

# E.R.C.P. AND THE ENDOSCOPIC TREATMENT OF BILIARY AND PANCREATIC DISEASE

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## INTRODUCTION

E.R.C.P. (endoscopic retrograde cholangiopancreatography) and the endoscopic treatment of biliary and pancreatic disease was introduced as a regular service in Lancaster in October 1990. Prior to this patients had to be referred to Manchester and other centres for these procedures.

In its first year more than 200 patients have benefited from the service. We now perform six elective and semi-urgent procedures on the weekly E.R.C.P. list. In addition occasional emergency E.R.C.P.s are performed on ill patients with cholangitis and pancreatitis.

## WHICH PATIENTS SHOULD BE REFERRED FOR E.R.C.P.?

Table 1 shows the patients who are likely to benefit from the service. The principal indication for E.R.C.P. is obstructive jaundice. These will be jaundiced patients with an obstructed pattern of liver enzymes and dilatation of the biliary tree on ultrasound.

### Indications for E.R.C.P.

- 1 Obstructive jaundice
- 2 Cholangitis
- 3 Acute gallstone pancreatitis or recurrent idiopathic pancreatitis.
- 4 Suspected chronic pancreatitis
- 5 Suspected pancreatic carcinoma
- 6 Biliary colic with abnormal LFT's or dilatation of the biliary tree on ultrasound.

Table 1

The principal causes of obstructive jaundice are gall stones and malignant strictures of the common bile duct – commonly due to carcinoma in the head of the pancreas. These pathologies can be difficult to distinguish using conventional ultrasound and CT scan. The poor performance of ultrasound in diagnosis of common bile duct pathology is due principally to intestinal gas overlying the common bile duct. Ultrasound performs well in detecting intra-hepatic bile duct dilatation and pathology of the gall bladder. It is frequently impossible to distinguish between malignant and stone obstruction in the common bile duct. CT scan also

performs poorly in detecting common bile duct stones and is often unable to identify small masses in the head of the pancreas. Even when pancreatic swelling is apparent, CT scan may not differentiate inflammatory change and neoplasm.

E.R.C.P. performs well in differentiating malignant and stone obstruction of the biliary tree. It also enables endoscopic therapeutic manoeuvres such as stone removal or tumour stenting to obtain relief of jaundice.

Most jaundiced patients can wait to be treated on the next elective E.R.C.P. list. If infection is present in the bile the patient may develop cholangitis. When signs of sepsis do not rapidly improve on antibiotic therapy emergency E.R.C.P. and biliary decompression is required as the mortality from obstructed cholangitis is high.

Other patients in whom common bile duct stones are suspected without frank jaundice will often benefit from E.R.C.P. These may be patients with a past or current attack of gall stone pancreatitis or patients with biliary colic with abnormality of liver function, short of clinical jaundice, or dilatation of the biliary tree demonstrated on ultrasound examination.

E.R.C.P. is also appropriate in patients with a history suggestive of chronic pancreatitis or pancreatic carcinoma, particularly if CT scan has demonstrated a mass.

It is important that the service is not swamped by the referral of patients with chronic upper abdominal pain for which no explanation has been found. It is unlikely that E.R.C.P. will demonstrate any abnormality in these patients unless they have had documented abnormality of liver function, serum amylase, ultrasound or CT scan.

## HOW IS E.R.C.P. PERFORMED?

The majority of E.R.C.P.s are performed as a day case under sedation alone. Even when therapeutic manoeuvres are performed endoscopically the majority of patients go home the same day or early the next day.

The procedures are performed in the X-ray screening room. After informed consent topical anaesthetic is sprayed on to the oropharynx. The patient is placed in the left lateral position and intravenous sedation administered.

