

Anatomy of the Gastrointestinal Tract

Done by Joud Al zubaidi

هاد الملف تفريغ لكل
كلام الدكتور محتسب
بالمحاضرة سواء من
السايدات أو الكلام
الخارجي و الصور
يلي بيشرح عليها . ان
شاء الله شامل كل
شي ..
في صور إضافية من
كتاب

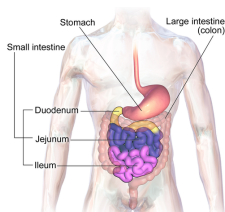
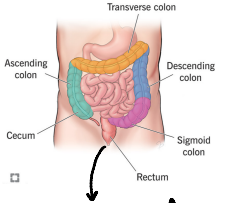
Netters Atlas

ادعولي



Lecture (4)

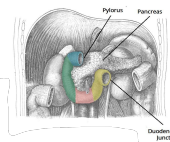
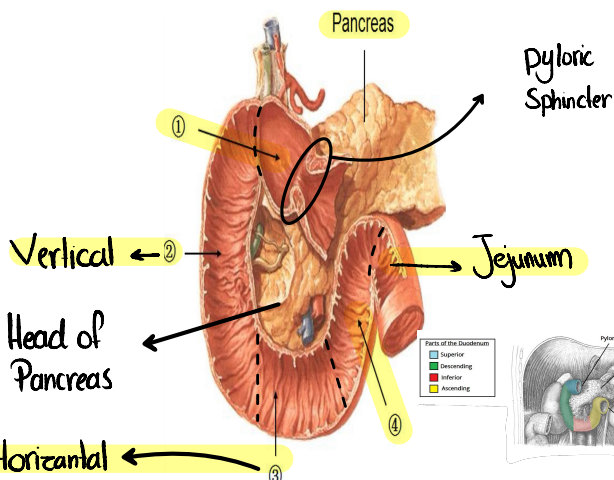
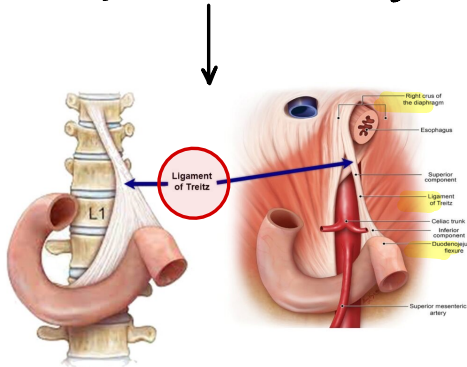
The Small intestine

	parts	Length	Diameter	function	Location
Small intestine		6 m	less than the large intestine	Complete Digestion and Absorption	Central in the Umbilical Region, Surrounded by the large intestine.
large intestine	 upper 1/2 of anal Canal	2.5 m Some books (1.5-2.5) there is Some Variation	larger than the Small intestine	Absorption of water. formation of feces.	peripheral in the Abdominal Cavity.

Duodenum

The first part of the Small intestine. Start from the **Pyloric Sphincter** after the Stomach and end in the **duodenojejunal junction** at the level of 2nd Lumbar Vertebra. 1 inch to the left → حد الكلى بيمين البطن - Ligament Called:

Ligament of Treitz → it's important for the fixation of the junction, it's attached to the Right Crus of Diaphragm.



