THE BILIARY SYSTEM

BILIARY TREE IS DIVIDED INTO:
- Intrahepatic ducts
- Extrahepatic ducts

INTRAHEPATIC DUCTS
- These comprise or ductular and canalicular network from the acini. The smallest interlobular ducts join to form segmental bile ducts which finally unite to form the left and right hepatic ducts.
- They travel with branches of portal vein and hepatic artery in portal triad.
ANATOMY OF BILIARY TREE

• The right hepatic duct drains four segments of the right lobe of liver through two segmental divisions, an anterior division drains segment 5 and 8 and posterior division drains segment 6 and 7.
• The left hepatic duct drains segment 2, 3 and 4 of the left lobe.
• Caudate lobe has a variable drainage pattern but in the majority, 78% drainage is into both main ducts.
EXTRAHEPATIC BILE DUCTS

• The right and left hepatic ducts fuse at the hilum anterior to bifurcation of portal vein to from common hepatic duct which is the inserted by cystic duct from the gall bladder and becomes common bile duct.

• The common bile duct passes inferiorly posterior to the first part of duodenum and pancreatic head to enter the second part of duodenum along with the main pancreatic duct at ampulla of Vater.
EXTRAHEPATIC BILIARY ANOMALIES

A NUMBER OF ANOMALIES WITH IMPORTANT RADIOLOGICAL IMPLICATIONS ARE:

• Agenesis of gall bladder
• Bilobar gall bladder
• Folded gall bladder
• Congenital diverticulum
• Duplication of cystic duct with a unilocular gall bladder
• Septum of the gall bladder
• Anomalies of the gall bladder position i.e. it may lie in an intrahepatic, suprahepatic or retrohepatic site or herniate through epiploic foramen

The anomalies if complicated by diseases carry high morbidity.
INVESTIGATION

Radiological investigations comprise of:

• Plain radiograph
• Ultrasound
• Computed tomography
• Magnetic resonance imaging
• Radionuclide imaging
• Indirect cholangiography
PLAIN RADIOGRAPH

• Plain radiograph is usually taken as part of sequence of investigation of abdominal pain.

• It gives information about radiopaque stones, mural calcification, mural gas and gas in biliary tree.
ULTRASOUND

• The first line investigation particularly calculous disease (over 98% accuracy).
• Preparation: Fasting for a minimum of 6 hours
• Scanning in two positions, supine and left lateral ensures to find any missed calculus.
• US detects dilated Intrahepatic and extrahepatic ducts, cholelithiasis, cholecystitis, GB polyp, choledochal cyst etc.
COMPUTED TOMOGRAPHY

• The sensitivity of CT in differentiating hepatocellular from obstructive jaundice and in determining the level and cause of obstruction parallels that of ultrasound.

• CT is reserved for those patients in whom there is doubt as to the cause of obstruction and in staging of biliary tumours.
RADIONUCLIDE IMAGING

• 99mTc-HIDA is used to study the action of biliary tree.

• TECHNIQUE
  – Between 2 and 10 mCi of 99mTc-HIDA is administered intravenously after a 2 hr fast. Images are acquired over the next hour at 1min intervals.
  – Subsequent images may be required at various intervals over 24 hours to evaluate excretion.
  – The normal HIDA scan provides functional and morphological information about hepatic parenchyma in the first 10 min, the extrahepatic biliary tree by 20 min, and excretion into the bile by 1 hr

• INDICATIONS
  – Neonatal and childhood jaundice
  – Cholesystitis
  – Biliary obstruction and leaks
INDIREKT CHOLANGIOGRAPHY

ORAL AND INTRAVENOUS CHOLANGIOGRAPHY

It has a limited role in anatomical and functional assessment of gall bladder but the diagnostic accuracy in demonstrating gall stones is upto 90%. 
INDIREKT CHOLANGIOGRAPHY

Small Cholesterol calculi which float in the erect posture

Prone

Erect
PERCUTANEOUS CHOLANGIOGRAPHY (PTC)

• Direct puncture of the intrahepatic ducts using a fine-gauge Chiba needle allows demonstration of biliary tree with relative safety.