The duodenoscope is a side viewing flexible endoscope. It is introduced through the mouth and passed down the oesophagus and stomach. The pylorus is negotiated in the 'setting sun' position to enable the side viewing instrument to pass into the duodenum. Once in the second part of the duodenum the sedated patient is rolled into the prone

position. A combination of rotation and straightening of the duodenoscope enables the papilla to be brought into the field of view. The papilla is a pinhole opening representing the common opening of the bile and pancreatic ducts on the left posterior wall of the second part of the duodenum. It can be difficult to locate. A small crescentic fold of mucosa is a frequent clue as to the location of the opening.

Once in position a fine plastic cannula is introduced down the duodenoscope until it exits from the lower end of the instrument. In addition to the left/right and forward/backwards wheel controls, the tip of the duodenoscope incorporates a small bridge which can be used to lift the cannula in a forward and upwards direction. A combination of these controls enables the cannula to be inserted into the papilla (Fig.1). Cannulation of the papilla may take time but can be achieved in the majority of patients. The most common reasons for failure are the presence of a previous polygastrectomy or congenital periampullary diverticulum.

Following cannulation contrast is injected gently under X-ray screening control. Frequently the cannula has to be repositioned on several occasions before adequate filling of the biliary and pancreatic trees can be obtained.

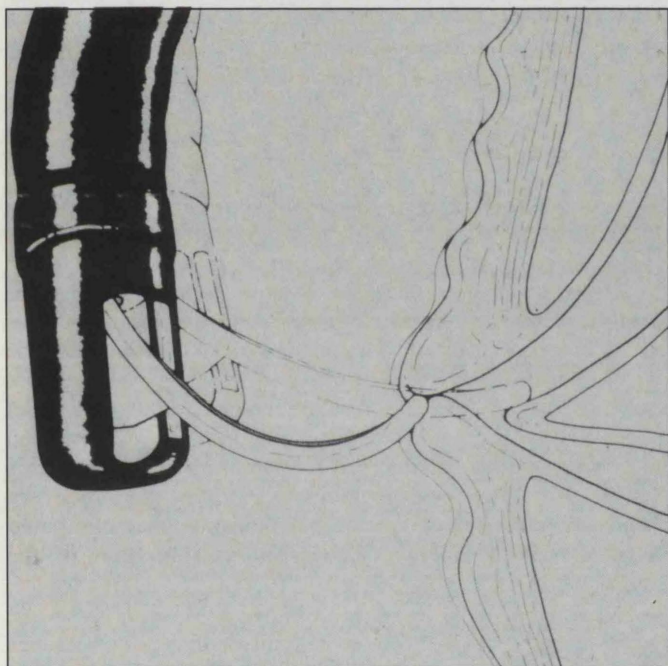


Fig 1 - Diagrammatic representation of cannulation of the duodenal papilla through the duodenoscope.

The normal E.R.C.P. (Fig. 2), demonstrates fine biliary and pancreatic trees with no evidence of stenosis or filling defects. The diameter of the common bile duct should be less than one cm while the pancreatic duct is usually less than 3 mms. Any tendency for X-ray magnification of the duct size can be corrected against the known diameter of the duodenoscope.

With careful patient selection many of the E.R.C.P. examinations reveal pathology. The most common pathologies are common bile duct calculi (Figs. 3 and 4) and malignant stricture of the common bile duct. Low strictures are usually due to carcinoma in the head of the pancreas