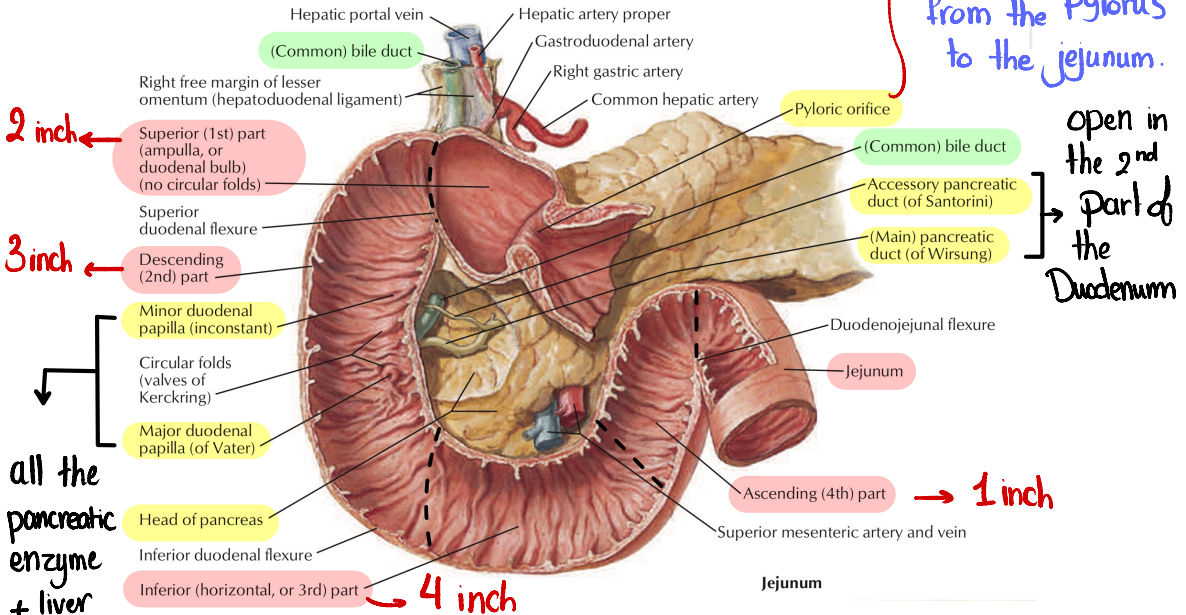
* The Duodenum is **C-shaped** → about **10 inch** in length

* The Concavity is directed to the left and backward.

→ it Contain: **'Head of pancreas** (embedded in the Concavity of the Duodenum)

2. The opening of the **Common bile duct + Pancreatic duct**

→ The Duodenum extend from the Pylorus to the jejunum.



Secretion + the Gall bladder Secretion → go to the 2nd part to **Complete digestion** Specially to the Fat.

This is very important why? Sometime (A **Cancer** in the head of pancreas) may accrue, **Cancer = Swelling** → Compress on the **Common bile duct** lead to: **Obstructive Jaundice**, also will compress on the **Pancreatic duct** lead to: **pancreatitis + Obstruction** to the Pancreatic duct

* The Duodenum is **Retroperitoneal** organ except the first and last inch ..

→ lies on the posterior abdominal wall and the peritoneum is just **Anterior** to it

The **parietal peritoneum** is like a Sac that Surround the Abdominal Cavity.

Why the first and the last inch are not **Retroperitoneal** ?



because it attached to the lesser Omentum above (Upper border) and the greater Omentum below (lower border) the lesser Sac posterior to it.

because it Continue as jejunum which is **intrapertoneal** Surrounded by the Mesentery 2 layers of Peritoneum

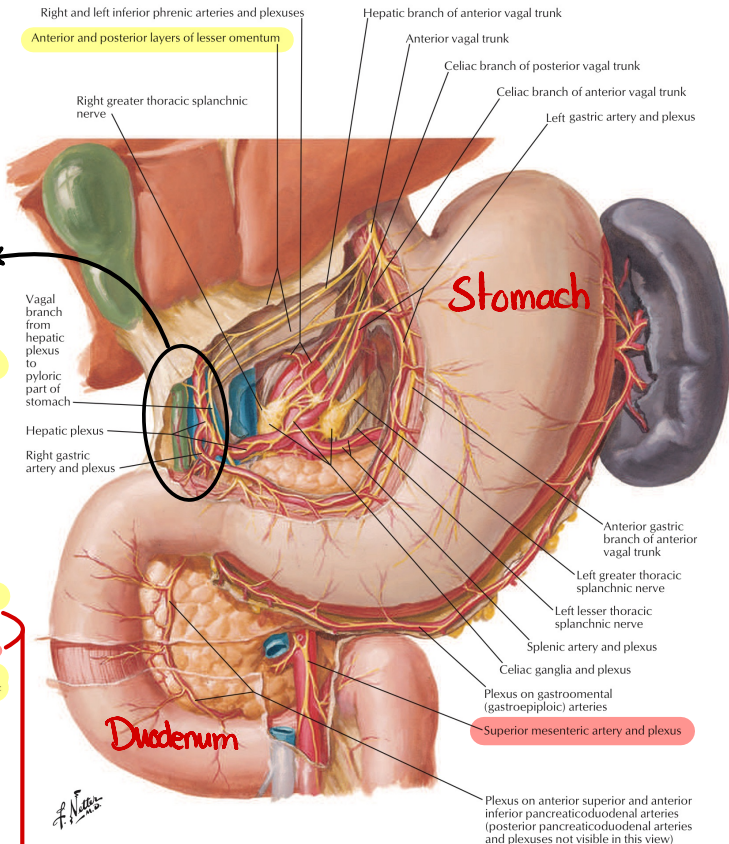
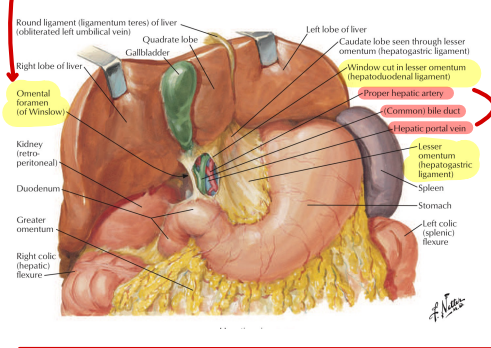
Due to that → it's Surgeries are Very Difficult
لأنك بكل بساطة تنخل على postero wall Peritoneum خلفه