• INDICATIONS
  – Obstructed jaundice with or without duct dilatation.
  – In defining biliary-enteric or biliary-cutaneous fistulas.
  – In defining levels of bile leak.
  – To map biliary tree as a preliminary to establish external or internal biliary drainage with stent placement.
ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP)

• ERCP is a technique that combines endoscopy and fluoroscopy through endoscope, inject contrast material into ampulla of Vater and can visualise the biliary tree and pancreatic duct

• ERCP can be used both for diagnostic and therapeutic purposes.

INDICATIONS

– Obstructive jaundice
– Gall stones with dilated bile ducts / Removal of stones
– Sphincter of oddi dysfunction / Sphincterotomy
– Bile duct tumors
– Dilatation of strictures
OPERATIVE CHOLANGIOGRAPHY

- Operative cholangiography prior starting surgical procedure is done commonly at the time of cholecystectomy for:
  - Exploration of common bile duct
  - Anomalous duct anatomy
  - Developmental disorders of biliary tree.

Postoperative cholangiography through a T-tube is indicated to ensure removal of all stones.
DEVELOPMENTAL DISORDERS OF CHILDHOOD

- Biliary tract atresia
- Choledochal cyst
- Caroli’s disease
BILIARY TRACT DISEASEs

- Cholelithiasis
- Cholecystitis
- Acalculous cholecystitis
- Choledocholithiasis
- Cholangitis
- Acute pancreatitis secondary to gallstone
DEFINITIONS

- Cholelithiasis: gallstones in the gallbladder
- Choledocholithiasis: presence of a gallstone in the common bile duct (CBD).
- Chronic gallstone disease fibrosis and loss of function of gallbladder with predisposition to gallbladder cancer.
- Biliary sludge: suspension of precipitated particulate matter in bile
DISORDERS OF GALL BLADDER
GALL STONES

• Upto 17% of adult population have gallstones.
• About 50% of detected calculi remain asymptomatic over a 10 year period.

Stones may be of
  – Cholesterol
  – Pure pigment
  – Calcium
  – Bile salts
  – Mixed
DISORDERS OF GALL BLADDER, CALCULOUS CHOLECYSTITIS

- This results when a calculus obstructing the cystic duct cause infection of static bile and the gall bladder mucosa.
- Differentiated into
  - Acute cholecystitis
  - Chronic cholecystitis

RADIOLOGICAL INVESTIGATIONS

- Plain radiograph estimated only 15% of gallstones are radiopaque.
  - Pure calcium carbonate described as mulberry stones
  - Stellate faceted appearance with gas forming fissures (Mercedes Benz sign)
  - US and CT showing tiny stones, sludge and gall bladder wall thickening as well as echogenic inflammatory changes in adjacent fat

Plain radiography

Ultrasonography
DEFINITIONS

• Acute cholecystitis is inflammation of the gallbladder.
• Acalculous cholecystitis occurs in <10% of cases.
• Cholangitis is inflammation of the bile ducts.
• Acute pancreatitis: acute inflammation of the pancreas.
CLASSIC PRESENTATION

• Biliary colic: episodic pain due to gallstone obstruction of the neck of the gallbladder.
• Persistent pain (>6 hours
PHYSICAL EXAM

• Biliary colic>RUQ or epigastric discomfort
• Positive Murphy’s sign->the cessation of deep inspiration on palpation over the gallbladder
• Jaundice
• Elevated temperature
DIFFERENTIAL DIAGNOSIS. WHEN CHOLECYSTITIS OR BILIARY COLIC SUSPECTED ALSO CONSIDER:

- AAA, abdominal aortic aneurysm
- Cholangitis
- Gastroenteritis
- Hepatitis
- Mesenteric ischemia
- AMI, myocardial infarction
- SBO, small bowel obstruction
- Pancreatitis
- Eclampsia (pregnancy)
- UTI, urinary tract infection (pregnancy)
- Cholelithiasis and renal calculi
- Diverticulitis and IBD
IMAGING

- Ultrasound
- CT
- HIDA scan
- MRCP
- ERCP
Figure Legend:

Selecting the best route for access to the biliary system. INR indicates international normalized ratio; ERCP, endoscopic retrograde cholangiopancreatography; and PTC, percutaneous transhepatic cholangiography.
MEDICAL CARE

• Although surgery is RX for acute cholecystitis, need to stabilize patient.
• ERCP for patient with evidence of CBD stones on US/MRCP,
• dilated CBD, elevated LFTs, pancreatitis.
• Medical therapy for gallbladder colic
THE 4 A’S

