

CASE REPORT

EUS-Guided Transduodenal Biliary Drainage in Unresectable Pancreatic Cancer with Obstructive Jaundice

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ABSTRACT

Context Endoscopic transpapillary biliary drainage is the procedure of choice for biliary decompression in patients with unresectable pancreatic cancer. When ERCP is unsuccessful, the usual alternative is percutaneous transhepatic biliary drainage. Recently, the use of EUS-guided biliary drainage has been reported, but it is not clear whether it is feasible for this technique to find more widespread use as an alternative to failed ERCP. We herein describe our experience with two cases of unresectable pancreatic cancer associated with obstructive jaundice treated by EUS-guided biliary drainage.

Case report Two men presented with obstructive jaundice due to unresectable pancreatic cancer. ERCP was unsuccessful in both cases because of complete tumor obstruction at the distal common bile duct. Both patients rejected the standard option of percutaneous transhepatic biliary drainage and EUS-guided biliary drainage was performed. The obstructed biliary system was successfully decompressed by the creation of a choledochoduodenal fistula and the insertion of a transduodenal biliary stent.

Conclusion EUS-guided biliary drainage has the potential of replacing percutaneous transhepatic biliary drainage in unresectable

pancreatic cancer with obstructive jaundice when ERCP is unsuccessful.

INTRODUCTION

Endoscopic transpapillary biliary drainage is the procedure of choice for biliary decompression in patients with unresectable pancreatic cancer with obstructive jaundice. However, it may be unsuccessful in 3 to 10% of cases [1]. For failed ERCP, the usual alternative is percutaneous transhepatic biliary drainage (PTBD). However, PTBD may be associated with complications such as bleeding and bile leakage and, if subsequent internal drainage cannot be achieved, the patients would have to accept long-term external biliary drainage which can be uncomfortable and is non-physiological, with significant impairment of quality of life. Recently, EUS-guided cholangiography [2] and EUS-guided biliary drainage [3, 4, 5, 6] have been reported in a small number of tertiary referral centers. It may be potentially safer than PTBD since the bile duct is accessed directly using real-time ultrasound and Doppler guidance and is also more physiological since there is internal biliary drainage. It is not clear whether more widespread use of EUS-guided biliary drainage as an alternative to failed ERCP is feasible. Hence it is important that more data on this topic are also published by other

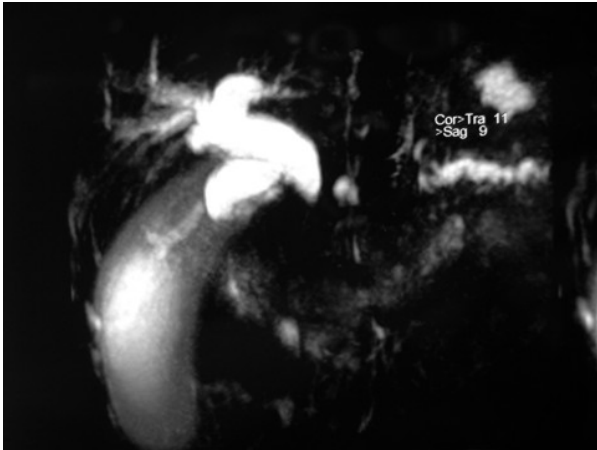


Figure 1. MRCP showing dilation of both the bile duct and the pancreatic duct due to a tumor at the pancreatic neck region.

centers. We herein describe our experience with two cases of unresectable pancreatic cancer associated with obstructive jaundice treated by EUS-guided biliary drainage.

