

# Gastrointestinal Intervention

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## Complication Forum

### Pancreatic perforation caused by the Soehendra® retrieval device in a patient with chronic pancreatitis



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#### ABSTRACT

**Summary of Event:** An endoscopic retrograde pancreatic duct (ERPD) stent was inserted in a male patient with chronic pancreatitis via endoscopic retrograde cholangiopancreatography (ERCP) to relieve chronic epigastric pain. After the procedure, an abdominal computed tomography scan showed localized peritonitis with a dislocated ERPD stent. The patient underwent an emergency operation, which revealed that the peritonitis was caused by perforation of the pancreatic parenchyma by the ERPD stent.

**Teaching Point:** A hydrophilic guide wire can puncture the pancreas during ERPD stent insertion. Therefore, it is necessary to ensure that the guide wire reaches the main pancreatic duct, especially in patients with chronic pancreatitis.

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**Keywords:** Cholangiopancreatography, endoscopic retrograde; Pancreas; Pancreatitis, chronic; Perforation

#### Event Details

A 69-year-old male was admitted to our hospital with worsening severe epigastric pain. The patient was diagnosed with hypertension and was taking oral calcium channel blocker. He had undergone endoscopic retrograde pancreatic duct (ERPD) stent insertion and removal for alcohol-induced pancreatitis 15 years prior and laparoscopic cholecystectomy for gallbladder stones 1 month prior. On admission, an abdominal computed tomography (CT) scan showed marked atrophic changes in the body and tail of the pancreas with tiny calcified parenchymal stones and ~1.2 cm dilatation of the main pancreatic duct (Fig. 1). We performed endoscopic retrograde cholangiopancreatography (ERCP) and insertion of an ERPD stent to decompress the pancreatic duct to resolve his abdominal pain (Fig. 2). The pancreatogram showed a very tight stricture of the main pancreatic duct at the head portion. During cannulation, the guide wire barely passed through the main pancreatic duct. We inserted a Soehendra® bougie dilator (4–6 Fr; Cook Medical, Bloomington, IN, USA), but it failed to pass the stricture. Dilating the stricture by drilling using a Soehendra® retrieval device (7 Fr; Cook Medical) was successful, and an ERPD plastic stent (7 Fr/10 cm, single pigtail; Cook Medi-

cal) was inserted into the main pancreatic duct along the guide wire. However, the patient complained of persistent abdominal pain after the procedure. At this time, his blood results were as follows: C-reactive protein 10 mg/L, total bilirubin 2.5 mg/dL, alkaline phosphatase 391 IU/L, aspartate aminotransferase/alanine aminotransferase 324/401 IU/L, gamma glutamyl transferase 694 IU/L, amylase 174 IU/L, and lipase 82 U/L. We performed a second ERCP and inserted an endoscopic retrograde biliary drainage (ERBD) stent because of suspicion of a common bile duct obstruction by acute aggravation of chronic pancreatitis (Fig. 3). However, the patient continued to complain of abdominal pain. He underwent abdominal CT, which showed localized peritonitis with pneumoperitoneum in the retroperitoneum, likely due to perforation by the ERPD stent. An emergency operation was performed, during which we found that the head portion of the pancreas was punctured by the ERPD stent (Fig. 4). Therefore, a total pancreatectomy was performed. The patient recovered after the operation and was discharged. He has since been monitored on an outpatient basis.

