

Severe Post-ERCP Pancreatitis Following Pancreatic Duct Stenting for Needle Knife Common Bile Duct Cannulation: a Case Series and Review of Literature

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ABSTRACT

Placement of prophylactic pancreatic duct (PD) stents is a strategy to reduce the rate and severity of post-endoscopic retrograde cholangiopancreatography (ERCP) pancreatitis (PEP) in high-risk patients. However, PD stents do not completely eliminate the risk of PEP. Most previous studies have shown the positive effects of PD stents on PEP reduction, especially in high-risk ERCP procedures. Here, we report seven cases of severe post-ERCP pancreatitis associated with PD stents. Needle knife cannulation technique following PD stenting was used for all cases. The PD stent that was used was a polytetrafluoroethylene, 5-Fr polyethylene single pigtail unflanged plastic PD stent (Endo-Flex GmbH, Voerde). The PD stent was inserted successfully with the first attempt and the least trauma to the pancreatic duct. In fact, the present article describes our experience of the successful placement of PD stent, but post-ERCP pancreatitis was diagnosed according to Cotton's criteria in all the patients. Because of the long hospitalization more than 10 days for each case, the intensity of pancreatitis in all cases was considered severe.

Keywords: Endoscopic Retrograde Cholangiopancreatography, Acute Pancreatitis, Endoscopic Biliary Sphincterotomy

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INTRODUCTION

Pancreatitis is the most common complication of endoscopic retrograde cholangiopancreatography (ERCP) (1,2). It can be associated with substantial morbidity and mortality in at least 3-5% of all procedures. It is usually mild to moderate but can be severe and potentially fatal in as many as 5-10% of

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cases. Thus, the minimization of both the incidence and severity of post-ERCP pancreatitis (PEP) is very important.

Both patient-related and procedure-related factors strongly influence the potential PEP, and probably, the presence of multiple risk factors synergistically can increase the risk of PEP (3). Suspected sphincter of Oddi dysfunction (SOD), female sex, young age, and prior history of pancreatitis as patient-related factors and difficult bile duct cannulation, precut sphincterotomy, pancreatic sphincterotomy, failure in clearing bile duct from stone, balloon dilatation of intact papilla, difficult cannulation, and pancreatic injection as procedure-related factors are some of the factors associated with an increased risk of PEP (4,5).

A number of strategies for reducing PEP have been introduced. The most well-known among these are pancreatic duct (PD) stenting and peri-procedural non-steroid anti-inflammatory drug (NSAID)

administration (6,7). To date, detailed information on the function of PD stents to prevent PEP is not available, although the mechanism probably involves preserving drainage of the gland and evacuating it from reactive pancreatic enzymes (8,9).

Several studies have shown the benefit of prophylactic PD stent placement in reducing the rate and severity of PEP in patients with related risk factors (10-17). A cross-sectional study by Dubravcsik on 288 patients who underwent ERCP shows that pancreatic stent effectively reduces the development of severe PEP (18).

In the current study, needle knife cannulation technique following PD stenting was used for all cases. The PD stent that was used was a polytetrafluoroethylene (PTFE), 5-Fr polyethylene single pigtail unflanged plastic PD stent (Endo-Flex GmbH, Voerde). Seven patients with severe PEP were identified after prophylactic PD stent placement. Hence, we report these cases in this paper.

CASE REPORTS

Case 1

A 28-year-old lady presented with complaint of abdominal pain. She had a history of cholecystectomy 3 years earlier. Ultrasonography of the abdominal revealed a dilated common bile duct (CBD) measuring approximately 9 mm with a small CBD stone less than 5 mm in size. For extraction of the CBD stone, the patient underwent ERCP and sphincterotomy, and to prevent PEP, she was scheduled for PD stenting. Therefore, during ERCP, PD stent was inserted, and CBD stone was removed by a stone extraction balloon. A few hours after ERCP, the patient developed severe abdominal pain, nausea and vomiting, tachypnea, and raised serum amylase. The patient was clinically diagnosed as having a severe PEP based on Cotton's criteria (19). Finally, 2 days after ERCP, the PD stent was removed, and the patient's symptoms improved, but she remained in the hospital for about 2 weeks because of the complications of pancreatitis, including fever. The indications for PD stent replacement, in this case, were performing sphincterotomy, female sex, and young age.

