# BILIO-ENTERIC ANASTOMOSES: RESULTS IN BENIGN AND MALIGNANT CONDITIONS

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*ABSTRACT*

***Twenty bilio-enteric anastomoses were performed or managed from May 1990 to December 1992. Recurrent pyogenic cholangitis (RPC) and pancreatic cancer were the commonest conditions which required drainage procedures. Roux-en-Y hepatico-jejunostomy (RHJ) was performed in 9 patients, 4 for RPC, one for pancreatic cancer, another for a cholangiocarcinoma, 2 following excision of choledochal cyst and one hepatico-jejunostomy was part of a Whipple reconstruction. Roux-en-Y side to side choledocho-jejunostomy (CDJ) was performed in one patient. Choledocho-duodenostomy (CDD) was performed in 6, 4 for obstructive jaundice due to choledocholithiasis, one for RPC and one in a choledochal cyst. One patient operated elsewhere presented with complications after a CDD. Palliative cholecysto-jejunostomy (CYJ) was carried out in 4 patients with pancreatic malignancy. All benign conditions were treated by hepatico-jejunostomy and choledocho-duodenostomy, while three patients with malignant conditions were treated by hepatico-jejunostomy. Permanent subcutaneous access loops were provided when recurrent problems were anticipated, 4 in RPC and one after subtotal resection of a cholangiocarcinoma. Based on this study, we found Roux-en-Y hepatico-jejunostomy a versatile drainage procedure, which was useful in both benign and malignant diseases.***

*Keywords: hepatico-jejunostomy, choledocho-duodenostomy cholecysto-enterostomy*

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## INTRODUCTION

A bilio-enteric anastomosis is considered in a number of benign and malignant conditions. Cholecysto-jejunostomy provides adequate relief of jaundice in cases with advanced malignancy[1]. The role of choledocho-duodenostomy in the treatment of benign diseases is well established[2] while Roux-en Y hepatico-jejunostomy has similar results in both benign and malignant conditions[3,4]. We undertook a retrospective study of our experience with these procedure and compared their utility in terms of applicability and complications.

## PATIENTS AND METHODS

The complete records of all patients with both benign and malignant disease who had undergone any form of bilio-enteric drainage or were managed for any complication developing after such a procedure were reviewed. One patient was operated elsewhere but presented with a complication.

There were 14 female and 6 male patients, whose ages ranged from 9 to 80 years with a mean of 57.4. The indications for bilio-enteric drainage are given in Table I. All patients except two were jaundiced on admission and were investigated in sequence. Ultrasonography was the primary diagnostic procedure and confirmed the presence of ductal dilatation in all patients. Further evaluation was performed by either percutaneous transhepatic cholangiography (PTC), endoscopic retrograde cholangiopancreatography (ERCP) or computerised tomography (CT) scanning or a combination (Table II). Pre-operative cholangiography was also performed when considered necessary. The various operative procedures performed are shown in Table III.

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**Table I – Indications for bilioenteric drainage**

| Indication | No. of cases |
|---|---|
| Cholangitis | 6 |
| Choledocholithiasis | 3 |
| Carinoma pancreas | 7 |
| Choledochal cyst | 3 |
| Cholangiocarcinoma | 1 |

**Table II – Radiological investigations**

| Procedure | CG | CDL | CAN# | CYST* | CHOCA | Total |
|---|---|---|---|---|---|---|
| Ultrasound | 6 | 3 | 7 | 3 | 1 | 20 |
| ERCP | 6 | 1 | 4 | 1 | 1 | 13 |
| PTC | 2 | 0 | 1 | 1 | 1 | 5 |
| CT | 1 | 0 | 3 | 1 | 1 | 6 |

CG – cholangitis
CDL – choledocholithiasis
CAN – pancreatic cancer
CYST – choledochal cyst
CHOCA – cholangiocarcinoma
US – ultrasound
* One patient had only ultrasound, one had ERCP, CT and US and one had PTC and US.
#:3 clinically advanced pancreatic cancers needed only ultrasound, one had PTC decompression prior to Whipple's resection. Three patients had both ERCP and CT and another, ERCP only.

