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# Evaluation of the Role of Multi detector Computed Tomography in Biliary Obstruction

***Essay***

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# List of Abbreviation

| | |
|---|---|
| CT | Computed tomography |
| MDCT | Multi detector computed tomography |
| IHBDS | Intra hepatic bile ducts |
| CHD | Common hepatic duct |
| CBD | Common bile duct |
| GB | Gall bladder |
| MinIP | Minimum intensity projection |
| MPR | Multiplanar reformation |
| VR | Volume rendering |
| PVP | Portal venous phase |
| HAP | Hepatic arterial phase |
| CPR | Curved planar reformation |
| PACS | Picture archiving and communication |
| TLC | Tumor to liver contrast |
| ER | Enhancement ratio |
| PSC | Primary sclerosing cholangitis |
| CDL | Choledochlithiasis |
| CC | Cholangiocarcinoma |
| ERCP | Endoscopic retrograde cholangiopancreatography |
| MRCP | Magnetic resonance cholangiopancreatography |
| US | Ultrasound |
| PTC | Percutaneous trans hepatic cholangiography |

# INTRODUCTION

**The last two decades** show improvement in the prognosis of cases of biliary obstruction thanks to the remarkable progress in the method of investigation of biliary channel, thus providing reliable (road map) that are helpful during surgery **(callery,2006)**

Biliary obstruction refers to the blockage of any duct that carries bile from the liver to the gallbladder or from the gallbladder to the small intestine. This can occur at various levels within the biliary system. (**Jennifer Lynn Bonheur, 2012).**

Biliary obstruction may be by mechanical means or by metabolic factors in the hepatic cells. Mechanical causes of biliary obstruction, further separating them into intrahepatic and extra hepatic causes. **(Niu, 2011).**

Intrahepatic causes are most commonly hepatitis and cirrhosis. Drugs may also cause direct damage to hepatocytes, such as anabolic steroids and chlorpromazine.

Extra hepatic causes may be further subdivided into those that are intra ductal and those that are extra ductal. **(Gwon, 2011).**

Biliary obstruction can be categorized into benign and malignant causes.

Benign causes as

- Choledocholithiasis.
- Benign stricture.

- ✓ Post-operative/traumatic.
- ✓ Post inflammatory.
- Choledochal cyst.
- Parasitic diseases.
- Benign tumors of the biliary tract.

Malignant as

- Cholangiocarcinoma.
- Carcinoma of gallbladder.
- Carcinoma of head of pancreas**( Jaganmohan,2011)**

Biliary obstruction is largely a clinical and radiographic diagnosis the major signs and symptoms of biliary obstruction result directly from the or failure of bile to reach its proper destination, and also may be from bacterial cholangitis and sepsis.**(Sultan, 2013).**

There are several diagnostic tests that may be administered to confirm the presence of a biliary obstruction. Initially, a physical examination and palpation of the abdominal area may be conducted to evaluate any distention, tenderness, or other abnormalities. Blood tests may be ordered to assess liver enzymes and bilirubin and alkaline phosphatase levels; results that indicate above normal levels of any of these substances may confirm the presence of a blockage. Imaging testing may be performed to evaluate the condition of the bile ducts and determine the presence and extent of any blockage. **(Afdhel, 2011)**

The radiological evaluation of obstructed biliary tract show advances with availability of US,CT,MRI including magnetic resonance cholangiopancreatography (MRCP) endoscopic retrograde cholangiopancreatography(ERCP)and percutaneous trans hepatic cholangiography (PTC),also there have been reports on the role of intravenous cholangiography with helical CT **(Sushma and Sanjay,2008).**

Although, MDCT is generally not considered to be a first line imaging technique for patient with biliary disease, advances in MDCT scanner have resulted in an increased capability to detect and categorize various biliary diseases **(Paulson, 2005)**

The advantage of MDCT of the biliary tract are increased speed and reduction of acquisition time and respiratory motion artefact furthermore, the thinner slice of MDCT result in reconstructed dataset with isotopic voxel for MPR and 3Ddisplays. Straight and curved MPR are especially valuable for visualization and evaluation biliary tree, which is typically, oriented either perpendicular tangential to the axial plane**. (Abdel moumen et al,2005)**

# Aim of the work

To discuss the role of multi detector computed tomography in evaluation of biliary obstruction.

