Postgrad Med J (1993) **69**, 384 – 388

Combined transhepatic and endoscopic procedures in the biliary system

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Summary: Endoscopic biliary procedures are 89–97% successful in skilled hands. The commonest causes of failure are inability to cannulate the papilla of Vater due to difficult anatomy or tortuosity of the distal common bile duct and failure to cross a rigid biliary stricture. In nearly all of these cases, successful endoscopic procedures can be completed after percutaneous antegrade placement of a small catheter or guidewire to the duodenum. In 44 such combined procedures on 42 patients, the success rate was 43 (98%). There were two severe and eight mild complications. Combined procedures overcome the difficulties caused by tortuous biliary ducts and rigid strictures while obviating the need for more extensive percutaneous procedures and transhepatic tract dilatation.

Introduction

Endoscopy is recognized as a valuable technique for performing most interventional procedures in the extrahepatic biliary tree.[1–3] However, even in skilled hands, technical factors can prevent cannulation of the papilla of Vater, passage through a biliary stricture, or placement of a stent.[4,5] These difficulties can nearly always be overcome by percutaneous antegrade placement of a guidewire or small catheter through the biliary system into the duodenum prior to repeat endoscopy.[6–12] This paper documents our experience with this combined approach.

Materials and methods

Between June 1986 and June 1992, 1,558 endoscopic biliary procedures were performed at our institution. A total of 730 of these were therapeutic, comprising 459 stent insertions, 427 for malignant and 32 for benign disease and 271 stone removal procedures. A total of 44 percutaneous procedures were performed on 42 patients to facilitate subsequent endoscopic therapy. All of the radiographs, in-patient charts and endoscopy reports of these patients were reviewed.

There were 20 women and 22 men aged from 35 to 81 years (mean age 61). The indications for biliary intervention are listed in Table I. Surgically placed T-tubes were present in seven patients, three with pancreatic carcinoma, three with common bile duct stones and in the case of a patient with sclerosing cholangitis.

Table I

Indication for biliary intervention	*No.*
Pancreatic carcinoma	22
Common duct stones	7
Metastatic porta hepatis nodes	4
Cholangiocarcinoma (porta hepatis 4 CBD 1)	5
Sclerosing cholangitis*	2
Post cholecystectomy stricture with bile leak	1
Post cholecystectomy occlusion with fistula to duodenum	1
Total patients	42

*One case primary, the other secondary to hepatic artery infusion chemotherapy. CBD = common bile duct.

The causes for failure of the initial endoscopic procedures are listed in Table II.

Techniques

In the seven patients with T-tubes, a torquable Ring Lunderquist biliary wire (Cook Inc., Bloomington, IN, USA) was passed through the inferior limb of the tube into the duodenum. A straight

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Accepted: 16 November 1992

Table II Causes of failed endoscopic sphincterotomy or retrograde stenting

	No.
Inability to cannulate papilla	25
Inability to cross stricture	7
Extrinsic mass deforming duodenum	2
Passage prevented by T-tube	2
Unsuccessful endoscopic stent change	2
Passage prevented by stones	3
Billroth 2 gastroenterostomy	2
Inability to cannulate left duct selectively	1
Total procedures	44

angiographic catheter was then placed over the guidewire into the duodenum.

In the remaining 35 patients, 37 percutaneous transhepatic biliary drainage procedures were performed using standard technique.[13] All patients received prophylactic antibiotics and had normal coagulation profiles. Whenever possible, the stricture or stones were crossed at the initial session and a 5–8 French straight polyethylene catheter (Cook Inc.) placed through the Papilla of Vater with 1–2 cm projecting into the duodenum and multiple side holes in the bile ducts. The biliary system was drained externally until subsequent endoscopy. In eight patients the stricture could not be crossed at the initial procedure and placement of a catheter into the duodenum was achieved after a period of external biliary drainage. In one patient, initial biliary decompression was achieved by percutaneous cholecystostomy. Percutaneous transhepatic biliary drainage was performed after failure to cannulate the cystic duct.

