
INTERNATIONAL SURGICAL
ANATOMY TEACHING
SERIES



ISATS
HANDOUT
2024/25

Hepatobiliary Surgery

HEPATOBILIARY ANATOMY

Objectives: Understand the anatomy of the liver, gallbladder, biliary tree, pancreas and their respective neurovascular supply. Apply anatomical knowledge in context of laparoscopic cholecystectomy

The Liver

Surfaces

- **Diaphragmatic** (*anterior, superior*)
 - Smooth, domed
 - Lies against the inferior diaphragm
 - Covered with visceral peritoneum (Glisson's capsule)
- **Visceral** (*posterior, inferior*)
 - Covered with visceral peritoneum
 - Except gallbladder fossa, porta hepatis
 - Related structures:
 - Gallbladder
 - Oesophagus
 - Right Kidney & Adrenal Gland

Lobes

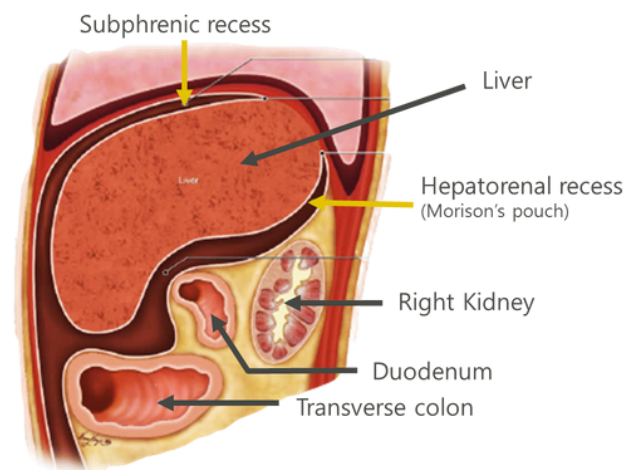
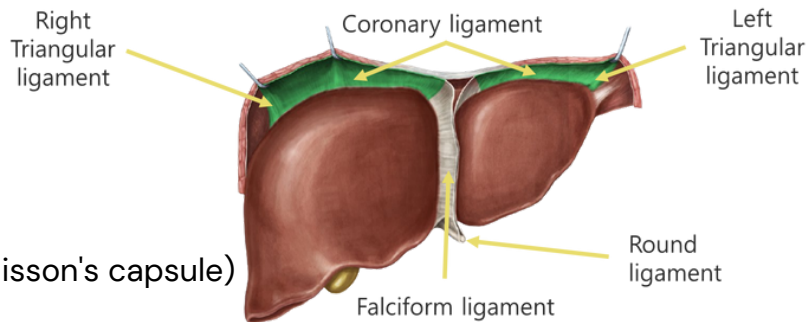
- **Right** and **Left lobe** separated superficially by the falciform ligament
- **Quadrate** and **caudate** lobes: functionally distinct lobes located on the visceral surface of the right lobe

Segments (Couinaud Classification)

- Divides the liver into **8 functionally independent segments**
- Each segment has its own vascular inflow, outflow, and biliary drainage
- **Clinical importance:** liver resection

Ligaments

- **Falciform ligament** → Abdominal wall
- **Coronary ligament** → Diaphragm
- **Triangular ligament** → Diaphragm
- **Hepatogastric ligament** → Stomach
- **Hepatoduodenal ligament** → Duodenum



Hepatic Recesses

- **Subphrenic recess**
 - Separates the diaphragmatic liver surface from the diaphragm
- **Hepatorenal recess**
 - Separates the visceral liver surface from the kidney

NEUROVASCULAR SUPPLY

Arterial Supply (+ portal vein!)