what does that mean ?

the 1st inch is Surrounded by peritoneum.

Free edge of lesser Omentum what we have beneath it ?

Opening Called : **epiploic opening** (foramen of Winslow) لون بويي ? for the lesser Sac behind the Stomach.

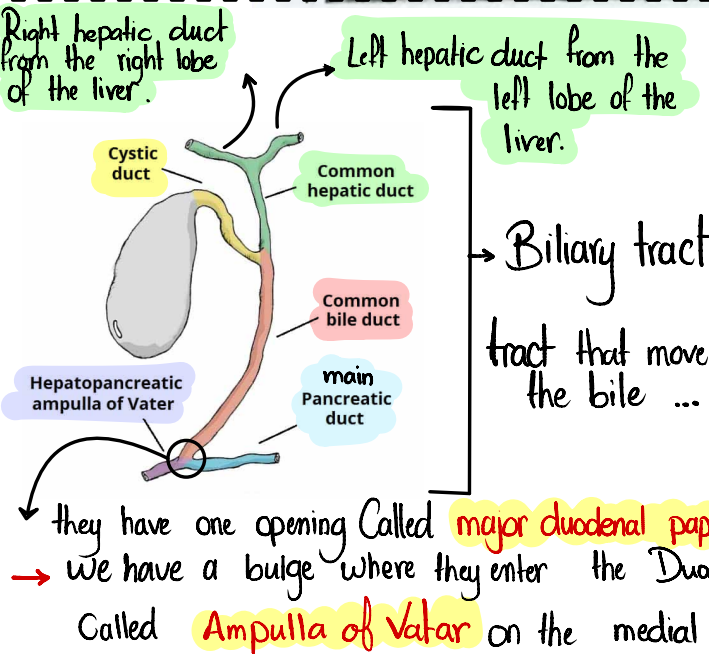
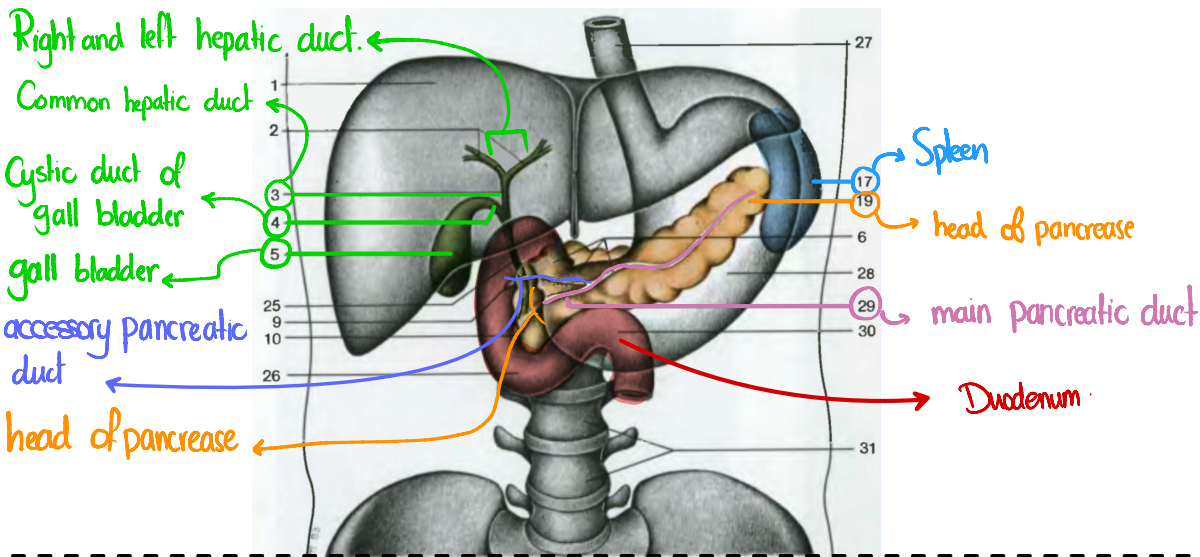
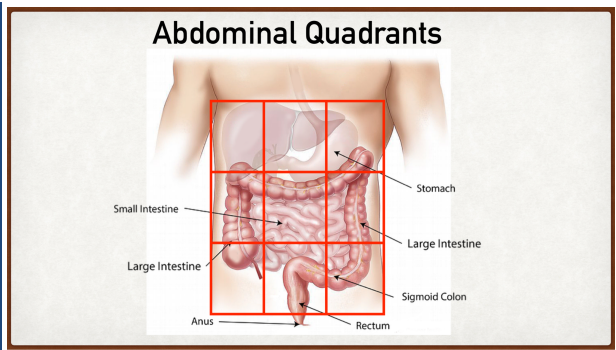


