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CASE REPORT

Percutaneous Transcholecystic Placement of an ePTFE/FEP-Covered Stent in the Common Bile Duct

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Abstract We report the case of a 78-year-old male patient with obstructive jaundice due to a pancreatic head neoplasm. The patient's general condition did not permit an endoscopic approach and the presence of diffuse liver metastases prohibited hepatic puncture for percutaneous biliary drainage, therefore the transcolecystic transperitoneal approach was decided to be the safest decompression route. Through a gallbladder access, a Viabil-covered stent with a mesh extension was placed in the distal common bile duct, without complications. The patient died 8 months later without signs of stent dysfunction or necessity of reintervention. Transcholecystic transperitoneal access is a safe option when diffuse liver metastases prohibit the transhepatic approach, even in cases where placement of a covered stent is considered necessary.

Keywords ePTFE/FEP-covered stent · Gallbladder interventions · Pancreatic cancer palliation · Biliary metallic stents · Obstructive jaundice

Introduction

Transcholecystic interventions were introduced in clinical practice approximately two decades ago and since then have offered a valid solution in various benign and malignant pathologies [1]. Most frequently gallbladder drainages are performed in order to treat acute cholecystitis in high-surgical-risk patients [2]. In the case of obstructive jaundice and failure or unsuitability of endoscopy, the transcholecystic approach is indicated when obstruction is not associated with dilated ducts, when diffuse liver pathology exists (cysts or metastases), and when stent placement in the cystic duct may be necessary [2–5]. Viabil-covered stent placement has been shown to be safe and effective in the palliation of malignant biliary disease [6]. The ePTFE/FEP coverage demonstrated that it could prevent tumor ingrowth, achieving a lower reintervention rate and offering better a quality of life for the oncologic patient [7].

We report a case where a Viabil-covered stent was placed through a transperitoneal transcholecystic approach, due to diffuse liver metastatic disease, aiming to avoid reintervention during the patient's life.

Case Report

A 78-year-old male patient was admitted to our hospital due to obstructive jaundice. The white cell count was normal, total bilirubin 8.4 mg/dl, SGOT 178 IU/L, SGPT 220 IU/L, and γ-GT 1120 U/L. Computed tomography (CT) revealed marked dilatation of the gallbladder and the biliary tree; numerous liver metastases, nearly everywhere in the liver parenchyma; and a pancreatic head tumor obstructing the lower common bile duct (CBD) and pancreatic duct (Fig. 1). The patient was characterized as inoperable and unsuitable for sphincterotomy due to his general condition, therefore palliation by percutaneous means was decided on. Due to the presence of the numerous hepatic metastases, direct liver puncture was avoided, considering the elevated risk of neoplastic

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seeding, bleeding of the metastatic lesions, and bacterial contamination. The transperitoneal transcholecystic approach was decided to be the safest way, taking into consideration dilatation of the gallbladder.

Informed consent was obtained from the patient and intravenous prophylactic antibiotics (cephalosporines) were administered, while nil per os was ordered the night before the intervention. The patient's coagulation status permitted a transperitoneal puncture and no ascites was present. Under ultrasound (US) guidance (6-MHz convex probe, Esatune; Esaote, Florence, Italy), the gallbladder was punctured along its long axis with an 18-Fr needle mounted on a 20° angle steering system. After bile aspiration, 2 ml of contrast material was injected into the dilated gallbladder, and under fluoroscopy the proper needle position was confirmed. A 0.035-in. guidewire was inserted through the needle, and after exchange with dilators an 8-Fr external cholecystostomy drainage locking catheter was placed (Flexima All Purpose; Boston Scientific, Natick, MA, USA).

The patient's condition improved over the following 2 days, with a 50% decrease in the bilirubin value in the first 48 h. A week later bilirubin levels were nearly normalized. Contrast injection through the external catheter followed and the stenotic area of the common bile duct was revealed (Fig. 2). Through the external catheter, a 0.035-in. stiff glidewire (Glidewire; Terumo Europe, Belgium) was inserted into the gallbladder, and after negotiation of the spiral valves of the cystic duct, it was advanced through the stricture toward the duodenum. The glidewire was exchanged for an extra stiff 0.035-in. wire (Amplatz; Cook Europe, Denmark) that was advanced to the ligament of Treitz. A 10-Fr sheath was placed (Radiofocus; Terumo Europe) in the gallbladder, and through the sheath an 8 × 80-mm Viabil stent (W. L. Gore & Associates, Flagstaff, AZ, USA) with distal side holes was inserted and successfully deployed in the stenotic area, with the side holes remaining above the stricture level (Fig. 3). A 10 × 69 Wallstent (Boston Scientific) was then advanced toward the CBD. The uncovered metallic stent was deployed as an intraduodenal mesh extension of the covered endoprosthesis. Finally, an 8-Fr external cholecystostomy catheter was left in place and the patient was dismissed.