**Table III – Bilioenteric procedures carried out in 20 patients**

| Indication | RHJ | CDD | CYJ | CDJ |
|---|---|---|---|---|
| Cholangitis | 4 | 2 | – | – |
| Panc. cancer | 2 | – | 4 | 1 |
| CDL | – | 3 | – | – |
| Chol. cyst | 2 | 1 | – | – |
| CholangioCa | 1 | – | – | – |

CDL: choledocholithiasis
Chol.Cyst: choledochal cyst
CholangioCa: cholangiocarcinoma

Palliation is defined as relief from obstructive jaundice inoperable cases due to advanced malignancy. Immediate and late complications are shown in Table IV.

**Table IV - Early and late complications specifically related to bilio-enteric anastomoses**

| | Complications | No. |
|---|---|---|
| Early | Anastomotic leakage/fistula | |
| | Peritonitis | |
| | Septicaemia | |
| | Wound infection/dehiscence | 1 |
| Late | Stomal stricture | |
| | Cholangitis | 1 |
| | Recurrent/retained calculi | 1 |

**Operative technique**

*Cholecysto-jejunostomy (CYJ)*

A side to side continuous suture of Vicryl 3/0 was used to construct a one layer anastomosis between the body of the gall bladder and jejunum. In 2 cases each a 50 cm Roux-en-Y loop and a simple loop jejunostomy with entero-enterostomy were used depending on the individual preference of the surgeon. A two-layer gastro-jejunostomy was added in all patients. No stents or drains were employed.

*Choledocho-duodenostomy (CDD)*

All procedures were side to side between a dilated bile duct (> 2 cm) and the duodenum. Interrupted sutures of Vicryl 2/0 were used to create a one-layer anastomosis without stents.

*Choledocho-jejunostomy (CDJ)*

Interrupted sutures of Vicryl 2/0 were used to make a one-layer side to side anastomosis between the dilated bile duct and a 70 cm Roux-en-Y loop of jejunum.

*Hepatico-jejunostomy (RHJ)*

The hepatic duct is the segment of the bile duct between the confluence of the right and left hepatic ducts and the insertion of the cystic duct. The length of this stump in our cases varied from zero to 1.5 cm. In the former the anastomosis was constructed at the confluence in a patient with a hilar cholangiocarcinoma and the latter length in a patient with pancreatic cancer and a low cystic duct insertion. All these procedures were end to side (end of hepatic duct and side of jejunum) with interrupted sutures of Vicryl 3/0 in one layer.

A 70 cm Roux-en-Y loop was prepared and brought up through the mesocolon. The anterior row of sutures were inserted on the hepatic duct individually and retained with their needles in numbered clips. The posterior row sutures were then serially introduced first through the jejunum and then the duct and made taut to railroad the jejunum to the hepatic duct. These sutures were then tied individually. A stent was placed at this time before completion of the anterior layer. A T tube or a straight drain was employed depending on the length of biliary stump. In stumps less than 1 cm, the stent was brought out transjejunally, distal to the anastomosis. The previously placed anterior row sutures were completed by passing the needles through the jejunum from outside inwards and tied individually, once all were placed. A tube drain was placed behind the anastomosis and removed in 48 hours. A subcutaneous access loop was incorporated whenever recurrent biliary track problems were expected by positioning the closed end of the jejunal limb in the epigastrium. In patients with access loops the hepatico-jejunostomy was constructed 10 cm from the closed end. The distance of the jejuno-jejunostomy from the hepatico-jejunostomy without access loops was 65 cm and in cases with access loops the distance was 55-60 cm.

Stents were left to drain freely for 10 days and removed after cholangiography (Fig 1). Hepatic iminodiacetic acid (HIDA) scanning was carried out as an outpatient procedure to assess the RHJ anastomosis at 3 months and 9 months (Fig 2). In the others, liver function tests and ultrasound were relied upon during follow-up.