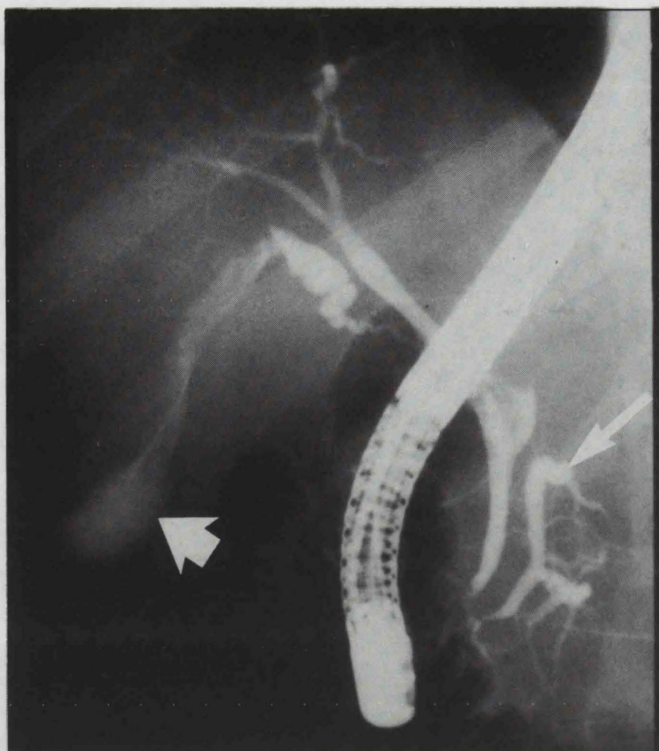


Fig 2 - The normal E.R.C.P. The duodenoscope is shown in position within the gas filled duodenum. The papilla has been cannulated. Contrast has partly filled the pancreatic ductal system (small arrow). The biliary tree has also been filled. The common bile ducts and intra-hepatic ducts are of fine calibre. The convoluted cystic duct has partly filled a healthy gall bladder (large arrow).

(Fig.5). Higher strictures may be cholangio-carcinoma of the bile ducts or metastatic tumour deposits. Occasionally complex multiple pathologies are demonstrated as shown in Fig.6.

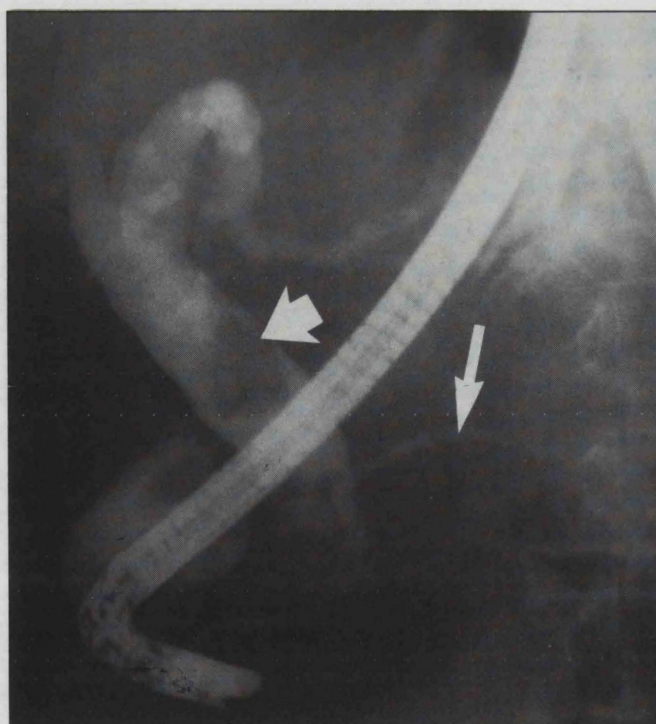


Fig 3 - E.R.C.P. showing a normal pancreatic duct (small arrow) and a grossly dilated common bile duct containing gall stones (large arrow).