- Branches from the **Coeliac trunk** (T12)
- Right hepatic artery (hepatic artery proper)
- Left hepatic artery (hepatic artery proper)

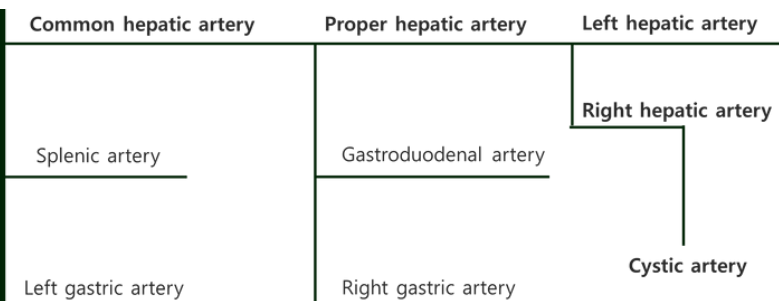
Venous Drainage

- Hepatic veins → Inferior vena cava

Innervation

- Hepatic plexus
- Sympathetic: coeliac plexus
- Parasympathetic: vagus nerve
- Glisson's capsule: lower intercostal n. branches

Coeliac Trunk (T12)

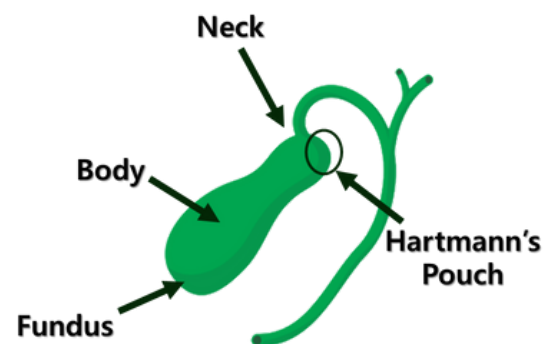


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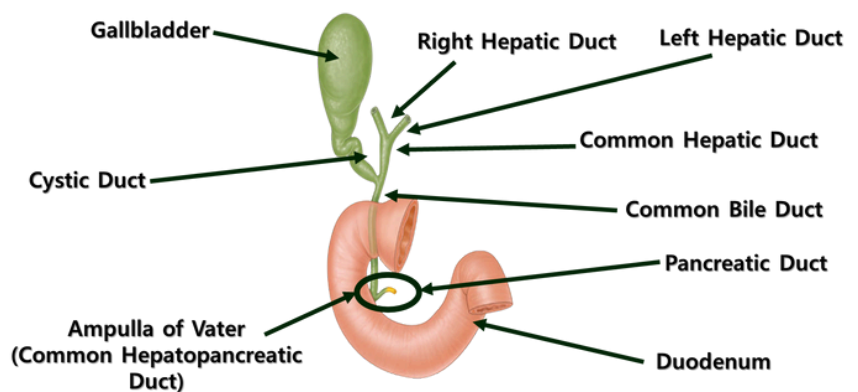
The Gallbladder Structure

- **Fundus:** Projecting from the inferior liver border
- **Body:** Located in the gallbladder fossa
- **Neck:** Mucosal folds forming spiral fold
 - **Hartmann's Pouch** – gallstones likely to get stuck here

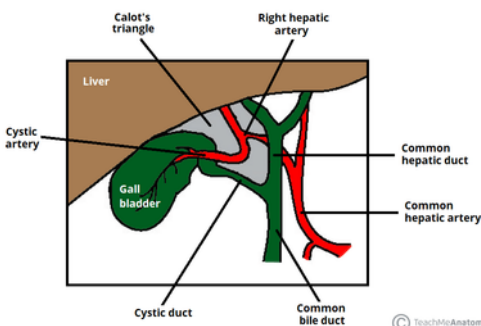


The Biliary Tree

- Duct system that connects **liver** (bile synthesis) to **gallbladder** (bile storage) and **pancreas** (digestive enzymes)
- Allows mixture of bile and pancreatic secretion into **duodenum**



Calot's Triangle



- **Borders:**
 - Medial – **Common Hepatic Duct**
 - Inferior – **Cystic Duct**
 - Superior – **Inferior surface of Liver**
- **Contents:**
 - **Right Hepatic Artery**
 - **Cystic Artery**
 - **Lymph Node of Lund**

Clinical Relevance: resection & identification of structures during laparoscopic cholecystectomy

NEUROVASCULAR SUPPLY

Arterial Supply

- Branches from the **Celiac trunk (T12)**
- Cystic artery (typically right hepatic a.)