**Fig 1 – Post-operative T-tube cholangiography following RHJ shows adequate flow of contrast through the anastomosis.**

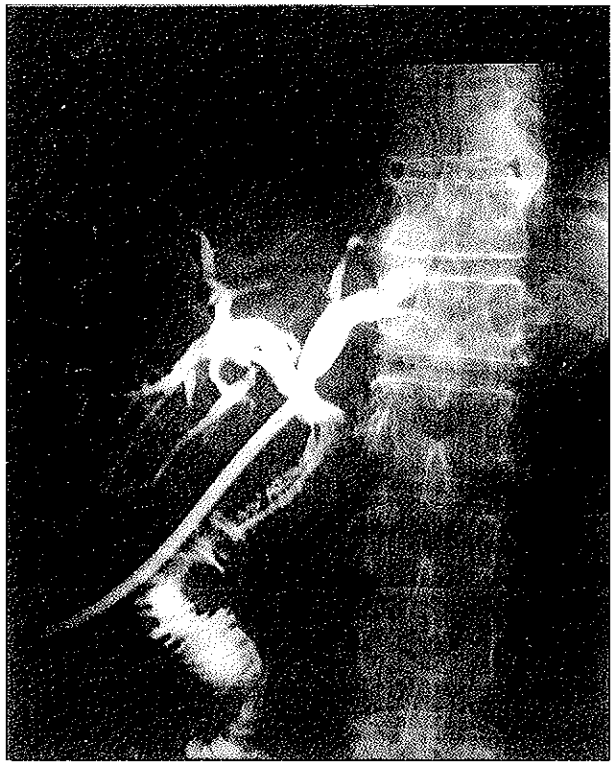
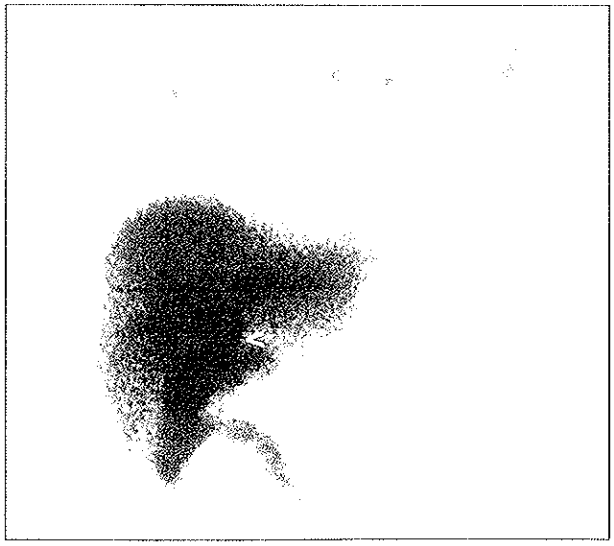


**Fig 2 – HIDA scan 3 months after RHJ. There was rapid uptake of the isotope by the liver with prompt passage across the anastomosis (arrowhead).**



## RESULTS AND OUTCOME

Cholecysto-jejunostomy with jejuno-jejunostomy (CYJ) was performed as a palliative procedure in 4 patients with advanced pancreatic cancer, with good relief from jaundice and pruritis. Two patients died of progressive liver failure due to secondaries 5 and 16 months after surgery. One patient is alive but jaundiced at 5 months with widespread hepatic metastases and one patient was lost to follow-up. During initial follow-up all three patients were free of jaundice but in the terminal stage, jaundice recurred. The pre and post-operative bilirubin levels in benign and malignant disease, plotted against time taken to achieve normal levels are shown in (Fig 3a and b). Patients with malignant disease had higher pre-operative bilirubin levels than the benign group and also took a longer time to achieve normal levels. A patient with a gall bladder tumour was anicteric, as were 2 patients in the benign group and have not been included.

