

# Part 4

## ERCP EUS

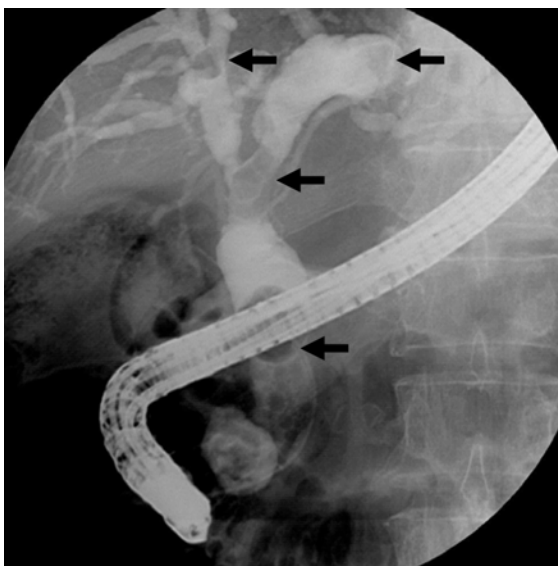
### Case 1

Wiriaporn Ridtitid, MD.

Rungsun Rerknimitr, MD.

An 85-year-old man presented with fever, jaundice and right upper quadrant pain for 2 days. He had a history of an open cholecystectomy during the last 20 years. An upper abdominal ultrasonography showed diffuse common bile duct and intrahepatic bile ducts dilatation.

Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Cholangiogram showed multiple round filling defects varying in sizes in common bile duct and both intrahepatic bile ducts (black arrows), the largest was 1.5 cm. in diameter,

The diagnosis is **common bile duct and intrahepatic ducts stones.**

Mechanical lithotripsy and biliary orifice dilation with controlled radial expansion (CRE) balloon (diameter range of 15-18 mm.) were performed to extract stones as shown in figures A and B.



### Discussion:

ERCP with sphincterotomy (EST) with stone extraction is a well-established therapeutic procedure for the treatment of bile duct stones. The rate of successful extraction declines with the increasing size of stone. Generally, bile duct stones up to 1.5 cm. in diameter can be extracted after EST<sup>1</sup>. Majority of CBD stones (85% to 90%) can be removed with a Dormia basket or balloon catheter. Methods for managing “difficult stones” include mechanical lithotripsy, intraductal shock wave lithotripsy, extracorporeal shock wave lithotripsy, chemical dissolution, and biliary stenting<sup>2</sup>. Some studies have shown that papillary balloon dilation with CRE balloon after endoscopic sphincterotomy is an effective and safe technique for retrieval of large common bile duct stones<sup>3,4</sup>.

### References

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2. Binmoeller KF, Schafer TW. Endoscopic management of bile duct stones. *J Clin Gastroenterol* 2001;32:106-18.
3. Ersoz G, Tekesin O, Ozutemiz AO, et al. Biliary sphincterotomy plus dilation with a large balloon for bile duct stones that are difficult to extract. *Gastrointest Endos* 2003;57:156-9.
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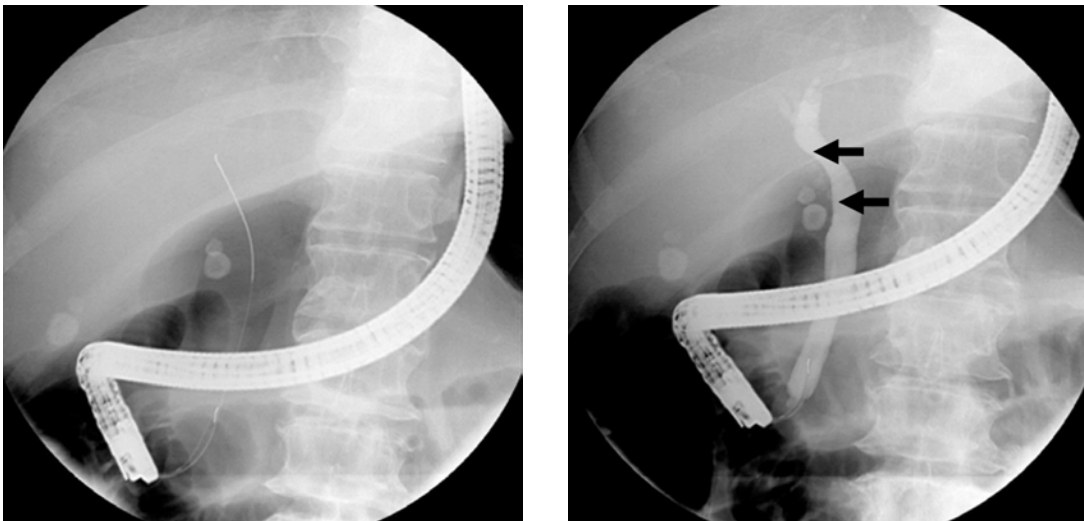


Wiriyaorn Ridtitid, MD.

Rungsun Rerknimitr, MD.

A 49-year-old man presented with fever and right upper quadrant pain for 2 days. He had an underlying end-stage renal disease and undergoing regular hemodialysis. Physical examination revealed mild jaundice and right upper quadrant tenderness.

Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Cholangiogram showed gallstones and a few stones in the cystic duct with extrinsic compression of the common hepatic duct (black arrows).

The diagnosis is **acute cholecystitis with type I Mirizzi syndrome**.

Standard sphincterotomy, balloon extraction, and cystic duct stent insertion was performed as shown. Two weeks later, cholangitis improved and open cholecystectomy was done electively.



### Discussion:

Mirizzi syndrome is a rare complication of cholelithiasis that accounts for 1% of all patients with gallstone disease. This syndrome is a form of obstructive jaundice caused by either a stone impacting gallbladder neck or the cystic duct that impinges on the common hepatic duct with or without a cholecystocholedochal fistula.<sup>1</sup> Management of this syndrome is extremely varied. Recently, endoscopic therapy has been increasingly used in the evaluation and treatment of patients with Mirizzi syndrome. Endoscopic treatment is preferred in a high operative risk patient. Outcomes in several small case series suggested that endoscopic placement of a double-pigtail stent between the gallbladder and the duodenum via the cystic and common bile ducts may prevent or treat symptoms caused by gallbladder disease<sup>2,3</sup>.

### References

1. Yonetci N, Kutluana U, Yilmaz M, et al. The incidence of Mirizzi syndrome in patients undergoing endoscopic retrograde cholangiopancreatography. *Hepatobil Pancreat Dis Int* 2008;7:520-4.
2. Conway JD, Russo MW, Shrestha R. Endoscopic stent insertion into the gallbladder for symptomatic gallbladder disease in patients with end-stage liver disease. *Gastrointest Endosc* 2005;61:32-6.
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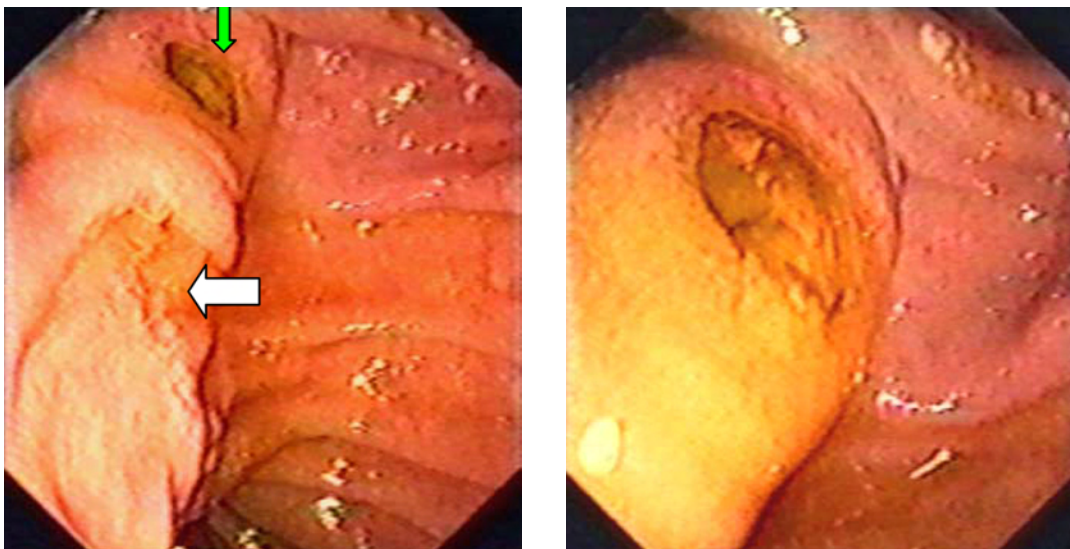


## Case 3

Boonlert Imraporn, MD.

Rungsun Rerknimitr, MD.

A 65-year-old woman had abdominal pain for several months. She developed fever for one week. Physical examination revealed mild jaundice and tenderness at RUQ without mass. Ultrasonography of the abdomen showed an evidence of cholecystitis with common bile duct stones. The side view duodenoscopy was done and showed as figure.



In this case, the side view duodenoscopic demonstrated a small fistula (green arrow) containing stone above the major ampulla (white arrow). ERCP showed choledocho-duodenal fistula and visible stone in the common bile duct. Standard sphincterotomy with stone extraction was successfully performed.

### Diagnosis:

An impact stone at the choledochoduodenal fistula site

## Discussion:

Ninety percent of internal biliary fistulae are choledochoduodenal type. The fistula originated from penetration of bile duct stone into the duodenum through a part of common bile duct or hood of the ampulla. Other rare causes are chronic duodenal ulcer<sup>2</sup>, periampullary tumor invasion, post-cholecystectomy, post-sphincterotomy, choledochostomy, papillitis and pancreatitis. These fistula can be classified into proximal type and distal (peripapilla) type. Choledochoduodenal fistula from cholecystectomy usually causes proximal type. The risk factors of choledochoduodenal fistula include the presence of common bile duct stones, a prolonged history of stones and recurrent episodes of cholangitis<sup>1</sup>. The decision to perform endoscopic sphincterotomy depends on the size of the fistula and surrounding deformity of mucosa. Generally, endoscopic sphincterotomy can be performed from the orifice of the ampulla through the opening of the fistula.

## References

1. Sheu BS, Shin JS, Lin XZ, et al. Clinical analysis of choledochoduodenal fistula with cholelithiasis in Taiwan: assessment by endoscopic retrograde cholangiopancreatography. The American journal of gastroenterology 1996;91:122-6.
2. Naga M, Mogawer MS. Choledochoduodenal fistula: a rare sequel of duodenal ulcer. Endoscopy 1991;23:307-8.

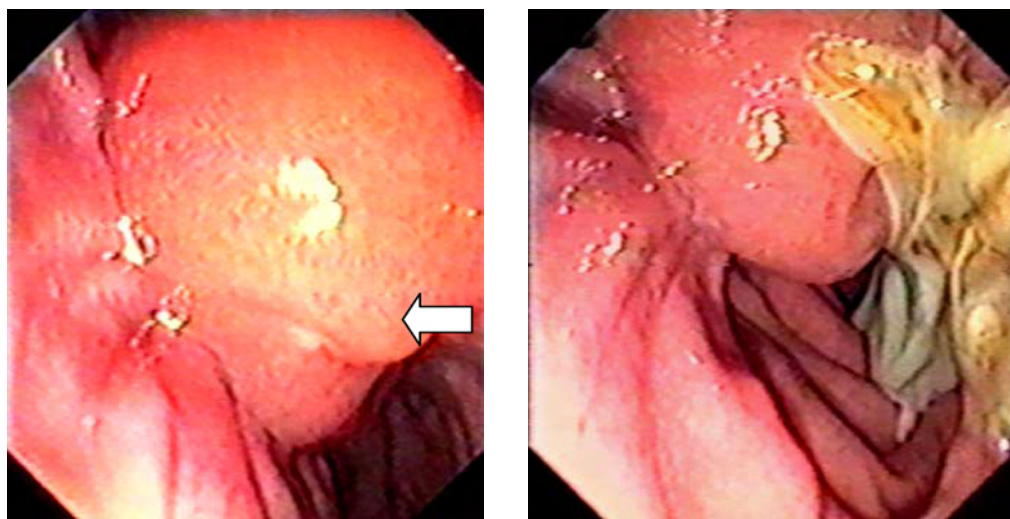


Boonlert Imraporn, MD.

Rungsun Rerknimitr, MD.

A 54-year-old woman with diabetes mellitus and hypertension developed right upper quadrant abdominal pain and fever with chill for two days. The physical examination showed mild jaundice. The abdominal ultrasound showed the evidence of acute cholecystitis and mildly dilated common bile duct without demonstrable stone.

A side view duodenoscopy was done as shown.



In this case, a side view endoscopy revealed an abnormal round bulging of the ampulla of Vater (white arrow). During manipulation for biliary cannulation, yellow and turbid fluid gushed out from the ampulla. The diagnosis was **acute suppurative cholangitis**. Biliary drainage was performed to decompress the system and to ensure improvement of the infection.

**Differential diagnoses** are intrapapillary mucinous producing neoplasia (IPMN), ampullary adenoma, submucosal lesion of the ampulla, duodenal duplication and choledochocoele.

## Discussion:

Acute suppurative cholangitis is a severe life-threatening condition which requires emergent, prompt and appropriate management. Immediate administration of empirical antibiotics and biliary drainage should be performed. The biliary drainage involves surgical, endoscopic and percutaneous drainage. In the past, most patients require surgical drainage but this carries significant morbidity and mortality<sup>1</sup>. Endoscopic drainage including sphincterotomy with stone extraction or a nasobiliary drainage is now a better treatment<sup>2</sup>.

## References

1. Magun A. Acute cholangitis--endoscopic drainage or emergency surgery? *Gastroenterology* 1990;99(5):1530-1.
2. Lee DW, Chan AC, Lam YH, Ng EK, Lau JY, Law BK, et al. Biliary decompression by nasobiliary catheter or biliary stent in acute suppurative cholangitis: a prospective randomized trial. *Gastrointest Endosc* 2002;56:361-5.



Wiriaporn Rittitid, MD.

Rungsun Rerknimitr, MD.

A 52-year-old female was admitted for an elective laparoscopic cholecystectomy (LC). Four days after LC, she developed acute fever and abdominal pain.

