

# Anatomy of intra- & extrahepatic biliary tract

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## Background

Although the anatomy of the portal and biliary systems and their interrelationships must be understood to safely and satisfactorily perform major liver resection of hilar cholangiocarcinoma, the anatomies of the portal and biliary systems are extremely difficult to understand.

## Methods

To investigate the relationship between the biliary duct system and the portal vein through in vivo analysis of the human liver using three-dimensional porto-cholangiography. Twenty-seven patients underwent CT during both arterial portography and cholangiography. Three-dimensional porto-cholangiograms were reconstructed to evaluate the relationship between the left biliary duct system and the left portal vein, in particular the umbilical portion. In addition, a total of 60 patients with normal liver underwent computed tomography during both portography and cholangiography to evaluate relationships between right biliary and portal systems based on reclassification of the liver to divide the right liver into 3 segments.

## Results

In 16 (59.3%) patients, segment 2 and 3 ducts united just above or laterally to the umbilical portion and the segment 4 duct joined medially to the umbilical portion. In 8 (29.6%) patients, segment 3 and 4 ducts united medially to the umbilical portion and the segment 2 duct joined at a point close to the hepatic hilum. In 3 (11.1%) patients, three ducts from segments 2, 3 and 4 united at a position immediately medially to the umbilical portion. In right-sided relationships between biliary and portal systems, all ventral and posterior ducts constantly join medially to the anterior portal trunk. In contrast, some dorsal ducts join the ventral duct medially and the others join the posterior duct lateral to the anterior trunk.

## Conclusions

Three types of bile duct anatomy were seen in relation to the portal vein in both left and right livers. Reclassification of the liver to divide the right liver into 3 segments facilitates an understanding of relationships between the right portal and biliary systems.