One 80-year-old male patient underwent Roux-en-Y choledocho-jejunostomy (CDJ) for a benign stricture of the lower end of common duct. This patient had been fully investigated and neither endoscopic retrograde cholangiopancreatography (ERCP) nor CT scan showed evidence of a pancreatic or periampullary lesion (Fig 4). The head of the pancreas at laparotomy was also normal in size and consistency following full Kocherization of the duodenum. Based on the CT, ERCP and the operative findings, the papillary stenosis was considered benign. This turned out to be malignant because 15 months later he was readmitted with gastric outlet obstruction. Ultrasound revealed a large pancreatic mass and liver secondaries. The patient probably had the carcinoma at the time of surgery but was not detectable.

Choledocho-duodenostomy (CDD) was carried out in 5 female and one male patients, one of whom was operated elsewhere 12 years ago, and subsequently had 6 hospital admissions for cholangitis. On 2 admissions to our hospital with abdominal pain and mild icterus, ultrasound revealed multiple echogenic shadows within a dilated intra and extra hepatic biliary tree. Debris and sludge were seen in the stoma during gastroscopy and ERCP confirmed intra-hepatic calculi. This patient had her CDD converted to an RHJ with an access loop because of multiple intra-hepatic calculi and debris. Another 68-year-old lady had a CDD carried out for obstuctive jaundice 26 months earlier and was readmitted with jaundice. Investigations revealed a choledochal cyst with a large CDD stoma. A cholangiocarcinoma was confirmed by histology and the patient died 4 weeks after surgery of progressive liver failure. Four patients were well, with normal liver function tests at 5, 10, 23 and 27 months.

Seven female and 2 male patients underwent RHJ, 4 for recurrent cholangitis with multiple intra and extra-hepatic calculi, debris and ascaris worms (Fig 5). One was part of a Whipple reconstruction, one hilar cholangiocarcinoma, two choledochal cysts and one as palliation for pancreatic cancer with low cystic duct insertion. Five patients had the proximal end of the Roux loop placed subcutaneously because of anticipated recurrent biliary tract problems. This access loop was placed in 4 patients with recurrent pyogenic cholangitis and the 5th patient had this procedure after subtotal excision of a type I hilar cholangiocarcinoma. Another patient underwent RHJ after excision of a type IV A choledochal cyst with a tumour in the gall bladder associated with an anomalous pancreaticobiliary junction. A 78-year-old lady with cholangitis died of intractable malaena 3

**Fig 3a – Graph showing pre and post-operative bilirubin levels in the cholangitis (benign group). Two anicteric patients were excluded.**