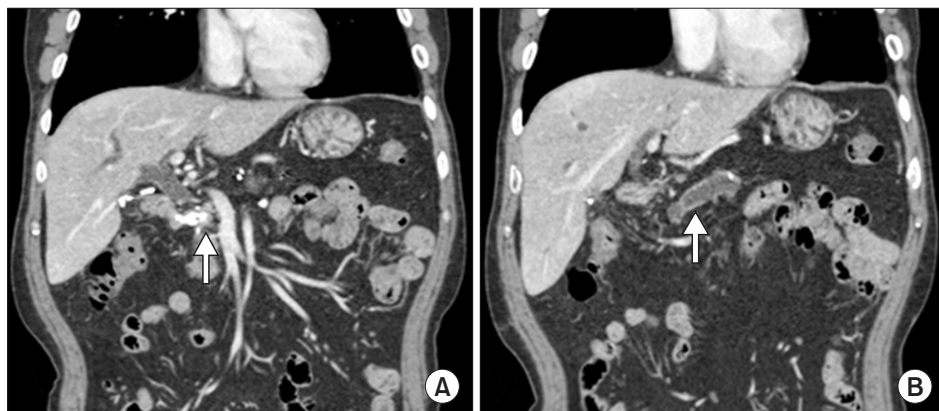
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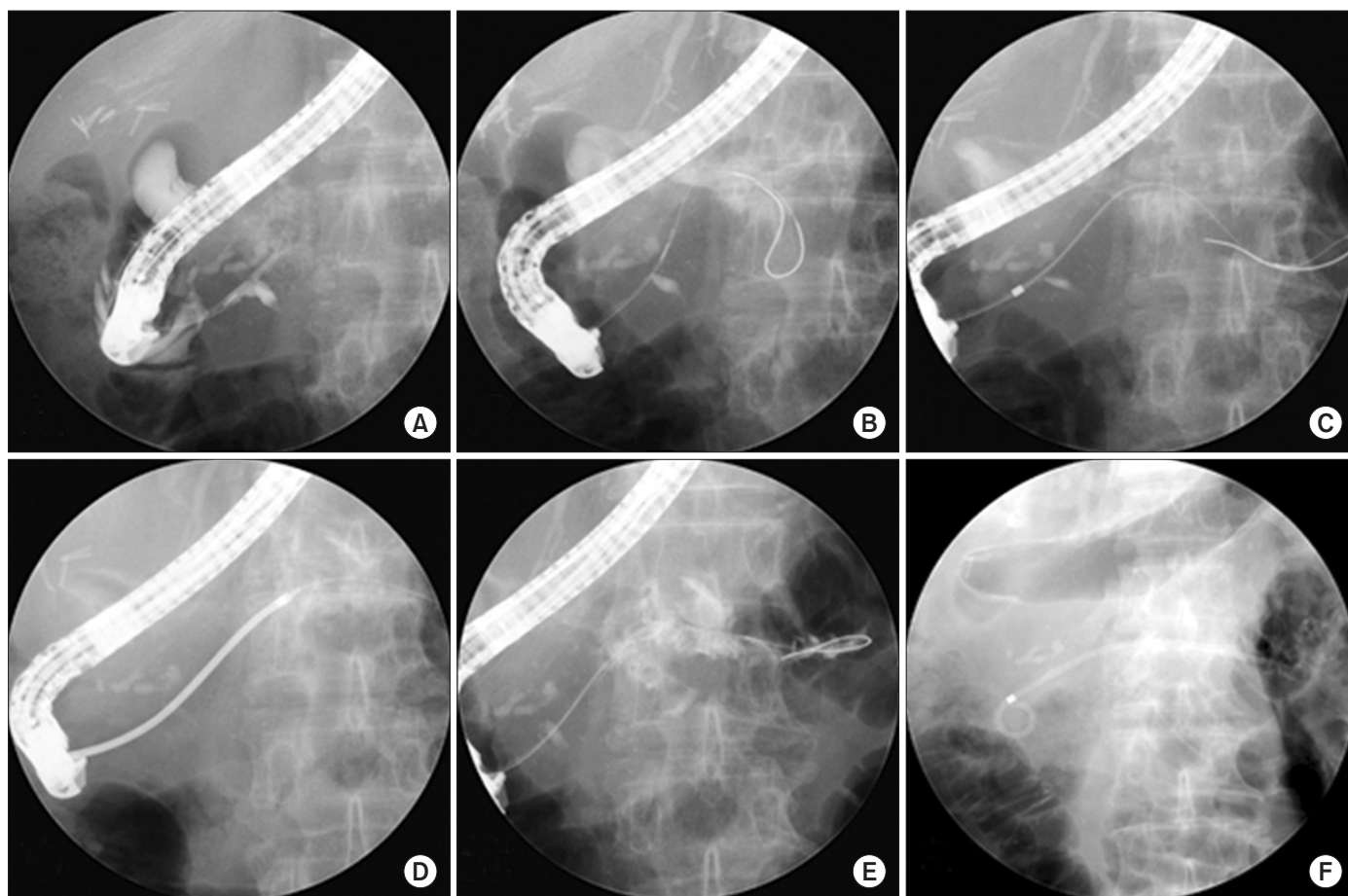
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**Fig. 1.** Computed tomography (CT) scans at admission. (A) CT scan showing numerous tiny calcified parenchymal or intraductal stones at the head portion of the pancreas (arrow). (B) Marked atrophic changes in the pancreas with tiny calcified parenchymal stones and a ~1.2 cm dilatation of the body and tail portions of the main pancreatic duct (arrow).



