

The Use of Fine Needle Percutaneous Transhepatic Cholangiography in the Diagnosis of Jaundice in Surgical Practice

Atta-Ullah Jan,* M.B.,B.S.,
M.C.P.S., F.C.P.S.,
Postgraduate Medical Institute,
Lady Reading Hospital,
Peshawar, Pakistan,
Qamar Zaman,** M.B.,B.S.,
F.R.C.S.,
and
Qazi Khadim Mohyuddin,***
M.B.,B.S., F.R.C.S.,
Khyber Medical College,
Peshawar, Pakistan.

Summary

Fine needle Percutaneous Tranhepatic Cholangiography (P.T.C.) was performed in series of 60 cases with suspected surgical jaundice in Surgical A unit, Hayat Shaheed Teaching Hospital, Peshawar from February 1984 to February 1990.

The ductal system was successfully outlined in 57 cases with dilated intrahepatic ducts as reported on ultrasound examination in 50 cases out of 60. In two cases the ducts were not dilated on P.T.C.

Mild pyrexial reaction and septicemia occurred in two cases (3.3%) after P.T.C. Three patients developed allergic reaction to contrast medium (Biligradin) but were resuscitated promptly. Mortality of one patient (1.6%) was recorded in this series. The patient was asthmatic and developed status asthmaticus during the procedure and expired within 24 hours.

* Asstt. Professor of Surgery, Postgraduate Medical Institute, Lady Reading Hospital.

** Associate Professor of Surgery,

*** Professor & Head, Department of Surgery,
Khyber Medical College & Visiting Surgeons,
Hayat Shaheed Teaching Hospital, Peshawar.

Two patients (3.3%) were found to have haemoperitoneum of mild degree on laparotomy next day.

Valuable accurate diagnosis was obtained in 54 cases. A programmed approach practiced in our unit is outlined.

From our study it is evident that P.T.C. is an acceptable safe procedure and need not be followed by immediate laparotomy as also is the view of other workers¹.

Introduction

The diagnosis of extrahepatic from intrahepatic cholestasis is a frequent problem² especially in general surgical units where specialist hepatobiliary services are inadequate. Precise diagnosis and relief of surgical jaundice are important because morbidity and mortality after operation on jaundice patients are directly proportional to the duration and degree of jaundice³ and hazards of diagnostic laparotomy in hepatocellular jaundice are well established^{4,44}.

Conventional Intravenous Cholangiography is not practiced in our unit because it is useless when serum bilirubin is more than 70 micro-mol/litre and may even fail to out-line biliary tree clearly⁵.

The development of Endoscopy and Endoscopic-Retrograde-Pancreaticography (E.R.C.P.) has allowed more precise definition of obstructive lesion of biliary tract^{5,6,7}. This technique is, however, not available in our institution and requires combined skill of experienced endoscopist and radiologist.

P.T.C. using fine sheathed needle has been available since 1962, originally popularised by Okuda^{8,9,10,11,12,38}, but its value has been limited by three factors:

Firstly the procedure may be complicated by biliary leak or haemorrhage so that it has become accepted practice to ensure that facilities are available for laparotomy within few hours should dilated biliary tree be entered^{13,14}.

Secondly biliary tract obstruction can not be excluded by failure to demonstrate a dilated biliary tract since the technique is reported as being successful in approximately 74% of patients¹³.

Thirdly puncture of non-dilated biliary tree is uncommon and positive results obtained in only 20.4% of patients^{9,13}. But recently all the above ideas have changed and according to various workers, the success rate in these cases with non-dilated ducts is upto 75%^{8,18,19}.

In 1962 Japanese workers from University of Chiba described an improved technique for P.T.C. involving the use of a thin very flexible steel needle (Skinny Chiba needle) inserted into the liver under fluoroscopic control⁸.

It is claimed that the procedure is more safer and reliable than the original technique, in preoperative diagnosis of patients with biliary tract disease^{15,16}.

A comparative study of Percutaneous Trashepatic Cholangiography (P.T.C.) and E.R.C.P. from Britain gave success rate for former for outlining of dilated intrahepatic duct of 95% but recorded only 25% success rate for non-dilated ducts¹⁷. J. Robert et al also gave figure of 97% and 71% for dilated and non-dilated ducts respectively⁴².

We report a study carried out in Surgical A unit at Hayat Shaheed Teaching Hospital, Peshawar from February 1984 to February 1990 and assess the value and safety of P.T.C. in the diagnosis of suspected jaundice cases. The flow chart followed in this surgical unit is given in Table-III.