CASE REPORT

Case 1

A 47-year-old Chinese man was admitted for a problem of obstructive jaundice. The results of the liver function test showed a serum bilirubin level of 114.5 $\mu\text{mol/L}$ (reference range: 3-24 $\mu\text{mol/L}$), alkaline phosphatase of 279 U/L (reference range: 32-103 U/L) and alanine transaminase of 298 U/L (normal range: 9-36 U/L). MRI of the liver and MRI cholangiopancreatography (MRCP) were performed and they revealed a tumor at the

neck and the body of the pancreas showing dilation of both the common bile duct (CBD) and the pancreatic duct (Figure 1), encasement of the celiac axis and superior mesenteric artery, the presence of a single metastasis to the right lobe of the liver and tiny nodules at the bases of the lung which were suspected of being lung metastases. EUS-guided fine needle aspiration (EUS-FNA) revealed pancreatic adenocarcinoma. ERCP was attempted but unsuccessful due to a complete obstruction of the distal CBD by the tumor. The patient rejected the standard option of PTBD because he was concerned about the possibility of subsequent unsuccessful stent internalization and opted for EUS-guided biliary drainage.

EUS-guided biliary drainage was performed by an experienced endoscopist (TLA) under conscious sedation using a combination of intravenous midazolam and fentanyl. Prophylactic antibiotics were administered prior to the procedure. The CBD was visualized using a linear echoendoscope (GF-UCT160, Olympus, Tokyo, Japan). It was punctured with a 19 gauge FNA needle (EUSN-19-T, Cook Endoscopy, Winston-Salem, NC, USA) (Figure 2) above the tumor, distal to the duodenal bulb. The bile was aspirated, and a 0.035 inch guidewire was inserted under fluoroscopy (Figure 3). The needle was withdrawn, a wire-guided needle knife (KD-441Q, Olympus, Tokyo, Japan) was inserted and the CBD was punctured.

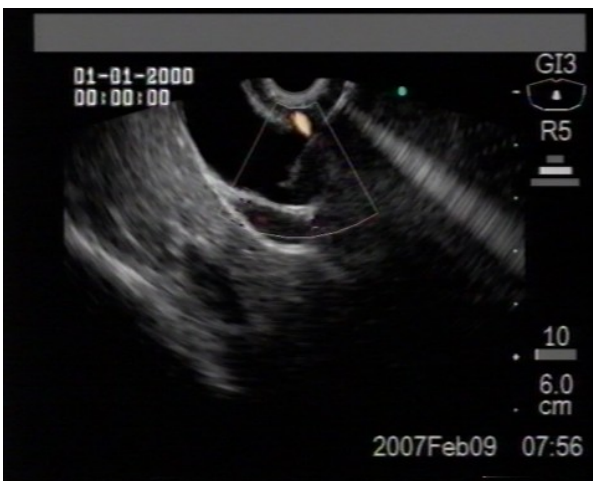


Figure 2. EUS image of the dilated common bile duct punctured by a 19G FNA needle.



Figure 3. Passage of 0.035 inch guidewire through the FNA needle into the biliary tree.

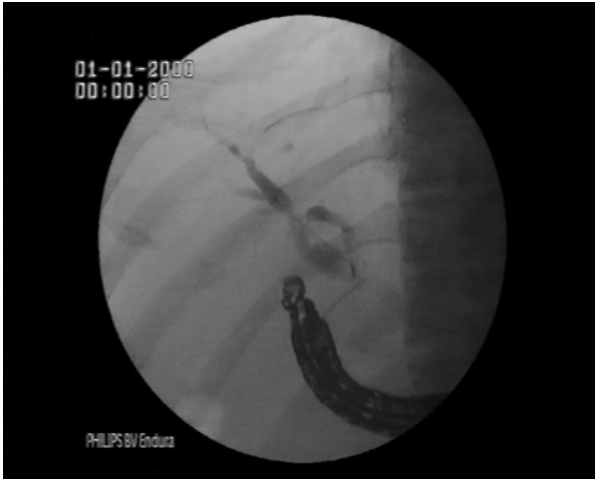


Figure 4. Cholangiography of the obstructed biliary system.

Cholangiography (Figure 4) was performed after advancing the catheter-tip proximally. The puncture site was then dilated using a 7-Fr Soehendra dilator (Cook Endoscopy, Winston-Salem, NC, USA), and a 7-Fr biliary stent was inserted (Figures 5, 6). There were no complications and resolution of the biliary obstruction was achieved.