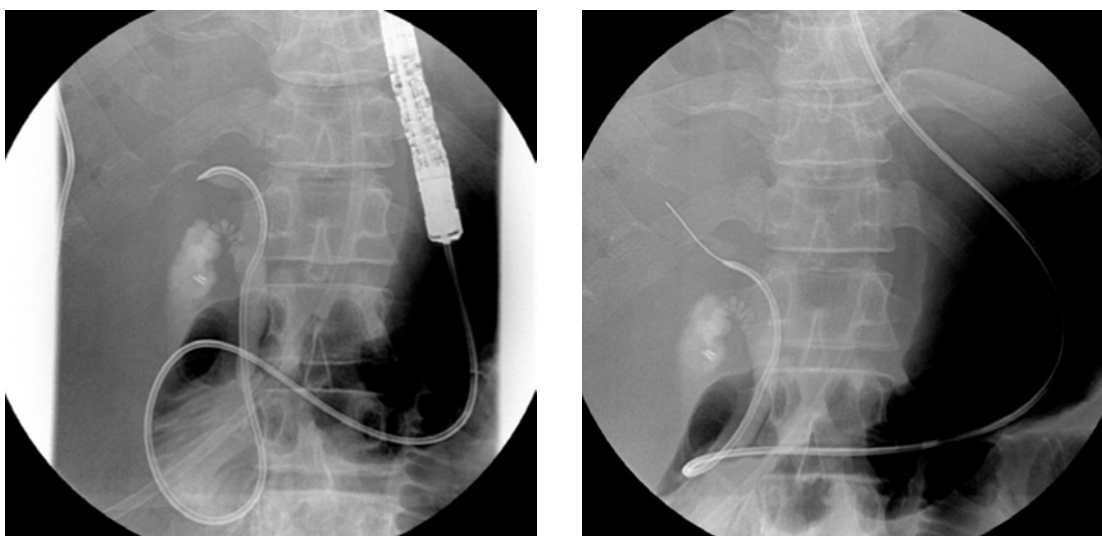
Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Cholangiogram showed an extravasation of contrast from the cystic duct stump.

The diagnosis is **cystic duct stump leakage**.

Nasobiliary tube (NBT) was inserted in across the leakage site as shown. One month later, tube was removed after a complete resolution of leakage was confirmed by a repeat cholangiogram.



### Discussion:

The incidence of bile duct injury during laparoscopic cholecystectomy (LC) was reported to be 0.3-0.5% in several series<sup>1</sup>. When bile leakage is suspected after operation, visualization of the biliary tract by ERCP is required to confirm the diagnosis, to locate the exact site of the defect and to exclude the presence of retained biliary stones. ERCP with biliary stent or drain placement is the procedure of choice for treatment of post-cholecystectomy bile duct leaks. Endoscopic therapy with either a nasobiliary drain or internal stent facilitates normal bile flow and leak closure. Endoscopic drainage appears to reduce the transpapillary pressure gradient, diverting bile into the duodenum and away from the site of leakage<sup>3</sup>.

### References

1. Larson GM, Vitale GC, Casey J, et al. Multipractice analysis of laparoscopic cholecystectomy in 1983 patients. Am J Surg 1992;163:221-6.
2. Ryan ME, Geenen JE, Lehman GA, et al. A. Endoscopic interventions for biliary leaks after laparoscopic cholecystectomy: a multicenter review. Gastrointest Endos 1998;47:261-6.
3. Pinkas H, Brady PJ. Biliary leaks after laparoscopic cholecystectomy: time to stent or time to drain. Hepatobiliary Pancreat Dis Int 2008;7:628-32.

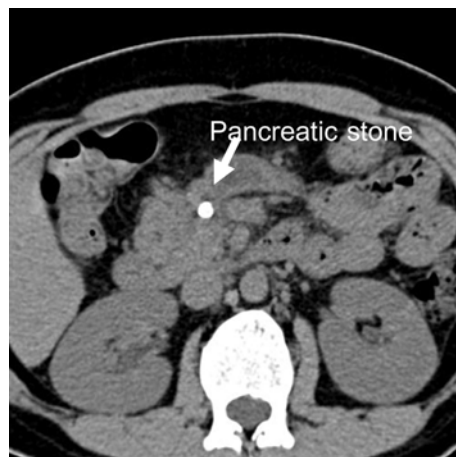
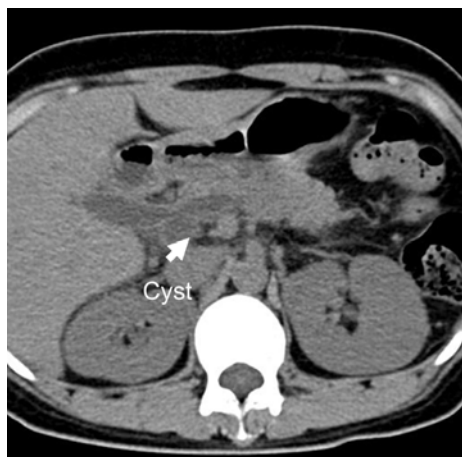


Wiriaporn Ridtitid, MD.

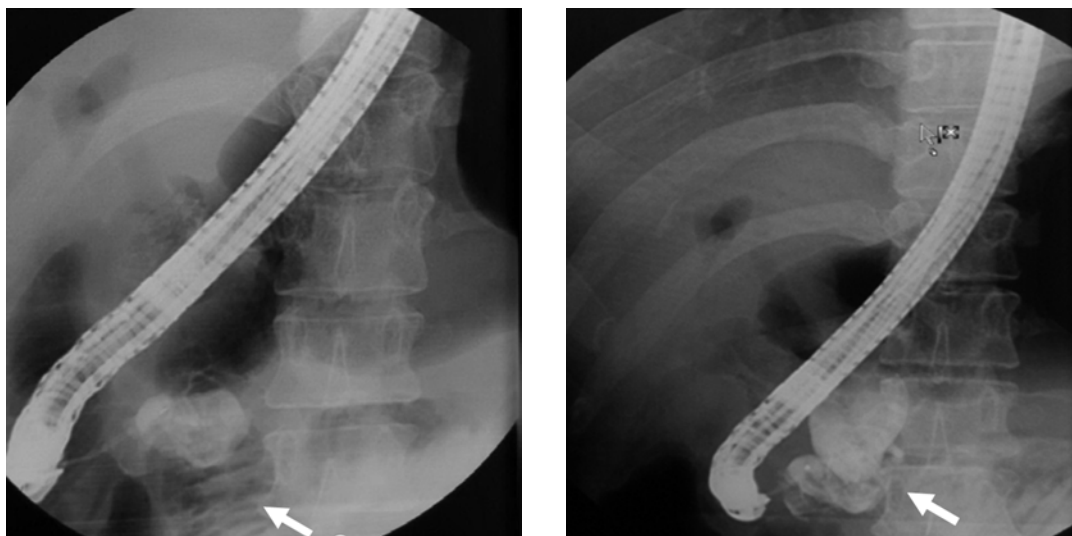
Rungsun Rerknimitr, MD.

A 28-year-old man presented with acute epigastric pain for 3 hours. She had a history of cholecystectomy since she was 11 years old. Serum amylase level was 1,219 U/L.

CT scan of the upper abdomen revealed a focal enlargement of pancreatic head. Focal dilatation of pancreatic duct at the head and uncinate process with a 0.6 cm. stone was also noted. Dilatation of distal common bile duct and a 2.6x2.8x1 cm. cyst in the pancreatic head with continuation to dilated pancreatic duct was observed.



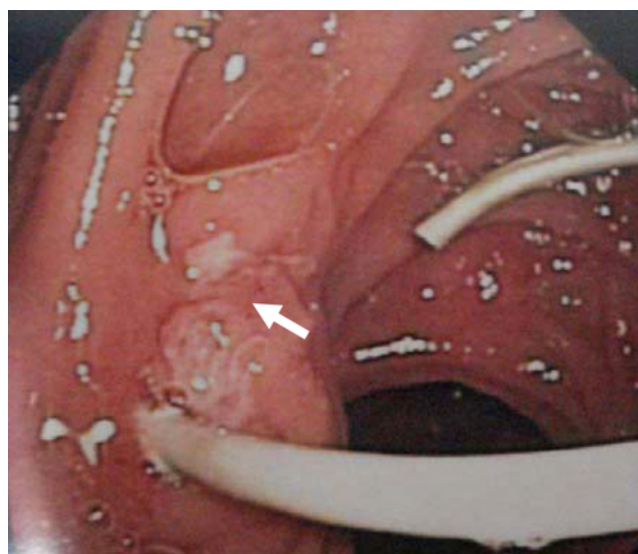
Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Pancreatogram showed a cystic portion of pancreatic head communicated with main pancreatic duct and contained multiple filling defects.

The diagnosis is **remnant choledochal cyst with pancreatic stone causing acute pancreatitis.**

During contrast injection, 3 whitish stones were found draining from the ampulla (white arrow). Pancreatic sphincterotomy and pigtail stent (5 Fr 5 cm.) was inserted into pancreatic duct.



## Discussion:

Choledochal cyst is a rare congenital anomaly of the biliary tract. The characteristics are cystic dilatation of the extrahepatic and/or intrahepatic bile ducts. Majority (80%) are diagnosed before 10 years of age. The main treatment is surgical excision. Post surgical complications are cholangitis, bile stone formation, anastomotic stricture, malignancy, and pancreatitis<sup>1-3</sup>. There were 3 reported cases of pancreatitis where the initial surgery was performed during childhood. All 3 cases had markedly dilated choledochal remnant in the pancreatic head, this may be implied to stagnation of pancreatic juice<sup>2</sup>. Three possibilities for the remnant dilatation are incomplete resection of the cyst, high intraluminal pressure of the pancreatic duct, and protein plug theory by pancreatic ductal calculi<sup>1-3</sup>.

## References

1. Ishibashi T, Kasahara K, Yasuda Y, Nagai H, Makino S, Kanazawa K. Malignant change in the biliary tract after excision of choledochal cyst. *Br J Surg* 1997;84:1687-91.
2. Komuro H, Makino SI, Yasuda Y, Ishibashi T, Tahara K, Nagai H. Pancreatic complications in choledochal cyst and their surgical outcomes. *World J Surg* 2001;25:1519-23.
3. Koshinaga T, Wakabayashi K, Inoue M, Sugito K, Ikeda T, Hagiwara N, et al. Pancreatitis after a primary and secondary excision of congenital choledochal cysts. *Surg Today* 2006;36:686-91.



## Case 7

Wiriaporn Ridtitid, MD.

Rungsun Rerknimitr, MD.

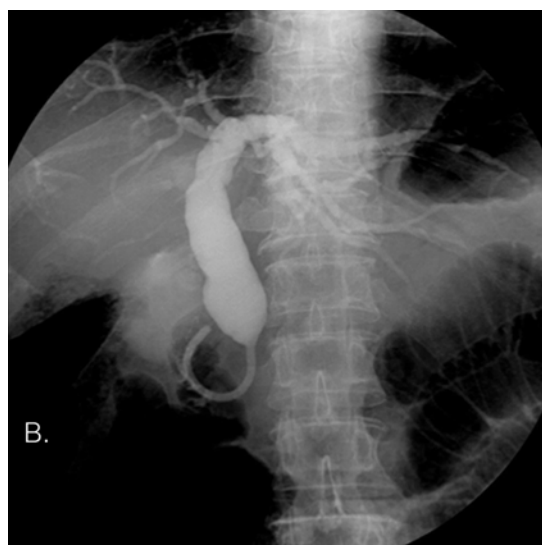
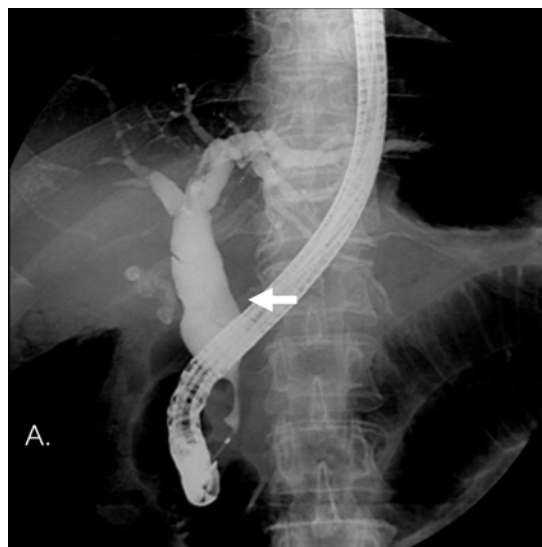
A 63-year-old man presented with painless jaundice for 5 months. Liver function test showed cholestatic pattern. Serum IgG4 level was 1670 mg/dl. CT scan of the upper abdomen revealed prominent pancreatic head with a suspicion for an ill defined mass like lesion. Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.

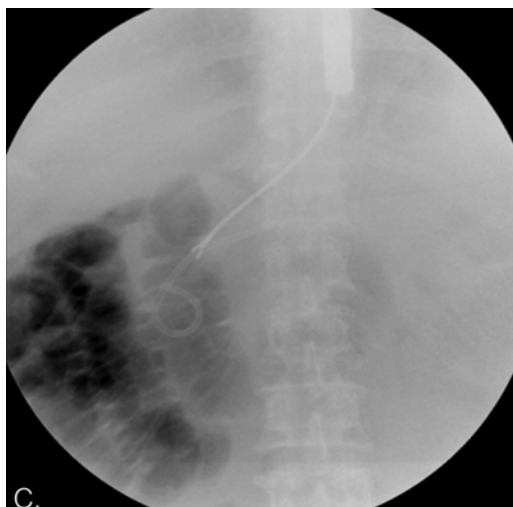
ERCP showed a long narrowing of distal common bile duct (white arrow) with upstream dilatation of common hepatic duct and bilateral intrahepatic ducts as shown in figure A.

The diagnosis is **autoimmune pancreatitis (AIP) causing distal CBD stricture.**

He underwent a standard sphincterotomy and double pigtail stent was inserted as shown in figure B. Endoscopic ultrasonography (EUS) showed diffuse hypoechoic lesions at pancreatic head. Fine needle aspiration revealed negative for malignancy.

After treatment with prednisolone for 2 months, repeated ERCP with stent removal showed a significant improvement of the distal biliary stricture as shown in figure C and D. The patient reported no recurrent symptoms and unremarkable laboratory findings after stopping prednisolone.





### Discussion:

AIP is a benign fibroinflammatory form of chronic pancreatitis. The most common presentation (> 60%) is obstructive jaundice associated with biliary stricture (s) and a focal mass or diffuse enlargement of the pancreas<sup>1</sup>. The major differential diagnosis is pancreatic or biliary tract cancer. Hence, many clinicians were misled for surgical resection. The extrapancreatic manifestations of AIP including biliary strictures, sclerosing cholangitis, sialadenitis, retroperitoneal fibrosis, hilar or abdominal lymphadenopathy, chronic thyroiditis, interstitial nephritis, and inflammatory bowel disease can be seen in up to 49% of patients. One antibody that can be used as a serologic marker for the diagnosis of AIP is IgG4. The treatment of choice for AIP is steroid therapy, which has been shown to improve the symptoms, reverse the inflammatory process and resolve the radiographic and laboratory abnormalities.

Patients should respond to steroid therapy within 2 to 4 weeks. If imaging and laboratory studies fail to show improvement, the diagnosis of AIP should be re-evaluated<sup>2,3</sup>.

