GI
ANATOMY

 # 7

WRITER:
Ibrahim Sudqi

CORRECTOR:
Salih Al-Qaderi

DOCTOR:
Mohammad Al-Mohtaseb

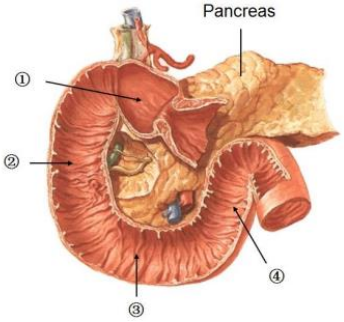
THE SMALL INTESTINE

The small intestine is made up of 3 parts:

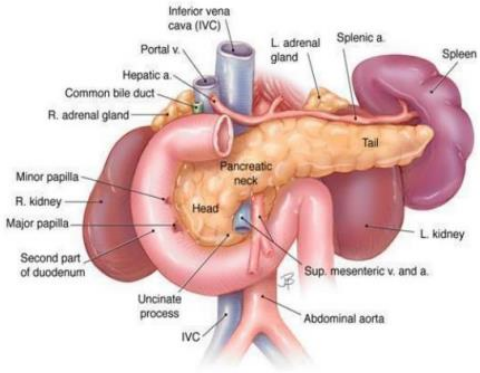
- The duodenum which is 25cm (10 inches) and is retroperitoneal except the first and last inches.

- The jejunum and ileum which are 6 meters long and are intraperitoneal (they have a mesentery). But in general, the small intestine is 6m long.

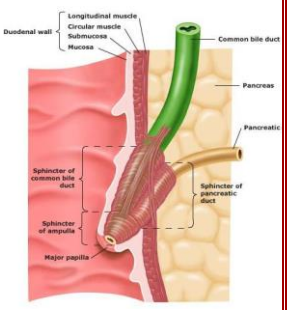
THE DUODENUM



- **The duodenum is a C-shaped concave tube and about 10" in length.**
- **It has four parts, the 1st is 2 inches, the 2nd is 3 inches, the 3rd is 4 inches, and the 4th is 1 inch).**
- **It joins the stomach to the jejunum.**
- The concavity of the duodenum has the head of the pancreas. The pancreas has a tail, body, neck and head and the duodenum curves around the head of the pancreas to the left and backwards.



- **Most of the duodenum is retroperitoneal except the 1st inch & last inch. This short segment (1st inch) has the lesser omentum on its upper border, the greater omentum on its lower border, and the lesser sac posterior to it.**
- **The duodenum begins at the pyloric sphincter (stomach) and ends at the ligament of Treitz which continues as the jejunum** (duodonojejenal junction).
- **Importance of duodenum: the 2nd part receives the opening of the common bile and pancreatic ducts;** they secrete substances to complete the digestion of fat which occurs in the duodenum and the absorption in jejenum & ileum.



➢ **Origin of the common bile duct:** the liver has left and right lobes, and the left and right hepatic ducts form the common hepatic duct which meets with the cystic duct of

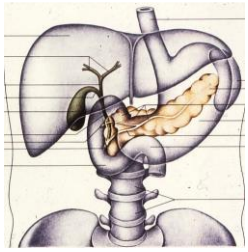
the gallbladder to form the common bile duct which opens on the second part of the duodenum.

- The common bile duct and the pancreatic duct have the same opening in the duodenum. When they meet, they form a bulge in the duodenal wall called **ampulla of vater.**

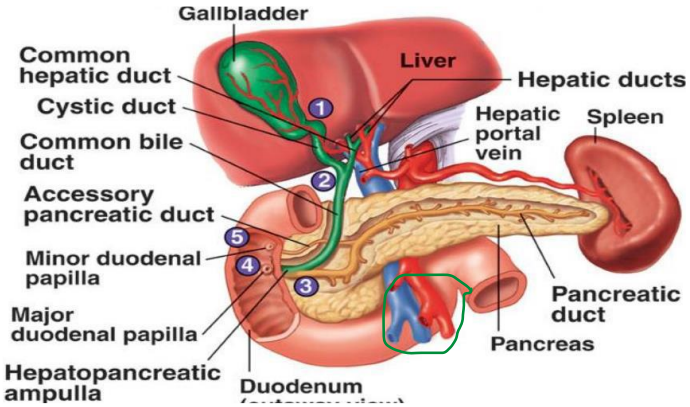
- Around it is a sphincter called sphincter of Oddi (a smooth muscle) that is always contracts, why? To make sure that the diluted bile is going to the gallbladder then the gallbladder contracts and the sphincter relax so bile got concentrated and go out the gallbladder.

- We call the opening from inside the major duodenal papilla, sometimes there is another opening 1 inch above the major papilla for accessory pancreatic ducts called minor duodenal papilla.