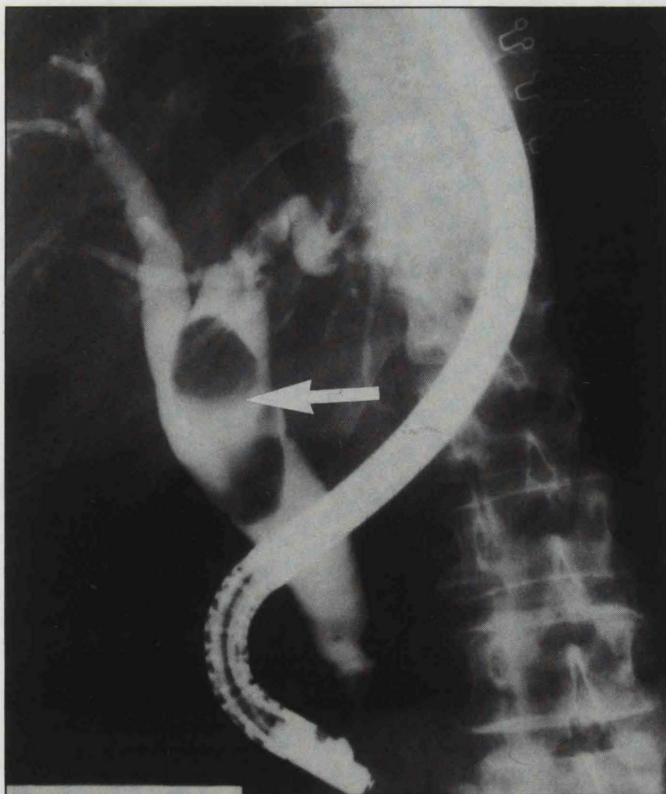


Fig 4 – Cholangiogram in a patient who underwent cholecystectomy many years previously. This shows a grossly dilated common bile duct with a single large calculus (arrow).

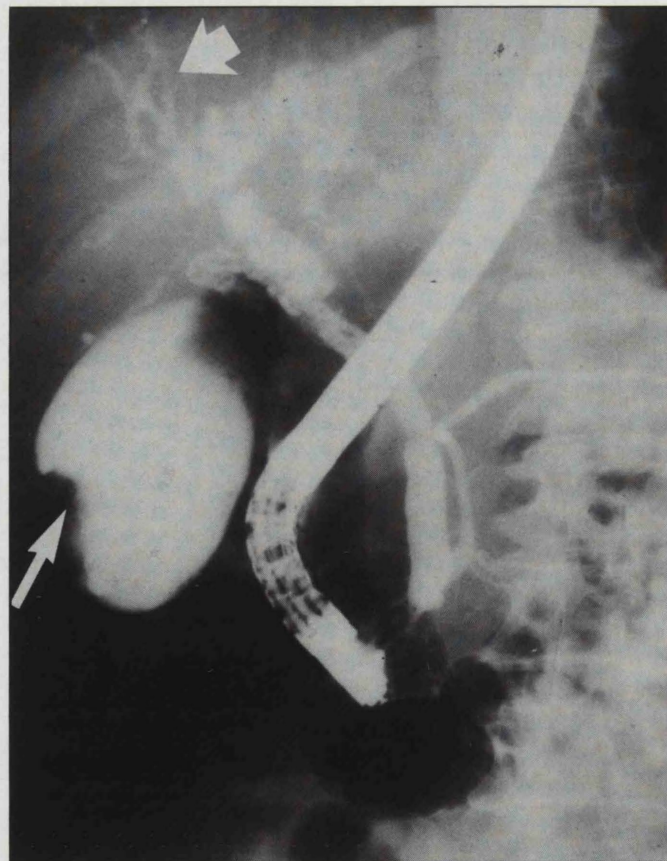


Fig 6 – Complex E.R.C.P. in a patient with carcinoma of the gall bladder (small arrow) and multiple stricturing and intrahepatic gall stones associated with sclerosing cholangitis (large arrow).

## THERAPEUTIC POSSIBILITIES

Having diagnosed common bile duct calculi at E.R.C.P. they can be removed endoscopically under the same sedation. This is a great advantage to the patient, particularly in the presence of acute cholangitis and acute pancreatitis where surgical treatment of common bile duct stones is

associated with high morbidity and mortality and lengthy hospital stay.

If stones are present in the common bile duct these are usually responsible for the symptoms. In the elderly patient endoscopic removal of common bile duct stones can be performed and cholecystectomy is often unnecessary. In a younger patient endoscopic treatment of common bile duct stones allows the patient to have the gall bladder removed with the new laparoscopic cholecystectomy technique. This significantly improves the patient's comfort and recovery time. It also reduces the overall hospital stay when compared to open surgical cholecystectomy and exploration of the common bile duct.

