

# KARNATAKA RADIOLOGY EDUCATION PROGRAM

# LIVER Anatomy and applied radiology

The liver, located in the upper right abdominal quadrant, is a vital organ with four lobes (right, left, caudate, and quadrate), and its anatomy includes surfaces (diaphragmatic and visceral), ligaments (coronary, triangular, falciform, and round), and fissures/recesses.

Location:

Upper right-hand portion of the abdominal cavity, beneath the diaphragm, and on top of the stomach, right kidney, and intestines. [The liver is predominantly located in the right hypochondrium and epigastric areas and extends into the left hypochondrium.]



Shape and Color: Shaped like a cone, the liver is a dark reddish-brown organ.

Lobes:

**Right Lobe: The largest lobe.** 

Left Lobe: The smaller lobe.

Caudate Lobe: Located on the posterior surface of the liver.

Quadrate Lobe: Located on the inferior surface of the right lobe.



## Surfaces:

Diaphragmatic Surface: The upper surface, in contact with the diaphragm.

The anterosuperior surface of the liver. It is smooth and convex, fitting snugly beneath the curvature of the diaphragm.

The posterior aspect of the diaphragmatic surface is not covered by visceral peritoneum and is in direct contact with the diaphragm itself (known as the 'bare area' of the liver).

Visceral Surface: The lower surface, in contact with other organs.

The posteroinferior surface of the liver. With the exception of the fossa of the gallbladder and porta hepatis, it is covered with peritoneum.

It is moulded by the shape of the surrounding organs, making it irregular and flat.

It lies in contact with the right kidney, right adrenal gland, right colic flexure, transverse colon, first part of the duodenum, gallbladder, oesophagus and the stomach

#### Ligaments:

Falciform Ligament: Attaches the liver to the anterior abdominal wall, containing the round ligament (remnant of the umbilical vein).

Coronary Ligament: Attaches the superior surface of the liver to the inferior surface of the diaphragm.

Triangular Ligaments: Formed by the anterior and posterior folds of the coronary ligament, demarcating the bare area of the liver.

Round Ligament: A remnant of the umbilical vein, located in the free edge of the falciform ligament.



## Fissures and Recesses:

Porta Hepatis (Central Fissure): The area where the hepatic artery, portal vein, and bile ducts enter and exit the liver.

Subphrenic spaces – located between the diaphragm and the anterior and superior aspects of the liver. They are divided into a right and left by the falciform ligament.

Subhepatic space – a subdivision of the supracolic compartment (above the transverse mesocolon), this peritoneal space is located between the inferior surface of the liver and the transverse colon.

Morison's pouch – a potential space between the visceral surface of the liver and the right kidney. This is the deepest part of the peritoneal cavity when supine (lying flat), therefore pathological abdominal fluid such as blood or ascites is most likely to collect in this region in a bedridden patient.



## **Blood Supply:**

The liver has a unique dual blood supply:

Hepatic artery proper (25%) – supplies the non-parenchymal structures of the liver with arterial blood. It is derived from the coeliac trunk.

Hepatic portal vein (75%) – supplies the liver with partially deoxygenated blood, carrying nutrients absorbed from the small intestine. This is the dominant blood supply to the liver parenchyma and allows the liver to perform its gut-related functions (such as detoxification).

Venous drainage of the liver is achieved through hepatic veins. The central veins of the hepatic lobule form collecting veins which then combine to form multiple hepatic veins. These hepatic veins then open into the inferior vena cava.



**Bile Ducts:** 

Intrahepatic Bile Ducts: A network of small tubes that carry bile inside the liver.

Right and Left Hepatic Ducts: Join outside the liver to form the common hepatic duct.

Common Hepatic Duct: Joins with the cystic duct from the gallbladder to form the common bile duct.

The liver is a peritoneal organ positioned in the right upper quadrant of the abdomen. It is the largest visceral structure in the abdominal cavity, and the largest gland in the human body.

An accessory digestion gland, the liver performs a wide range of functions, such as synthesis of bile, glycogen storage and clotting factor production.

### Lymphatic drainage

The majority of the lymph from the liver drains into nodes that lie in the porta hepatis. Drainage channels of these lymph nodes follow the hepatic artery to reach the retropyloric and then the celiac lymph nodes 9.

The superior surface of the liver also has communications with extraperitoneal lymphatics that perforate the diaphragm and drain into mediastinal lymph nodes 9.

#### Innervation

The liver is supplied by sympathetic and parasympathetic autonomic fibers from the hepatic plexus via the celiac plexus, which travel with branches of the hepatic artery and portal vein to the liver. Within the liver, the nerve fibers accompany the portal triad. Sympathetic fibers are derived from the splanchnic nerves and parasympathetic fibers are derived from the anterior and posterior vagal trunks

https://www.hopkinsmedicine.org/health/conditions-and-diseases/liver-anatomy-andfunctions, https://radiopaedia.org/?lang=us, https://teachmeanatomy.info/