these Structures that are Located in the free edge pass behind the 1st part of Duodenum to Open in the 2nd part like the Common bile duct ..

The Superior mesenteric artery and Vein Crossing in front of the 3rd part of Duodenum, Originate from the abdominal Aorta behind the body of pancreas

Site of duodenum

- The duodenum is situated in the **epigastric and umbilical regions**
- for purposes of description, is divided into four parts

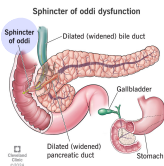


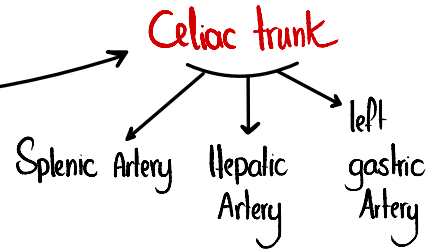
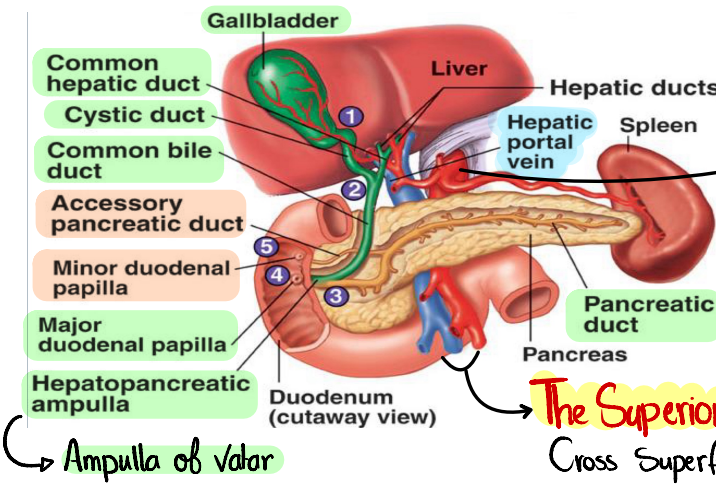
We have a Sphincter Called **Sphincter of Oddi**

↳ Smooth muscle that surround the main duct.

↳ it's always **Contracted** all the Secretion that Come from the liver go back to the gall bladder **why?**

. **Concentration** ← **زيادة** when we have digestion a **تأخير** Stimulation Come and release **Concentrated bile**.





The Superior mesenteric artery and Vein
Cross Superficial to the Duodenum

1st part of the Duodenum

- The first part is 2 inches long.
- It begins from the pyloroduodenal junction
- At the level of the transpyloric line
- Runs upward and backward at the level of the 1st lumbar vertebra 1 inch to the right.

The first part is a Common Site of **peptic Ulcer** [Duodenal Ulcer].

if it perforate it will **penetrate** the posterior structures : **Gastroduodenal Artery** branch of hepatic Artery that will Cause **Bleeding**.

Relations of 1st part of doudenum

Ant.

- The liver (quadratus lobe)
- gall bladder

Sup.