### References

1. Okazaki K, Kawa S, Kamisawa T, et al. Clinical diagnostic criteria of autoimmune pancreatitis: revised proposal. *J Gastroenterol* 2006;41:626-31.
2. Yadav D, Notahara K, Smyrk TC, et al. Idiopathic tumefactive chronic pancreatitis: clinical profile, histology, and natural history after resection. *Clin Gastroenterol Hepatol* 2003;1:129-35.
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## Case 8

Piyawat Komolmit, MD.

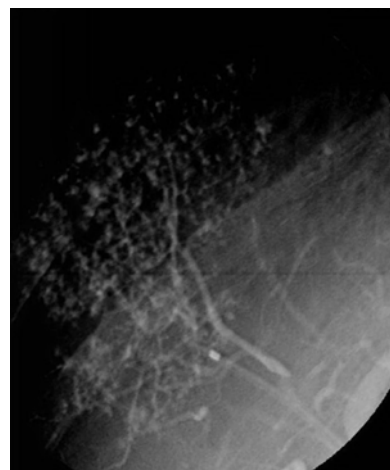
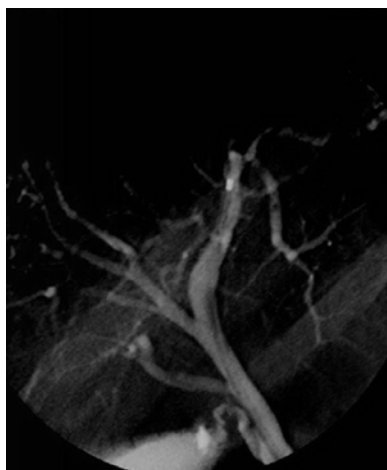
Naruemon Klaikaew, MD.

Wiriyaporn Rittitid, MD.

Rungsun Rerknimitr, MD.

A 58-year-old man presented with fatigue and abnormal liver function test over the last 2 years. Liver biopsy was done and autoimmune hepatitis was suspected. Treatment with prednisolone and azathioprine had been given for 2 months and was stopped due to frequent severe infections. Liver function test was not improved and still showed cholestatic pattern.

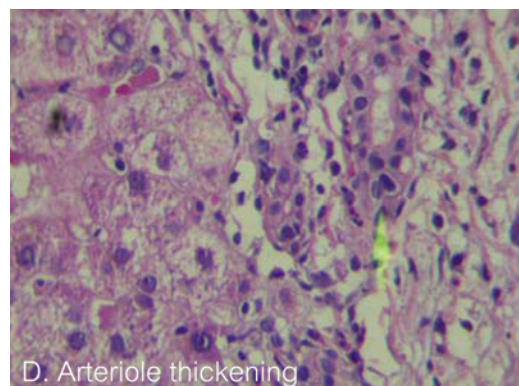
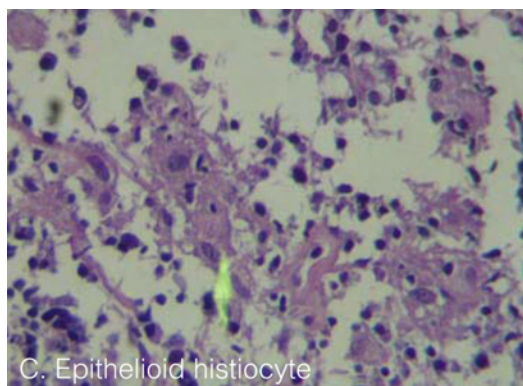
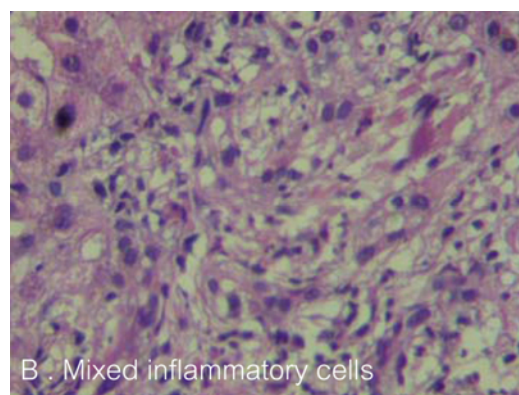
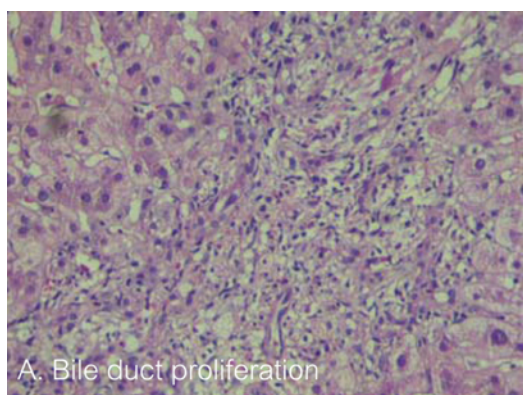
Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Cholangiogram of the intrahepatic ducts showed short focal strictures that alternated with normal ducts resulting in a “beaded” appearance of ductal structures. The remainder of extrahepatic ducts were spared.

The differential diagnosis are **sclerosing cholangitis (primary VS secondary)** and **autoimmune pancreatitis**.

Liver biopsy was done as shown.



Liver biopsy showed proliferative and serpigenous appearance of ducts that contains lymphocytic infiltration through the duct basement membrane in between the duct epithelial cells. Focal aggregation of epithelioid histiocytes is noted together with thickening of hepatic arterioles. The most likely diagnosis is secondary sclerosing cholangitis.

### Discussion:

Sclerosing cholangitis is a spectrum of chronic, variably progressive cholestatic diseases of the intrahepatic and/or extrahepatic biliary system<sup>1,2</sup>. It is characterized by patchy inflammation, fibrosis, and structuring. The classical findings on cholangiogram are multifocal strictures, segmental dilatation, diverticulum-like outpouchings, and irregular beading of large and/or peripheral smaller bile ducts. The causes of secondary cholangitis are obstruction (from choledocholithiasis, stricture, or infection), congenital anomalies, pancreatic disorders, toxin, ischemia, and neoplasms<sup>1,2</sup>. Bile duct ischemia is one of the earliest events leading to biliary cast formation and ischemic-like cholangiopathy in critically ill patients<sup>3</sup>.

### References

1. Abdalian R, Heathcote EJ. Sclerosing cholangitis: a focus on secondary causes. *Hepatology* 2006;44:1063-74.
2. Nakazawa T, Ohara H, Sano H, et al. Cholangiography can discriminate sclerosing cholangitis with autoimmune pancreatitis from primary sclerosing cholangitis. *Gastrointest Endosc* 2004;60:937-44.
3. Gelbmann CM, Rummele P, Wimmer M, et al. Ischemic-like cholangiopathy with secondary sclerosing cholangitis in critically ill patients. *Am J Gastroenterol* 2007;102:1221-9.

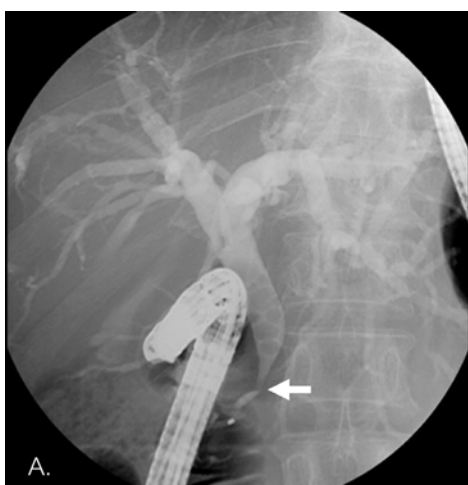
## Case 9

Wiriaporn Ridtitid, MD.

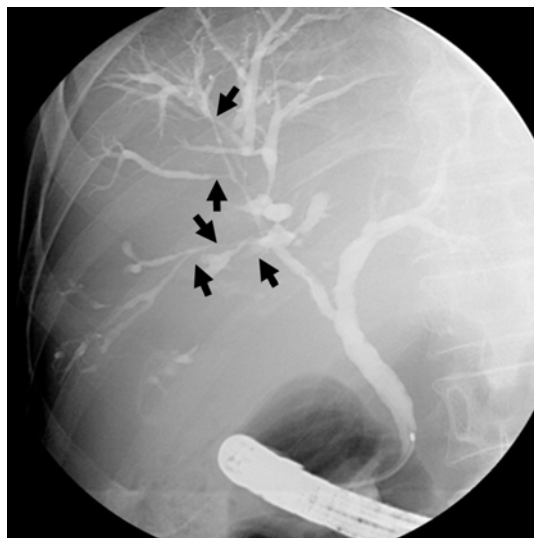
Rungsun Rerknimitr, MD.

A 54-year-old man presented with painless jaundice for 2 months. Serum IgG4 level was 605 mg/dl. CT scan of the upper abdomen revealed no pancreatic mass.

Endoscopic retrograde cholangiopancreatography (ERCP) showed long narrowing of distal common bile duct (white arrow) with upstream dilatation of common hepatic duct and bilateral intrahepatic ducts. Pancreatogram revealed small-sized with diffuse narrowing of pancreatic duct as shown in figure B. Precut fistulotomy and double pigtail stent insertion was performed as shown in figure C.



The diagnosis of autoimmune pancreatitis (AIP) was given. Serum IgG4 and alkaline phosphatase (AP) level had been decreased during treatment with prednisolone for 5 months. Additional azathioprine 50 mg/day was given after serum IgG4 and AP level rose again. Subsequent ERCP with stent removal showed progressive diffuse long stricture of bilateral intrahepatic bile duct (black arrows) as shown.



The differential diagnosis is **sclerosing cholangitis (primary VS secondary)**.

Liver biopsy was done and showed subacute cholangitis with increasing fibrosis and ductular reaction, mechanical duct obstruction is likely. The diagnosis is **sclerosing cholangitis with AIP (SC-AIP)**. Serum IgG4 and AP level decreased after the dose of azathioprine has been raised to 100 mg/day.

### Discussion:

SC-AIP has a cholangiographic appearance that is similar to primary sclerosing cholangitis (PSC). But only AIP responds to corticosteroid therapy, therefore it is necessary to distinguish between these two conditions<sup>1,2</sup>. The typical cholangiographic findings of PSC include multifocal beading of both intrahepatic and extrahepatic biliary tree. Strictures are typically diffusely distributed, short, and annular with intervening segments of normal or slightly dilated duct (the classic beaded appearance). The characteristic findings such as a long segmental narrowing of the bile duct can discriminate SC-AIP from PSC<sup>2</sup>. Differentiating PSC from SC-AIP is sometimes challenging, particularly if sufficient specimens to diagnose AIP are not available.

### References

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2. Nakazawa T, Ohara H, Sano H, et al. Cholangiography can discriminate sclerosing cholangitis with autoimmune pancreatitis from primary sclerosing cholangitis. *Gastrointest Endos* 2004;60:937-44.



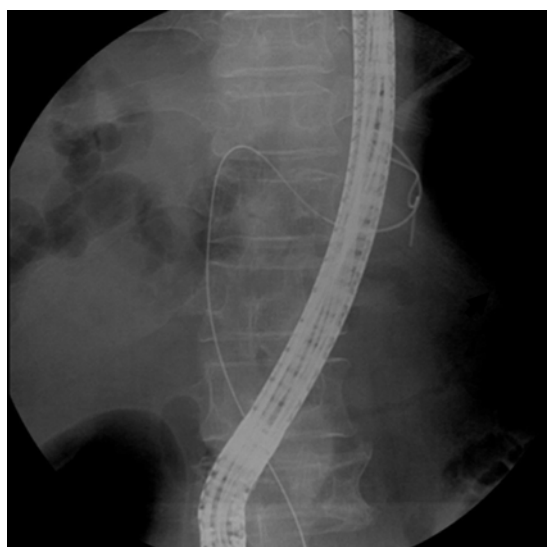
## Case 10

Wiriaporn Rittitid, MD.

Rungsun Rerknimitr, MD.

A 57-year-old woman presented with progressive jaundice and weight loss for a month. CA 19-9 level was >1,000 mg/dl. An upper abdominal ultrasonography revealed moderately dilatation of right and left intrahepatic ducts.

Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Air cholangiogram (black arrow) showed markedly dilatation of bilateral intrahepatic bile ducts.

The diagnosis is **cholangiocarcinoma with hilar obstruction Bismuth I or II.**

Plastic stents (10 Fr 15 cm.) were inserted in the left and right intrahepatic bile ducts as shown later patient's jaundice improved. Metallic stents replacement was done later.



### Discussion:

The optimal management strategy for palliating malignant hilar obstruction is controversial. From the previous studies involving hilar tumors, the median patency rates for plastic stents were 2.7 months<sup>1</sup>. It was significantly shorter when compared to the 5 to 9-month median patency rates of metallic stents<sup>2</sup>. In addition, another report showed that stent complications including occlusion, migration, perforation, and recurrent cholangitis occurred in 32% of patients with plastic stents as compared with 9% of those with metallic stents<sup>3</sup>. The reason for the poorer performance of plastic stents in hilar malignant obstruction may be due to the characteristics of the stents themselves. Plastic stents have a number of theoretical disadvantages in hilar tumors including rigidity, limitation to the tortuous intrahepatic ductal system, increased propensity to migrate, and inability to drain secondary branch ducts.

### References

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2. Peter RA, Williams SG, Lombard M, et al. The management of high-grade hilar strictures by endoscopic insertion of self-expanding metal endoprostheses. *Endoscopy* 1997;29:10-6.
3. Perdue DG, Freeman ML, DiSario JA, et al. Plastic versus self-expanding metallic stents for malignant hilar biliary obstruction. A prospective multicenter observational cohort study. *J Clin Gastroenterol* 2008;42:1040-6.

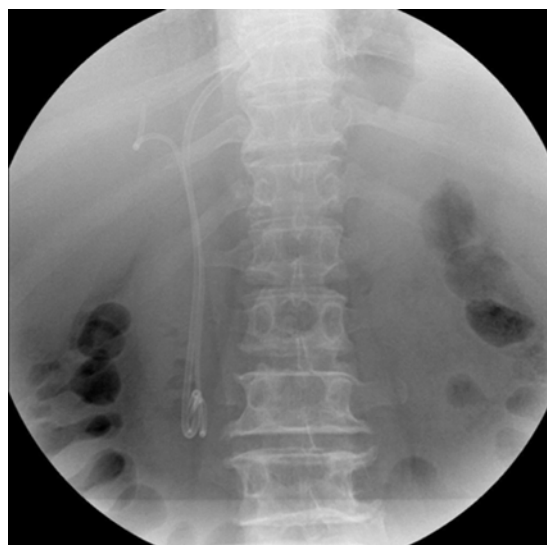


## Case 11

Wiriaporn Ridtitid, MD.

Rungsun Rerknimitr, MD.