Case 2

A 56-year-old woman presented with gallbladder (GB) stone, dilated CBD in cholangiogram and raised alkaline phosphatase. The patient underwent ERCP and sphincterotomy. After the removal of the CBD stone, a PD stent was replaced. She was diagnosed as having mild PEP based on abdominal pain and raised serum amylase more than 3 times of normal range within hours after the ERCP. The patient's symptoms easily recovered by analgesics, and the PD stent was removed after 5 days from ERCP, and she was discharged in good condition. Unfortunately, 3 days later, she returned to us with abdominal pain, fever, dyspnea, pleural effusion, and ascites with the diagnosis of severe PEP. Two weeks of medical therapy, including keeping the patient in nothing the mouth "NPO" status, and intravenous fluids and antibiotics therapy had a limited benefit. Computed tomography (CT) guided drainage was done, and 700 ml of necrotic fluid was drained. Despite that, the patient's fever continued, and finally, she was referred for surgical drainage. Eventually, after 10 weeks of hospital admission, she was discharged. The indication for PD stent replacement, in this case, was performing sphincterotomy.

Case 3

A 19-year-old woman presented with gallbladder (GB) stone, a dilated CBD, and elevated liver transaminases. ERCP was performed with sphincterotomy and papillary dilation for stone extraction. Despite the replacement of PD stent, PEP after a few hours of ERCP was confirmed by severe abdominal pain and elevated serum amylase more than 3 times of normal range. Although the patient was managed medically without any intervention, she underwent a prolonged hospitalization about 4 weeks for complications of PEP, including abdominal pain, fever, and ascites. The indications for PD stent replacement, in this case, were performing sphincterotomy, manipulation of biliary ducts, female sex, and young age.

Case 4

An 80-year-old man presented with abdominal pain and a CBD stone detected by endoscopic ultrasonography. During ERCP, sphincterotomy, and CBD stone extraction was done successfully and

a PD stent was replaced to prevent PEP. PEP was confirmed with high fever, abdominal pain, ascites, and pleural effusion within 2 days following ERCP. This patient was managed medically with prolonged hospitalization for about 6 weeks for the management of PEP. The indication for PD stent replacement, in this case, was performing sphincterotomy.

Case 5

A 74-year-old woman presented with abdominal pain dilated CBD and elevated liver enzyme after cholecystectomy. The patient was clinically diagnosed as having sphincter of Oddi dysfunction (SOD) type I and was scheduled to undergo ERCP. PD stent was implanted during ERCP to prevent PEP, but the patient developed mild PEP. Because of the mild nature of the PEP, the PD stent was kept in place, and the patient was discharged in good condition after 5 days. PD stent is usually removed within the same admission, but in the present patient, with respect to her general condition, the stent was removed one month after the ERCP, but the patient had recurrent hospitalization for PEP and related complications for medical management, for more than 4 weeks. Because of the attack of pancreatitis and concerns about the pancreatic duct drainage impairment, the stent was not removed and kept in place until full recovery of pancreatitis. The indication for PD stent replacement, in this case, was suspected SOD.

Case 6

A 23-year-old man presented with abdominal pain, which was diagnosed as cholecystitis with CBD stone. He underwent ERCP to remove the stone. After sphincterotomy and extraction of the stone, a PD stent was replaced to prevent PEP due to the cannulation of the pancreatic duct. The patient developed severe pancreatitis the next day, which was fully recovered after the removal of the PD stent. The indication for PD stent replacement in this case was insertion of the guidewire to the pancreatic duct.

Case 7

A 68-year-old woman was presented with abdominal pain and a history of the biliary stone. With the diagnosis of biliary obstruction due to CBD stent, she underwent ERCP. During the procedure,

the pancreatic duct was cannulated twice with the guidewire, so that, after sphincterotomy and removal of the CBD stone, a PD stent be replaced to prevent pancreatitis. Six hours after the procedure, the patient developed severe abdominal pain and a significant elevation in serum amylase level. Palliative treatments did not improve the symptoms, so with suspicion of traumatic complications, she underwent abdominal CT. Fluid accumulation was observed around the pancreatic head on CT scan. After drainage of the fluid, she was diagnosed as having infectious pancreatitis. With respect to her bad general condition, the patient was not a candidate for ERCP and removal of the stent, and finally, she expired.