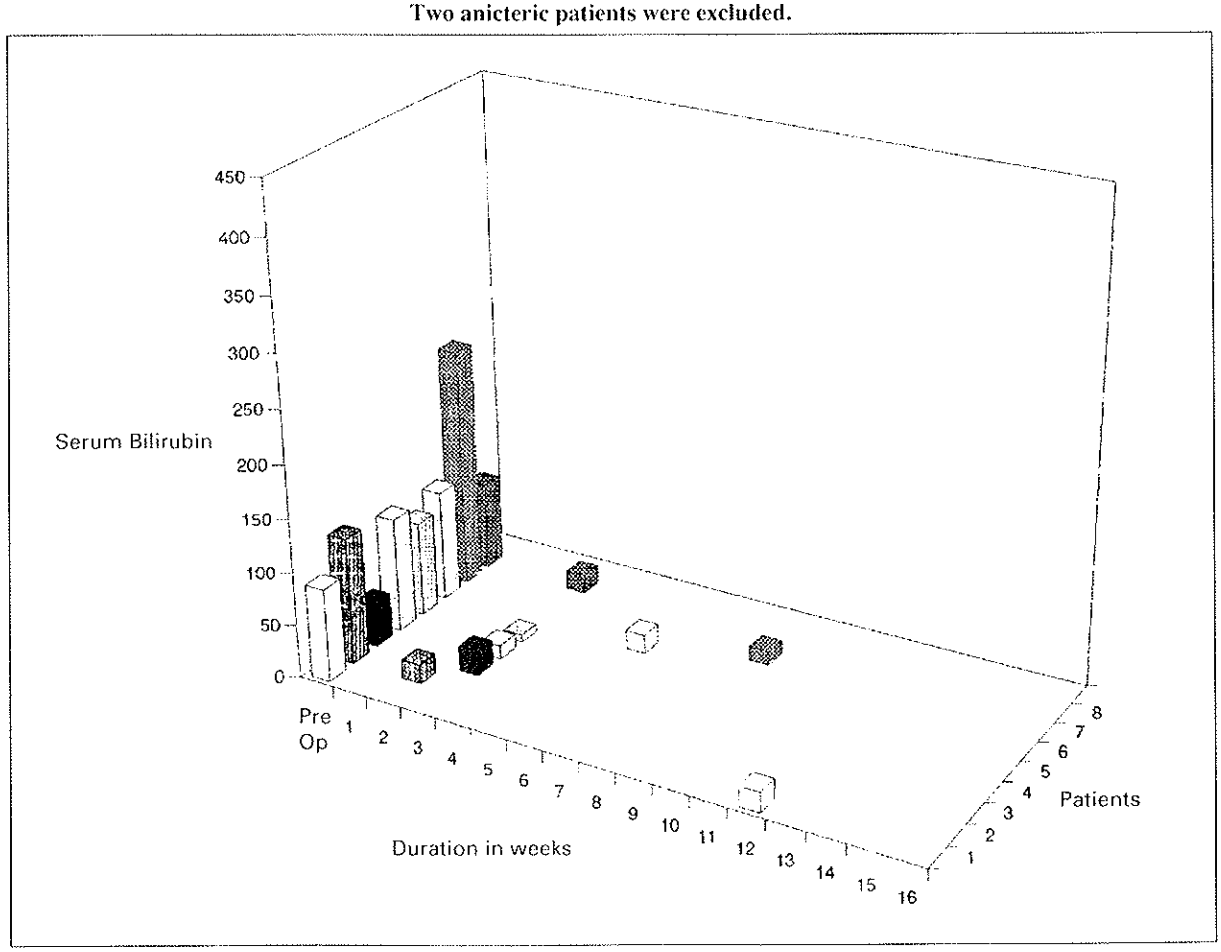