A 57-year-old man presented with progressive jaundice with weight loss for 3 months. CA 19-9 level was >1,000 mg/dl. Endoscopic retrograde cholangiopancreatography (ERCP) was done and cholangiogram showed multiple stenosis of the extrahepatic bile duct and bilateral intrahepatic ducts (involving subsegmental branches) as shown in figure A. Plastic stents were inserted bilaterally in the left and right intrahepatic ducts as shown in figure B.



The diagnosis is **cholangiocarcinoma with hilar obstruction Bismuth IV**.

Later patient's jaundice improved and metallic stents (uncovered Y and S-types of Niti-S biliary stent, Tae Woong, Seoul, Korea) were replaced in the right and left intrahepatic ducts respectively.



### Discussion:

In hilar obstruction, the patency of self-expanding metallic stent (SEMS) was longer when compared with a plastic stent. The recent series demonstrates that successful biliary drainage with SEMS can be achieved in both low-grade and advanced hilar obstructions. However, the rate of post-ERCP cholangitis is significantly higher in patients with advanced hilar block despite a large diameter of SEMS<sup>1</sup>. In hilar cholangiocarcinoma, endoscopic placement of bilateral metal stents has been considered to be very difficult. Significant numbers of the cases require multiple procedures with an increased risk of complications. To overcome this difficulty and complexity, the newly designed stents in a Y configuration has been introduced. The central open mesh of the first stent (Y-type) facilitates the insertion of the second stent into the contralateral bile duct. Y stents shorten relatively less (10%) than other metal stents (15-30%). Thus, accurate deployment is achieved, and misplacement rarely occurs<sup>2</sup>.

### References

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2. Lee JH, Kang DH, Kim JY, et al. Endoscopic bilateral metal stent placement for advanced hilar cholangiocarcinoma: a pilot study of a newly designed Y stent. *Gastrointest Endosc* 2007;66:364-9.

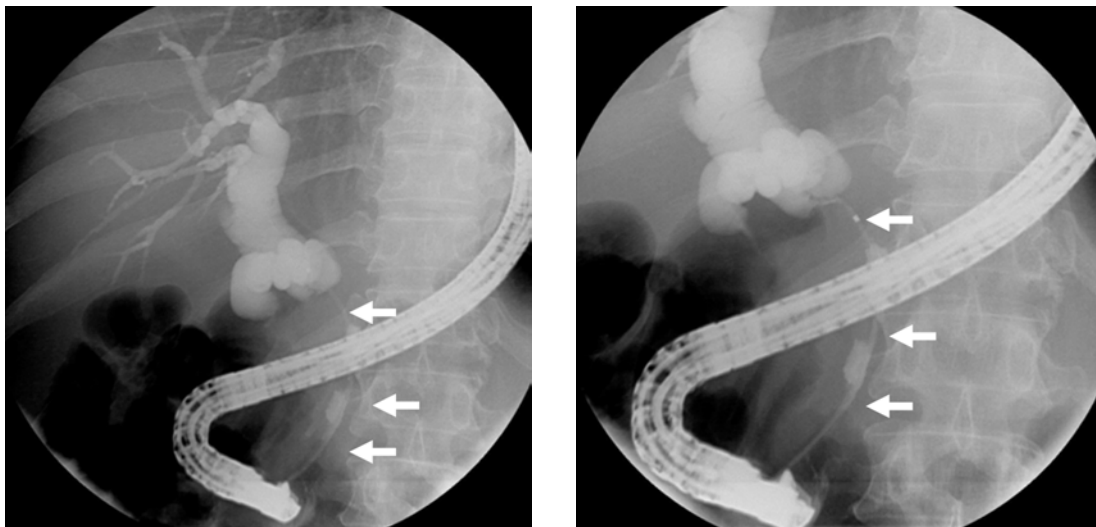


## Case 12

Wiriaporn Ridtitid, MD.

Rungsun Rerknimitr, MD.

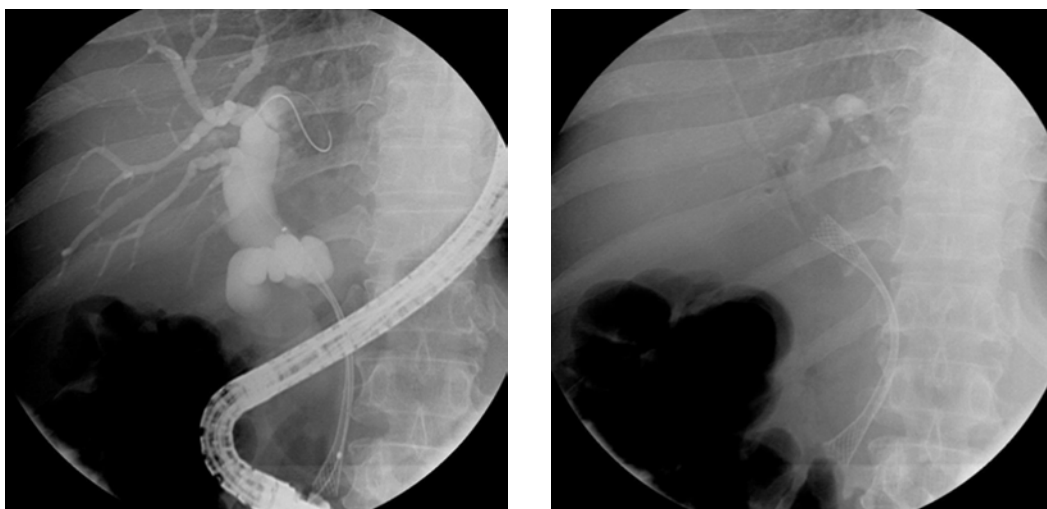
A 52-year-old man presented with progressive jaundice for a month. His underlying condition was metastatic adenocarcinoma of unknown primary origin. Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



Cholangiogram showed multiple sites of distal common bile duct narrowing (white arrows) with upstream dilatation of common hepatic duct and bilateral intrahepatic ducts.

The diagnosis is **metastatic adenocarcinoma with distal common bile duct obstructions.**

A metallic stent (Wallstent, Boston Scientific, Natick, MA, USA) was inserted across the stricture as shown in figure A and the residual contrast could be completely drained from bilateral intrahepatic ducts as shown in figure B.



Jaundice improved thereafter and a follow-up CT scan of the upper abdomen showed matted soft tissue around distal common bile duct. External radiotherapy was later given.

### Discussion:

Common causes of malignant biliary obstruction include pancreatic carcinoma, cholangiocarcinoma and metastatic disease. Majority of malignant biliary obstruction are due to inoperable diseases (operable in 30% of the cases), and therefore the mainstay of palliating jaundice is stent placement during ERCP<sup>1</sup>. The previous study comparing to plastic stent showed that there were fewer ERCP requirements, shorter hospital stays and fewer complications in the metallic stent group. If survival is likely to be more than 4-6 months, then metal stenting has a better cost effective than plastic stenting<sup>2</sup>. There is no difference in survival between the covered and uncovered stents group. However, less stent obstruction and greater patency time can be found in the covered stent group<sup>3</sup>.

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## Case 13

Wiriyaporn Ridtitid, MD.

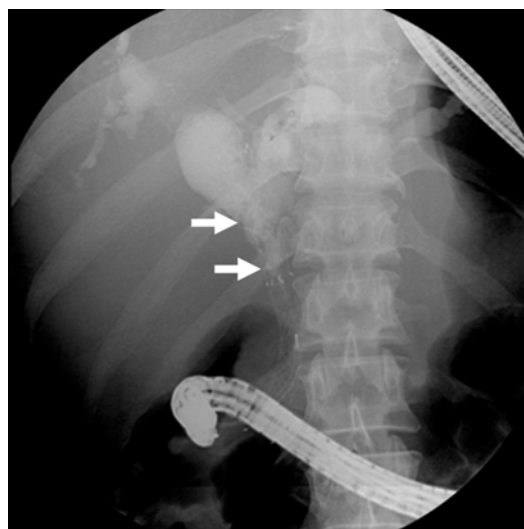
Rungsun Rerknimitr, MD.

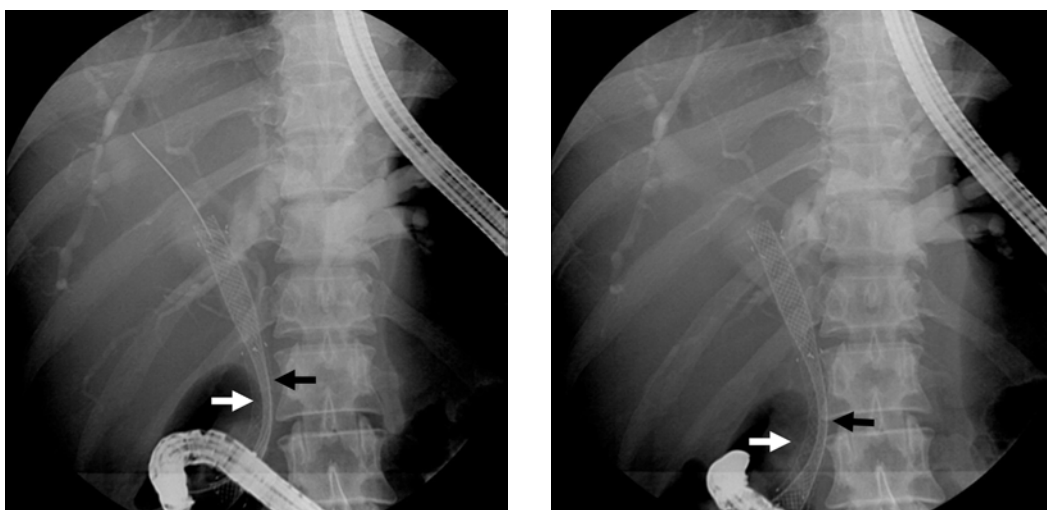
A 38-year-old woman presented with progressive jaundice for a weeks. She had been diagnosed as advanced pancreatic cancer and underwent self expandable metallic stent (SEMS) insertion recently. Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.

Endoscopic finding revealed that metallic stent was in place. A cholangiogram showed tissue outgrowth at proximal side of previous metallic stent (white arrows). There was an evidence of upstream bilateral intrahepatic ducts dilatation.

The diagnosis is **tissue overgrowth**.

The new metallic stent (Wallstent, Boston Scientific, Natick ,MA, USA, black arrow) was inserted in the old stent (white arrow) as shown.





### Discussion:

Although SEMS has a longer patency time than plastic stent for a palliative treatment of unresectable malignant biliary obstruction, many who undergo SEMS insertion can still present with premature occlusion. The causes of occlusion are tumor ingrowth, tumor overgrowth, and sludge or debris. Mechanical cleaning with an extraction balloon has a low patency and high reocclusion rate<sup>1</sup>. Bueno et al demonstrated longer patency rates for a second SEMSs insertion as a treatment of occluded SEMSs<sup>2</sup>. Tumor ingrowth was the most common reason for SEMS occlusion. Another recent study also confirmed that treatment of biliary SEMS occlusion with second SEMS insertion provided longer patency and survival, lower the number of subsequent ERCPs by 50% and was more cost-effective than plastic stents insertion<sup>3</sup>.

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## Case 14

Wiriaporn Ridtitid, MD.

Rungsun Rerknimitr, MD.

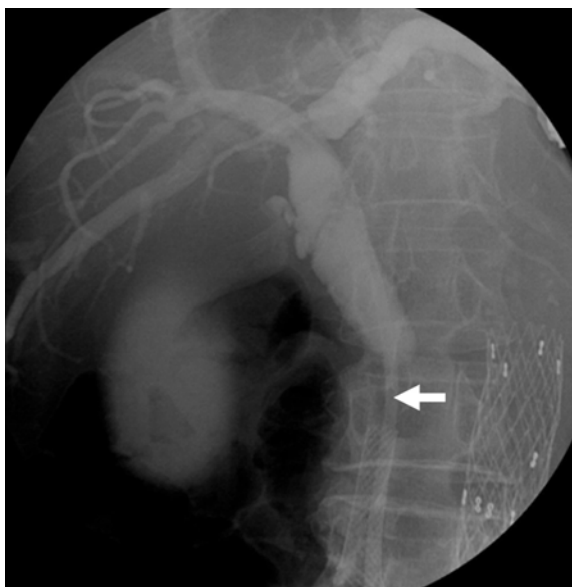
A 76-year-old woman presented with fever and jaundice for 2 weeks. She had been diagnosed as advanced periampullary cancer and underwent covered self expandable metallic stent (SEMS) insertion 2 months ago. She also had history of abdominal aortic aneurysm with aortic stent last year. Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



A cholangiogram showed downward migration of the metallic stent (white arrow) with a short segment of stricture left above the stent. Note there was an aortic stent left in place at the lower right corner.

The diagnosis is **distal migration of metallic stent**.

Plastic stent was inserted in metallic stent across the stricture (white arrow) as shown.



### Discussion:

Covered SEMS is clearly effective in preventing tumor ingrowth<sup>1</sup>. However, other complications of metallic stent can occur including cholangitis (7.2%), stent migration (5.8%), cholecystitis (5.8%), and pancreatitis (5.8%). The mean time for stent migration ever reported was 45.3 days (range 27-74 days)<sup>2</sup>. Correct positioning of SEMS at the initial stent placement is important in preventing these complications.

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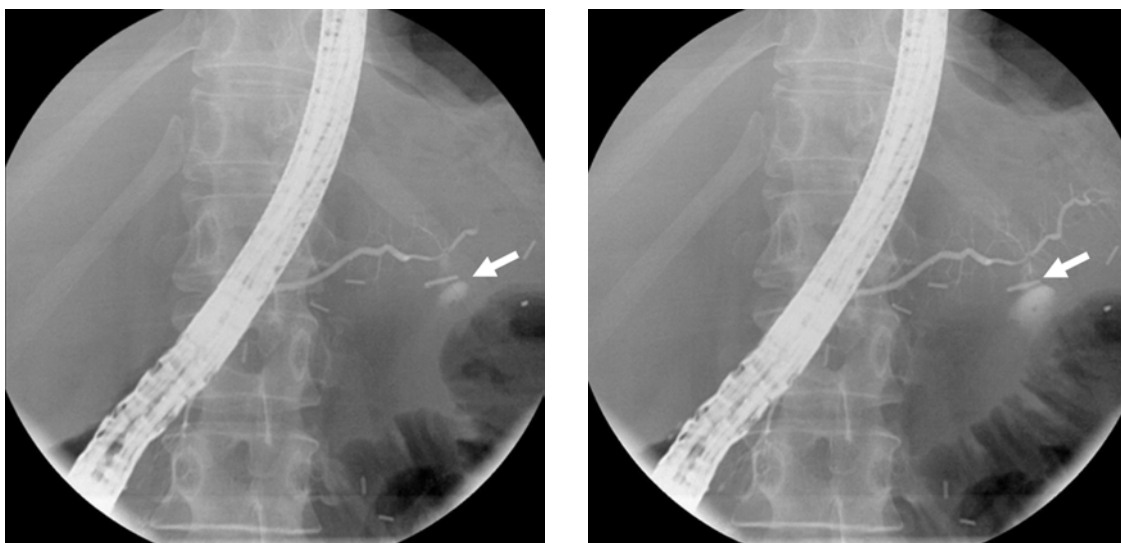


## Case 15

Wiriyaporn Ridtitid, MD.