DISCUSSION

All cases undergoing ERCP were at risk for PEP based on the patients- and procedural-related factors (Table 1). All cases met one or more criteria, such as; age less than 50 years, female sex, balloon dilation, PD cannulation, and SOD. Therefore all were appropriate candidates for PD stent to prevent PEP. With respect to the fact that the patients were high risk for PEP, all of them received an NSAID suppository before the procedure. The stent used was a 5-Fr polyethylene double flange plastic PD stent in all cases, except for one case that a 7-Fr PD stent was used. The length of the stent selected for each case was based on the degree of flexion and the length of the Wirsung duct in the head of the pancreas according to endoscopic ultrasound (EUS) or magnetic resonance cholangiopancreatography (MRCP) findings. Placement of PD stent was successful in all cases, but PEP was diagnosed according to Cotton's criteria in all patients (19).

PEP is defined as acute pancreatitis that has developed following ERCP, and based on guidelines presented by Cotton and colleagues in 1991; it was defined as continuous abdominal pain for at least 24 hours associated with an increase in serum amylase three folds more than the normal upper limit (19). The severity of PEP is mainly based on the length of hospitalization: mild pancreatitis, which requires hospitalization for 3 or fewer days, moderate pancreatitis, which needs hospitalization for 4 to 10 days, and severe pancreatitis, which requires hospitalization for more than 10 days. Pancreatitis

Table 1: Risk factors for pancreatitis separated by patients

Risk Factors	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7
PATIENTS' RELATED	Probable SOD				√		
	Female gender	√	√	√	√		√
	Previous history of Pancreatitis		√				
	Age > 60	√	√	√		√	
PROCEDURE RELATED	Percut sphincterotomy						
	Dye injection and manipulation of pancreatic duct						
	Difficult cannulation						√
	Pancreatic sphincterotomy	√	√	√	√	√	√
	Failure in clearing CBD						
	Balloon dilatation of intact papilla						

was also graded as severe if the patient developed hemorrhagic pancreatitis, pancreatic necrosis, or pseudocyst, or if they need percutaneous drainage or surgical intervention (20). Based on long hospitalization for more than 10 days for each case, the intensity of pancreatitis in all cases was considered as severe.

Currently, pancreatic duct stenting is considered as the standard intervention for preventing PEP (21). Pancreatic duct stenting is thought to prevent PEP by overcoming edema and inadequate drainage that may result after trauma associated with the manipulation of the papilla (9). Many prospective randomized controlled trials (10,13,14, 22-31), case-control studies (32,33) {Sakai, 2011 #42, and meta-analyses (34-37) have compared the rates of pancreatitis after ERCP with and without a pancreatic stent in high-risk patients. Most of them show the decreased incidence of pancreatitis in high-risk patients after the placement of a PD stent. In contrast, Smithline and colleagues (21) reported that PD stent placement after ERCP did not have a significant beneficial effect in individuals undergoing biliary sphincterotomy for various indications. Another study by Troendle and co-workers (38) on 313 patients younger than 19 years of age showed that prophylactic pancreatic stenting is associated with higher rates of PEP in high-risk patients in this age group.

Although pancreatic duct stenting decreases the

risk of PEP, it does not completely eliminate the risk. There are some patients who develop pancreatitis even if treated with PD stent. Pancreatitis occurs in 2–23% of these patients. In these cases, occlusion of the PD stent should be kept in mind as the underlying cause of pancreatitis. There are multiple studies that have examined the effect of different caliber pancreatic stents in high-risk patients undergoing ERCP. A recent large population-based study by Olsson and others (39), and randomized trial studies have revealed that PD stents with a diameter of 5 Fr or more and length of 5 cm appear to provide more protection against PEP, while a trend toward the higher rate of spontaneous stent dislodgement and stent placement failures were observed with 3 Fr stents (38). On the other hand, other studies showed that there was no relationship between stent calibers and the risk or severity of PEP. However, placement of 5-Fr comparing to 3-Fr pancreatic duct stents for PEP prophylaxis is easier, faster, and requires fewer wires (40, 41). Moreover, recently a study by Sugimoto and colleagues showed that the location of the inserted pancreatic stent rather than pancreatic stent length influenced the frequency of PEP. Stent insertions into the pancreatic body or tail reduce the risk of PEP more than insertion into the pancreatic head (42-44).

In conclusion, our results indicate that although prophylactic PD stenting is a well-known strategy to

prevent PEP, occlusion of the stent may lead to severe complications that, if not diagnosed and managed promptly, may be fatal. In such situations, immediate removal of the stent can preserve drainage of the duct and resolve the symptoms of pancreatitis. Another probable cause of occurring severe pancreatitis, despite prophylactic arrangements, is minor trauma to the pancreatic tissue during cannulation of the duct, which cannot be prevented by stenting.

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CONFLICT OF INTEREST

The authors declare no conflict of interests related to this work.

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