# Biliary tree anatomy

The biliary tract consists of the system of ducts which collect and deliver bile from the hepatic parenchyma and transports it to the second part of the duodenum.By convention the biliary tree is divided into intra- and extra-hepatic bile ducts **(fig.1)**. The intrahepatic bile ducts are formed from bile canaliculi that unite to form segmental bile duct. Intrahepatic bile ducts fuse at portahepatis of the liver into the right and left hepatic ducts. The extra hepatic bile ducts consist of the right and left hepatic ducts, the common hepatic duct, the cystic duct , gallbladder and the common bile duct.**(fig1) (knipe and Bashir ,2014)**

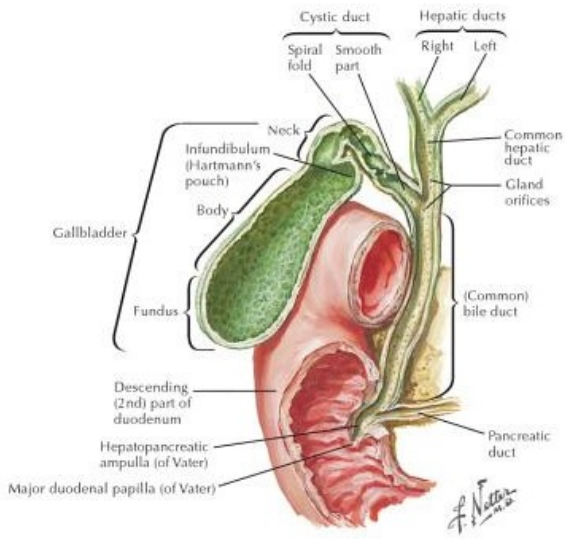


**Figure 1**: over all arrangement of the intrahepatic and extra hepatic biliary tree. The biliary tree to the level of the segment duct shown in relation to the conventional arterial anatomy. **(Sana bria et al, 2013)**

# Hepatic duct

The Couinaud classification of liver anatomy divides the liver into eight functionally independent segments **(fig.2)**. Each segment has its own vascular inflow, outflow and biliary drainage. In the Centre of each segment there is a branch of the portal vein, hepatic artery and bile duct. In the periphery of each segment there is vascular outflow through the hepatic veins.**(Scalea and bruns, 2014)**

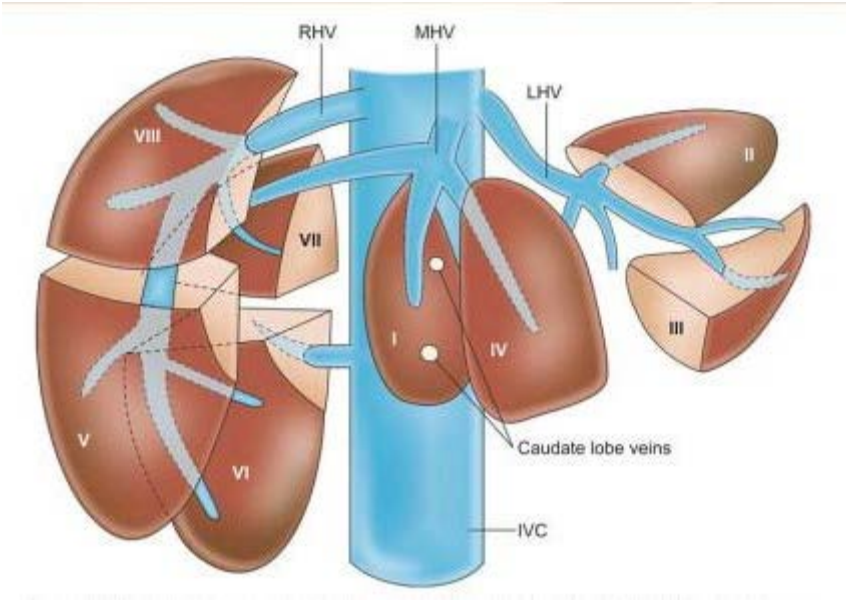


**Figure 2:** Segmental liver anatomy based on couinaud classification (segment1-8). (RHV right hepatic vein, LHV: left hepatic vein, MHV: middle hepatic vein, IVC: inferior vena cava. **(Chakravarty, 2010)**

The intrahepatic ductal anatomy is modeled on the segmental anatomy of the liver. **(Lee, 2013)**

At the hilum there are two- main hepatic duct, a short right and a much longer left, which join to form common hepatic duct .The left hepatic duct drains segments 2, 3, and 4 of the left hemi liver. The "normal" confluence comprises a duct formed from ducts of segments 2 and 3 and one or more ducts from segment 4 .The right hepatic duct drains all segments of the right hemi liver (segments 5, 6, 7, and 8).The ductsof segments 6 and 7 form the posterior right hepatic duct and those of segments 5 and 8 form the anterior right hepatic duct. The anterior hepatic duct lies vertical, located to the left of the anterior branch of the portal vein. The direction of the posterior duct is more horizontal, running superior to the anterior portal branch and joins the anterior duct. **(Lee, 2013)**

The segment one has its own biliary drainage running to both hepatic ducts in 80% of the time, solely to the left hepatic duct in 15% of the time, and solely to the right hepatic duct in 5% of cases. **(Scalea and Bruns**, **2014)**

# The common hepatic duct

The main right and left hepatic ducts join soon after emerging from the liver to form the common hepatic duct at the