Rungsun Rerknimitr, MD

A 42-year-old woman presented with acute epigastric pain for 2 days. She had a history of surgical excision for gastrointestinal stromal tumor (GIST) near pancreatic tail and splenectomy a month ago. Her serum amylase level was 560 U/L. Endoscopic retrograde cholangiopancreatography (ERCP) was done as shown.



A pancreatogram showed an extravasation of contrast from the main pancreatic duct near the tail into cystic cavity (partial duct disruption).

The diagnosis is **communicating pancreatic pseudocyst**.

A long plastic stent (5 Fr 17 cm.) was inserted in pancreatic duct. After then, the serum amylase level decreased and epigastric pain resolved.



### Discussion:

The main causes of pancreatic duct leak are acute pancreatitis, chronic pancreatitis, post pancreatic surgery and procedure that involved pancreatic duct puncture such as pancreatic fine needle aspiration. These patients may manifest with pancreatic pseudocyst, pancreatic ascites or pancreatic pleural effusion. Pancreatic duct leak can be categorized into 3 types<sup>1</sup>: side branch leak, partial duct disruption, and complete duct disruption/disconnected duct syndrome. The chance of side branch duct leak to be sealed from the conventional management is very high. For partial duct disruption, the recommended treatment is to put a plastic stent into the upstream duct to bridge the site of disruption. However, the standard treatment of complete duct disruption or disconnected duct syndrome is still surgery.

Pancreatic tail leakage is a special circumstance, since it is acting like complete duct disruption. Endoscopic therapy for these patients has been reported to have a lower rate of healing than others<sup>2</sup>. Traditionally, it requires a distal pancreatectomy.

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## Case 16

Tassanee Sriprayoon, MD.

Thawatchai Akaraviputh, MD.

A healthy 53-year-old male was admitted to the hospital with melena. An EGD was performed and revealed a 3 cm. subepithelial mass in the gastric body with central ulceration but no active bleeding. An endoscopic ultrasound (EUS) revealed a 3.5 cm. hypoechoic mass arising from the muscularis propria that consistent with **gastrointestinal stromal tumor (GIST)** (Figure). He underwent surgical resection and pathology later confirmed as GIST.

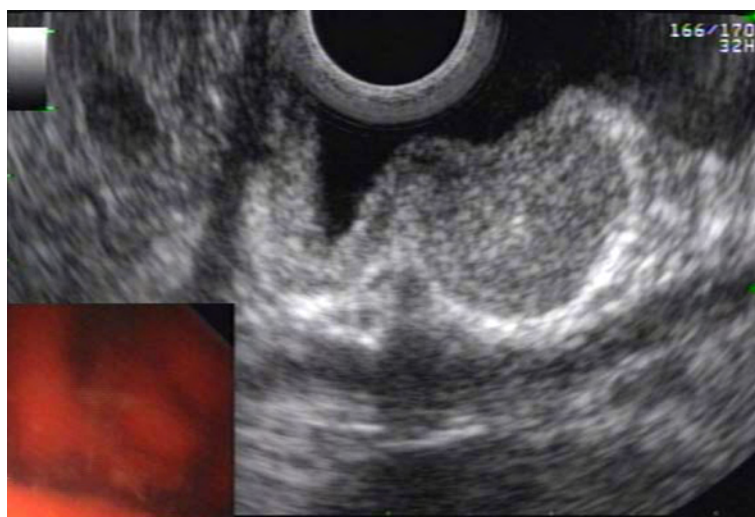


Figure: EUS revealed a hypoechoic mass arising from the muscularis propria of the gastric wall with central ulceration.

### Discussion:

The most common submucosal lesions in the upper GI tract is GISTs.<sup>1</sup> They typically arise within the muscularis propria. They are often found incidentally and standard forceps biopsies are usually nondiagnostic. Majority of GISTs occur in the stomach (60-70%) and small intestine (20-30%). Less than 10% are found in the esophagus, rectum, colon, mesentery, omentum and peritoneum.<sup>2</sup> Tumor size

exceeding 30 to 40 mm. and irregular margins appear to be the most important endoscopic feature of GISTs associated with an increased risk of malignancy.<sup>3,4</sup> There is less agreement on the value of non-oval shape, heterogeneous echotexture, exophytic development, and ulcerated mucosa.<sup>5,6</sup>

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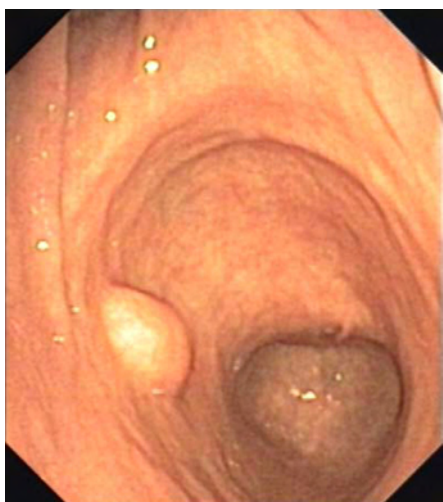


## Case 17

Tassanee Sriprayoon, MD.

Thawatchai Akaraviputh, MD.

A 65-year-old female known case of subepithelial gastric mass and had been followed with annual EGD examination for the past 2 years by another gastroenterologist. According to the patient's gastroenterologist, the lesion appeared to expand over the past year. She remained asymptomatic. She is now referred for an EUS evaluation of the gastric subepithelial lesion. On the endoscopic examination, the lesion is located in the gastric antrum, 2 cm. in diameter (Figure A), well demarcated, intensely hyperechoic, and arising from the third EUS layer (Figure B).



**Figure A:** Endoscopic finding revealed a 2 cm. submucosal lesion in the gastric antrum.



**Figure B:** Demonstrating a well demarcated, hyperechoic, arising from the third layer (radial endoscopic ultrasonoscope (Olympus, Tokyo)).

### Discussion:

Gastric subepithelial lesion of the stomach is usually identified incidentally during routine upper endoscopy. EUS is the diagnostic test of choice to assess size, margin, layer of origin and echo texture of the lesion. Current evidence does not allow making a firm recommendation on the optimal management for the patient with incidentally detected, asymptomatic gastric subepithelial mass. Options include performing

no further testing, following the mass with periodic endoscopic or EUS surveillance and endoscopic or surgical resection of the mass (Table)<sup>1</sup>

**Table** Summary of Recommendations for the management of Asymptomatic gastric subepithelial masses.<sup>1</sup>

| No further investigation  | Follow with periodic endoscopy and/or EUS or resection  | Resection  |
|---|---|--|
| <ul style="list-style-type: none"> <li>- Normal extramural organ</li> <li>- Lipoma</li> <li>- Duplication cyst</li> <li>- Pancreatic rest</li> <li>- Inflammatory fibroid polyp</li> <li>- Neural origin tumor (e.g. schwannoma)</li> </ul> | <ul style="list-style-type: none"> <li>- GIST &lt; 3 cm. in diameter</li> <li>- Glomus tumor</li> </ul> | <ul style="list-style-type: none"> <li>- Carcinoid in the absence of hypergastrinemia</li> <li>- GIST ≥ 3 cm. in diameter</li> </ul> |

In this case, the patient was diagnosed as **gastric lipoma** which typically identified as hyperechoic lesion in the third layer. Most lipoma identified at EUS can be left alone. However, if lipoma is though to be causing symptoms e.g. obstruction, an endoscopic resection is recommended. In addition, EUS may be helpful for delineating and avoiding the underlying vascular structure.<sup>2</sup>

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## Case 18

Tassanee Sriprayoon, MD.

Thawatchai Akaraviput, MD.

A 37-year-old female presented with chronic abdominal pain. She had a history of gallstone pancreatitis 8 years ago. A CT scan of the upper abdomen revealed a hypodensity lesion at uncinate process of the pancreas (size about 2 x 1 cm.). Pancreatic duct was normal. The radial endoscopic ultrasonography showed some hyperechoic foci, hyperechoic strands, lobularity and hyperechoic duct wall without irregularity. Pancreatic head and uncinate were normal without any abnormal mass. She was diagnosed as **chronic pancreatitis** by 5 EUS criteria.



**Figure A :** Endoscopic ultrasonography showed multiple small hyperechoic foci and lobularity of pancreatic parenchyma without abnormal mass lesion at the pancreatic head area.



**Figure B :** At the pancreatic body, EUS also revealed hyperechoic strands and lobularity of pancreatic parenchyma.

### Discussion:

The diagnosis of chronic pancreatitis (CP) remains challenging especially in the early stage of the disease<sup>1</sup>. Primarily, the diagnosis is established by typical signs and/or symptoms that compatible with the disease (steatorrhea, diabetes, weight loss and epigastric pain) and later confirmed by imaging modalities.

Increasing evidence suggests that ERCP may not actually be sensitive enough for CP diagnosis especially in patients with early stage<sup>2-5</sup>. Fortunately, EUS can provide the advantage to evaluate the pancreatic parenchyma and duct that are not visible on any imaging modalities. In addition, EUS is considered to be safer than ERCP. The diagnosis of CP by EUS can be made based on real time examination during the endoscopic procedure when 5 or more of established criteria which developed by the International Working Group for Minimal Standard Terminology (MST) in Gastrointestinal Endosonography are present<sup>6</sup> (Table).

**Table** Modified minimum standard terminology (MST) relevant to inflammatory pancreatic EUS criteria.

| EUS criteria for Chronic Pancreatitis |                     | Appearance   | Histological feature        |
|---------------------------------------|---------------------|--|-----------------------------|
| <b>Parenchymal features</b>           | Hyperechoic foci    | Small distinct foci of bright echoes                       | Focal fibrosis              |
|                                       | Hyperechoic strands | Small string like bright echo                              | Bridging fibrosis           |
|                                       | Lobularity          | Rounded areas separated by hyperechoic strands             | Fibrosis, Glandular atrophy |
|                                       | Cyst                | Abnormal anechoic round or oval structure                  | Cyst, Pseudocyst            |
|                                       | Calcification       | Hyperechoic lesion with acoustic shadowing within pancreas | Calcified parenchyma        |

| EUS criteria for Chronic Pancreatitis |                        | Appearance  | Histological feature      |
|---------------------------------------|------------------------|---|---------------------------|
| Ductal features                       | Ductal dilatation      | 3 mm. in head<br>>2 mm. in body<br>>1 mm. in tail         | Duct dilatation           |
|                                       | Side branch dilation   | Small anechoic structure outside the main pancreatic duct | Side branch dilation      |
|                                       | Irregular duct         | Course uneven outline of the duct                         | Focal dilation, narrowing |
|                                       | Hyperechoic duct wall. | Hyperechoic margins of the main PD                        | Periductal fibrosis       |

However, all these criteria may not be equally important. The presence of intraductal calcification alone is highly suggestive of CP even in the absence of other criteria. In addition, there are age-related changes in the pancreas that may affect the diagnostic threshold. The pancreatic duct becomes progressively wider as patient age increasing. A 4 mm. pancreatic duct may be normal for a 70-year-old man, but it is abnormal in a 18- year-old lady<sup>3</sup>. Currently, there is no standard scoring system that measuring these effects. One common practice is using a higher threshold (e.g.  $\geq 5$  criteria) for older individuals and a lower threshold (e.g.  $\geq 4$  criteria) for younger patients.

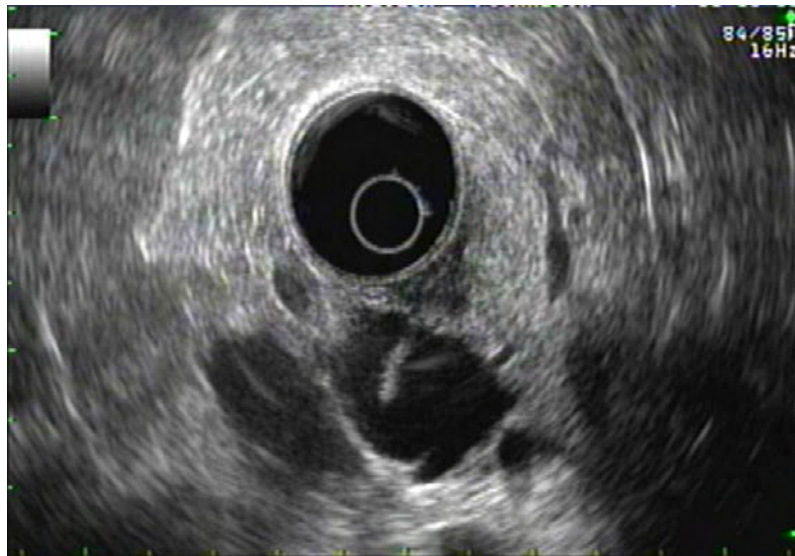
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Tassanee Sriprayoon, MD.

Thawatchai Akaraviput, MD.

A 50- year-old male presented with chronic abdominal pain. A CT scan of the abdomen showed incidental cystic lesion of the pancreas (3 cm. with internal septation) (Figure A). Serum CEA and CA19-9 levels were normal. EUS guided cyst fluid aspiration (Figure B) for the possibility early malignancy was done. She underwent a Whipple's operation. Later, pathologist reported as **pancreatic intraepithelial neoplasia type 2 (PanIN-2)**.



**Figure A :** Radial endoscopic ultrasonography showed cystic lesion with internal septation at the pancreatic head (sized 3 cm. in diameter).



**Figure B :** EUS-guided aspiration was performed by linear endoscopic ultrasonography and echo-tip needle.

### Discussion:

Intraductal papillary mucinous neoplasm (IPMN) of the pancreas is characterized by an adenomatous proliferation of pancreatic duct epithelium developed from the main pancreatic duct (MPD), branch duct (BD) or both.<sup>1,2</sup> IPMN may progress from adenoma to high grade dysplasia (HGD) or invasive carcinoma.<sup>3</sup>

Patient with low grade dysplasia (LGD) or HGD may benefit from surgical resection, with low rate of disease recurrence.<sup>4,5</sup> When invasive carcinoma is present, the prognosis is similar to that of ductal pancreatic adenocarcinoma.<sup>4</sup>

Patient with suspected IPMN, clinicians must assess (a) whether it is actually IPMN and (b) the risk of malignancy. There is a general agreement in the literature that the main predictive factor of malignancy is the MPD involvement.<sup>5,6</sup> The presence of mural nodules or thick walls are predictive of malignancy in several studies.<sup>7</sup>

EUS gives high resolution images of pancreatic cystic lesion, as well as the surrounding parenchyma and the ductal system. In addition EUS guide FNA with cyst fluid analysis provides further information that may assist in differentiating benign from malignant cystic lesion of the pancreas.<sup>8,9</sup>

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## Case 20

Phonthep Angsuwatcharakon, MD.

