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# Utility of endoscopic transpapillary pancreatic cyst drainage for intraductal papillary mucinous neoplasm infection

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## SUMMARY

A 61-year-old woman with intraductal papillary mucinous neoplasm (IPMN) infection, who was treated with antibiotics, developed IPMN reinfection with febrile epigastric pain and was febrile. CT showed that the diameter of the IPMN had grown and hardened, with thickening of the cyst wall. Endoscopic retrograde pancreatography was then performed and a nasopancreatic cyst drainage tube was placed into the cyst. Symptoms and inflammatory findings improved considerably 17 days after endoscopic drainage. Few reports and evidence have been found regarding IPMN infections, and the frequency of onset, route of infection and optimal drainage method remain unknown. This study indicated that endoscopic transpapillary pancreatic cyst drainage was effective and is highly recommended for IPMN infection.

## BACKGROUND

Advancements in cross-sectional imaging, for example, CT and MRI, have allowed frequent detection of pancreatic cystic lesions, often incidentally.<sup>1</sup> Approximately 50% of all pancreatic cystic lesions are pancreatic cystic neoplasms (PCNs),<sup>2</sup> among which, intraductal papillary mucinous neoplasms (IPMNs) are the most common,<sup>3</sup> with an estimated prevalence of 26/100 000.<sup>4</sup> In Japan, IPMN is often treated in accordance with the International Consensus Guideline.<sup>5</sup> Considering that IPMN produces mucin, acute pancreatitis caused by a large amount of mucin has been recognised as a major adverse event in IPMN<sup>6 7</sup> along with concomitant pancreatic ductal adenocarcinoma and extrapancreatic malignancies.<sup>8</sup> In contrast, given the limited reports on IPMN infection as an adverse event, its frequency, infection mechanism, appropriate treatment and relation of malignancy have not been clarified.

We, herein, report a case of IPMN infection that was successfully treated with endoscopic transpapillary pancreatic cyst drainage without malignant findings.

## CASE PRESENTATION

A 61-year-old woman diagnosed with IPMN through magnetic resonance cholangiopancreatography and endoscopic ultrasonography (EUS) 5 years prior to presentation (figure 1) was admitted to our facility with fever and epigastric pain that persisted for 2 days with her body temperature reaching 38.2°C.

Approximately 20 months prior to presentation, the patient was treated for IPMN infection, which improved through antibiotics alone and without cyst drainage. Follow-up MRI had been continued every 6 months. Although the diameter grew slowly, no reinfection and malignant signs, such as high-risk stigmata (HRS), were observed.

When presenting at our facility, her symptoms were very similar to those of the previous IPMN infection, and we suspected IPMN reinfection.

## INVESTIGATIONS

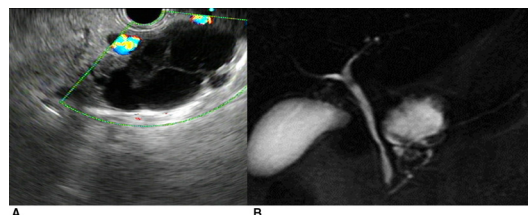
Blood tests revealed a marked inflammatory response:  $23.3 \times 10^9$  white cell count/L, 27.9 µg/mL C reactive protein, and 3.89 ng/mL procalcitonin. Pancreatic enzyme and all tumour markers were within the reference range (table 1). Contrast-enhanced CT revealed that IPMN had grown from 34.2 to 47.2 mm, with a hardening of the cyst, thickening of the cyst wall, and existence of a dirty fat sign around the cyst (figure 2).

## DIFFERENTIAL DIAGNOSIS

Patients who present with a connection route between the main pancreatic duct (MPD) and cyst may have branch duct-type IPMN (BD-IPMN), retention cyst, and pancreatic pseudocyst caused by pancreatitis. A connection between multilocular cysts and the MPD is a typical finding in BD-IPMN. However, no findings of acute pancreatitis, such as elevated pancreatic enzymes and pancreatic swelling, were noted. Given that the inflammatory sign was localised around the cyst, IPMN infection was considered.

## TREATMENT

The patient received the same antibiotics as on previous presentation, but the inflammatory



**Figure 1** Endoscopic ultrasound image and MR cholangiopancreatography imaging 5 years prior to presentation. The maximum diameter of the cyst was 34.2 mm. The pancreatic cyst was multilocular (A) and connected to the main pancreatic duct (B).