Endoscopic removal of common bile duct stones necessitates enlargement of the papilla. The pinhole meatus will often prevent the passage of gall stones into the duodenum. An endoscope sphincterotome (Fig.7) is passed down the duodenoscope. This instrument incorporates a diathermy wire. Once introduced into the papilla the wire can be bowed and a combined cutting/coagulation current used to widen the opening of the papilla (Fig.8.).

Once the sphincterotomy has been performed common bile duct stones can be retrieved using a balloon extraction device (Fig.9) or a basket (Fig.10). These are used to manipulate gall stones through the endoscopic sphincterotomy into the bowel lumen where they can either be retrieved or allowed to pass with the patient's faeces.

Another major therapeutic possibility after E.R.C.P. is the insertion of a biliary stent through a bile duct stricture. The majority of patients with malignant bile duct strictures are elderly. The results of attempted surgical resection of

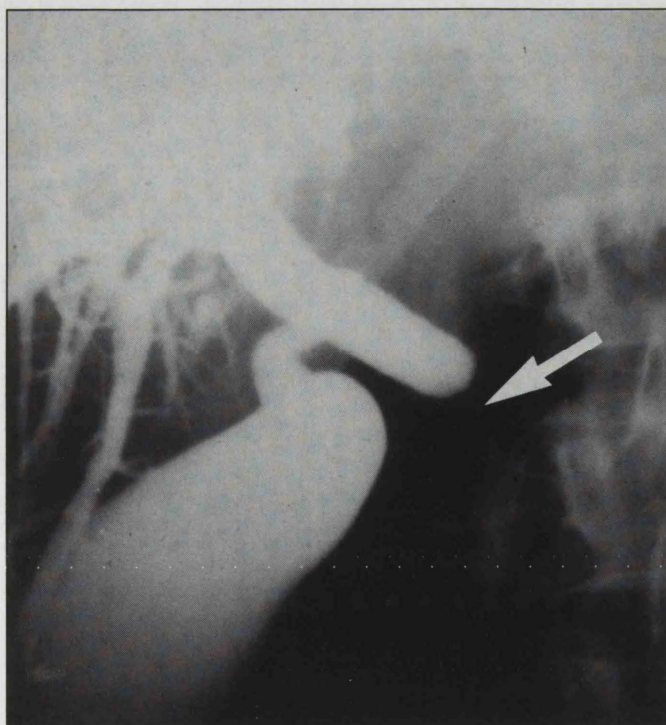


Fig 5 – E.R.C.P. in a patient with obstructive jaundice. This shows gross dilatation of the biliary tree above a tight stricture in the lower common bile duct. (arrow). This stricture was due to carcinoma in the head of the pancreas.

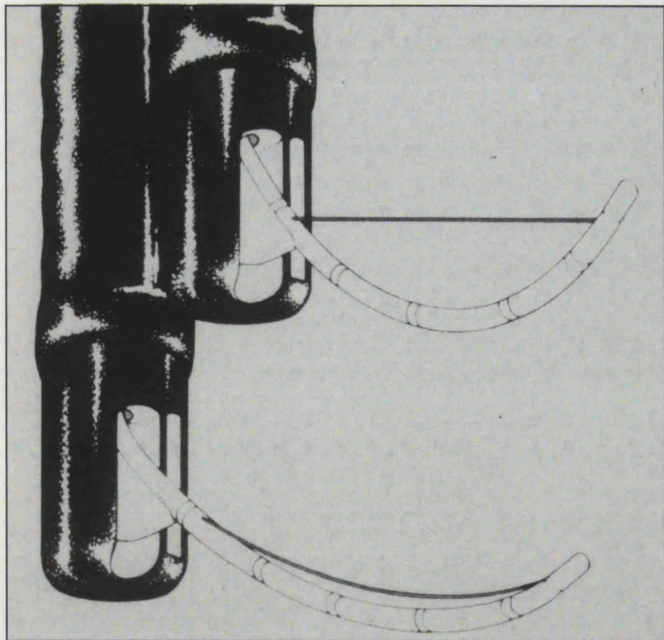


Fig 7 – Diagrammatic representation of the endoscopic sphincterotome in its relaxed and bowed positions.

malignant strictures are generally poor. Historically patients fit enough for general anaesthetic were offered a palliative surgical bypass of the obstruction. These operations were associated with an unacceptably high hospital morbidity and mortality. Even when patients survived the operation, the length of time in hospital and recovery time detracted significantly from the remaining life span.