- Antibiotics
- Analgesia
- Anti inflammatory agents
- Antiemetic agents
FURTHER TREATMENT

- Definitive treatment for symptomatic cholelithiasis is surgery.
- Choledocholithiasis is treated with surgical or endoscopic (ERCP) removal of stone.
- Cholecystitis may need to be delayed but surgery is the treatment.
COMPLICATION OF CHOLECYSTITIS

• Persistent transmural infection may result in a gangrenous gall bladder that may perforate giving rise to either a localised abscess or biliary peritonitis.
• An empyema or mucocele may result if there is continuing cystic duct obstruction.
• Fistulation of calculus into small or large bowel with associated enteric obstruction is termed GALL STONE ILEUS.
• In acute cholecystitis, if local inflammatory process involves the common hepatic or common bile duct, condition is called MIRRIZZI SYNDROME.
Porcelain Gall Bladder

- A porcelain gallbladder is a rare disorder in which chronic cholecystitis produces mural calcification.
- It is a precancerous condition.
- In these patients a prophylactic cholecystectomy has been advocated because of its association with gallbladder carcinoma.

US and plain radiograph showing gall bladder wall calcifications i.e. porcelain gall bladder
ACALCULOUS CHOLECYSTITIS

- Approx. 5% cases of acute cholecystitis occur in the absence of gall stones.
- Etiology is multifactorial and includes ischemia, gall bladder wall infection or cystic duct obstruction.
- It may occur in very sick patients like after major surgery, extensive trauma and prolonged parenteral nutrition.
EMPYEMATOUS CHOLECYSTITIS

• Infection from gas forming organisms like Clostridium Welchii within the gall bladder wall or lumen.
• Most often occur in diabetics or immunocompromised patients.
• Perforation is 5 times more likely than with calculus cholecystitis.

PLAIN RADIOGRAPH shows gas shadows from the wall and lumen of gall bladder along with gas-fluid levels demonstrated on erect posture.

SONOGRAPHICALLY manifests as very bright reflections from a non dependent part of GB wall. The associated acoustic shadow is usually dirty and in many cases has a demonstrable ring down artifact, typical sign of gas.
EMPYEMATOUS CHOLECYSTITIS

Gas in the lumen and wall

Gas-fluid level Plain X-Ray/US
OTHER DISEASES OF THE GALL BLADDER

• CHOLESTEROSIS: There is diffuse deposition of cholesterol on the gall bladder mucosa. Generally asymptomatic. Deposits are usually 1-2mm, multiple and fixed on scanning.

• ADENOMYOMATOSIS: It is a benign, usually asymptomatic condition that may produce diffuse or focal wall thickening due to round cell infiltration, muscle hypertrophy and mucosal herniations into the muscular layer.
Fundal nodule of adenomyomatosis before and after gallbladder contraction. Note long cystic duct medial to common bile duct, a congenital anomaly.
ADENOMATOSIS

Adenomyomatosis showing comet-tail artefacts from the superficial wall of gall bladder
GALL BLADDER POLYP

• It is a benign, usually asymptomatic condition that may produce cholesterol polyps, which are usually small and are the most common polypoid lesion of gall bladder.

• SONOGRAPHICALLY
  – Appear as a non-mobile, non-shadowing “ball on the wall”.
GALL BLADDER POLYP

Gall bladder polyp fixed to the ventral wall of the gallbladder
COMMON BILE DUCT AND INTRA HEPATIC STONES

• The spectrum of presentation of common duct stones is wide, ranging from septicemia resulting from untreated biliary obstruction and cholangitis to an incidental finding on US.
• May accompanied by Gall bladder stones.
COMMON BILE DUCT AND INTRA HEPATIC STONES

Very large gallstone (arrow) in dilated bile duct shown at ERCP.