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**Table 1** Blood test results on admission

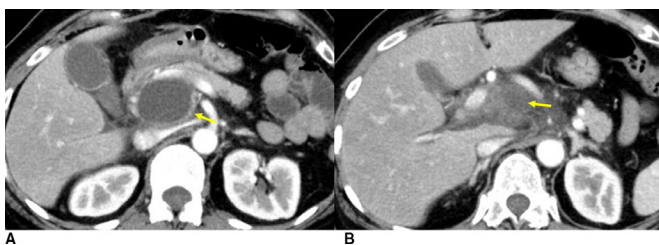
<Complete blood count>			<Biological examination>		
RCC	4.58×10 <sup>12</sup>	/L	Na	137	mEq/L
Hgb	13.6	g/dL	K	3.1	mEq/L
Plt	23.8×10 <sup>4</sup>	/μL	Cl	96	mEq/L
WCC	23.3×10 <sup>9</sup>	/L	Alb	4.1	g/dL
<Blood coagulation test>			BUN	13.3	mg/dL
PT	89.0	%	Cr	0.50	mg/dL
APTT	39.5	sec	T-Bil	3.3	mg/dL
FDP	5.0	μg/mL	D-Bil	0.8	mg/dL
D-dimer	0.7	μg/mL	ALP	222	IU/L
<Tumour marker>			γGTP	69	IU/L
			AST	40	IU/L
CEA	1.4	ng/mL	ALT	58	IU/L
CA19-9	19.9	U/mL	Amylase	71	IU/L
Span-1	15.3	U/mL	Lipase	125	IU/L
DUPAN-2	25	U/mL	CRP	27.9	mg/dL
			PCT	3.89	ng/mL

Alb, Albumin; ALP, alkaline phosphatase; ALT, alanine aminotransferase; APTT, activated partial thromboplastin time; AST, aspartate aminotransferase; BUN, blood urea nitrogen; CA19-9, carbohydrate antigen; CEA, carcinoembryonic antigen; Cl, chlorine; Cr, creatinine; CRP, C reactive protein; D-Bil, direct bilirubin; DUPAN-2, duke pancreatic monoclonal antigen type 2; FDP, fibrin and fibrinogen degradation products; γGTP, γ-glutamyltransferase; Hgb, haemoglobin; K, potassium; Na, sodium; PCT, procalcitonin; Plt, platelet; PT, prothrombin time; RCC, red cell count; Span-1, S-pancreas-1 antigen; T-Bil, total bilirubin; WCC, white cell count.

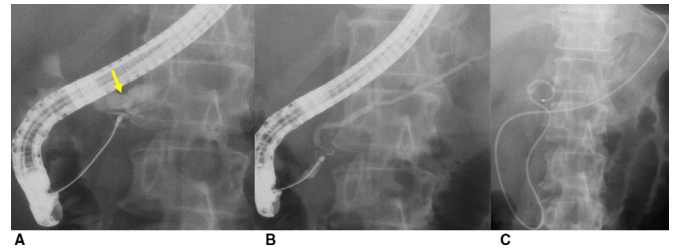
response had progressed further. Cyst drainage was required to control inflammation, and endoscopic transpapillary pancreatic cyst drainage was performed (figure 3). No expansion of the pancreatic duct orifice and mucus drainage in duodenal papilla was observed. The diameter of the MPD was slightly dilated to 3.4 mm; the cyst connected with the MPD was visualised using endoscopic retrograde pancreatography. A catheter was inserted into the cyst, and a viscous yellowish-white pus was aspirated from it (figure 4). A nasocystic drainage tube (Cook Medical Japan, Tokyo, Japan) was placed into the cyst and continuous drainage was performed.

**OUTCOME AND FOLLOW-UP**

Follow-up contrast-enhanced CT revealed improvement in cyst hardness and cyst wall thickness, and the dirty fat sign around the cyst disappeared (figure 5). Both inflammatory response and abdominal symptoms improved 17 days after drainage, whereas the drainage tube was removed 21 days later. *Klebsiella pneumoniae* was detected in the pus bacterial culture, whereas negative findings were found on blood culture. Cytological examination of the cyst fluid revealed only inflammatory cells against a mucus background. Owing to the absence of neoplastic



**Figure 2** CT images on admission. The maximum diameter of the cyst increased to 47.2 mm. The cyst wall thickened (A: arrow) and a dirty fat sign was again recognised around the cyst (B: arrow).



**Figure 3** Endoscopic retrograde pancreatography images. The pancreatic cyst was connected to the main pancreatic duct (A: arrow). The diameter of main pancreatic duct was 3.4 mm (B). The catheter was placed transpapillary into the cyst (C).