Pradermchai Kongkam, MD.

Naruemon Klaikaew, MD.

Rungsun Rerknimitr, MD.

A 61-year-old woman with epigastrium discomfort for 8 months underwent an EGD.

EGD was done and showed as figure A.

Endoscopic ultrasonography (EUS) was done and showed as figure B.



Figure A

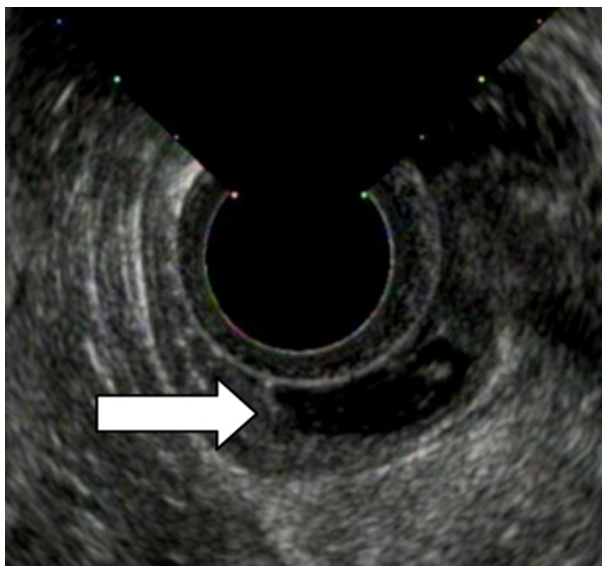


Figure B

The EGD showed an ampullary mass, 1.5 cm. in size. The mass was overlaid with normal mucosa.

The EUS showed a hypoechoic lesion (white arrow) at ampullary region without muscularis propria invasion.

Endoscopic ampullectomy was done. Histology was demonstrated as figures C and D

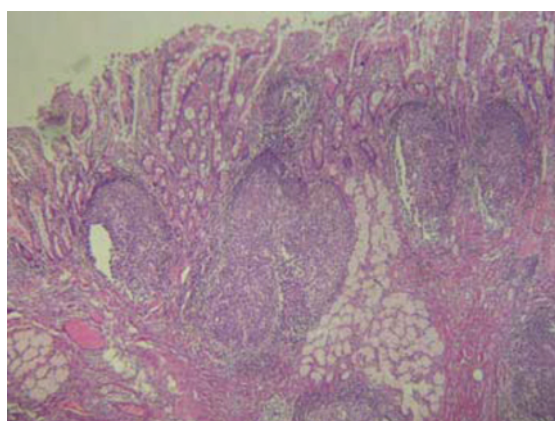


Figure C

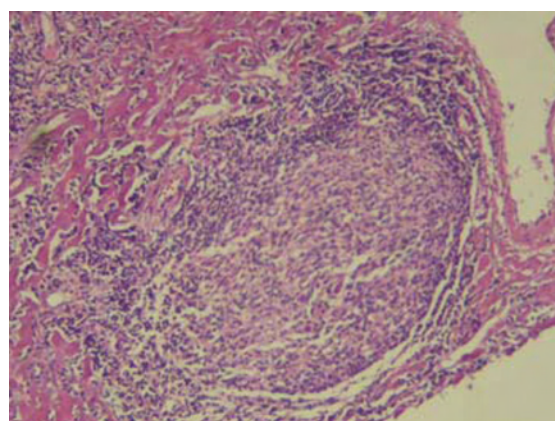


Figure D

**Histology revealed** nodular lymphoid hyperplasia with normal mucosa.

**The diagnosis is nodular lymphoid hyperplasia of the ampulla.**

### Discussion:

Nodular lymphoid hyperplasia (NLH) is characterized by the presence of hyperplastic, mitotically active germinal centers with well-defined lymphocytes mantle<sup>1</sup>. NLH is a benign, reactive process of the small intestine. NLH is a common finding in children and the incidence is decreased in adult<sup>2</sup>. NLH can be found in terminal ileum, colon and duodenum. NLH is association with food allergy, Giardiasis, Ig-A deficiency and other immune deficiency syndromes<sup>2</sup>. Adult patients frequently present with diarrhea, involuntary weight loss or abdominal pain<sup>1</sup>, and may rarely present with lower gastrointestinal hemorrhage<sup>3</sup>.

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## Case 21

Nopavut Geratikornsupuk, MD.

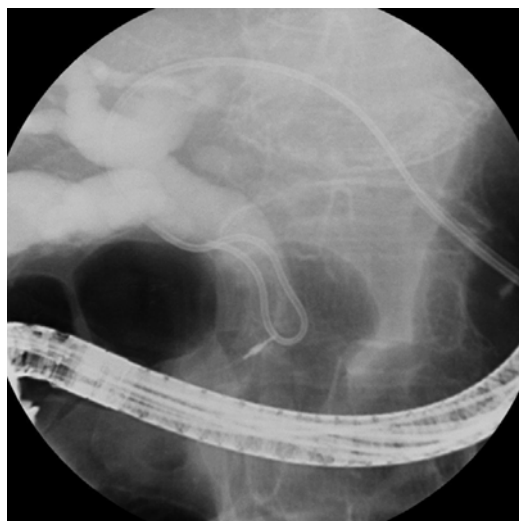
Akkawat Janchai, MD.

Rungsun Rerknimitr, MD.

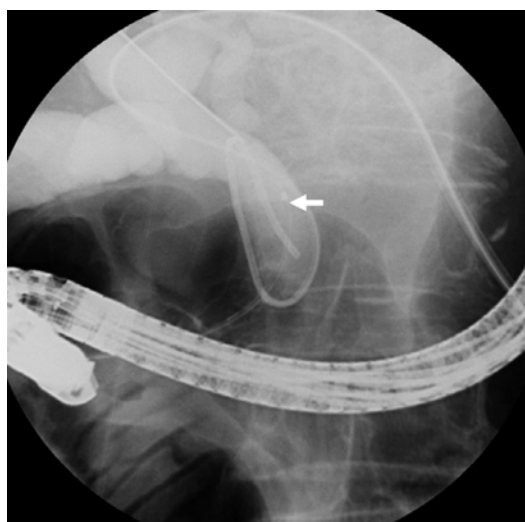
A 73-year-old Thai female presented with a recurrent episode of cholangitis. Two months previously, she presented with acute cholangitis and underwent ERCP with sphincterotomy and balloon extraction for common bile duct stones. This time, a repeat ERCP was performed, surprisingly, the cholangiogram showed a cut off sign at mid-extrahepatic duct. A CT scan of the abdomen showed air in the gallbladder but no mass or cause of biliary obstruction was found. Subsequently, patient underwent percutaneous biliary drainage, a cholangiogram confirmed **mid-extrahepatic duct obstruction** (Figure A). In addition, the contrast extravasation from the gallbladder into jejunum was observed. A third ERCP under rendezvous technique demonstrated a thin area of disconnected common bile duct. An attempt with a guide wire to traverse the obstruction from both sites was unsuccessful. A triple lumen needle knife (Microvasive, Natick, Mass, USA) was introduced intraductally (Figure B). Under fluoroscopic guidance, **a puncture into the upstream disconnected duct was successfully made** (Figure C). Finally, a 10 Fr plastic stent was inserted to bridge the duct (Figure D). Patient was discharged home within 2 days and reported no symptom that related to perforation or bleeding. Currently, she is rescheduled for repeat ERCP for stent upsizing.



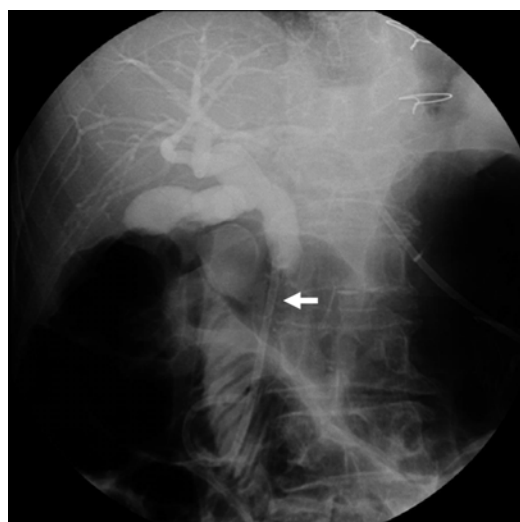
**Figure A :** Common hepatic duct obstruction via percutaneous cholangiogram



**Figure B :** A needle knife was introduced into the common duct. There was a thin gap between the knife and the obstructed upstream duct.



**Figure C :** A successful puncture by needle knife was made (white arrow).



**Figure D :** A stent was successfully inserted into the upstream duct (white arrow)

### Discussion:

Normally, rendezvous biliary drainage is led from the percutaneous site<sup>1,2</sup>. Endoscopic rendezvous can be performed under EUS guidance through duodenum or stomach<sup>3,4</sup>. A blind puncture of the biliary tract without definite bulging or EUS confirmation is prone to an inadvertent perforation. However, in our case in which a very thin gap was noted by bidirectional cholangiogram, the proximal cholangiogram was used as a landmark for a successful puncture.

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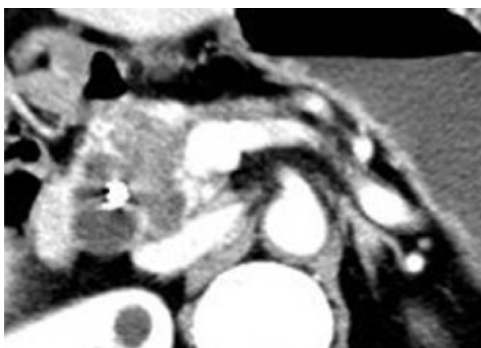
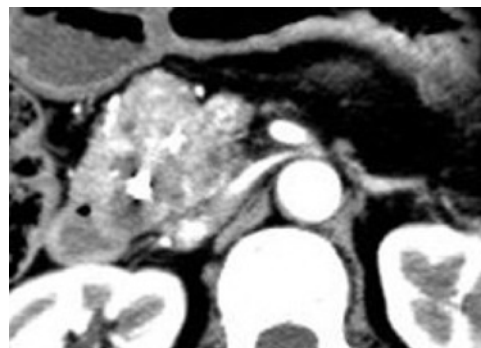


## Case 22

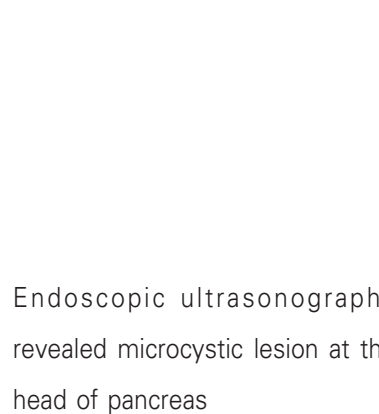
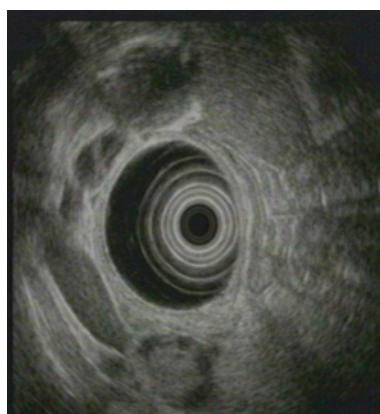
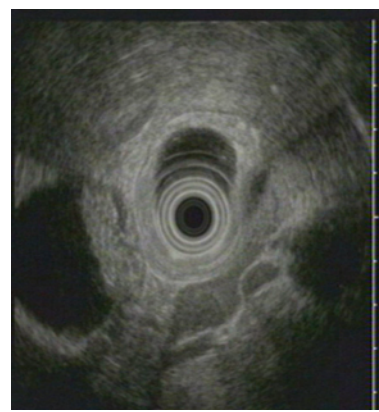
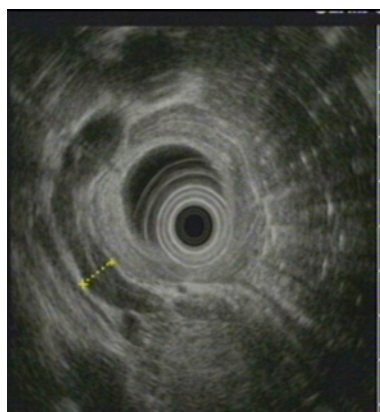
Rachawit Chareonkul, MD.

Bancha Ovartharnporn, MD.

A 55-year-old woman presented to the hospital with a history of painless progressive jaundice in 2 months. Physical examination revealed mild pale and icteric sclera. A computed tomography (CT) of the abdomen showed an ill defined cystic solid mass about 3x4 cm. at the head of pancreas. Some scatter internal calcifications were also noted. No celiac or paraaortic nodes were enlarged. An EUS revealed microcystic lesion with solid component at the pancreatic head with some intramural nodule. Fluid from tissue FNA was sent for CEA and amylase levels and the levels were 1 ng/ml and 87 U/L respectively. Cytology was also negative. These profiles suggested a serous cystadenomas (SCAs) of the pancreas. Soon after, an ERCP was performed to determine cause and to palliate the obstructive jaundice. The ERCP revealed distal common bile duct stricture with contrast extravasated into those multiple cystic lesions (it was believed to be secondary to the recent puncture for FNA). Due to the fear of possible mixed component of malignancy of this tumor and patient had symptomatic jaundice, finally, the patient underwent a Whipple's operation without complications. The final pathological diagnosis was **microcystic cystadenoma** (negative for malignancy).



A computed tomography (CT) imaging showed an ill defined cystic solid mass about 3x4 cm. at the head of pancreas (note a plastic was identified as metallic density).