**FLOW CHART FOR JAUNDICE PATIENT USED IN
SURGICAL A UNIT HAYAT SHAHEED TEACHING
HOSPITAL PESHAWAR**

**JAUNDICE PATIENT
HISTORY AND CLINICAL EXAMINATION**

L.F.T., HBS Ag: Prothrombin Time

HBS Ag: (POSITIVE)

L.F.T. (Suggestive of
Infective Hepatitis)

*TREAT CONSERVATIVELY.
(Ultrasound Examination to
see the state of Hepato-
biliary tree).

HBS Ag: (NEGATIVE)

L.F.T. (Suggestive of
Obst: Jaundice)

*Ultrasound Examination
of Hepatobiliary tree

Dilated Intra/Extra
Hepatic ducts

P.T.C.

Precise definition
of level & cause of
obstruction.

SURGERY

Non-dilated ducts

(We have not
attempted P.T.C.)

Patients and Method

The modified Chiba needle (Fig: 1 & 2) is a long (15-17cm) thin flexible hollow steel needle with central stylet. The needle we used in the present study has external diameter of 0.7mm. The examinations were carried out under screening control in Radiology department of Hayat Shaheed Teaching Hospital. Intravenous Diazepam 5-10mgm was required in some cases especially in small children. Under local anaesthesia using 1% Xylocain, the needle is introduced through 8th or 9th intercostal space (depending how much liver is enlarged below costal margin) in the mid-axillary line: the needle is directed horizontally and medially towards the xiphisternum. While introducing the needle the patient is asked to hold the breath in inspiration and there after the patient is allowed to breath normally but excessive respiratory excursions are discouraged. After removing the stylet, the contrast material (Billigrafin) is injected very slowly while the needle is withdrawn slowly at the same time. The contrast is seen on T.V. screen outlining the biliary tree. Decompression of the dilated ducts was not done in our series because, due to very narrow lumen, hardly 5-10ml of bile could be aspirated in few cases in the beginning of the series when fluoroscopic facilities were not available and confirmation of entry into a bile duct was dependent on aspiration of bile. This difficulty in aspiration of bile has also been reported by other workers^{8,17}.

The outlining of non-dilated biliary tree is easier if the needle is placed as close to porta hepatis as possible where ducts are larger, but needle should not cross mid line and should be 2.5cm to the right of mid line (Fig: 3). The distended intrahepatic ducts can be easily entered and identified when contrast material flows towards porta hepatis. Approximately 50 to 60 ml contrast is required to outline biliary tree completely. We in our studies rarely required more than 50ml of contrast material. The X-Ray table may be tilted to upright position to delineate completely the lower biliary tree¹ and patient placed in left lateral position for outlining ducts in the left lobe of liver. Some workers use anterior approach through mid-clavicular line to study left hepatic duct system⁴⁷. Radiographs are taken as required.

Injection of dye into blood vessel (hepatic & portal-V) can be distinguished from bile ducts by the rapid wash out of contrast material. Occasionally lymphatic vessels are outlined but they empty very slowly and have tortuous beaded appearance extending to hilum and out over the spine. Parenchymal injection (extravasation) appears on the screen as an ill defined rounded mass (Fig: 3) which is slowly absorbed and may remain throughout the procedure, but it does not, however, result in any adverse clinical sequelae except slight pain. As far as the number of times needle passage is attempted, we restricted ourselves to 5-6 needle passes and most of the time we were able to delineate the biliary tree. In three cases we had to terminate the procedure prematurely due to bradycardia and hypotension¹⁸. Some workers do not limit the number of needle passes, but persist until the ducts are opacified especially when ultrasonogram has shown dilated ducts and they claim that incidence of complications does not seem to increase with multiple needle insertions^{8,18,19,28}. However, the success rate increases with number of needle passes⁵¹. If the intrahepatic ducts are dilated, the success rate is upto 95% which is also the figure in our series and may approach 100% if one persists⁸. With non-dilated ducts the success rate is 36-75%^{18,19,27}.

No patient was subjected to P.T.C. until the results of base line investigations were available i.e. L.F.T., HBS-Ag., Bleeding & Clotting time and Prothrombine time in order to avoid complications resulting due to these abnormal results especially coagulation screening and HBS-Ag.²³.