In 32 patients, 34 procedures were performed to cannulate the right biliary system. In three patients left biliary drainage was performed including two who had undergone right hepatectomy for metastatic disease. The third patient had a cholangiocarcinoma at the porta hepatis (Klatskin tumour) with persistent left duct dilatation and cholangitis after successful endoscopic stenting of his isolated right biliary system.

For logistical reasons endoscopy usually could not be performed immediately after percutaneous transhepatic biliary drainage or T-tube tract cannulation. After an interval of 0–13 days (mean 2.7) endoscopic access to the biliary system was obtained by one of three methods: (1) In 12 procedures the endoscopic wire could be passed alongside the percutaneous catheter into the biliary system (Figure 1). The antegrade catheter both indicates the position of the ampulla and straightens the distal common duct facilitating retrograde catheterization. (2) In 15 procedures the endoscopic

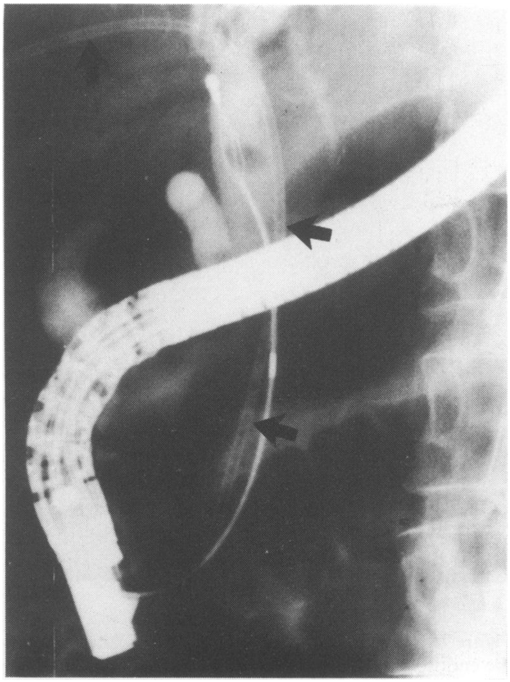

Figure 1 Endoscopic stone extraction. The 6 French percutaneous catheter (arrows) acts as a guide alongside which the sphincterotome and subsequently the basket could be passed.

guidewire was passed into the lumen of the percutaneous catheter which was then withdrawn into a peripheral duct to allow stent placement (Figure 2a). In some of these cases, the wire was passed out of the end of the percutaneous catheter and clamped outside the body to facilitate stent placement through a rigid stenosis (Figure 2b). (3) In the remaining 16 cases in which these techniques were unsuccessful, a 300 cm or longer (ideally 400 cm) 0.038 inch diameter standard floppy tipped wire (Cook Inc.) was passed antegrade through the percutaneous catheter into the duodenum and its end grasped by a stone basket introduced through the endoscope. The wire was then withdrawn through the endoscope by traction on the basket. In both the second technique and in this one, the presence of a guidewire, which could be controlled at both ends, usually allowed easy placement of stents. In five cases in which there was difficulty advancing the stent through rigid strictures, the stent pusher, catheter and wire were clamped together as a single unit at the endoscopic end, and the stent advanced to the required position by traction on the wire at the percutaneous site.

A total of 39 stents were placed in 37 patients. In all cases, final positioning of the stent was moni-