The introduction of endoscopic stenting of these tumours as a day case, under sedation, represents a major breakthrough. A guide wire is passed down the duodenoscope and through the tumour into the dilated biliary tree. Over the guide wire a stiffening tube is passed followed by a short plastic stent which is pushed down the duodenoscope until it is situated across the obstructing lesion with the lower end hanging into the duodenum (Fig.11). Once the stent is in position the guide wire, stiffening tube and pusher are removed. (Fig.12) The stent allows bile to flow from the dilated duct above the obstruction into the duodenum. The patient's jaundice resolves which improves the general feeling of well being and prevents pruritus. Stents up to 12F diameter are inserted. These are usually adequate to prevent recurrence of jaundice in the patient's remaining lifespan. If the stent does silt up with bile debris a change of stent can be performed. This is also achieved as a

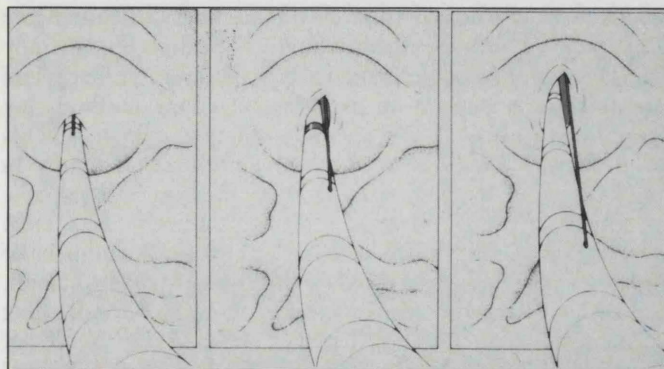


Fig 8 – Diagrammatic representation of the sphincterotome being used to enlarge the opening at the papilla.

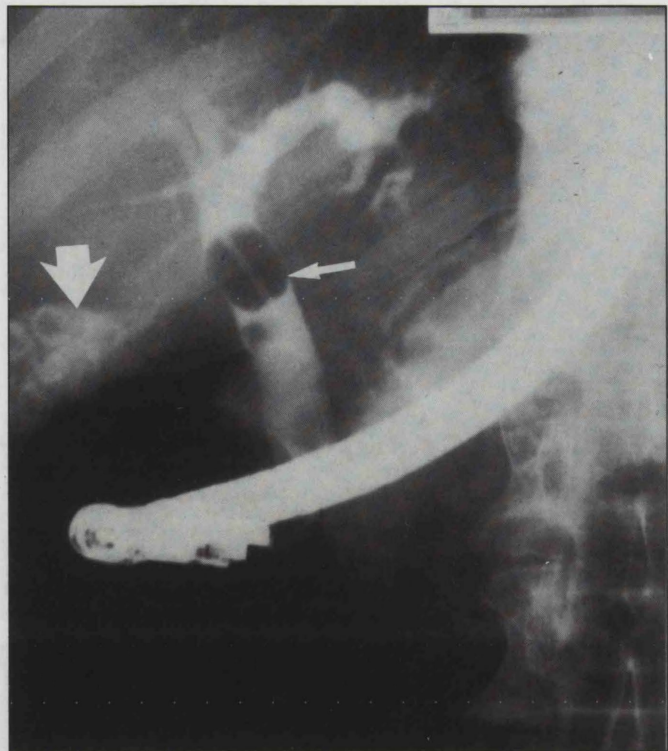


Fig 9 – A balloon catheter has been inflated above a stone in the common bile duct and is used to draw the stone into the duodenum. (small arrow). The patient also has multiple radio-opaque stones in the gall bladder (large arrow).

day case under sedation. The old stent is grasped through the duodenoscope and withdrawn prior to insertion of a new stent using the original technique.