**Fig. 2.** Endoscopic retrograde pancreatic duct (ERPD) stent insertion. (A) Pancreatogram by endoscopic retrograde cholangiopancreatography (ERCP) shows pancreatic duct stenosis due to an intraductal stone in a patient with chronic pancreatitis. (B) The guide wire was advanced and passed through the stenosis in the pancreatic duct. (C) We attempted to dilute the stricture site using a bougie dilator along the guide wire, but failed. (D) The stricture site was dilated using a Soehendra® retrieval device. (E) Dye was observed up to the tail portion of the pancreas on the pancreatogram. (F) An ERPD stent was inserted along the guide wire.

## Discussion

During ERCP, guide wires are used to reach the biliary, pancreatic, cystic or intrahepatic duct.<sup>1,2</sup> Perforation and failed device placement are the major wire-related risks of wire-guided procedures in the pancreas or biliary tree.<sup>3</sup> Four types of perforation complicating ERCP have been recognized; type III is extramural passage of guide wires or migration of stents. Type I perforation

is luminal perforation by the endoscope, usually resulting in intraperitoneal perforation; type II is extension of a sphincterotomy beyond the intramural portion of the bile or pancreatic duct with retroperitoneal leakage; and type IV is retroperitoneal air only. According to the numerous, primarily retrospective, studies published from 1999 to 2014, type III perforations account for 22%, type I for 25%, type II for 46%, and type IV for 3% of the total cases of perforation.<sup>4</sup> The risk factors for perforation are anatomic



**Fig. 3.** Clinical course after endoscopic retrograde cholangiopancreatography (ERCP). (A) Abdominal pain persisted until day 2 after ERCP, when mild gas distension was observed on abdominal x-ray, but no ileus was detected. (B) Hepatic function was decreased and the total bilirubin level increased; thus, an endoscopic retrograde biliary drainage (ERBD) stent was inserted. (C) On day 4 after the initial ERCP, the patient's abdominal pain was exacerbated, and computed tomography revealed localized peritonitis with pneumoperitoneum in the retroperitoneum. (D) Distal tip of the endoscopic retrograde pancreatic duct (ERPD) stent located in the left anterior pararenal space (arrow) and high-density fluids near the ERPD stent with multiple air densities (arrowhead).

cal deformities such as Billroth II anastomosis, endoscopic sphincterotomy, and diverticulum of the ampulla, stenosis of the duct, a long procedure time, dysfunction of the sphincter of Oddi, and old age.<sup>5,6</sup>

It is classified as severe chronic pancreatitis according to the Cambridge classification, especially when accompanied by stricture of the main pancreatic duct by intraductal calculi.<sup>7</sup> European Society of Gastrointestinal Endoscopy recommends insertion of a single 10 Fr stent into the main pancreatic duct via ERCP, maintained for at least 1 year.<sup>8</sup> Therefore, insertion of an ERPD stent using a guide wire is performed to maintain the flow of pancreatic juice. In general, the tip of the guide wire is of a soft, hydrophilic material and complications are very rare. However, wire-induced perforation can occur when excessive force is applied below a stricture or at an acute angle. Rigid devices can perforate when wire access is lost due to a stricture or a tortuous lumen, or when tension is lost, and the wire can no longer serve as a guide. In this case, we do not think that the hydrophilic guide wire caused perforation of the pancreatic duct and pancreatic parenchyma. However, the guide wire did not pass the severe stricture and moved to the uncinate duct, resulting in pancreatic perforation. Several cases of hepatic and pancreatic parenchymal perforation by the guide wire during ERCP have been reported.<sup>9</sup> The patients with hepatic perforations underwent surgery, and the patient with a pancreatic perforation, which was induced incidentally during ERCP for removal of a common bile duct stone, recovered after conservative management. This is different from our case, in which perforation occurred during insertion of an ERPD stent in a patient with chronic pancreatitis involving a severe stricture.

## Prevention

The pancreatic parenchymal perforation by the guide wire during ERCP is a rare and under-appreciated complication. We report a case of post-ERCP pancreatic parenchymal perforation by a hydrophilic guide wire in a patient with chronic pancreatitis. It is necessary to be ensured that the guide wire reaches the main pancreatic duct during the ERPD stent insertion, especially in the patients with severe chronic pancreatitis. Moreover, because difficult cannulation is associated with complications of ERCP,<sup>10</sup> surgery is an alternative to endoscopic modalities as the initial treatment for patients with severe advanced chronic pancreatitis.