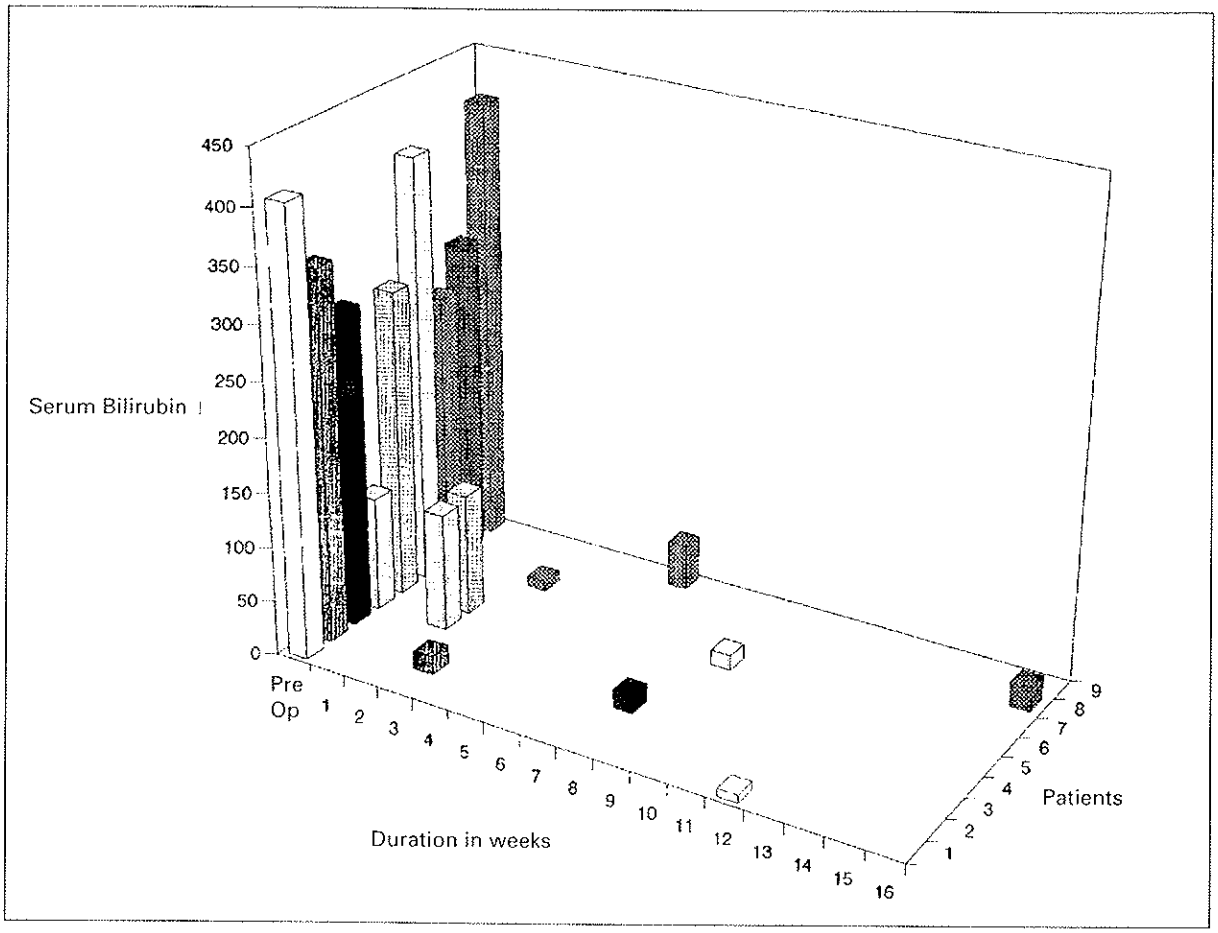


