Contrast-free endoscopic stent insertion in malignant biliary obstruction

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with the standard procedure is needed to confirm the findings of the present study.

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Abstract

AIM: To present a case series of MRCP-guided endoscopic biliary stent placement, performed entirely without contrast injection.

METHODS: Contrast-free endoscopic biliary drainage was attempted in 20 patients with malignant obstruction, unsuitable for resection on the basis of tumor extent or medical illness. MRCP images were used to confirm the diagnosis of tumor, to exclude other biliary diseases and to demonstrate the stenoses as well as dilation of proximal liver segments. The procedure was carried out under conscious sedation. Patients were placed in the left lateral decubitus position. The endoscope was inserted, the papilla identified and cannulated by a papillotome. A guide wire was inserted and guided deeply into the biliary tree, above the stenosis, by fluoroscopy. A papillotomy approximately 1 cm. long was performed and the papillotome was exchanged with a guiding-catheter. A 10 Fr, Amsterdam-type plastic stent, 7 to 15 cm long, was finally inserted over the guide wire/ guiding catheter by a pusher tube system.

RESULTS: Successful stent insertion was achieved in all patients. There were no major complications. Successful drainage, with substantial reduction in bilirubin levels, was achieved in all patients.

CONCLUSION: This new method of contrast-free endoscopic stenting in malignant biliary obstruction is a safe and effective method of palliation. However, a larger, randomized study comparing this new approach

INTRODUCTION

Endoscopic stent insertion has become the preferred method of biliary drainage for palliation of malignant biliary obstruction. Stent placement can relieve jaundice and pruritus and improve liver function and quality of life^[1-4].

Currently, endoscopic stent placement involves the use of contrast media to achieve direct opacification of the biliary duct systems, and to determine the location and the extension of biliary obstruction.

Bacterial cholangitis is the main ERC-related complication in these patients. The risk of cholangitis after contrast injection into the biliary tree in cases where incomplete drainage is achieved is well known^[5,6].

Recent reports describe the utility of MRCP or CT imaging to guide selection of the target lobe for subsequent endoscopic stenting. MRCP or CT images are used to confirm the diagnosis of tumor to exclude other biliary diseases and to demonstrate the stenoses as well as dilation of proximal liver performed entirely without contrast injection.

MATERIALS AND METHODS

Contrast-free endoscopic biliary drainage was attempted in 20 patients with malignant obstruction unsuitable for resection on the basis of tumor extent or medical illness. Full and informed consent was obtained from all patients.

Baseline clinical and biochemical characteristics of patients are given in Table 1.

Table 1 Baseline characteristics of 20 patients with malignant biliary obstruction

Parameter	n (%)
Gender (M/F)	13/7
Mean age $\pm$ SD (yr)	62.8 $\pm$ 8.0
Mean duration of symptoms $\pm$ SD (mo)	1.75 $\pm$ 0.72
Jaundice	20 (100)
Pruritus	20 (100)
Fever	0 (0)
Anorexia	10 (50)
Weight loss	10 (50)
Mean serum bilirubin $\pm$ SD (mg/dL)	15.8 $\pm$ 9.2
Mean AST $\pm$ SD (U/L)	43.2 $\pm$ 9.9
Mean ALT $\pm$ SD (U/L)	41.3 $\pm$ 9.9
Mean alkaline phosphatase $\pm$ SD (KA units)	37.3 $\pm$ 7.6

Three patients (15%) had ampullary carcinoma, 5 (25%) pancreatic cancer, 10 (50%) cholangiocarcinoma of the main biliary duct and 2 (10%) a Klatskin tumor.

The diagnosis was based on ultrasound or computed tomography with ultrasound guided or CT fine needle aspiration cytology. The site of biliary stricture was defined with the help of MRCP. MRCP images were used to confirm the diagnosis of tumor, to exclude other biliary diseases and to demonstrate the length of the stenoses as well as dilation of proximal biliary segments.

Implantation technique

The stent placement was carried out as an elective procedure. A side-viewing video-endoscope (Olympus TJF 145R, Olympus TJF 160R; Olympus Europe, Hamburg, Germany) was used.

Prophylactic treatment with a broad-spectrum antibiotic was initiated the day of the procedure and continued for 5 d thereafter. The procedure was carried out under conscious sedation. Premedication consisted of 5-10 mg diazepam and 40-60 mg hyoscine butylbromide, in several separate intravenous doses. Patients were placed in the left lateral decubitus position. The endoscope was inserted and the papilla identified and cannulated by a papillotome. A guide wire (Tracer Metro guide-wire, Cook-Endoscopy; Winston-Salem, NC, USA) was inserted and guided deeply into the biliary tree by fluoroscopy. A papillotomy approximately 1 cm. long was performed and the papillotome was exchanged with a guiding-catheter that was introduced and identified, under fluoroscopy, in the common bile duct across the stricture. A 10 Fr, Amsterdam-type plastic stent (Cotton-Leung biliary stent, Cook Endoscopy; Winston-Salem, NC, USA), 7 to 15 cm long, was finally inserted over the guide wire/guiding catheter by a pusher tube system (Figure 1 A-F). The correct length and diameter of the biliary stent is previously determined on the basis of the CPRM image.

