Biliary System

- Right Hepatic Duct
- Left Hepatic Duct
- Liver
- Pancreas
- Stomach
- Gallbladder
- Cystic Duct
- Common Hepatic Duct
- Common Bile Duct
- Pancreatic Duct
- Duodenum
Intrahepatic biliary apparatus

- Bile canaliculi
- Canals of Herring
- Bile ductules
- Right and Left hepatic ducts
Structure of liver (Schematic).
Bile canaliculi form a polygonal network around individual liver cells (except those surface of the cells which are related to sinusoids)
The canaliculus is formed by the separation of plasma membranes of the adjacent liver cells.
In the peripheral part of hepatic lobules canaliculi unite to form canals of Hering.
At the porta hepatis the arrangement of the structures from before backwards is

DUCT

ARTERY

VEIN
EXTRAHEPATIC BILIARY APPARATUS
Common hepatic duct

- 3cm long
- 2mm in calibre

Relations

Behind: Portal vein

Left side: Principal hepatic Artery

Below and to the right: cystic duct
Gall Bladder

A. Location:

1. Epigastric region
2. Right hypochondriac region
3. On inferior surface of liver
4. Between quadrate and right lobes

B. Pear-shaped, hollow structure
- Fundus
- Body
- Infundibulum
- Neck
- Cystic duct
C. Fundus slants inferiorly, to the right

D. Attached to liver by loose (areolar) connective tissue

E. Peritoneum covers free surfaces
Peritoneum covering the gall bladder
Relations

Infront: Anterior abdominal wall just below the tip of 9\textsuperscript{th} costal cartilage

Behind: Transverse colon
Fundus of GB:

1. may be palpated

2. in angle between lateral border of right rectus abdominis and costal margin

3. At level of elbow

4. Most anterior visceral structure
GB must be distended with bile to be clearly visualized.

Phrygian Cap
Anatomical variation
Fund is is folded back on itself
not pathological
Body of Gallbladder

Relations

Above: Visceral surface of liver
   Deep branch of cystic artery and corresponding vein in the connective tissue

Below: transverse colon and 1st part of duodenum

Right side: hepatic flexure of colon

Left side: Pyloric part of the stomach
Hartmann’s Pouch

1. Infundibulum of gallbladder

2. Lies between body and neck of gallbladder

3. A normal variation

4. May obscure cystic duct

5. If very large, may see cystic duct arising from pouch
Neck of gallbladder

- S shaped

- at first passes upwards and forwards then turns abruptly downwards and backwards

- continuous with cystic duct
Cystic Duct

Characterized by a spiral valve (of Heister)
• Does not have any valvular function.
• makes catheterization difficult
1. joins common hepatic duct

2. superior and posterior to pylorus of stomach
Common Bile Duct

1. 10-15 cm long

2. Courses through lesser omentum

3. Deep to pyloric sphincter

4. Narrow tube, 1-2 mm diameter

5. Should be no more than 6 mm in diameter
6. May be 8-10 mm in post-cholecystectomy patients

7. Normally has smooth walls

8. Joins with pancreatic duct

9. On L.S., convergence is seen
   a. anterior to portal vein
   b. posterior to head of pancreas
Supraduodenal (1st) part of CBD has:

1. hepatic artery on left and portal vein posterior

2. descends in free margin of lesser omentum

Retroduodenal (2nd) part of CBD

J. runs parallel to gastroduodenal artery

K.
Infra duodenal part of CBD

Infront: head of pancreas, accessory pancreatic duct, anterior row of vasa recta of duodenum

Behind: Posterior row of vasa recta of duodenum

Left side: superior mesentric and portal veins
Combined duct of CBD and main pancreatic duct empties into duodenum at ampulla of Vater

**Intra duodenal part of CBD**

- **Length:** 2cm
- **Ampulla:** 5mm
Gaurded by Sphincter of Oddi
Sphincter of Oddi:

- Sphincter of Oddi guards duct, regulates bile flow
  1. Closed: bile goes into gallbladder
  2. Open: bile goes into duodenum

- Regulates bile flow, prevents back flow, and diverts bile into G.B.

- Basal resting pressure of 13 mm Hg above duodenal pressure.

- CCK causes relaxation
Ruggero Oddi

Described the Sphincter of Oddi while a student

Inflammation of the sphincter of Oddi is called *odditis*
Arterial supply

- the cystic artery
- pancreatrico duodenal artery
- the right hepatic artery
- accessory cystic artery
1. Cystic artery
   
a. arises (~ 60% of the time) from right hepatic
   
b. passes posterior to hepatic duct, then divides
c. Superficial branch, to peritoneal surface of GB

d. Deep branch, to hepatic surface of GB

e. May be doubled or tripled
Variations in arterial supply:

- In 50% of population from Right hepatic artery
- from SMA (20%)
- 2 right hepatic arteries (5%)
- Cystic artery can arise from left hepatic, common hepatic, gastroduodenal, or SMA (10%).
A. Common hepatic artery

B. Low origin common hepatic artery
C Gastroduodenal artery

D Superior pancreaticoduodenal, coeliac or right gastric arteries
E  Left hepatic artery
F Accessory deep artery

G Multiple non-dominant arteries
Small arteries supplying CBD

a. arise from cystic artery

b. posterior branch of superior pancreatico-duodenal artery
Venous drainage

- Tributaries of hepatic veins
- Cystic veins
- Portal vein
- Many small veins drain directly into the liver
Lymphatic drainage of GB

1. Terminate at celiac nodes

2. Cystic node at neck of GB
   a. Actually a hepatic node
   b. Lies at junction of cystic & common hepatic ducts

3. Other lymph vessels also drain into hepatic nodes
Nerve supply

- Cystic plexus
- Parasympathetic nerves
  - motor to gallbladder and bile ducts
  - inhibitory to sphincters
- Phrenic nerve (C4)
sympathetic T7- T9
Anomalies:

- The classic description applies only in one third of the patients.

- G.B: abnormal portions, intrahepatic, rudimentary, or duplicated.

- Bile ducts: duct of Luschka, accessory right hepatic duct.
G.B Function:

- Store and concentrate bile.
- Secrete glycoprotein and hydrogen ion.
- Contraction stimulated by CCK and vagus nerve and inhibited by sympathetic stimulation, VIP, and somatostatin.
Gallbladder Diseases

1. Cholecystitis = inflammation of GB

2. Cholelithisis = Stone(s) in GB
THANK YOU