‘Meniscus’ sign of impacted stone (arrow) in bile duct.
LIVER ABSCESS

- The most common source of liver abscess is the biliary tree in patients with cholecystitis, choledocholithiasis, or cholangitis.
- Incidence is approximately 3.6 per 100,000 in the U.S., based on the Nationwide Inpatient Sample database from 1994 to 2005. Prevalence rates from autopsy data: 300 to 1,500 per 100,000 of population.
- Common pathogens include Streptococcus spp., Escherichia coli, Klebsiella, and Bacteroides spp. Polymicrobial infections occur in 15% to 20% of patients; approximately the same percentage have multiple abscesses.
LIVER ABSCESS

Parameter of pyogenic liver abscess:

- **Number**: Often multiple
- **Location**: Either lobe of liver
- **Presentation**: Diagnosis US or CT ± aspiration
- **Treatment**: Drainage (if technically feasible) + antibiotics IV (see text)
LIVER ABSCESS

• A single abscess is the most common presentation; spread to the liver via the vascular route is associated with multiple abscesses

• The right hepatic lobe is affected more than twice as frequently as the left, due to vascular anatomy
LIVER ABSCESS

• Aspiration of abscess fluid and subsequent culture guide antibiotic choice
• Failure to culture pathogenic organism(s) may be due to prior antibiotic treatment or inadequate anaerobic culture
• Treatment includes antibiotics and often either percutaneous or surgical drainage/debridement, depending on the size, number, and complexity of the abscess(es)
LIVER ABSCESS
COMPUTER TOMOGRAPHY
LIVER ABSCESS
LIVER ABSCESS
RUPTURED LIVER ABSCESS
PERCUTANEOUS CT GUIDED DRAINAGE OF A SOLITARY LIVER ABSCESS
BENIGN BILIARY STRICTURES

CHRONIC PANCREATITIS:
Any cause pancreatitis may result in a low bile duct stricture and biliary obstruction.

BLUNT OR PENETRATING LIVER TRAUM:
Injury to bile duct or gall bladder occurs in approx. 5% of liver trauma cases leads to biliary leaks and stricture formation.
BENIGN BILIARY STRICTURES

PRIMARY SCLEROSING CHOLANGITIS:

• This is a disease of unknown aetiology, characterized by an inflammatory process affecting the intra and extra hepatic ducts. The condition may occur at any age. Biliary cirrhosis and hepatic failure ensue.

• There is a predisposition of developing bile duct cancer. CHOLANGIOGRAPHY demonstrates multifocal stricturing of bile ducts. Strictures of extrahepatic bile duct may be long or short and multiple. Severity of extra hepatic involvement carry worse prognosis. US & CT may demonstrate segmental duct dilatation and increased periductal reflectivity. Regional lymphadenopathy may be seen, this may be associated with features of cirrhosis and portal hypertension.
PRIMARY SCLEROSING CHOLANGITIS

Characteristic stricturing of sclerosing cholangitis involving the intra- and extrahepatic biliary system.
POSTSURGICAL BILE LEAKS AND BILE DUCT STRICTURES
POST SURGICAL STRICTURES

Four main groups of operation carry the risk of stricture formation:

- Cholecystectomy (open or laproscopic). Bile duct injury, with transection or devascularisation, may result in a post operative bile leak or stricture formation, site of cystic duct insertion is at highest risk.

- Biliary disconnection and drainage of the bile ducts; Roux loop anastomosis to the common hepatic duct and portoenterostomy (Kasai operation) carry a risk of anastomosis stricturing.

- Hepatic resection: These operations carry the risk of arterial devascularisation of hepatic artery.

- Transplantation; An anastomotic stricture will occur in 5-14 % of liver transplants.
BENIGN POSTCHOLECYSTECTOMY STRicture

Stricture of a hepaticojejunostomy. common duct (arrow).  
Typical site at the level of ligation of cystic duct.

![Image of hepaticojejunostomy stricture](image1.png)

![Image of cystic duct ligation](image2.png)
MANAGEMENT OF POSTSURGICAL BILE LEAKS AND BILE DUCT STRICTURES

• The majority of surgical bile duct injuries occur during cholecystectomy, but any surgical procedure involving the liver and/or bile ducts may cause these lesions.

• Over the last decade laparoscopic cholecystectomy has gained widespread acceptance among surgeons and the public and has replaced conventional 'open' cholecystectomy as treatment of choice for symptomatic cholecystolithiasis.
• Compared with 'open' cholecystectomy, laparoscopic cholecystectomy is associated with less postoperative pain, shorter stay in hospital and recovery, earlier return to work, and a better cosmetic outcome.