The patient subsequently underwent palliative chemotherapy. During follow-up at 10.1 weeks, he remained well with no recurrence of the biliary obstruction.

Case 2

An 81-year-old Chinese man presented with a problem of obstructive jaundice associated with marked weight loss. The results of the liver function test showed a serum bilirubin level of 512 $\mu\text{mol/L}$, alkaline phosphatase of 343 U/L and alanine transaminase of 53 U/L. Computer tomography of the abdomen revealed a mass at the pancreatic head associated with dilation of both the CBD and the pancreatic duct as well as two metastases at the caudate lobe of the liver and multiple lung metastases. The diagnosis of pancreatic adenocarcinoma was confirmed histologically by EUS-FNA. ERCP was attempted but was unsuccessful due to a complete obstruction of the distal CBD by the tumor. EUS-guided biliary drainage, as described earlier in the text, was performed because the patient rejected the standard option of PTBD. The procedure was complicated by



Figure 5. X-ray image of the transduodenal biliary stent.

pneumoperitoneum which was resolved with conservative treatment. Resolution of the biliary obstruction was achieved, and the patient was subsequently transferred to a hospice for in-patient supportive care. At a follow-up of 15.1 weeks, he remained well with no recurrence of the biliary obstruction.

DISCUSSION

EUS has been in clinical use for over twenty years. With the introduction of linear echoendoscopes to complement radial echoendoscopes, it has evolved from a purely diagnostic procedure to an interventional procedure. The first step was the application of EUS-FNA to obtain tissue samples [7]. Subsequently EUS-guided therapeutic procedures such as an EUS-guided celiac

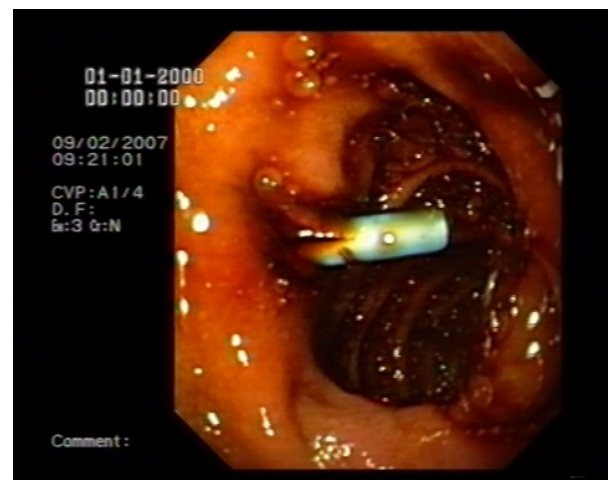


Figure 6. Endoscopic view of the transduodenal biliary stent.

plexus block [8] and the drainage of pancreatic pseudocysts [9] and abscesses [10] were introduced. Recently EUS-guided biliary drainage has also been reported.

Wiersema *et al.* first reported the use of EUS-guided cholangiography in seven patients which was used to guide a repeat ERCP [1]. Giovannini *et al.* [2] performed EUS-guided biliary drainage in a patient with pancreatic cancer by first creating a choledochoduodenal fistula using a needle knife followed by transduodenal stenting. Burmester *et al.* [3] created EUS-guided enterobiliary fistulas in four patients and was successful in placing 8.5-Fr stents in three patients. Similar successful biliary drainage was also reported by Püspök *et al.* [4] and Kahaleh *et al.* [5]. The technique essentially involved visualizing the CBD using a linear echoendoscope and then puncturing the CBD under US and Doppler guidance. One approach was to use a needle knife to puncture the CBD, followed by the insertion of a guidewire through the catheter lumen, and then stenting [2]. Another approach which has been described used an FNA needle for the initial puncture, upon which bile was aspirated and contrast injected to confirm successful biliary access. This was then followed by guidewire insertion through the FNA needle into the CBD. This wire was then either directed in a retrograde manner into the proximal CBD followed by stenting, or an attempt was made to pass the wire in an antegrade manner across the biliary obstruction into the duodenum so that a rendezvous procedure could be performed. To create an enterocholedochal fistula, the puncture tract was dilated using 6-Fr or 7-Fr bougies [11].