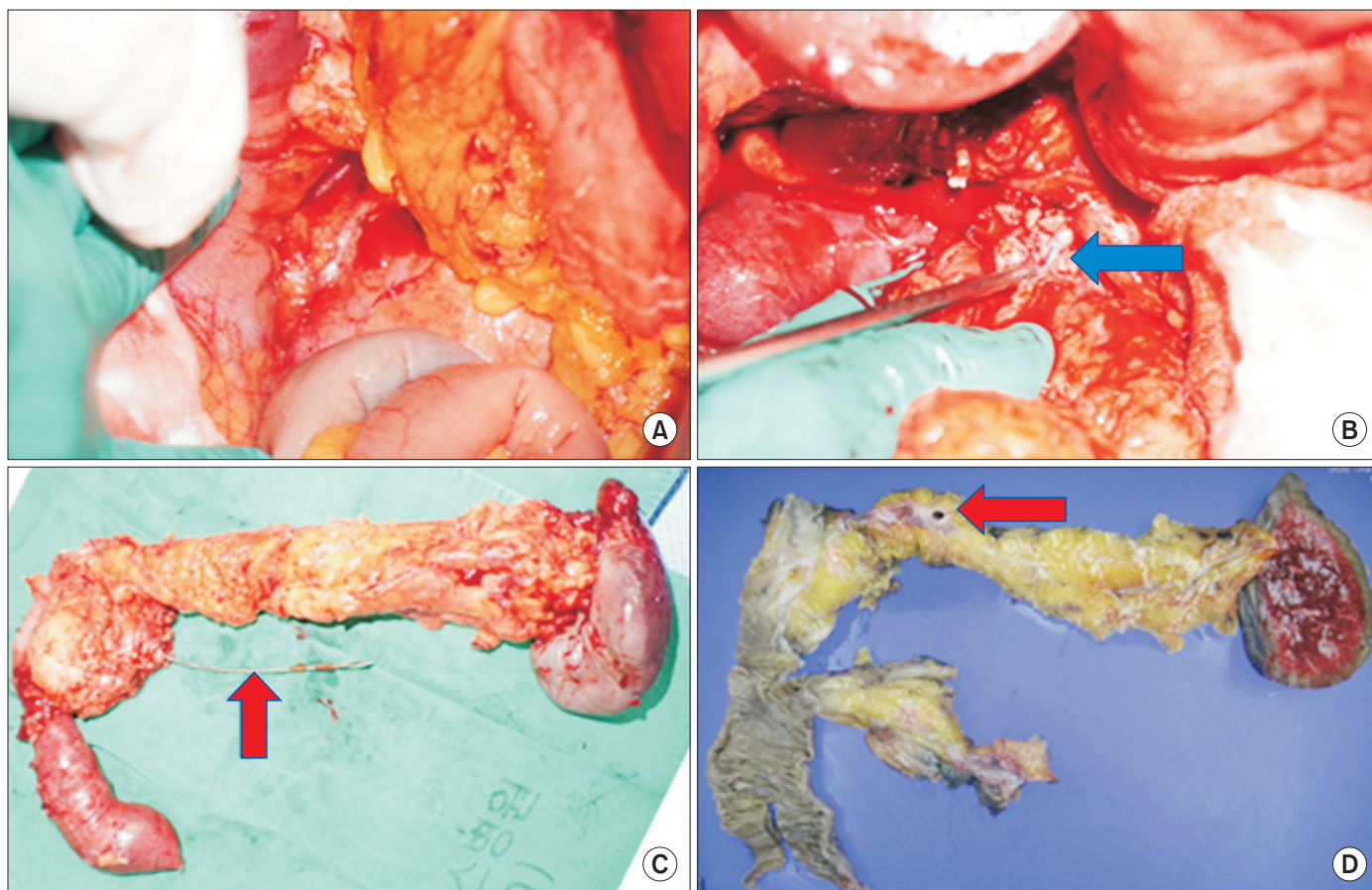
## Teaching Point

A hydrophilic guide wire can puncture the pancreas during ERPD stent insertion. Therefore, it is important to verify the position of guide wire during insertion of ERPD stent in patients with severe stricture of main pancreatic duct. In addition, the pancreatic parenchymal perforation need to be evaluated if the patient with severe stricture of pancreatic duct complains of persistent abdominal pain after ERPD stent insertion.

## Conflicts of Interest

No potential conflict of interest relevant to this article was reported.





**Fig. 4.** Photographs of the operation and specimen. (A) Inflammation of the head portion of the pancreas was not severe. (B) An endoscopic retrograde pancreatic duct (ERPD) stent was observed during separation of the pancreas from surrounding tissues (arrow), and a total pancreatectomy was performed because of severe inflammation. (C) An ERPD stent perforating the pancreas was observed in the surgical specimen (arrow). (D) A perforated hole in the pancreatic duct was observed in a specimen obtained following removal of the ERPD stent (arrow).

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