**Fig 3b – Graph showing pre and post-operative bilirubin levels in the malignant group. One patient was not jaundiced and thus excluded.**




weeks after surgery. All other patients except one have been symptom-free for 4-27 months, a mean of 10.4 months. This patient presented with a loss of appetite, normal serum bilirubin and a raised ALP on 2 visits. Ultrasound and CT scanning showed multiple calculi in the left ductal system. He was offered removal of these calculi through the access loop but refused.

There were two hospital deaths, one each in the CDD and RHJ groups, none were due to anastomotic leaks. Four late deaths occurred due to cancer, 3 in the CYJ and one in the CDJ groups. There was one complete wound dehiscence of a right paramedian incision which was resutured. A swab taken from the wound grew no organisms. This occurred in a patient who underwent emergency RHJ. There were no other wound complications.

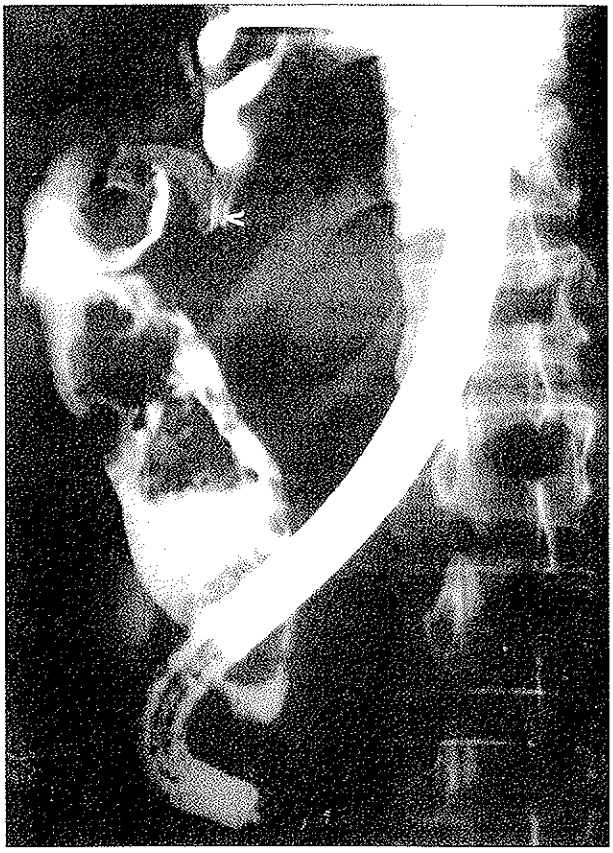
## DISCUSSION

Cholecysto-jejunostomy for palliation of jaundice in advanced pancreatic and periampullary cancer is safe and well established[1]. The only contraindications are the involvement of the cystic duct by tumour or a low cystic duct insertion. In such situations, CDD is not indicated and an RHJ should be considered as in one of our cases. We were not able to diagnose a pancreatic cancer despite CT, ERCP and laparotomy in one 80-year-old male patient who underwent a CDJ. Similarly, Escudero-Fabre and others missed the malignancy in 6.7% of their patients[2]. The longer time taken for bilirubin levels to become normal in the malignant group is multifactorial, the disease itself, poorer liver reserve and the non dependent drainage provided by CYJ. In the benign group the initial bilirubin levels were lower but half the patients had significant sepsis, despite which the bilirubin levels normalised quicker than in the malignant group.

Side to side choledocho-duodenostomy (CDD) is a shorter and technically easier procedure with a lower morbidity when compared with sphincteroplasty[5]. Choledocho-duodenostomy is only indicated in benign conditions such as lower CBD stricture, multiple common duct stones, chronic pancreatitis and papillary stenosis[2]. The 'sump' syndrome is an established entity and results from collection of debris and vegetable fibres in the posterior blind segment of CBD and occurs in about 3% of patients[6]. It is difficult to prove whether it is really the 'sump' which is the cause or whether it is recurrent primary calculi that cause cholangitis. This incidence may be reduced by creating a large stoma, good mucosal apposition or by creating an end to side CDD[7-9]. Two patients had long term complications, one developed a cholangiocarcinoma in a choledochal cyst despite a large stoma and the other patient developed repeated attacks of cholangitis 4 years following CDD for choledocholithiasis. In the former case, CDD was not the ideal procedure but the malignant change should not be considered a direct complication of CDD. The latter patient developed cholangitis 4 years after CDD with intra and extra-hepatic calculi and was probably a case of RPC for which CDD was not the ideal procedure. Four cases reported by Miros et al also developed cholangitis 1-4 years after CDD[10]. All our patients with CDD had dilated ducts and stomas larger than 2 cm, but a longer follow-up is necessary to see whether they develop complications.

Sphincteroplasty results in an internal CDD, has no blind posterior segment and was popularised by Jones[11]. Being technically more demanding it has a greater complication rate[12] but is the procedure of choice in stenosing papillitis[13]. None was carried out in this series as an easier alternative was available.

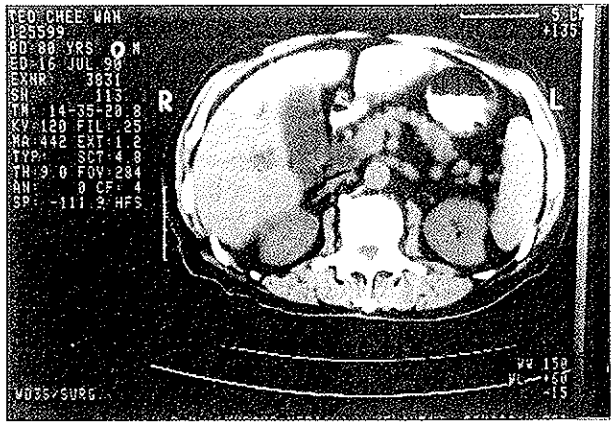
**Fig 4 – CT scan of the pancreas in the patient with ampullary stenosis. The head of the pancreas is within normal limits with gross dilatation of the terminal common bile duct.**