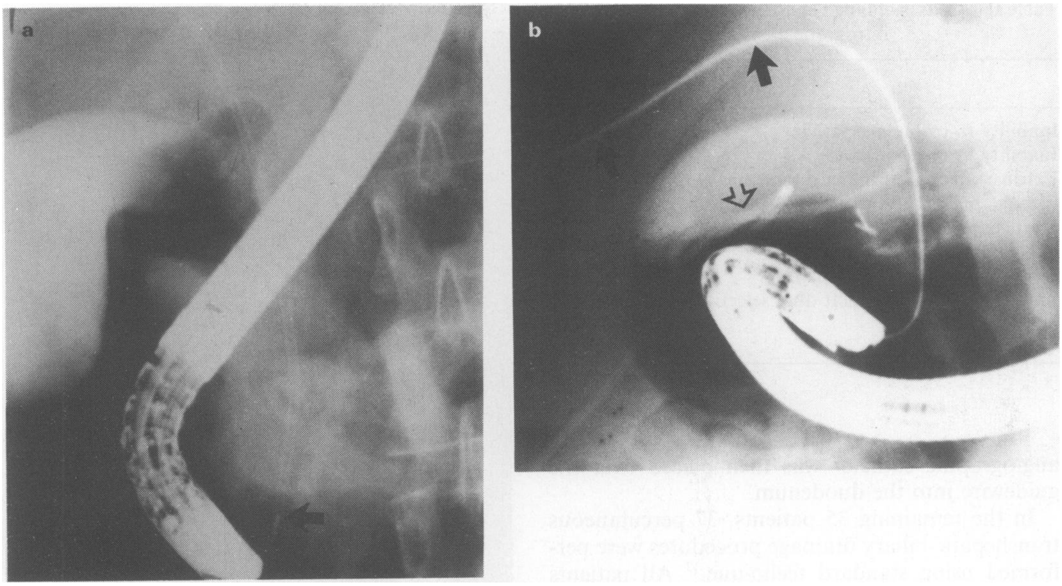

Figure 2 (a) Percutaneous catheter being cannulated by the endoscopic guidewire (arrow). (b) In a different patient, the endoscopic wire (arrows) has been advanced to the percutaneous entry site where it can be clamped to allow the stent to be pushed through a rigid stricture. There is a drainage catheter in the gallbladder (hollow arrow).

tored fluoroscopically with reference to films taken during previous antegrade or T-tube cholangiography. When the stent position was deemed satisfactory, the guidewire was withdrawn and where possible antegrade cholangiography was performed to determine the position of the proximal end of the stent and to confirm free drainage to the duodenum (Figure 3). The percutaneous catheter was then removed. Stents were placed in three of the patients with common bile duct stones. In the other four patients, percutaneous transhepatic biliary drainage facilitated subsequent endoscopic sphincterotomy and stone basketing.

Results and complications

Endoscopic choledocholithotomy was successful with no complications in the four patients in whom it was attempted. Initial satisfactory stent placement was achieved in 38 out of 39 procedures. In one patient the stent was too short resulting in inadequate biliary drainage and persistent jaundice. After 3 days, the stent was replaced endoscopically by a longer one without recourse to repeat percutaneous transhepatic biliary drainage.

Short-term follow-up was available on 35 patients who had undergone 37 procedures. There were ten periprocedural complications, eight mild and two severe. Five patients had episodes of cholangitis with fever of more than 38°C, three after percutaneous drainage, one after stent insertion and one after a single session combined procedure. All these episodes resolved with continued antibiotic and supportive treatment. One patient had transient pancreatitis with fever, abdominal pain and a serum amylase of 1,370 units after stent insertion. Three patients had bleeding complications. Two had self-limiting haemobilia post percutaneous drainage not requiring transfusion. The third patient had a self-limiting bleed after a single session combined procedure requiring transfusion of 2 units of blood but no other treatment. There was one procedure-related death from septic shock in a 76 year old patient with an obstructing pancreatic carcinoma and grossly infected bile.

Discussion

In skilled hands, endoscopic biliary procedures are 89–97% successful.[1,4,7] The cause of failure is usually inability to cannulate the papilla of Vater even after using the precutting technique, or inability to cross a tortuous, rigid ductal stricture.

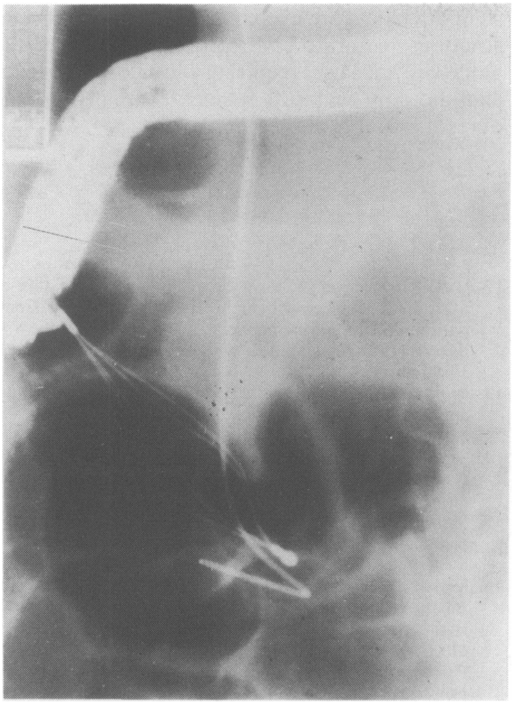

Figure 3 Final antegrade cholangiography (in this case via a cholecystostomy catheter) demonstrating good stent position and free flow of contrast to the duodenum.