Venous Drainage

- Neck: Cystic vein → portal vein
- Fundus & body: hepatic sinusoids

Innervation

- Hepatic plexus
- Sympathetic & sensory: coeliac plexus
- Parasympathetic: vagus n.

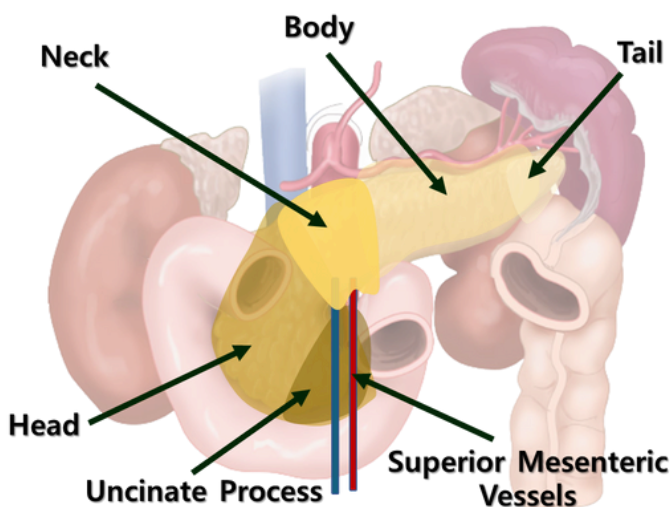
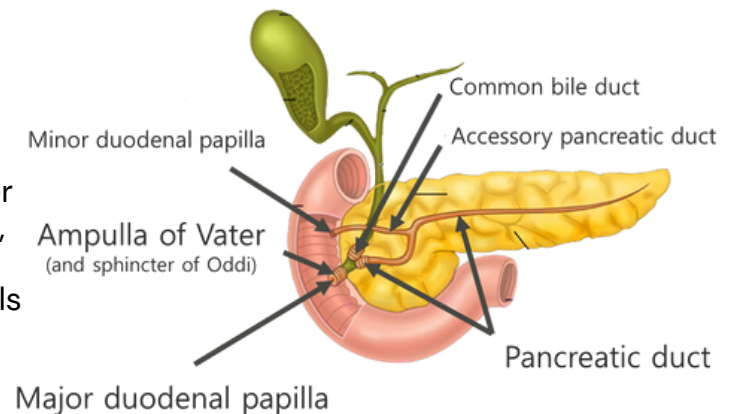
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The Pancreas

Structure

- **Head:** Projecting from the inferior liver border
- **Uncinate process:** projects from lower head, **posterior** to superior mesenteric vessels
- **Neck:** **anterior** to superior mesenteric vessels
- **Body:** elongated, joins neck and tail
- **Tail:** not retroperitoneal



- **Ampulla of Vater** = joint common bile and pancreatic duct
- **Sphincter of Oddi** = muscle that opens and closes the Ampulla of Vater
- **Major duodenal papilla** = part of the duodenum where the ampulla of Vater joins

NEUROVASCULAR SUPPLY

Arterial Supply

- Head and neck:
 - Superior pancreaticoduodenal branches
 - Inferior pancreaticoduodenal branches
- Body and tail:
 - Dorsal pancreatic artery (splenic a.)
 - Greater pancreatic artery (splenic a.)

Venous Drainage

- Head and neck: pancreatic veins → superior mesenteric v. → **portal vein**
- Body and tail: pancreatic veins → splenic v. → **portal vein**

Innervation

- Celiac ganglia
- Sympathetic: T6–T12
- Parasympathetic: vagus n.