Successful stent insertion was defined as passage of the stent across the stricture along with flow of bile through the stent. A decrease in bilirubin (> 0.5 mg/dL per day) and improved cholestatic liver function tests, assessed 7 d later were considered as signs of successful drainage. Complications were defined according to the criteria of Cotton *et al*^[10].

RESULTS

Successful stent insertion was achieved in all patients. There were no major complications. A minor complication (pancreatitis) developed in 1 patient (5%). Successful stent implantation was obtained in all patients and successful drainage, with substantial reduction in bilirubin levels, was achieved in all patients (15.8 ± 9.2 at baseline *vs* 4.0 ± 2.1 mg/dL at 1 wk). There were no cases of 30-d mortality. The median stent patency was 110.6 ± 17.8 d and the mean survival was 136.8 ± 38.8 d.

DISCUSSION

Retention of contrast and subsequent segmental cholangitis is a risk associated with endoscopic attempts to treat advanced malignant stenoses of the biliary tract^[7].

Risk factors identified as significant in univariate analysis include the use of combined percutaneous-endoscopic procedures, stent placement in malignant strictures, the presence of jaundice, low case volume, and incomplete or failed biliary drainage^[11]. A special circumstance is the presence of a hilar obstruction (e.g., "Klatskin tumor"). Post-ERC bacterial cholangitis in patients with Klatskin tumors occurs in 17% to 49%^[6,12,13].

Factors that may increase the risk of sepsis in obstruction include disruption of the tight junctions between hepatocytes, impaired Kupffer cell function, and lack of clearance of contaminants which occurs with normal bile flow. In addition the protective action of secretory IgA and biliary mucus which prevent bacterial adherence is lost. In animal studies bacterial reflux from bile to blood is enhanced by increased intrabiliary pressure^[14]. This suggests that increased intrabiliary pressure during ERC is the main reason for increased bacterial access to the blood.

Some endoscopists advocate attempts to avoid filling all intrahepatic segments and the importance of draining all intrahepatic segments that are filled with contrast^[6,15].

Recent reports describe the utility of MRCP or CT imaging to guide selection of the target lobe for subsequent endoscopic stenting^[7-9].

Contrast-free biliary decompression has been performed and previously reported with duodenoscopes, US, and EUS guidance^[16-19].

In this present series, stents are placed under fluoroscopic guidance without any injection of contrast.

This method differs somewhat from common practice in a number of ways. The traditional approach consists of obtaining a complete cholangiogram at ERCP with retrograde opacification of obstructed ductal segments and this, particularly for hilar stenoses, may pose a substantial risk for cholangitis and mandate placement of multiple stents. For the MRCP and TC-target biliary stenting approach, contrast injection at ERCP is deliberately limited to the extrahepatic bile duct distal to the tumor while a unilateral or bilateral cholangiogram is completed after the passage of guide-wire and guiding- catheter above the stenosis.

Our approach completely avoids contrast injection. The correct length and diameter of the biliary stent is

Figure 1 A: The papilla identified and cannulated by a papillotomy and a guide wire is inserted deeply into the biliary tree by fluoroscopy; B: Contrast-free guidewire cannulation of main biliary duct (case of pancreatic cancer); C: Contrast-free deployment of plastic stent (same case of A); D: Contrast-free guidewire cannulation of left hepatic duct (case of Klatskin tumor); E: Contrast-free unilateral deployment of plastic stent (same case of C). The arrows show the markers of the stent; F: Contrast-free bilateral deployment of plastic stent (case of Klatskin tumor).

previously determined on the basis of the CPRM image. Guidance of the guide wire, guiding catheter and stent in the biliary tree is performed under fluoroscopic control allowing safe and effective endoscopic stent insertion.

In this series, all patients had successful drainage. None developed cholangitis or died within 30 d, which may be due to contrast-free stenting.

In conclusion, this new method of contrast-free endoscopic stenting in malignant biliary obstruction is a safe and effective method of palliation. However, larger, randomized studies comparing this new approach with the standard procedure are needed to confirm the findings of the present study.

COMMENTS

Backgrounds

Currently, endoscopic stent placement involves the use of contrast media to achieve direct opacification of the biliary duct systems, and to determine the location and the extension of biliary obstruction. Bacterial cholangitis is the main ERC-related complication in these patients.

Research frontiers

This study shows a new technique for endoscopic biliary stent placement.

Innovations and breakthroughs

This report describes a possible improvement of endoscopic biliary drainage. In this present series, stents are placed under fluoroscopic guidance without any injection of contrast. A sensitive reduction of septic complication is preventable?

Applications

Endoscopic drainage of malignant biliary obstruction and particularly drainage of hilar stenoses.

Peer review

Contrast-free biliary decompression has been performed and previously reported with duodenoscopes, US, and EUS guidance. The current paper gives a prospective analysis of data on endoscopic biliary stent placement, performed entirely without contrast injection. Larger, randomized studies comparing this new approach with the standard procedure are needed to confirm the findings of the present study.

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