Cholangiography through the external catheter was performed 3 days later and satisfactory contrast runoff was revealed (Fig. 4). The drainage catheter was left in place for 3 weeks in order to obtain a mature tract, and it was retracted after fistulography revealed no intra-abdominal extravasation of contrast. Close follow-up was performed for the next 8 months, with CT and US, but no signs of stent dysfunction were revealed until the patient's death.

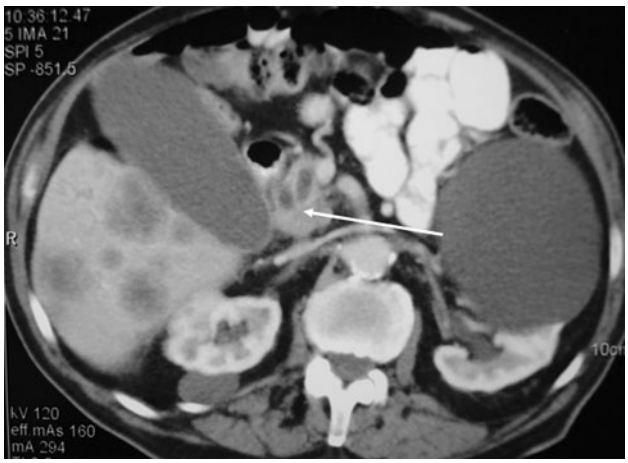

Fig. 1 Marked dilatation of the gallbladder and a "double duct sign" indicating the presence of a pancreatic head neoplasm (*arrow*). Several hypodense lesions with rim enhancement are detected in the liver parenchyma, characterized as pancreatic metastases

Discussion

Image-guided percutaneous transcholecystic interventions were introduced in clinical practice approximately 20 years

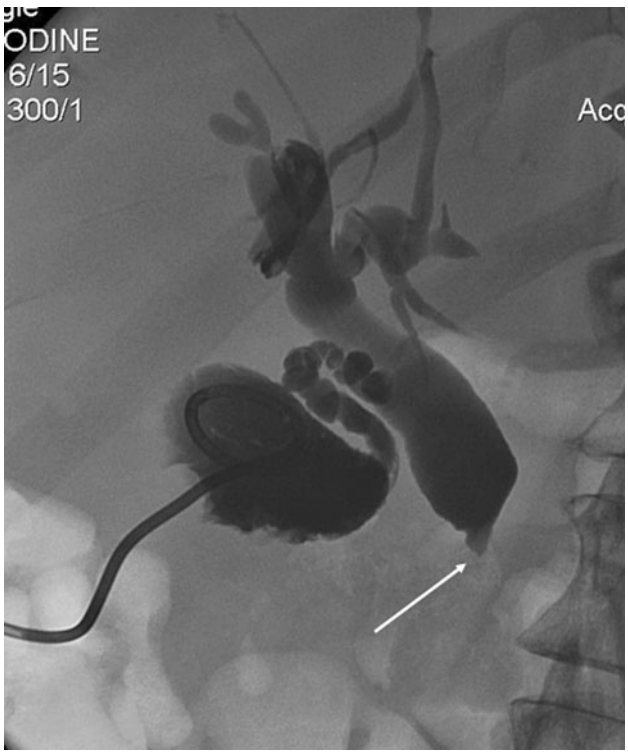

Fig. 2 Percutaneous transcholecystic cholangiography through the cholecystostomy drainage catheter reveals CBD obstruction at the distal third (*arrow*)

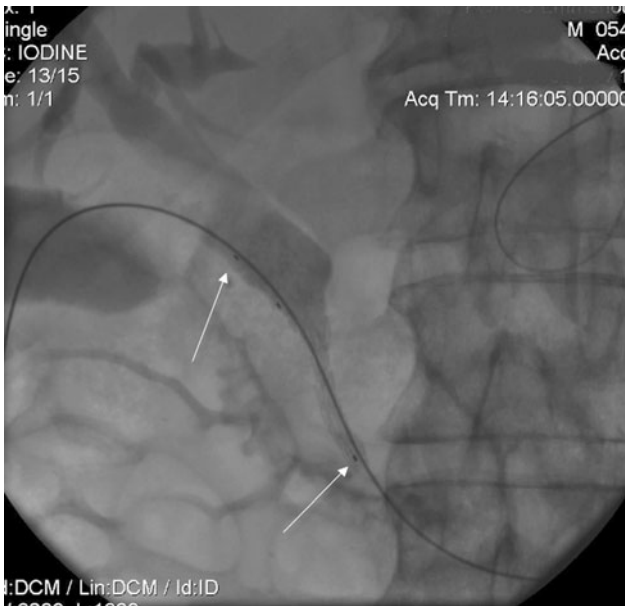

Fig. 3 An 8 × 80-mm Viabil-covered stent with proximal side holes was advanced to the level of the obstruction. The proximal and distal edges of the endoprosthesis are indicated by *white arrows*. The side-hole area is demarcated by the upper two radiopaque markers and remains above the malignant stricture