As all the patients in this series were jaundiced so they were prepared for P.T.C. as follow:

1. Inj: Vitamin-K 10 mgm I/M B.D. for 72 hours prior to P.T.C.
2. Inj: Kefzol 1Gm I/V stat an hour before P.T.C. because of high incidence of infected bile in obstructive jaundice^{21,20,22,23,24,25,26,50}.
3. Inj: Vitamin C 500 mgm in 5% Dextrose Water daily once.
4. 5% Dextrose water with hypertonic glucose solution 1000 ml daily was given to these patient to replenish glycogen store.

5. Prothrombine time checked and brought to near normal by pre-medication mentioned above.
6. Patients were shifted to Radiology department in a trolley with In-travenous line set up and 5% glucose infusion running in it.
7. P.T.C. tray containing all the required material for P.T.C. and emergency drugs to treat any adverse reaction if happens. (see table for P.T.C.)
8. After the procedure the patient is kept in bed for 24 hours with regular monitoring of Pulse, Blood Pressure and Temperature.

**CONTENTS OF PERCUTANEOUS TRANSHEPATIC
CHOLANGIOGRAPHY TRAY**

1. Skiny "Chiba" needle.
2. Two ampoules of Biligradin.
3. Two syringes of 10,20,2.5 cc each.
4. Sterilised pack containing Gauzes, two pairs of Sterile gloves, Forceps, Bowls, Draping towels.
5. Antiseptic solution for skin preparation.
6. 2% Xylocaine 10cc ampule.
7. Inj: Avil.
8. Inj: Solucortef 500mgm.

Results

Percutaneous Transhepatic Cholangiography was performed in 60 patients over a period of 6 years from February 1984 to February 1990.

The year-wise distribution is shown in Table-I. All these patients were jaundiced clinically and biochemically. There were 31 male and 29 female patients making 1:1 male to female ratio (Table-II).

Decade-wise age incidence is shown in Table-III. The minimum age was 1 year and the maximum age was 74 years. Ultrasonography was done in 50 out of 60 cases (83%) and in 48 cases the ultrasound finding coincided with P.T.C. finding making 96% success of ultrasound.

Dilated ducts were reported in 50 cases on ultrasound but in two cases out of those who had ultrasound studies, ducts were not dilated on P.T.C.

P.T.C. showed dilated ducts in 55 cases and non-dilated in two cases making success rate of P.T.C. upto 95%.

P.T.C. failed in 3 patients (5%) due to premature termination. In all 55 patients P.T.C. gave exact site and probable nature of obstruction (Fig: 5 & 6-14).

The types of operations in 54 cases is given in Table-IV.

Complications

Variety of complications have been mentioned in literature^{8,19,24,30,28,40,41,47} but we have come across following complications in our series (Table-V).

Transient and mild right hypochondrial pain requiring mild analgesia was common after P.T.C.

Two patients had haemoperitoneum of little degree, found on operation next day, but none had presented with massive haemorrhage requiring resuscitation or blood transfusion. Bile leakage was observed in none of our cases though quite frequently reported in literature^{48,49}. Vaso-vagal syncope

occurred in three cases and the patients became restless but successfully resuscitated and in these patients P.T.C. was terminated prematurely.

TABLE-I

**YEAR-WISE DISTRIBUTION OF P.T.C.
PERFORMED IN 60 PATIENTS**

Year	Number of Cases
1984	14
1985	6
1986	9
1987	4
1988	7
1989-90	20
Total	60

TABLE-II

Sex	Number of Cases
Male	31
Female	29
Total	60

TABLE-III**AGE DISTRIBUTION IN 60 CASES OF P.T.C.
(February 1984 to February 1990)**