- **The duodenum is situated in the epigastric and umbilical regions.**



❖ The Parts of the Duodenum and their Relations:



Notice the superior mesenteric artery and vein where they pass behind the pancreas.

1. 1st Part of The Duodenum

- **The first part is 2 inches long,** and is divided into two parts:

➢ **<u>The first inch (intraperitoneal)</u>**

✓ Common site of peptic\duodenal ulcers.

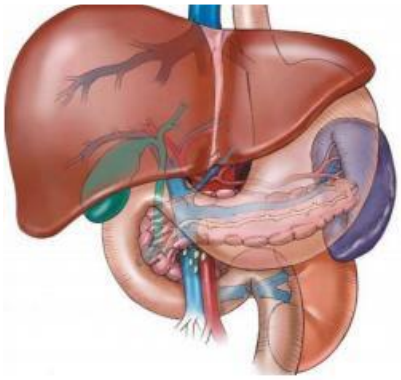
➢ **<u>The second inch (retroperitoneal)</u>**

- **The first part begins from the pyloduodenal junction.**

- **At the level of the transpyloric line.**
- **Runs upward and backward** to the liver **at the level of the 1st lumbar vertebra 1 inch to the right.**

x Relations of the first part:

- Anteriorly:



- ✓ **The liver (quadratus lobe).**
- ✓ **The gall bladder.**

- Superiorly: The epiploic foramen

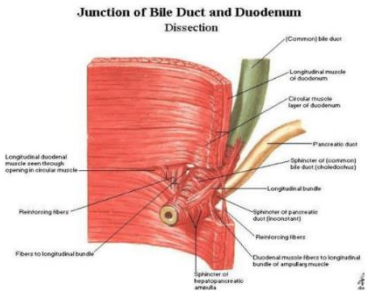
- Posteriorly: (الدكتور حكى "مكان أسئلة")

- ✓ **The lesser sac.**
- ✓ **The common bile duct.**
- ✓ **The portal vein.**
- ✓ **Inferior vena cava.**
- ✓ **gastroduodenal Artery** that supplies the duodenum and pancreas**.** (If there is a peptic ulcer on the posterior wall of the 1st inch perforation and infiltration may occur along with bleeding from this artery).

- Inferiorly: The head of the pancreas.

2. 2nd Part of the Duodenum (vertical part)

- **It is 3 inches long, runs downward vertically on the right side in front of the right kidney and right ureter and ends next to 3rd and 4th lumbar vertebrae.**
- **Importance of the 2nd part:** it receives the common bile and pancreatic ducts so completing the digestion.
- **Halfway through it, the bile duct and the main pancreatic duct pierce the medial wall, and then form the ampulla that opens in the major duodenal papilla.**



- **The accessory pancreatic duct (if present) opens in the minor duodenal papilla more superiorly.**

➢ ERCP (Endoscopic retrograde cholangiopancreatography):

- This is a new technique where an endoscope is placed through the mouth and proceeds retrogradely through the pharynx, esophagus, stomach and duodenum and then you find the major duodenal papilla and you cut the sphincter of oddi and you enter either the pancreatic or common bile ducts based on what you want to do.

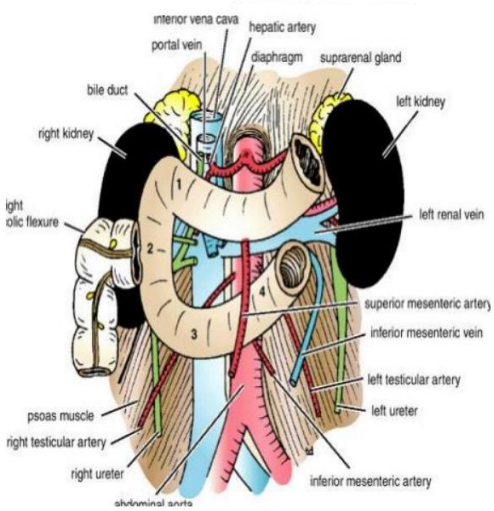
- This technique is used in treatment of stones that form in the common bile duct and block it and this causes jaundice (yellow sclera, yellow and itchy skin) which was treated with surgery (cholecystectomy by opening the abdomen) in the past, when you find the stone with the endoscope you use a basket and remove the stone and leave it in the duodenum and it gets out with the stool. Then it was 6 days now it is 15-30 minutes the patient leaves after 6 hours.

- Sometimes stasis of the secretion of pancreas happens and it becomes like mud or forms stones and closes the pancreatic duct and may cause pancreatitis which is very dangerous, and it is treated with ESRP, by entering the duct with the endoscope and adding saline suction and irrigation which will dissolve the stones, so the duct opens. 6 hours and the patient is recovored.

x Relations of the second part:

- Anteriorly:

- ✓ **The gallbladder (fundus).**
- ✓ **The right lobe of the liver.**
- ✓ **The transverse colon.**
- ✓ **The coils of small intestine.**



- Posteriorly:

- ✓ **Hilum of the right kidney.**
- ✓ **The right ureter.**

- Medially:

- ✓ **Head of the pancreas.**
- ✓ **Bile and pancreatic ducts.**

Be like Mourinho, don't feel the pressure.