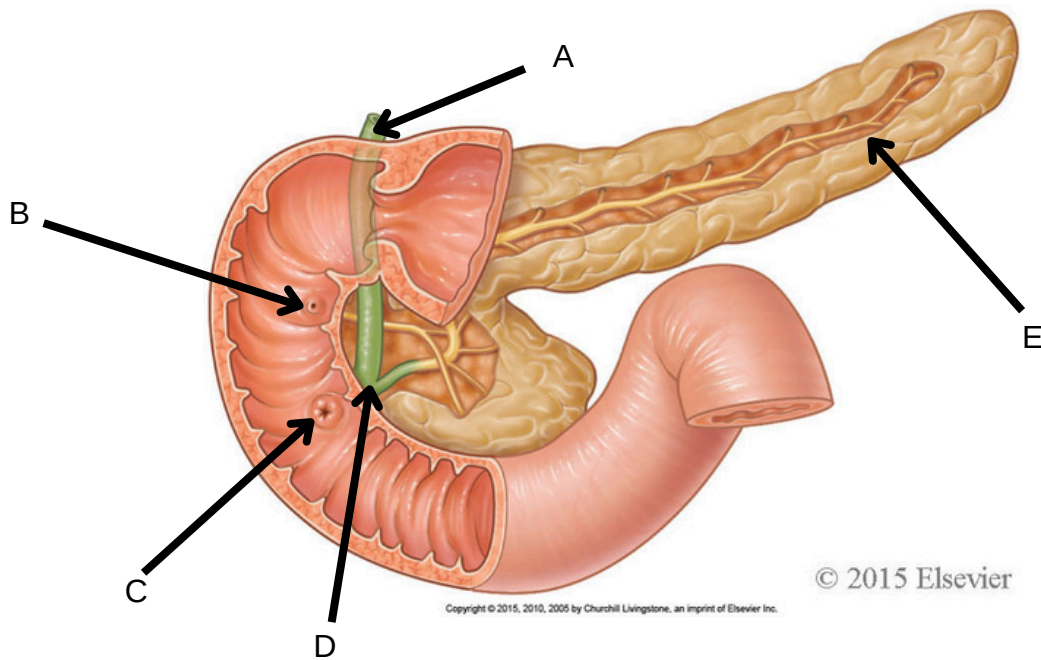
Lymphatic Drainage

- Coeliac, superior mesenteric, and splenic nodes
- Drain into paraaortic lymph nodes