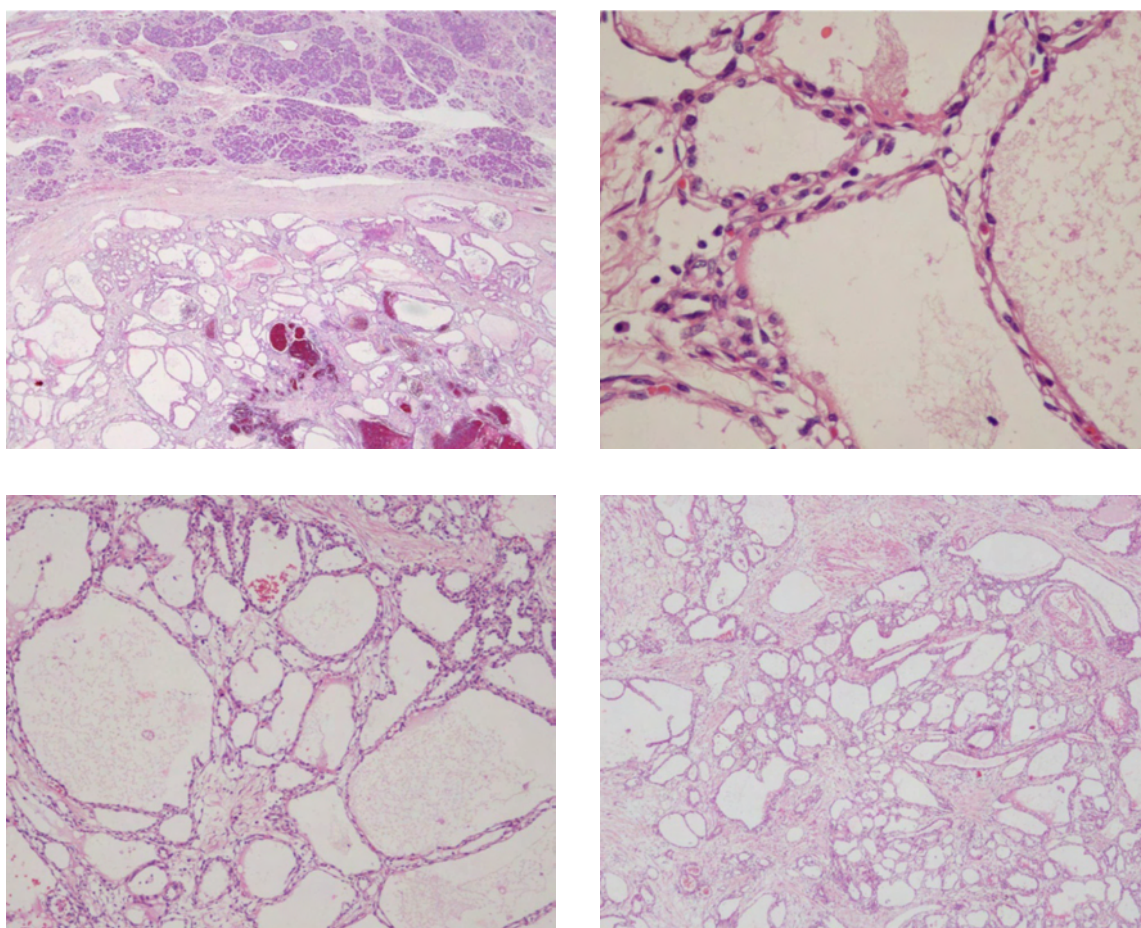


Endoscopic ultrasonography revealed microcystic lesion at the head of pancreas



ERCP revealed distal common duct stricture with contrast extravasated into the multiple cystic cavities.





**Figure D :** Pathological diagnosis was microcystic cystadenoma (negative for malignancy)

### Discussion:

Serous cystadenomas (SCAs) are benign neoplasms of the pancreas which originated from centro acinar cell. SCAs are diagnosed mainly in women during their seventh decade of life. SCA are comprised of multiple small fluid-filled cysts.<sup>1</sup> Most SCAs are asymptomatic and are discovered incidentally but if patients do have symptoms, they may consist of low-grade abdominal pain or discomfort. Large SCAs may cause mechanical symptoms if they compress the bile duct (causing jaundice) or produce a palpable mass.<sup>2</sup> SCNs have 3 morphologic patterns: polycystic, oligocystic, and honeycomb. The polycystic pattern is the most common, occurring in approximately 70% of patients. This type is characterized by a bosselated collection of multiple, small (<2 cm.) cysts, usually greater than 6 in number.<sup>4</sup> On imaging, SCA appears as a focal, well-demarcated lesion. A central scar or “sunburst” calcification is visible in 20% of SCA<sup>1</sup>. EUS with FNA and fluid analysis improves accuracy for the assessment, amylase < 250 U/l virtually excluded pseudocysts. Fluid CEA <5 ng/l had the sensitivity of 50% and the specificity of 95% for excluding cystadenoma. Fluid

CA19-9 <37 U/l had the sensitivity of 19% and the specificity of 98% for excluding cystadenoma<sup>3</sup>. Although the sensitivity is low, a positive cytology confirms a diagnosis of malignant cyst with high specificity (approaching 100%),<sup>1</sup> Symptomatic patients who are fit with SCAs > 4 cm. should be considered for resection. Large SCAs > 4 cm. are more likely to give rise to symptoms and have been shown to have a more rapid rate of growth than those < 4 cm<sup>2</sup>.

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## Case 23

Yosaporn Sophonthanasiri, MD.

Rungsun Rerknimitr, MD.

A 44-year-old male presented with severe epigastric and right upper quadrant pain for 3 weeks. He had a history of acute pancreatitis last 7 years. He denied a history of heavy alcohol consumption. The ERCP was performed via minor and major papilla as shown



Figure A

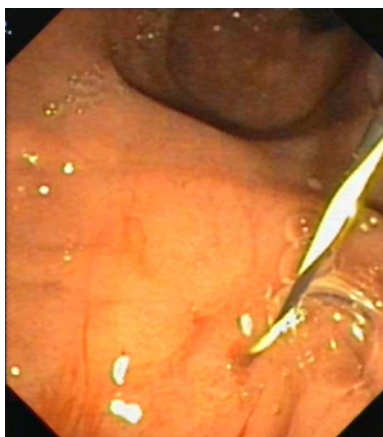


Figure B



Figure C



Figure D



Figure E

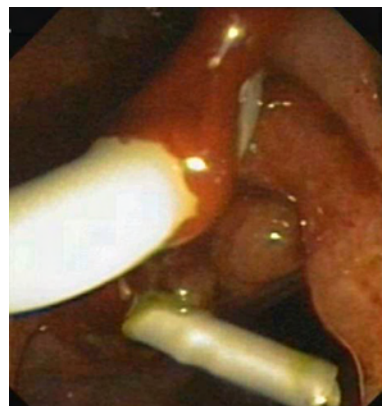


Figure F

The endoscopic view showed inflamed mucosa with dimple area representing minor papilla (Figure A). A guidewire was inserted into a dorsal pancreatic duct via minor papilla (Figure B).

The ERCP revealed calcified pancreas, a long stricture of the main pancreatic duct in the head region. Also there were evidences of upstream duct dilatation and communication between pseudocyst and main pancreatic duct (Figure C). The cholangiogram also showed long narrowing of the distal common bile duct (Figure D).

The final diagnosis is **pancreas divisum, chronic calcified pancreatitis with communicating pancreatic pseudocyst and benign stricture of the distal common bile duct.**

**The differential diagnoses are** neoplastic pancreatic cysts such as, intraductal papillary mucinous neoplasms (IPMN), mucinous cystic neoplasms (MCN) and serous cystic neoplasms (SCN).

The patient underwent minor and major papilla sphincterotomy, with 10 Fr stents insertion in each ducts.

### Discussion:

The prevalence of pancreas divisum in patients who undergo ERCP is less than 2% in Thailand<sup>1</sup>. Minority of patients with pancreas divisum becomes symptomatic with recurrent acute pancreatitis, chronic pancreatitis or chronic abdominal pain without evidence of pancreatitis. The underlying mechanism in these cases is thought to be a relative outflow obstruction at the site of the minor papilla due to a true or relative stenosis. Therapeutic interventions are aimed to relieve the obstruction by improving pancreatic drainage via the minor papilla. Endoscopic interventions such as minor papillotomy or dilation and subsequent dorsal duct stent placement provide less invasive procedure than surgical sphincteroplasty. There was one randomized controlled trial that showed a good outcome of endoscopic therapy for pancreas divisum reported by Lans et al.<sup>2</sup> Endoscopic dorsal duct stenting has been suggested as a therapeutic trial in patients with recurrent symptoms after initial response prior to surgical sphincteroplasty<sup>3</sup>. In cases with significant duct damage like this patient a repeat endoscopic treatment can be attempted; however, surgical interventions may eventually be required. Of note, in patient with a normal dorsal duct, prolonged stenting can induce irreversible ductal damage and should therefore be avoided.

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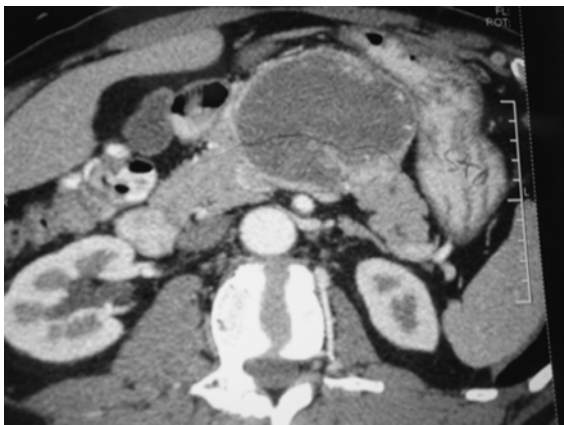
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## Case 24

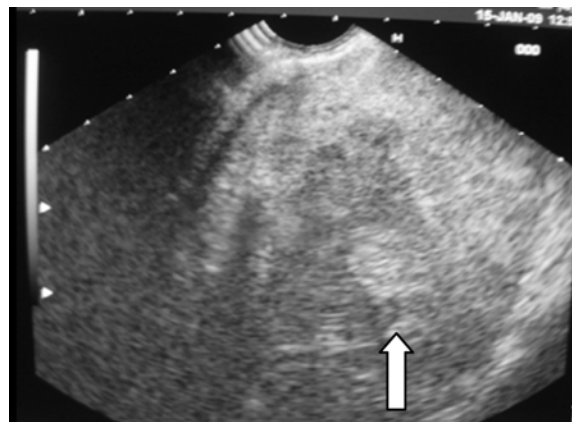
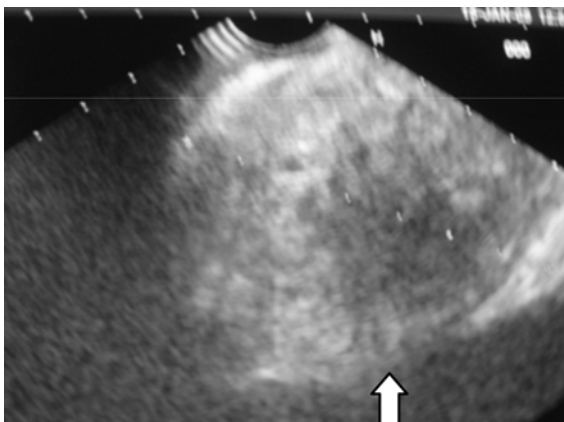
Thawee Ratanachu-ek, MD.

A 58-year-old male presented with asymptomatic large cystic tumor at body of pancreas. A curvilinear endoscopic ultrasonography was performed (EUS) and showed a solid tumor (4x5 cm.) containing some area of cystic degeneration (white arrow). The patient underwent distal pancreatectomy and pathology result was compatible with **neuroendocrine carcinoma of pancreas**.

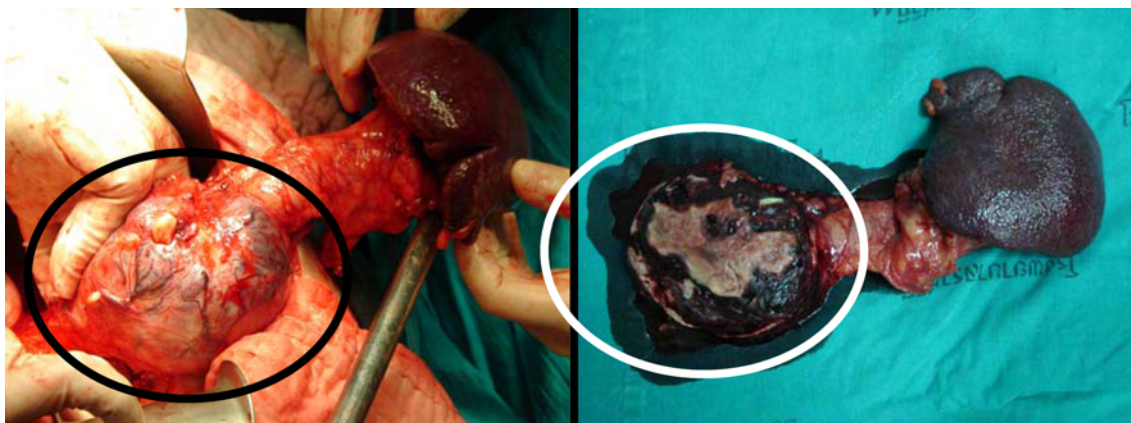
CT scan of the abdomen images



Convex EUS images



Operative finding and Gross specimen



### Discussion:

Pancreatic neuroendocrine tumors (PNETs) are more commonly present as a solid tumor<sup>1</sup> of the pancreas and may rarely appear as cystic or mixed solid-cystic masses<sup>2</sup>. EUS appearance can be a mixture of solid and cystic mass or cystic lesion alone<sup>2</sup>. By fine needle aspiration, cyst fluid contains low level of carcino-embryonic antigen (CEA) whereas amylase level can be elevated<sup>2</sup>.

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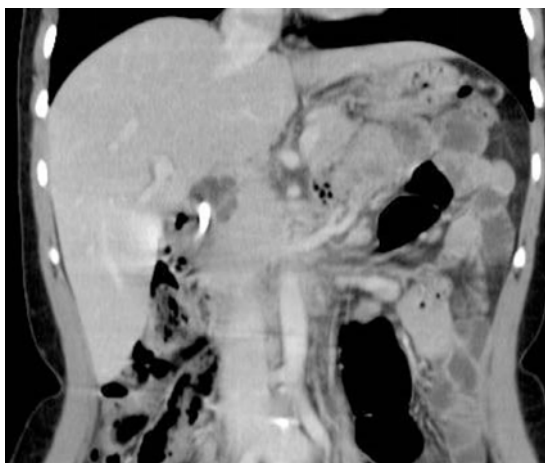


## Case 25

Thawee Ratanachu-ek, MD.

A 64-year-old female presented with jaundice from common bile duct compression with a cystic lesion detected by CT scan of the abdomen (white arrow). Then endoscopic ultrasonography (convex type) was performed and showed typical honey-comb appearance cystic lesion at the head of pancreas (2x3 cm.) and serous cystadenoma was suspected. Because of symptomatic jaundice, duodenopancrectomy (Whipple's operation) was performed and pathology confirmed as serous cystadenoma.