• Laparoscopic cholecystectomy does, however, carry an increased risk for biliary tract injury. These injuries occur in 0.2–0.5% of patients undergoing open cholecystectomy and in 0.5–2.7% after laparoscopic cholecystectomy.
MANAGEMENT OF POSTSURGICAL BILE LEAKS AND BILE DUCT STRICTURES

• The injury often results from poorly defined anatomy or from attempts to stop hilar bleeding by means of clipping or thermal devices.
• Besides direct injury due to clipping and diathermy, delayed injury may arise from ischemia of the bile ducts.
• The presence of acute cholecystitis, and a low case volume of the surgeon, are accepted risk factors for bile duct injury during laparoscopic cholecystectomy.
CLASSIFICATION OF BILE DUCT INJURIES

• Intraoperative cholangiography does not seem to reduce the frequency of these complications.
• Management of patients with postsurgical bile duct injuries requires a multidisciplinary approach of radiologists, endoscopists, and surgeons.
• In general, multiple invasive procedures are required and, although the functional outcome is usually good, postsurgical bile duct injuries have a marked influence on the patients' physical and mental quality of life, even at long-term follow-up.
CLASSIFICATION OF BILE DUCT INJURIES

• **Type A:** Cystic duct leaks or leakage from aberrant or peripheral hepatic radicles (Figs 1 and 2).

• **Type B:** Major bile duct leaks with or without concomitant biliary strictures (Figs 3 and 4).

• **Type C:** Bile duct strictures without bile leakage (Figs 4 and 5).

• **Type D:** Complete transections of the duct with or without excision of some portion of the biliary tree (Fig. 6).
CLASSIFICATION OF BILE DUCT INJURIES. TYPE A

Type A: Cystic duct leaks or leakage from aberrant or peripheral hepatic radicles (Figs 1 and 2).
CLASSIFICATION OF BILE DUCT INJURIES. TYPE B

Type B Major bile duct leaks with or without concomitant biliary strictures (Figs 3 and 4).
CLASSIFICATION OF BILE DUCT INJURIES. TYPE C

Type C Bile duct strictures without bile leakage (Figs 4 and 5).
Type D Complete transections of the duct with or without excision of some portion of the biliary tree (Fig. 6).
CARCINOMA OF THE GELLBLADDER
GALL BLADDER CARCINOMA

• Adenocarcinoma of gall bladder is associated with stones in over 90% of cases.
• Female to male ratio is 3: 1
• Porcelain gall bladder and sclerosing cholangitis are predisposing factors.

RADIOLOGICALLY

• US and CT may demonstrate a soft tissue mass within and adjacent to the gall bladder, often with direct extension into related liver segments.
• Cholangiography reveals biliary stricturing often with intrahepatic ducts dilatation.
GALL BLADDER CARCINOMA

Gall bladder carcinoma with marked generalised wall thickening with few calculi representing filled lumen
CT image shows thick walled gall bladder with local infiltration in adjacent liver parenchyma
“Biliary Tract Cancer (BTC)”
- Cholangiocarcinoma
  - *Intra-hepatic*
  - *Hilar*
  - *Extra-hepatic*
- Gallbladder cancer
- Ampullary tumours

- 3% of all GI cancers globally \(^1\)
- Second commonest primary hepatic tumour but more lethal than HCC \(^2\)
- Mostly adenocarcinomas (95%), some mixed with HCC, +/- mucin production

\(^1\) Vauthey Sem Liver Dis 1994; \(^2\) Taylor-Robinson Gut 2001, \(^3\) Aljiffry et al. World J Gastroenterol 2009
BILIARY TRACT CANCER

• The natural course of cholangiocarcinoma is aggressive, with a median survival of less than 24 months following diagnosis.

• The only potentially curative treatment is surgical.

• Unfortunately, the majority of patients are diagnosed at an advanced stage that precludes curative surgery.
CANCER OF THE BILIARY TRACT
CANCER OF THE BILIARY TRACT

Hilar cholangiocarcinoma, also referred to as Klatskin tumors, are described clinically according to the **Bismuth-Corlette classification** as types I to IV.