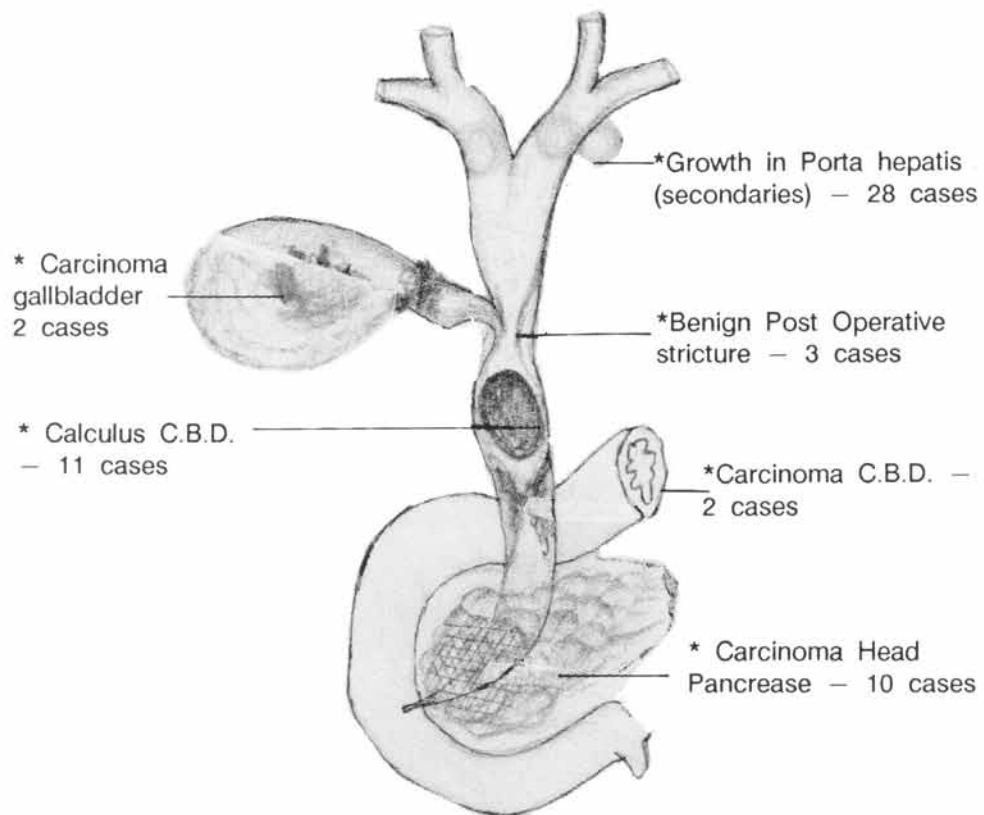
Age	Number of Cases
1-10 Years	2
11-20 Years	1
21-30 Years	3
31-40 Years	13
41-50 Years	14
51-60 Years	19
61-70 Years	7
71-80 Years	1
Total	60

TABLE-IV
SHOWING THE OPERATIONS PERFORMED
IN 54 CASES

Operations	No. of Cases
1. Cholecystectomy & Choledocholithotomy with T-Tube drainage	2
2. Cholecystectomy & Choledocholithotomy with Choledochoduodenostomy	9
3. Cholecystojejunostomy for Carcinoma Head Pancrease	10
4. Choledochoduodenostomy for Stricture Common Bile Duct	3
5. Stint for Growth C.B.D.	2
6. Open Biopsy & Closure (Advanced inoperable growth at porta-hepatis-secondary)	28
Total	54

Fig: 5

Showing causes and level of Obstruction in series of 60 cases on P.T.C. confirmed on operation in 54 cases. (three cases were not fit for operation).



Only two patients developed pyrexia of about 100-101-F following the procedure but none of the patients developed fulblown picture of endotoxic shock.

Allergic reaction to dye occurred in two cases inspite of testing the allergy to the contrast, but resuscitated promptly. There was one mortality in the series, who was a middle aged man with history of asthma; he developed bronchospasm during the procedure. He was resuscitated but later on went into status asthmaticus and died in next 24 hours.

The complications occurred in 7 out of 60 cases making overall rate of 11.5%. The detail of these is given in Table-V. When these complications are compared with other series as in Fritz.B²⁸ and Nilesen.V²⁹ who have shown complication rate of 29.3% and 34% of 237 cases respectively, then our series seems quite reasonable. The rate is quite low in work of T.V. Taylor i.e. about 5%⁴⁰.

TABLE-V

**COMPLICATIONS IN SERIES OF SIXTY P.T.C.
(More than one complication had occurred in
single patient so the percentage is different**

	Complication	No. of Cases	Percentage
1.	No complications	53	(88.5%)
2.	Bradycardia & hypotension	3	(5%)
3.	Allergic reaction to contrast medium	3	(5%)
4.	Haemoperitoneum (mild)	2	(3.3%)
5.	Pyrexia	2	(3.3%)
6.	Mortality	1	(1.6%)
Over all complication rate of 11.5%			

Discussion

Expeditious surgical treatment is the aim of management in patients with obstructive jaundice and prompt accurate diagnosis is vital before operation.