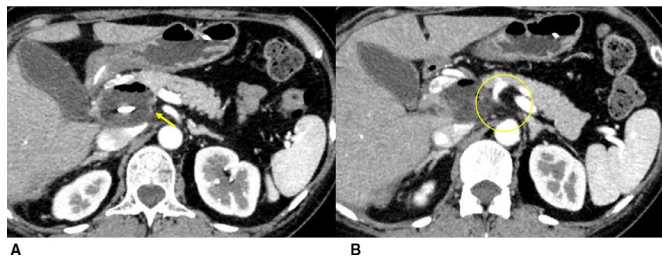
cells, the patient’s disease was categorised as class II (figure 6). Although the cyst did not disappear, she was discharged without an internal fistula for cyst drainage considering the improvement of the infection.

**DISCUSSION**

The current study highlights the utility of transpapillary pancreatic cyst drainage in the treatment of infection to prevent dissemination. Currently, pancreatic cyst drainage can be performed through not only the transpapillary approach but also transmural technique with EUS.<sup>9</sup> However, the transmural technique with EUS is generally performed for non-PCN conditions, such as pancreatic pseudocysts and walled-off necrosis. The international consensus guidelines<sup>5</sup> do not recommend the transmural technique with EUS for both cell sampling and drainage in patients with PCN due to the possibility of neoplastic cell dissemination. Lerch *et al* reported that transpapillary pancreatic cyst drainage is perhaps the least traumatic procedure for pancreatic cysts connected to the MPD.<sup>10</sup> Watanabe *et al*, who investigated IPMN infection similar to the present report,<sup>11</sup> also recommended transpapillary drainage and succeeded in placing an indwelling drainage tube into the IPMN. Despite the unclear route of infection in IPMN, some studies have suspected retrograde infection, which involves bacterial translocation of the



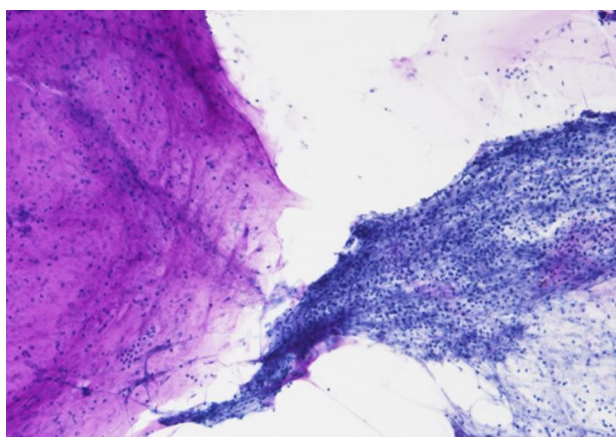
**Figure 4** The drained fluid showing yellowish-white pus.



**Figure 5** CT images after the successful drainage. The cyst hardness and cyst wall thickness improved (A: arrow) and the dirty fat sign around the cyst disappeared (B: circle).

intestinal flora more commonly observed in acute pancreatitis than in transpapillary infection.<sup>11</sup> Moreover, the cyst is thought to be directly infected without passing through the papilla. It is possible that the infection did not improve with MPD drainage only because it was not a transpapillary infection. Because no signs of obstruction were observed in the MPD of the current case, the drainage tube could be placed directly into the cyst for better drainage (instead of in the MPD), which also improved infection control.

The predictive factors of malignant IPMN have been previously identified, with several features having been associated with the presence of symptoms, such as diabetes, jaundice, tumour size and dilatation of the MPD.<sup>12</sup> In a case report involving IPMN infection,<sup>11</sup> in which one case was diagnosed with moderate dysplasia and another with invasive tubular adenocarcinoma using surgical specimens, surgical resection soon after drainage was strongly recommended. Because the current case was categorised as class II without neoplastic cells following cytological examination of cyst fluid and did not have HRS, we decided that the findings suggestive of malignant IPMN were poor. Even after 24 months, the IPMN did not show signs of malignancy. IPMN infection may be one of the findings of malignancy; therefore, it is necessary to carefully consider the indications for surgical resection after preoperative evaluation, including cytological



**Figure 6** Cytological examination of the cyst fluid (PAS staining). Only inflammatory cells against a mucus background were observed without neoplastic cells. PAS staining, Periodic Acid Schiff staining.

examination and consultation with the surgical department, and to closely follow-up the patient to identify findings suggesting malignancy.

### Learning points

- ▶ Endoscopic transpapillary cyst drainage is an effective and safe method for managing intraductal papillary mucinous neoplasm (IPMN) infection with an obvious connection to the main pancreatic duct.
- ▶ IPMN infection is a rare symptom that can be caused by bacterial translocation of the intestinal flora.
- ▶ Although symptomatic IPMN is considered a risk factor for malignancy in IPMN, surgical indications should be carefully considered in IPMN infections.

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