatation of the duct representing the secondary change associated with MDE. In cases of MDE, however, not only the pancreatic duct near the main lesion but also the duct proximal to the pathologic area might be dilated due to partial obstruction of the ducts by mucin or due to the abnormal ductal dysplastic epithelium. Therefore, the area of dilated pancreatic duct and the extent of the pathology may not be identical. In case 1, we could not define the extent of the lesion by imaging diagnostic modalities alone. However, on pancreatoscopic examination, the abnormal mucosa was confined to the head portion of the main pancreatic duct. Therefore, we resected the pancreas partially without total pancreatectomy which can lead to a severe long term morbidity such as diabetes.

In conclusion, pancreatoscopy, which allows a precise macroscopic differentiation of intraductal lesions, may help to facilitate a preoperative diagnosis and determine the extent of the lesion.

SUMMARY

We report three cases of mucinous ductal ectasia which was suggested by the abdominal computed tomography and finally diagnosed by the duodenoscopy with pancreatoscopy. Duodenoscopic findings of ampulla Vater demonstrated patulous papillary orifice and extrusion of viscid mucus. Pancreatoscopic examination was performed in all three cases and characteristic findings such as papillary or villous mucosal projections coated with whitish gelatinous mucus were noted. In patients of mucinous ductal ectasia with an equivocal radiologic appearance, pancreatoscopic examination may give valuable information in the differential diagnosis of amorphous filling defects in the main pancreatic duct and may provide some information in determining the extent of pathology and the resection margin.

Key Words: Mucinous ductal ectasia, Pancreatoscopy

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