Fine needle P.T.C. has proved to be a relatively safe procedure in the rapid and accurate diagnosis of jaundice in a surgical unit. We have not used the procedure in non-jaundiced patients though some workers have got this experience⁵.

The "Chiba" needle is now widely used and has overcome both the limitation on safety and limited success rate of older techniques^{17,33,34,35}.

We have found P.T.C. to be of considerable diagnostic value in planning the jaundiced patient management and so in our unit nearly every patient with suspected surgical jaundice undergoes P.T.C. We were able to diagnose the cause and level of obstruction in majority of our cases (Fig:5).

We could diagnose 11 cases of choledocholithiasis, 2 cases of cirrhosis liver, 10 cases of carcinoma, head of pancreas and 28 cases of malignancy in porta hepatis. Of particular interest were two cases of mixed common bile duct calculi who were treated successfully by choledocholithotomy and choledochoduodenostomy.

In present series we have a success rate of 95% in outlining dilated intrahepatic ducts, the figure is quite comparable to other series^{30,32,42,28}. We have not included patients with non-dilated ducts but two of our patients in whom ultrasound reported dilated ducts had no dilated ducts on P.T.C. (Fig:4).

I.S. Benjamiin et al³⁰ claim 100% success rate with dilated intrahepatic ducts and 73% for patients with non-dilated intrahepatic ducts. Similarly Fritz et al²⁸ claim 99-100% success rate if number of needle passes is more than six and 95.5% if less than six⁵¹. That is why Steven, K. Teplick⁸ advocates for more and more needle passes to achieve 100% success, especially if ultrasound has reported dilated ducts^{19,28}.

Before the introduction of P.T.C., E.R.C.P. was the only reliable method of demonstrating such lesions. Though we have not used P.T.C. in non-dilated ducts but I.S. Benjamin³⁰ claims increasing awareness of the diagnostic problem posed by lesions which may produce chronic or intermittent or incomplete obstruction accompanied by minimal biochemical changes without bile duct dilatation. They had demonstrated 4 such patients in their series who had stone and debris demonstrated at P.T.C. without concomitant ductal dilatation.

E.R.C.P. is not available in our institution and so we do not have this experience; however, combined P.T.C. and E.R.C.P. can give better information. We think that P.T.C. is a better procedure in obstructive jaundice to find out the level and nature of obstruction^{31,39}.

Because of the known high incidence of infection in obstructed biliary tree^{20 to 26 & 50}, we use prophylactic antibiotics. We could aspirate bile in 10 out of 60 cases but in majority of the cases there was difficulty in aspirating bile. Jain et al recommend a slight wide bore needle for obviating the difficulty in aspiration of bile without increasing the risk of complications³⁵. In our series in 8 out of 10 cases where we could aspirate bile, wide bore needle was used.

The safety of fine needle P.T.C. has been confirmed in this series, and the only one death was due to status asthmaticus rather than P.T.C. itself. The safety has also been confirmed by other workers in various series^{8,30,38,51}.

In none of our cases there was evidence of continued haemorrhage or bile leakage at laparotomy within 24 hours of P.T.C.

It had been suggested that when obstructed biliary tree is demonstrated at P.T.C. even with fine needle technique then laparotomy should be under taken within a few hours^{17,36,35}. We, from our series and other studies on this procedure^{30,33,34}, suggest that this approach is perhaps too cautious. We feel that while surgical facilities should be available in a center where P.T.C. is performed, urgent laparotomy is very rarely required.

Ultrasound of biliary tree was performed in 50 (83%) cases and there has been agreement between Ultrasound and P.T.C. in 96% cases in the diagnosis of bile duct dilatation in this series. Figures of 90% and 96% have been reported by Mckay et al³⁷ and Vallen et al⁴³ respectively. Now we are selecting cases for P.T.C. on the basis of Ultrasound.

The programmed approach to the investigation of patients with suspected obstructive jaundice, aimed at rapid and accurate pre-operative diagnosis in cases of extrahepatic cholestasis, is summarised in flow chart (Table-III).

Upon the diagnosis of surgical jaundice on P.T.C., appropriate surgical procedure is planned and performed next day. The various surgical procedures performed in 54 patients are given in Table- IV.

The early use of "Chiba" needle P.T.C. has proved to be safe and has virtually eliminated the situation where obstructive jaundice remained undiagnosed or incompletely diagnosed during prolonged series of investigations.