**Type I** cholangiocarcinomas involve the common hepatic duct distal to the union of the right and left hepatic ducts

**Type II** tumors involve the union of the right and left hepatic ducts

**Type IIIa** tumors involve the union of the right and left hepatic ducts and extend up the right hepatic duct

**Type IIIb** tumors involve the union of the right and left hepatic ducts and extend up the left hepatic duct

**Type IV** tumors are multifocal or involve the biliary confluence and extend up the right and left hepatic ducts.
Surgery - challenges:

- **Only** modality of cure
- Most patients are inoperable
  - Late presentation
  - Difficult to image (diagnosis / surveillance)
  - Difficult to confirm histologically/ cytologically
  - Difficult to resect
  - Elderly patient population (65% over 65 yrs)
  - Associated co-morbidities
  - Unwell population: biliary obstruction/ infection
HILAR CARCINOMA

Cholangiocarcinoma of the hilum with a characteristic stricture involving the confluence of the main left and right hepatic ducts.
EXCLUSION CRITERIA FOR RESECTION OF HILAR CHOLANGIOCARCINOMA

• Atrophy of one liver lobe with encasement of the contralateral portal vein branch
• Atrophy of one liver lobe with contralateral secondary biliary radicle involvement
• Bilateral portal vein branch encasement
• Bilateral hepatic artery encasement
• Distant lymph node metastases
• Hilar cholangiocarcinoma, Bismuth-Corlette type IV
• Intrahepatic or distant metastases
• Primary sclerosing cholangitis
• Significant comorbid conditions
The only curative treatment option for cholangiocarcinoma is surgical extirpation. Surgical outcomes have improved substantially in the 2000s because of careful patient selection with lower surgical mortality rates and higher rates of R0 (negative surgical margin) resection.

Surgical treatment options include resection and liver transplantation.
SURGICAL TREATMENT OF INTRAHEPATIC CHOLANGIOCARCINOMA

• Solitary intrahepatic cholangiocarcinoma can be resected by hepatic segmentectomy or lobectomy. Five-year survival rates after resection of intrahepatic cholangiocarcinoma range from 22% to 42%. Survival is positively correlated with early tumor stage (localized tumor), younger age, and better performance status.

• Liver transplantation is not an option for intrahepatic cholangiocarcinoma because of disappointing five-year survival rates of 0% to 18%
SURGICAL TREATMENT OF EXTRAHEPATIC CHOLANGIOCARCINOMA

• Resection is also the treatment of choice for extrahepatic cholangiocarcinoma.

• Five-year survival rates for extrahepatic CCA after R0 resection are 11% to 41% for hilar and 27% to 37% for distal cholangiocarcinoma.

• Unfortunately, R0 resectability rates are less than 50%.

• Occasionally, increased resectability can be achieved by preoperative portal vein embolization, resulting in compensatory hyperplasia of the contralateral hepatic lobe. This technique allows extended partial hepatectomy because of the increased volume of the remnant liver.
Neither adjuvant nor neoadjuvant chemotherapy or radiation therapy has been shown to be effective and is therefore not recommended in patients with cholangiocarcinoma who undergo resection.
AMPULLARY AND PANCREATIC CARCINOMA

• These are the most common causes of a malignant bile duct stricture.

• Indications for radiological assessment are:
  – Define site and size of tumour.
  – Confirm a tissue diagnosis by guided biopsy.
  – Determine operability by excluding, local involvement of vessels, regional lymphadenopathy, ascites and distant metastasis.
Low common bile duct stricture, with characteristic features of extrinsic compression from a pancreatic mass (arrow). ‘Double duct ‘ sign. Concomitant strictures of pancreatic duct and bile duct (arrows) diagnostic of carcinoma of head of pancreas.
BILLIARY CYSTADENOMA AND CYSTADENOCARCINOMA

- These are rare tumours of biliary epithelium present as complex, cystic masses within liver parenchyma which may infiltrate segmental bile ducts.
- Radiological assessment is based on determining segmental distribution and vascular relationships.
ENDOSCOPIC TREATMENT OF BILIARY DISEASES

INDICATIONS OF ENDOSCOPIC SPHINCTEROTOMY

• Commo bile duct stones with or without all bladder stones
• Common bile duct stones following cholecystectomy with or without a T-tube in place.
• Ampullary carcinoma
• Malignant bile duct strictures prior to stent insertion
• Benign papillary stenosis
• Post surgical strictures before dilatation or stent placement
• Choledochal fistula
• Choledochocele.
ENDOSCOPIC TREATMENT OF BILIARY DISEASES

INDICATIONS OF STENTING FOR BENIGN BILE DUCT DISORDERS

• Early structuring or anastomotic leak following liver transplant.
• As a preclude to definitive surgery in iatrogenic transection of bile duct with biliary leak.
• Failed stone extraction or a large impacting stone associated with biliary obstruction
• Benign strictures in patients unfit for surgery.
• Recurrent anastomotic strictures following surgery.
Thank you for your attention!