In our cases, we used a 19 gauge FNA needle to perform the initial transduodenal CBD puncture as reported above [11]. However, thereafter, we first advanced a 0.035 inch guidewire through the needle into the CBD, followed by the insertion of a wire-guided needle knife to puncture the CBD and thus further dilate the puncture site. Only after we had advanced the needle knife catheter proximally, did we inject the contrast to perform cholangiography. We felt that it

might be safer to use the needle knife over a guidewire since its entry path would be under better control. In addition, due to the inherent unstable position of the echoendoscope when performing EUS-guided biliary drainage, we felt that it would be safer to secure the position by first inserting a guidewire and catheter proximally before contrast injection rather than performing a cholangiography at the initial needle puncture. This was to avoid the possibility of a sudden loss of CBD access and thus failure to drain an opacified CBD.

EUS-guided biliary drainage has the following advantages over PTBD. An external drain is no longer necessary, thus significantly improving the quality of life of the patients, especially for those with terminal diseases receiving palliative care. In addition, the possibility of vascular injury and bleeding is minimized by the use of real-time US and color-Doppler. Unlike PTBD for which the presence of ascites may increase the risk of drainage procedures, the use of EUS-guided biliary drainage would avoid ascitic fluid in the area of intervention. The main risk of EUS-guided biliary drainage is that of bile leakage, especially if stent insertion is unsuccessful. Other complications include pneumoperitoneum (usually self-limiting) and minor bleeding [5]. Another complication which may arise would be that of biliary stent occlusion. However, during the follow-up period for both patients (71 and 106 days respectively), stent occlusion did not occur and, therefore, there was no need to exchange the stent. If occlusion had occurred, the stent exchange would have been performed by first cannulating the stent and inserting a 0.035 inch guidewire through the stent into the CBD, followed by the extraction of the stent using a Soehendra stent retriever while the guidewire remained in place across the fistula, thereby enabling easy insertion of a replacement stent [12]. A 10-Fr biliary stent might be expected to provide better biliary drainage and could possibly last longer than a 7-Fr biliary stent. However, these two cases were our initial experience in performing EUS-guided biliary drainage and we were concerned about the possibility of bile leakage. Excessive

dilatation of the choledochoduodenal fistula created with resultant bile leakage might have occurred if we had attempted further dilatation to accommodate a larger 10-Fr stent. In addition, 7-Fr biliary stents had been used successfully for long-term biliary stenting in patients with CBD stones who declined or were unfit for further interventional procedures [13]; given the guarded prognosis of our patients who had advanced cancer, we felt that 7-Fr stents could provide adequate drainage during the limited lifespan of our patients. Nonetheless, we currently believe that it is probably safe and feasible to gradually dilate the tract even more by using a 10-Fr Soehendra dilator to allow insertion of a bigger 10-Fr stent.

Recent publications have explored the issue of using EUS-guided pancreaticogastrostomy to drain inaccessible pancreatic ducts as an alternative to surgery when ERCP was not possible. The principle is similar to EUS-guided biliary drainage; it entails EUS-guided puncture of the obstructed pancreatic duct, followed by the creation of a transgastric fistula and subsequent stent placement [14, 15]. Initial results are promising and it appears relatively safe. However, this can be technically demanding, more so than EUS-guided biliary drainage and certainly more data on its utility are required.

In conclusion, we report our initial experience in performing EUS-guided biliary drainage in two patients having unresectable pancreatic cancer with biliary obstruction. This procedure was performed successfully without major complications. EUS-guided biliary drainage has the potential of replacing PTBD as an alternative for biliary drainage for patients with unresectable pancreatic cancer and obstructive jaundice when ERCP is unsuccessful.

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Keywords Choledochostomy; Endosonography; Pancreatic Neoplasms

Abbreviations CBD: common bile duct; PTBD: percutaneous transhepatic biliary drainage

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