On occasions it is not possible to insert a stent through a difficult malignant stricture. In these patients a combined percutaneous endoscopic approach is used. A guide wire is

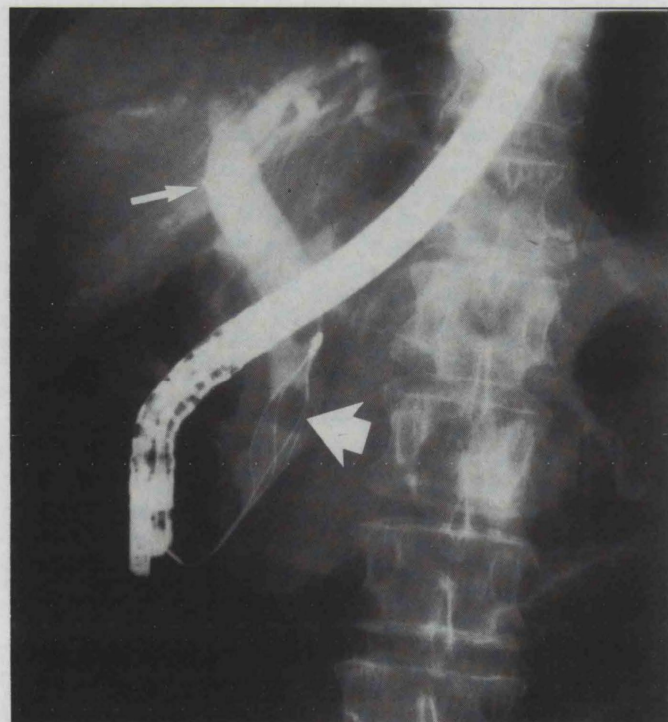


Fig 10 – This patient had a cholecystectomy some years ago and a metal clip is visible on the cystic duct stump (small arrow). A stone in the dilated common bile duct has been grasped with a basket extractor and is being withdrawn into the duodenum (large arrow).

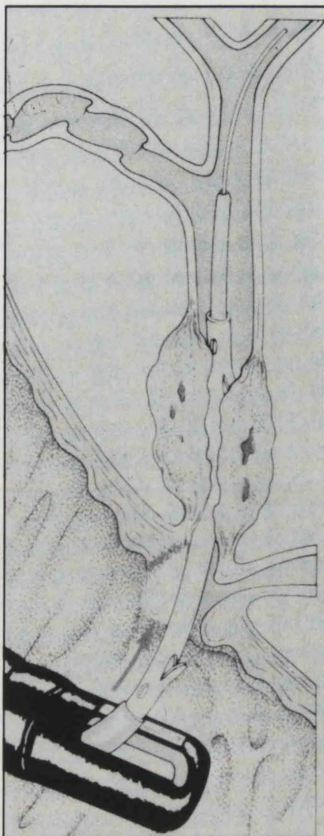


Fig 11 – Diagrammatic representation of a biliary stent being pushed into position across a malignant stricture of the common bile duct.

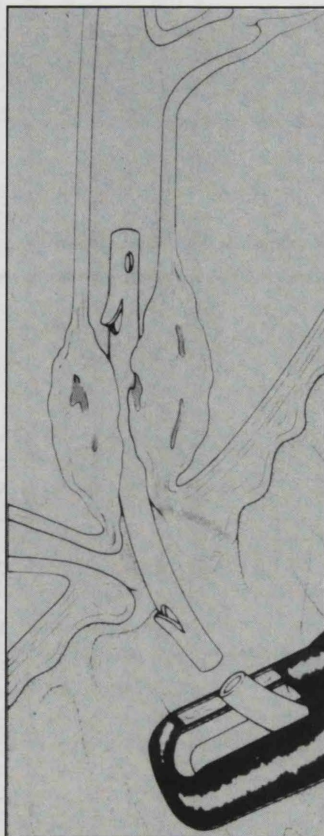


Fig 12 – Once the biliary stent is in position the guide wire and pushing tube are removed. The stent then allows bile to drain across the stricture.

passed into the liver through the abdominal wall under local anaesthetic and the stricture transversed from above. Once the guide wire has entered the duodenum the duodenoscope is inserted in the usual fashion and the wire grasped as it exits the duodenal papilla. This guide wire is then used to insert a stent from below.