Fig. 4 Cholangiography through the external catheter revealed adequate stent expansion and satisfactory contrast runoff to the small bowel

ago as an alternative to laparoscopic cholecystectomy and, since then, have offered a valid alternative in the management of a wide variety of biliary system disorders [1]. The most frequently used intervention is percutaneous cholecystostomy, which is indicated for high-surgical-risk patients with acute cholecystitis that does not improve after conservative treatment [2], when intracorporeal lithotripsy is necessary, or in special cases when cholecystitis is hemorrhagic or emphysematous [8–10].

Apart from biliary drainage or lithotripsy through the gallbladder lumen, there is the option of malignant obstructive jaundice management by performing biopsy, bile duct balloon dilation, and stent insertion [3–5]. Gallbladder puncture can be performed either transperitoneal or transhepatically. The transhepatic route offers several advantages over the transperitoneal one, such as a more stable access for further transcholecystic interventions such as lithotripsy [2, 11]. It is also considered to be more appropriate for patients without liver pathology, and it should be avoided if the bleeding parameters are prolonged or not correctable [12]. Nevertheless, van Overhagen et al. [12] found no difference in complication rates between the two techniques. Also, the transhepatic approach is associated with faster tract maturation [13], especially in the presence of ascites.

There are no clear indications for transcholecystic management of obstructive jaundice. Usually it is limited to inoperable cases of malignant jaundice, where obstruction is manifested by acute cholecystitis and percutaneous cholecystostomy is initially necessary [1, 3]. In our case the patient was considered inoperable and unsuitable for endoscopic sphincterotomy, therefore the percutaneous solution was the only one available.

Another indication may be the presence of a noninflamed but dilated gallbladder (hydrops) in a patient with malignant jaundice and a nondilated intrahepatic biliary tree. In cases like the one we report here the transcholecystic route is the only solution due to extensive liver pathology such as the presence of diffuse metastases or benign lesions that prohibit liver puncture. Sheiman and Miyayama have also described cases of malignant jaundice where the transcholecystic approach was considered the best option due to the necessity of stent placement in the cystic duct [4, 5].

Except for these cases, percutaneous cholecystostomy is not widely applied in patients with obstructive jaundice, since access to the CBD must be secured in a safe and easy fashion. Cannulation of the cystic duct can be technically difficult since it is tortuous and the spiral valves of Heister are present. In the early years vanSonnenberg et al. [3] cannulated the cystic duct successfully in only two of the five patients in whom the procedure was attempted. In a more recent study Miyayama et al. [14] failed to pass through the cystic duct that was infiltrated by tumor, and therefore cholecystocholedochostomy was the only possible way to the CBD. After that experience the same group used a microcatheter in the three following cases in order to pass through the infiltrated cystic duct from a transcholecystic access [4]. In our case the wire was advanced through the spiral valves and toward the CBD

in the first attempt, considering that the cystic duct was not infiltrated by the tumor. We experienced some difficulty in passing through the malignant stricture in the infiltrated papilla.

The choice of a covered stent was based on the fact that in recent studies ePTFE/FEP-covered stents have been shown to be more effective in preventing tumor ingrowth in malignant biliary disease [7]. In the patient that we treated there was poor possibility for reintervention after eventual stent dysfunction. Considering that our intention was to obtain the longest possible patency, the ePTFE/FEP endoprosthesis was considered the most suitable solution. To avoid overgrowth or occlusion from tumor growth in the distal duodenal edge of the stent, a second, noncovered stent was used. The fact that no dysfunction occurred during the patient's life confirms this choice, even though the patient survived for only 8 months after the procedure. We also consider the method to be cost-effective considering that the patient was not readmitted for reintervention. The choice of the side-hole-type stent offered us the possibility of keeping the junction point of the cystic duct with the CBD patent.

In a patient with a low life expectancy a low reintervention rate is important. In addition, in our case there was no other possibility of reintervention due to the presence of metastasis in the liver parenchyma. The transcholecystic access was the only one possible, considering that it was impossible to puncture the liver without crossing a metastatic lesion and that the endoscopic approach would have been difficult due to the fact that the stricture was infiltrating the sphincter of Oddi. In the case of impossibility of the transcholecystic approach, the endoscopic solution would have been the only available, and in the case of new failure, external cholecystostomy drainage would be the permanent palliative treatment option.

We conclude that it is possible to place a ePTFE/FEP-covered stent through a transcholecystic access. This technique has not been described in the literature previously. We consider this a safe and suitable option for patients where liver puncture is not recommended.

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