### CT images



### EUS images



### Discussion:

Preoperative diagnosis of cystic lesions of the pancreas is a big challenge. To date endoscopic ultrasonography (EUS) become a standard diagnostic tool for these conditions<sup>1</sup>. The differential diagnoses are mucinous cystadenoma, serous cystadenoma, intrapapillary mucinous neoplasia (IPMN) and pseudocyst. Serous cystadenoma generally is a benign condition and does not require a resection in

asymptomatic patient. Honey comb appearance is the typical morphology detected by EUS for serous cystadenoma<sup>2,3</sup>. However, if there is any suspicion, fluid aspiration for Carcino-embryonic (CEA) level and amylase level may be helpful.<sup>2,3</sup>

## References

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## Case 26

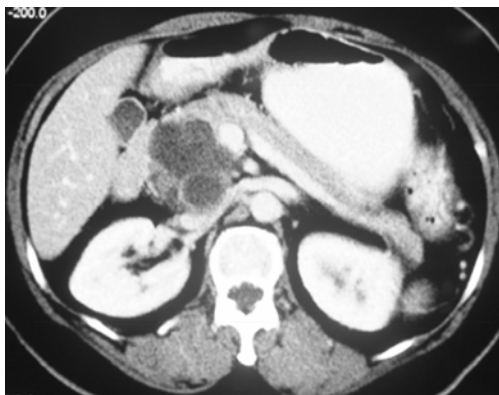
Thawee Ratanachu-ek, MD.

Rungsun Rerknimitr, MD.

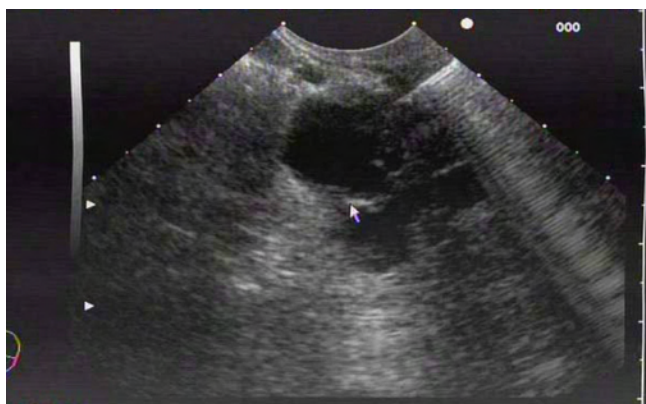
A 68-year-old female presented with abdominal discomfort. A transcutaneous upper abdominal ultrasonography showed pancreatic cyst at pancreatic head. A CT scan of the abdomen further revealed multicystic lesion with one large cyst at the same area. Later an EUS (convex type) was performed and confirmed on honey comb appearance of the cyst with one large cyst that was subsequently aspirated with a 22 G needle. Cyst fluid was clear and contained normal levels of amylase and CEA. Cytology and culture from the cyst were unremarkable.

### Diagnosis:

Serous cystadenoma of the pancreatic head



### EUS/FNA





Clear cystic fluid

### Discussion:

Cystic lesions in the pancreas can be categorized according to pathology into congenital cysts, pseudocysts and cystic neoplasm. For cystic neoplasm, the main differentiate diagnoses are mucinous and serous cystadenoma. Mucinous cystadenoma carries a malignant potential and requires surgical removal whereas serous cystadenoma dose not require surgery unless it causes symptom mainly biliary obstruction. Currently, endoscopic ultrasonography is a part of important tool to delineate the final diagnosis since it provides important information from fluid analysis. Elevated CEA level with normal amylase level is found in mucinous cystadenoma. In serous cystadenoma, we expect normal levels of amylase and CEA from the fluid<sup>1,2</sup>.

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## Case 27

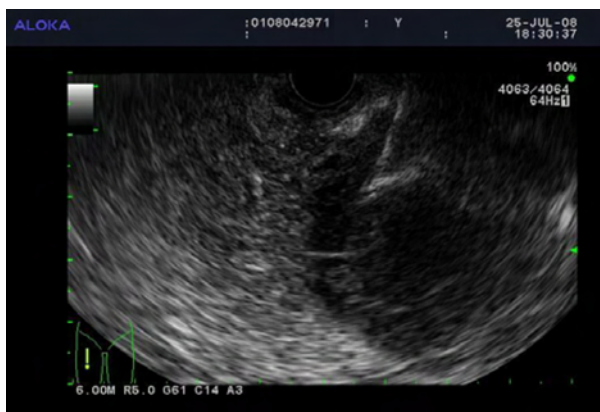
Thawee Ratanachu-ek, MD.

A 50-year-old male with recurrent abdominal pain underwent an abdominal CT scan. It showed a pancreatic mass at the body. Later an EUS (convex Type) was done and demonstrated a cystic lesion with some internal echo of debris. A fine needle aspiration (FNA) with a 22G needle was done and revealed pus with positive stain for AFB.

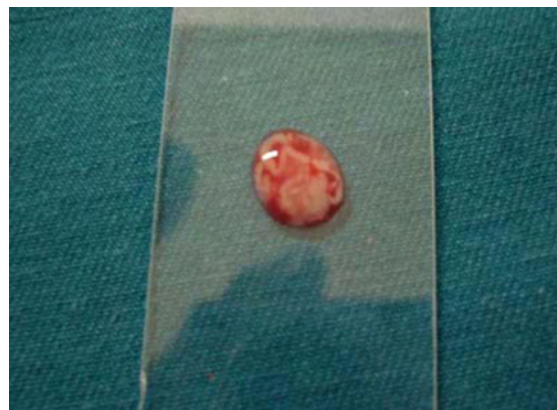
### Diagnosis:

Tuberculous abscess of the pancreas

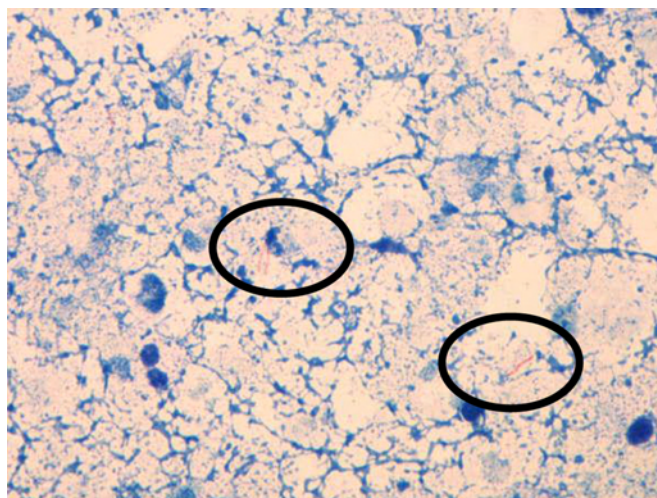
EUS image



Pus from aspiration



AFB stain (positive stain in circles)



### Discussion:

Pancreatic tuberculosis is a rare entity. The appearance by imaging including CT scan may mimic malignant tumor. Cystic lesion with necrotic tissue may be a clue to be aware for this condition. Majority of cases were diagnosed by fluid aspiration that positive for AFB stain<sup>1-3</sup>.

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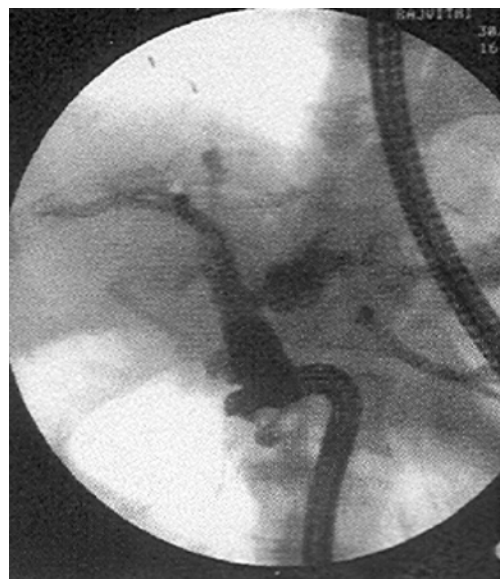
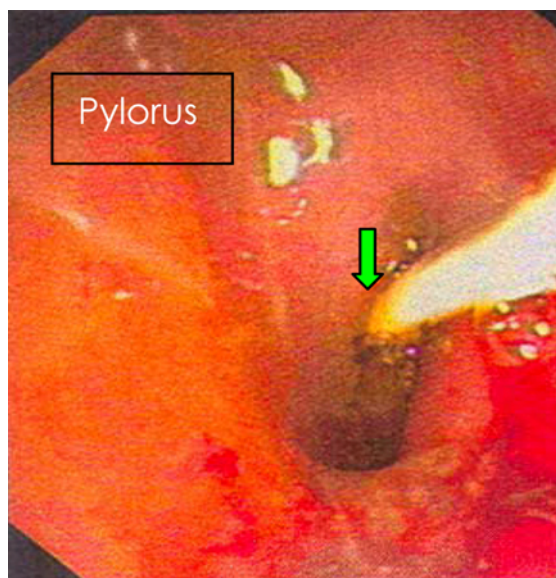


## Case 28

Thawee Ratanachu-ek, MD.

A 68-year-old male presented with cholangitis. An abdominal ultrasonography was done and suspected for biliary obstruction. Later an ERCP was performed. Interestingly, it showed an ectopic opening of biliary orifice (green arrow) at subpyloric area. Biliary cannulation was successful and reviewed a common bile duct stone. Since sphinctrotomy was difficult then biliary orifice was dilated with balloon dilation to facilitate stone removal.

*Of note: subpyloric opening of bile was found from 7 cases from 6,000 ERCP cases (personnel experience),*



### Discussion:

The variation of biliary orifice location is rare. Majority of cases series and reports showed that duodenal bulb including subpyloric is the most common location<sup>1-5</sup>. Due to its ectopic anatomical landmark, direction of sphincterotomy can not be certainly made and perforation may be high<sup>2</sup>. Therefore, balloon dilation of the orifice is recommended if widening of the orifice is required<sup>2</sup>.

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## Case 29

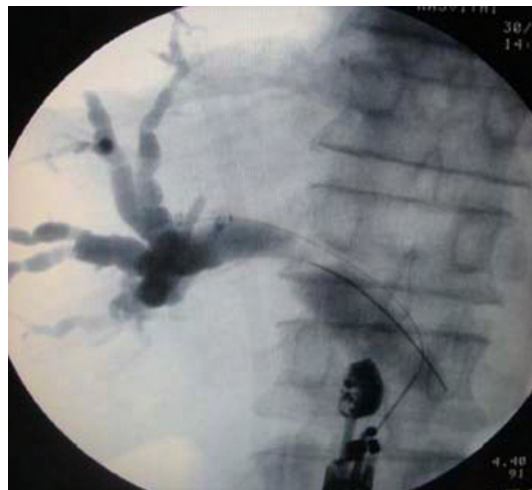
Thawee Ratanachu-ek, MD.

A 69-year-old female with advanced pancreatic cancer presented with jaundice underwent ERCP. Patient had a failed CBD cannulation. Then EUS guided choledochoduodenostomy was performed via duodenal bulb. In order to maintain patency of the created ostomy then a 6 cm. covered metal stent (Wallstent, Microvasive, MA, USA) was placed.

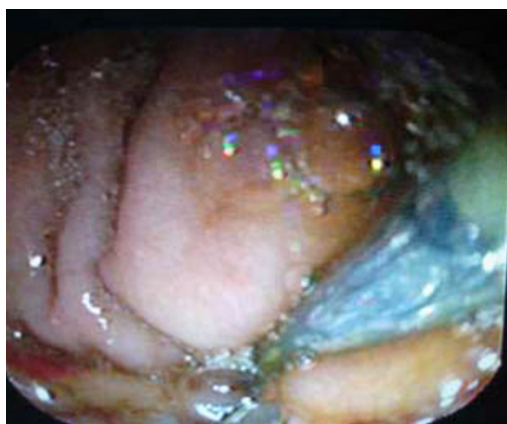
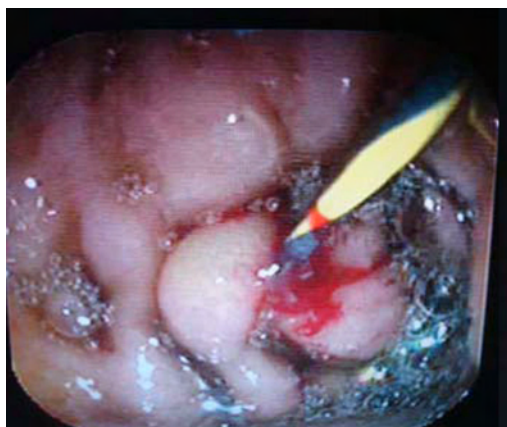
### Diagnosis:

**EUS guided choledochoduodenostomy with Wallstent insertion.**

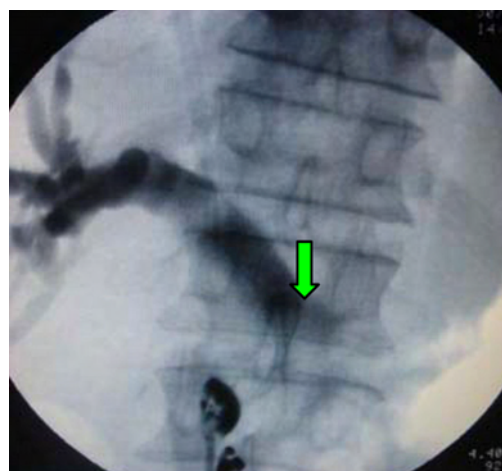
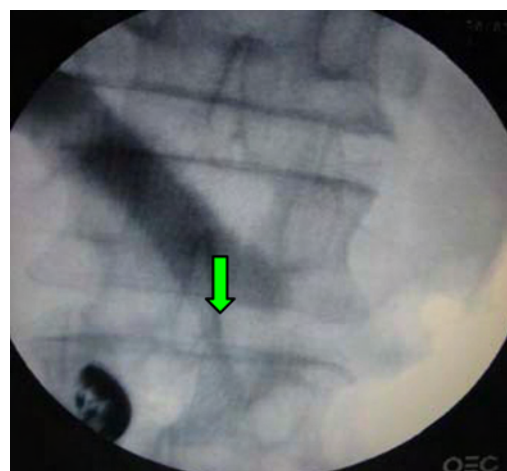
EUS guided CBD (green arrow) puncture and cholangiography with wire insertion



After dilation of the created tract with Soehendra dilator (6 mm.) then a 6 cm. Wallstent was placed. Gush drainage of bile was observed.



Final images, noted stent was inplace (green arrow)



### Discussion:

In obstructive jaundiced patient with failed cannulation by ERCP, percutaneous biliary drainage or biliary-enteric bypass surgery are the main options for further management. Recently, EUS guided

choledochoduodenostomy has been reported in many case series with a good prolonged patency<sup>1-3</sup>. The stent that used in this created fistula can be either plastic or metallic stent. However, the most preferred stent is a covered metallic stent since it has a larger diameter. In addition, with covered membrane, bile leakage after punctured is expected to be low. In patient with hilar obstruction or duodenal stenosis an EUS-guided hepaticogastrostomy can also be performed by draining via left intrahepatic duct<sup>4</sup>.

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