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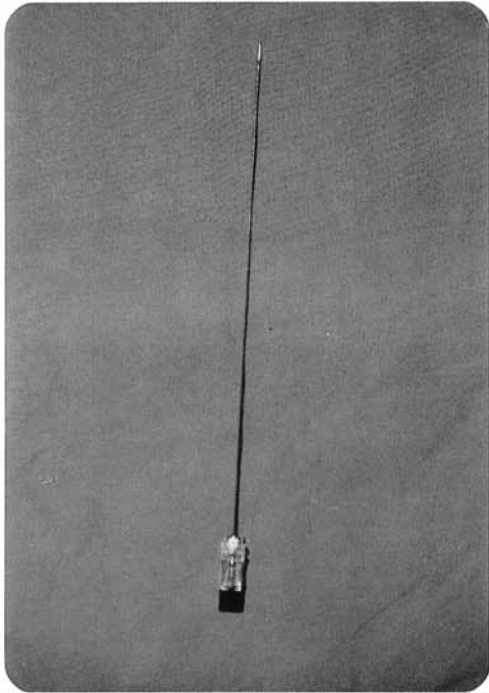


Figure No. 1 & 2: Modified Chiba used in most of the P.T.C. in our series.



Figure No. 3: P.T.C. showing extravasation of dye into liver parenchyma. Note the dilated intrahepatic ducts and the needle reaching the mid-line which should not occur normally.



Figure No. 4: P.T.C. showing non-dilated intrahepatic ducts. Multiple needle passes outlined few ducts; extravasation is also seen near the mid-line. This patient turned out to be cirrhotic on liver biopsy.



Figure No. 6: P.T.C. in a one-year old child with jaundice showing intrahepatic dilatation of biliary ducts.



Figure No. 7: P.T.C. outlining markedly dilated common bile duct with a filling defect at lower end (calculus). Some of the dye had gone into the duodenum. This patient had cholecystectomy (calculi) and choledochoduodenostomy after removal of stone C.B.D.



Figure No. 8: The P.T.C. of middle aged lady showing calculus C.B.D. She had cholecystectomy done some-time back. The contrast has passed around the calculus. She was treated by choledocholithotomy and choledochoduodenostomy.



Figure No. 9: P.T.C. of a patient showing dilated intrahepatic ducts due to secondaries in porta hepatis.



Figure No. 10 & 11: P.T.C. showing dilatation of both extra and intra-hepatic biliary tract. The gall bladder is also shown. Both these patients had carcinoma, head of the pancreas. Jaundice relieved by cholecystojejunostomy.



Figure No. 12: P.T.C. outlining dilated intra and extra-hepatic ducts with narrowing of C.B.D. in the distal half due to carcinoma C.B.D. Some of the dye is passing into the duodenum. (Incomplete obstruction).



Figure No. 13: P.T.C. outlining the dilated intra-hepatic ducts; no extra-hepatic ducts visible. This patient had growth at port hepatis. (Primary growth not traceable).

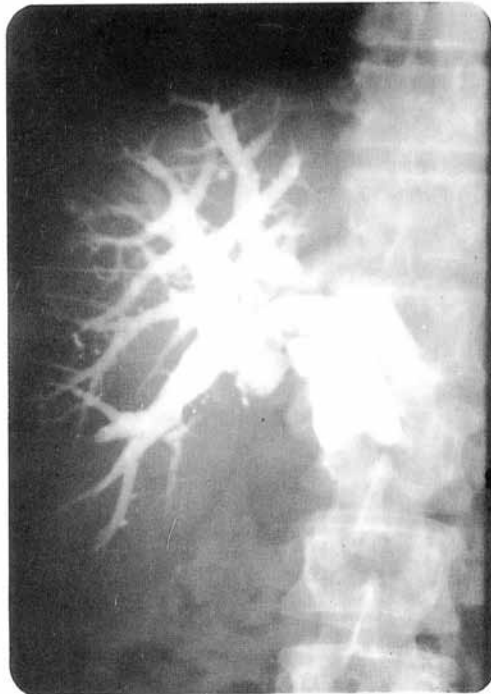


Figure No. 14: P.T.C. showing dilated intra and extra-hepatic ducts with filling defect at lower end with crescentic appearance. No. dye has passed into the duodenum. This patient had calculus impacted in C.B.D. with complete obstruction. He was treated by choledocholithotomy and choledochodudenostomy.

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