It is worth mentioning here that in patients with cholangitis, none had complete obstruction as the papilla was patulous and cannulation at ERCP was easy. All except one of our patients settled on antibiotics and underwent elective surgery. This was the first patient with RPC and septicaemia and because of our inexperience with the disease entity, we decided on emergency surgery. In retrospect, this emergency procedure could have been avoided because all the subsequent patients responded to antibiotics. Endoscopic sphincterotomy was not attempted in any patient in the above group but would have proved useful in the CDD group since these calculi were impacted. Nasobiliary drainage has been suggested as initial treatment to decompress the biliary system in the old and the acutely ill[14]. Its purpose would be defeated in our group because of the good response to antibiotics, patulous papillas at ERCP, the nature of intraductal debris and the small calibre drains used during the procedure.

Roux-en-Y hepatico-jejunostomy eliminates the 'sump' but is inaccessible to the endoscope unlike CDD. It has been termed ulcerogenic[15] but the long term results have disproved this claim[3,4]. One of our cases developed intractable malaena and died of cardio-pulmonary complications following the second laparotomy. The advantages of RHJ over CDD are its flexibility of application and a more manageable fistula if leakage occurs. It can be performed in both benign and malignant diseases, even if the biliary stump is small as in our patient with cholangiocarcinoma. It is the only method available for the round ligament[16], the left duct (hilar plate) or right duct (segment 5 duct) approaches[17,18]. The problem of access to the biliary tree has been overcome by placing the proximal end of the Roux loop subcutaneously[19] and successfully used by Hutson et al, for dilatation of strictures and removal of stones[20]. We created access loops in 5 patients, four in recurrent cholangitis for the removal of possible retained and recurrent calculi and another after a subtotal resection of a hilar cholangiocarcinoma, anticipating recurrent tumour. We have not used the access loops yet, but based on the experience of others they seem to be a viable addition to an RHJ for gaining access and post-operative manipulation within the biliary tract[21]. We converted one CDD to RHJ because of recurrent cholangitis due to intra-hepatic calculi. Stefanini et al converted 9 of their CDDs to RHJs because of poor results[3]. They and others claim that RHJ is the procedure of choice in conditions where a bilioenteric drainage is considered necessary because of their good long term results[4]. It is worth mentioning here that half the patients who underwent RHJ were acutely ill on admission with septicaemia and positive blood cultures. None of the patients who underwent CDD was dangerously ill at the time of surgery. A wide range of biliary tract diseases, both benign and malignant, were treated by RHJ confirming its flexibility. The long term problems of RHJ stomal stricture have not developed in any patient, but a longer follow-up is necessary. There were no wound complications except one dehiscence. No patient developed an anastomotic leak but one patient had retained stones. There was no incidence of septicaemia or peritonitis, one patient developed cholangitis one year following excision of a choledochal cyst and RHJ. This settled promptly with antibiotics. There were no stomal strictures, but a longer follow-up is required to make a definite comment.

**Fig 5 – Pre-operative ERCP in a patient with RPC. A grossly dilated common bile duct with multiple large calculi and debris is seen. An Ascarid worm is present in the left intra-hepatic duct (arrowhead). The right ducts are not visualised due to blockage by stones and debris.**




In conclusion, based on our short term results we found RHJ to be a useful drainage procedure in both benign and malignant conditions. RHJ was used in all situations in which a CDD would be considered, but the reverse is difficult. Choledochoduodenostomy should not be outrightly discarded since it is useful when performed in the correct situation.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