## COMPLICATIONS OF E.R.C.P. AND ENDOSCOPIC THERAPEUTIC MANOEUVRES.

E.R.C.P. in itself is a very safe procedure. Complications are rare and are usually related to the sedation or mild pancreatitis caused by overfilling the pancreatic tree with contrast.

Complications following endoscopic sphincterotomy are more common. Approximately 10% of patients will experience a complication, most of which are minor. The procedure-related mortality is less than 1%. The common complications are shown in Table 2. Haemorrhage from the sphincterotomy accounts for half. Usually this is mild and settles on conservative management. Some patients require transfusion and on occasions haemorrhage does not stop and laparotomy is required so that the endoscopic sphincterotomy can be oversewn to stop the bleeding. Even though the morbidity and mortality associated with endoscopic sphincterotomy and other therapeutic endoscopic procedures is not insignificant it compares favourably with the morbidity and mortality associated with open surgery in this predominantly elderly group of patients.

### Complications of endoscopic sphincterotomy

|                                         |      |
|-----------------------------------------|------|
| Haemorrhage                             | 5%   |
| Acute pancreatitis                      | 2%   |
| Cholangitis                             | 1%   |
| Duodenal perforation                    |      |
| Impacted dormia basket                  | } 2% |
| Gallstone ileus                         |      |
| Other                                   |      |
| Overall complication rate               | 10%  |
| Procedure associated hospital mortality | <1%  |

Table 2

## THE FUTURE

I hope to continue expanding the E.R.C.P. service in Lancaster and at the new Westmorland General Hospital. The number of therapeutic endoscopic procedures is likely to increase. One of the most common reasons for failure of endoscopic removal of common bile duct stones is the presence of large stones. Small common bile duct stones can usually be removed intact through an endoscopic sphincterotomy (Figs.9 and 10). Larger stones (Fig.4) need to be broken up before they can be extracted through the sphincterotomy. One method of breaking up larger common bile duct stones is to insert a crushing basket into the common bile duct where the stone can be fragmented and the pieces removed individually through the sphincterotomy. I hope to have this equipment available in the near future. Another advance is the development of a very small flexible endoscope which can be passed down the channel of the duodenoscope and inserted through the sphincterotomy directly into the common bile duct. In this way common bile duct stones and other pathologies can be visualised directly through the "daughter" scope. Ultrasonic probes can be placed in direct contact with common bile duct stones to produce satisfactory fragmentation.

Large stones can also be fragmented with percutaneous shock wave lithotripsy but results with gallstones are disappointing. It is unlikely that this will be available in Lancaster because of the cost of the equipment. Stone dissolution therapy down a naso-biliary tube does not appear to hold great promise.

## SUMMARY

The E.R.C.P. service has significantly improved the accuracy of diagnosis in pancreatic and biliary disease. More importantly it provides the possibility for endoscopic therapy under sedation. This is particularly important in elderly and sick patients in whom open surgery and long hospital stay can often be avoided. It is also important in younger patients with acute illnesses such as pancreatitis or cholangitis. In these patients the morbidity and mortality of endoscopic treatment of biliary disease is significantly less than open surgery. In Lancaster we are performing large numbers of laparoscopic cholecystectomies for gall bladder calculi. At present laparoscopic treatment of common bile duct calculi is in its infancy. Patients with any evidence of common bile duct calculi must undergo E.R.C.P. and endoscopic removal of the calculi before proceeding to laparoscopic cholecystectomy.