- Laterally:

- ✓ **Right colic flexure.**
- ✓ **Ascending colon.**
- ✓ **Right lobe of the liver.**

3. 3rd Part of the Duodenum (horizontal part)

- **4 inches long.**
- **Runs horizontally to the left, in front of the vertebral column.**
- **On the subcostal plane** (L3).
- **Under the lower margin of the head of pancreas.**
- **Above the coils of the jejunum.**

x Relations of the third part:

- Anteriorly:

- ✓ **The root of the mesentery of the small intestine** (obliquely).
- ✓ **The superior mesenteric vessels contained within the mesentery.**
- ✓ **Coils of the jejunum.**

- Posteriorly:

- ✓ **The right ureter.**
- ✓ **The right psoas muscle.**
- ✓ **The inferior vena cava.**
- ✓ **The aorta.**

- Superiorly: The head of pancreas - Inferiorly: Coils of jejunum

4. 4th Part of the Duodenum (the last inch)

- **1 inch long,** Intraperitoneal.
- **Runs upward to the left.**
- **Ends in the duodejejunal junction at the level of the 2nd lumbar vertebrae 1 inch to the left.**
- **The junction (flexure) is held in position by the ligament of Treitz, which is attached to the right crus of the diaphragm (duodenal recess).**

x Relations of the fourth part:

- Anteriorly:

✓ **The beginning of the root of the mesentery.**

✓ **Coils of the jejunm.**

- Posteriorly:

✓ **Left psoas major muscle.**

✓ **The sympathetic chain on the left margin of the aorta.**

- Superiorly: Uncinate process of the pancreas.

❖ **Blood supply of the duodenum:**

☼ ***Arteries:***

1. The upper half (1st part + upper half of the 2nd part) follows the foregut and is supplied by the superior pancreaticoduodenal artery, a branch of the gastroduodenal artery (from hepatic from celiac trunk).

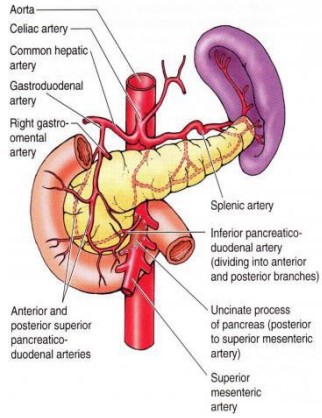
2. The lower half (lower half of the 2nd part + 3rd + 4th part) follows the midgut and is supplied by the inferior pancreaticoduodenal artery, a branch of the superior mesenteric artery

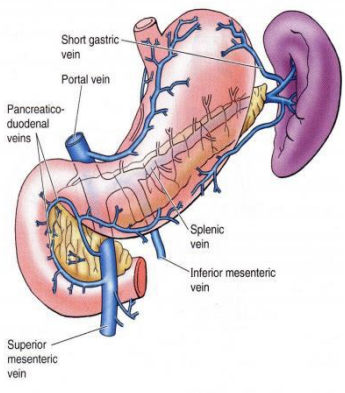
➢ The upper are lower halves are separated by the major duodenal papilla and sphincter of Oddi or common bile duct.

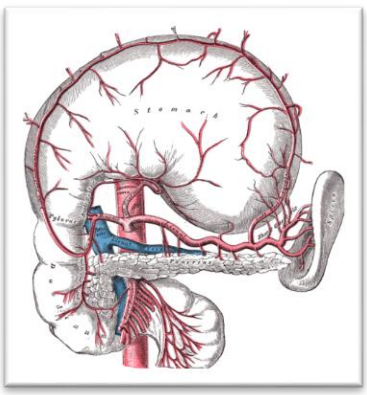
☼ ***Veins:***

- **The superior pancreaticoduodenal vein drains into the portal vein.**
- **The inferior vein joins the superior mesenteric vein.**

- The final destination of venous drainage goes to the portal vein to the liver.







❖ Lymphatic drainage:

➢ **The lymph vessels follow the arteries:**

- **Drainage upward → via pancreaticoduodenal nodes → gastroduodenal nodes → the celiac nodes.**
- **Drainage downwards → via pancreaticoduodenal nodes → the superior mesenteric nodes around the origin of the superior mesenteric artery** (on the anterior surface of the abdominal aorta).

❖ Nerve supply:

- **Sympathetic nerves** from celiac ganglia and superior mesenteric ganglia (gives the sphincter).
- **Parasympathetic nerves** from vagus nerve (gives gland and smooth muscles)

Together they form:

1- The celiac plexus

2- Superior mesenteric plexus.

- Both are distributed with the branches of the arteries to organs.

V1