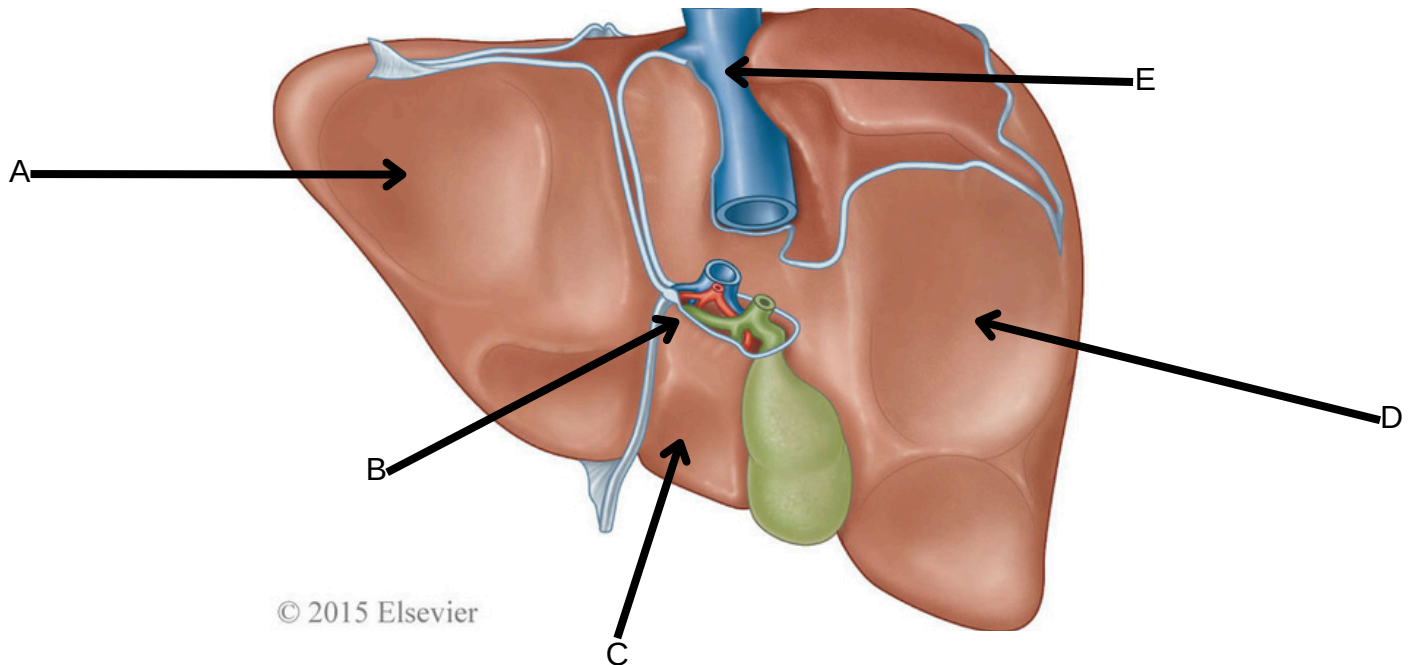
HEPATOBILIARY ANATOMY

Test yourself

1) Label the structures



2) Label the structures



HEPATOBILIARY ANATOMY

Test yourself

MCQ 1

What is the clinical relevance of Couinaud's classification?

- A. Whipple procedure
- B. Liver resection
- C. Cholecystectomy
- D. Identification of metastatic disease
- E. Caudate lobe resection

MCQ 2

The Falciform ligament attaches which two structures?

- A. Liver and abdominal wall
- B. Liver and duodenum
- C. Liver and stomach
- D. Liver and diaphragm
- E. Liver and gallbladder

MCQ 3

What is the clinical relevance of the epiploic foramen?

- A. Allows for easier access to retroperitoneal organs
- B. Allows for the expansion of the liver in liver disease
- C. Blood and Pus can accumulate in this area
- D. Anastomosis can form here in liver haemorrhage
- E. Morrison's pouch can be accessed here

MCQ 4

What is contained within the hepatoduodenal ligament?

- A. Common hepatic artery and splenic artery
- B. Portal triad
- C. Right and left gastric arteries
- D. Cystic artery and right hepatic artery
- E. Minor pancreatic duct

MCQ 5

A 45-year-old female presents to her GP with consistent pain in her right upper quadrant. This has been going on for a while. The GP notices that she has yellowing of her sclera and a fever of 38.5.

What is your most likely diagnosis?

- A. Primary biliary cholangitis
- B. Ascending cholangitis
- C. Pancreatic cancer
- D. Biliary colic
- E. Cholecystitis

MCQ 6

A 40-year-old female presents with a 3 week history of right upper quadrant pain. She describes the pain as a pain that comes and goes and usually worse after a weekly takeaway. The GP calculates her BMI to be 55.

What is the most likely diagnosis?

- A. Primary biliary cholangitis
- B. Ascending cholangitis
- C. Pancreatic cancer
- D. Biliary colic
- E. Cholecystitis

HEPATOBILIARY ANATOMY

Test yourself

OSCE Station – Case Based Discussion

You are an F1 on your general surgery rotation. You come across a 75 year old patient who appears well in herself but you notice that she appears very cachectic. You check her notes and realise she has a BMI of 16.5. On examination, she has a small palpable mass in her RUQ and yellowing of her skin. You also notice a swollen left leg which appears red upon systems review.



- Q1. What differentials would you give for this patient's jaundice?
- Q2. What is the most common cause of her swollen leg?
- Q3. What is the likely diagnosis & cause of this patient's symptoms and why?
- Q4. What investigations would you arrange?
- Q5. How would this patient be managed?
- Q6. What additional support might this patient need?
- Q7. What is the most common surgery for tumours of the head of the pancreas?