Other causes of failed endoscopic procedures are listed in Table I. These can nearly all be overcome by the presence of a small catheter or guidewire placed antegrade through the papilla followed by endoscopic catheterization using one of the techniques described above. The long tortuous route through the working channel of the endoscope hampers fine control of the catheter and guidewire whereas the much shorter transhepatic route allows successful negotiation of tortuous bile ducts and ductal strictures.

Use of this combined approach was first described in 1980 using the transhepatic route[14] and via an existing cholecystostomy.[15] Since then there have been several reports of its use to facilitate endoscopic sphincterotomy[6–8] and stenting.[10,12,23] Kerlan and Ring reported a combined transhepatic and peroral approach which does not require endoscopy.[16]

Endoscopic stenting of bile duct strictures has a lower morbidity and mortality and a higher rate of successful biliary drainage than percutaneous biliary endoprosthesis placement.[1] In addition Hall *et al.* reported a higher rate of successful endoscopic stent replacement with endoscopically placed stents compared with percutaneously placed endoprostheses.[12] The higher complication rate of transhepatic procedures is mainly due to the trauma of creating a tract through the liver parenchyma and dilating it to 10–14 French. Combined procedures requiring tract dilatation to only 5–8 French may well have a lower complication rate as reported in the comparative study of Hall although the results were not statistically significant.[12] In this series the complication rate is comparable to that reported with percutaneous biliary stenting or drainage.[1,17,18] There are, however, definite advantages to the combined approach. The avoidance of dilating the transhepatic tract to 10F or more makes the procedure far less traumatic and acceptable for the patient, and larger series may eventually show a lower complication rate. The presence of external drainage tubes with local entrance site complications and adverse psychological effects is avoided. In addition, the use of percutaneous prostheses which may be difficult to replace endoscopically is avoided. In patients with large common bile duct stones in whom failure of endoscopic therapy means probable surgery, the advantages of lithotomy or stenting by the combined approach are obvious. The shorter percutaneous procedure also results in a lower radiation dose to the radiologist.

Biliary obstruction at the confluence of the main intrahepatic biliary ducts presents a special problem. One patient required a combined left-sided procedure to supplement successful endoscopic stenting of the right biliary system. A second patient was successfully stented by the combined approach but after failure of stent replacement due to a sharp angle at the site of obstruction was managed by percutaneous drainage. Since patients with Klatskin tumours may survive for a long time, placing a stent that is difficult or impossible to replace endoscopically is not recommended. For this reason, after our initial experience, subsequent patients with Klatskin tumours (not included in this series) in whom endoscopic stenting was unsuccessful were managed by percutaneous drainage. Using this combined approach, the success rate of endoscopic procedures at our institution has risen from 93.5% to 99.5%.

Chespak *et al.*[19] recently reported an increased success rate of endoscopic interventions using the highly controllable Glidewire (Terumo, Meditech Watertown, MA, USA) through the endoscope. This technique may obviate the need for some combined procedures in patients with intrahepatic duct lesions or very tortuous non-rigid strictures.

The recent introduction of percutaneous expandible metallic biliary stents allowing the introduction of large calibre stents (8–10 mm) through 7–12 French sheaths[20–21] provides an alternative means of percutaneous stent insertion in some cases of failed endoscopic stenting. Despite their large internal diameter, these expensive devices have not yet demonstrated a higher long-term patency rate compared to standard percutaneous or endoscopic stents.[21,22] Further evaluation is required to determine their place in the treatment of biliary obstruction. Even if problems of long-term patency and tumour ingrowth through the stent interstices are overcome, the stenting of rigid strictures requiring control of both ends of the guidewire and cases requiring endoscopic choledocholithotomy will still require combined procedures if initial endoscopy fails.

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