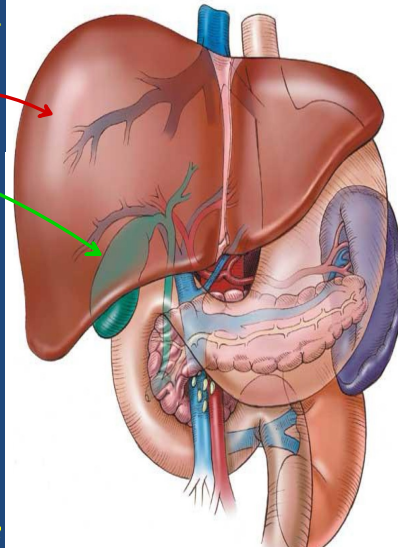
- the epiploic foramen ^(foramen of Winslow)

post.

- The lesser sac
- gastroduodenal Artery
- the Bile duct → Perforate the head of Pancrease
- portal vein
- I.V.C

Inf.

- The head of the pancreas.



سؤال كير يجي ت

2nd part of the Duodenum

Vertical part

Start below the right lobe of the liver to the Disk between (L3 - L4) ..

- It is 3" (3 inch) long
- runs downward vertically on the right side
- In front of the Rt. kidney
- next to the 3rd and 4th lumbar vertebrae.

- halfway of 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.

Ant.

- The gallbladder (fundus)
- Right lobe of the liver
- Transverse colon
- coiled of small intestine.

Post.

↪ ileum

- Hilum of Rt. Kidney
- Rt. Ureter.

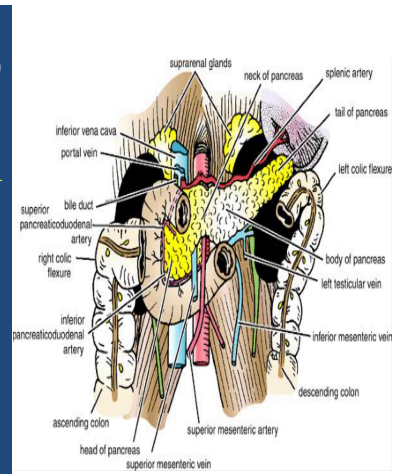
Lateral.

↪ hepatic

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

Medial.

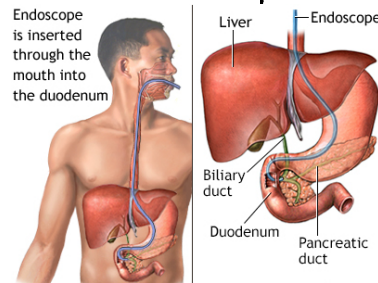
- Head of pancreas
- Bile and pancreatic ducts.



Before 20 years when we have a patient with **Colecystitis**. **Stone in the Gall bladder** → we perform an open Surgery to remove the gall bladder, or if there is stone in the Common bile duct that lead to **Obstruction** → Prevent the passage of Bile = **Obstructive Jaundice** → الرض بعد أسبوعين أو أيام بالسعال = that have a lot of Complication **Bleeding**

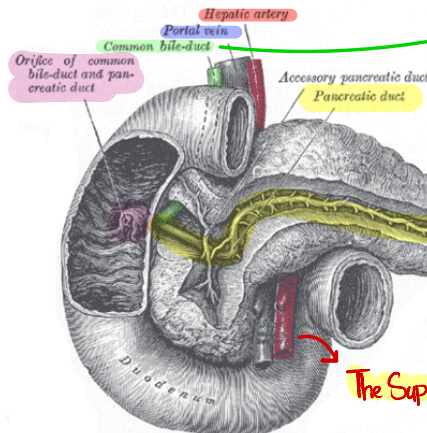
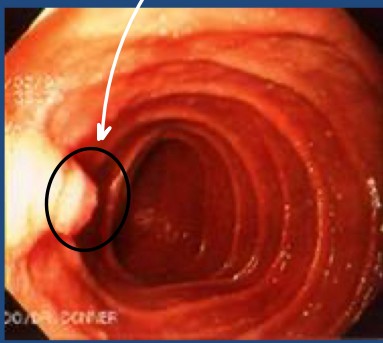
A New Technique now is Used **ERCP** → **Endoscopy Retrograde CholangioPancreat** → enter from the Oral Cavity → to the Stomach once it gets into the Duodenum it enter through the **major duodenal papilla**. Cut the Sphincter to enter either to the **Common bile duct OR Pancreatic duct** → to remove the **Obstruction** through a Small basket. put it in the Duodenum and passes through the Stool الرض خلال 6 ساعات بروج على سبيل

Same for **Obstruction of pancreatic duct** Due to the Dehydration and the Stasis of Secretion Lead to **pancreatitis** → we will inject a Saline to release the Obstruction.



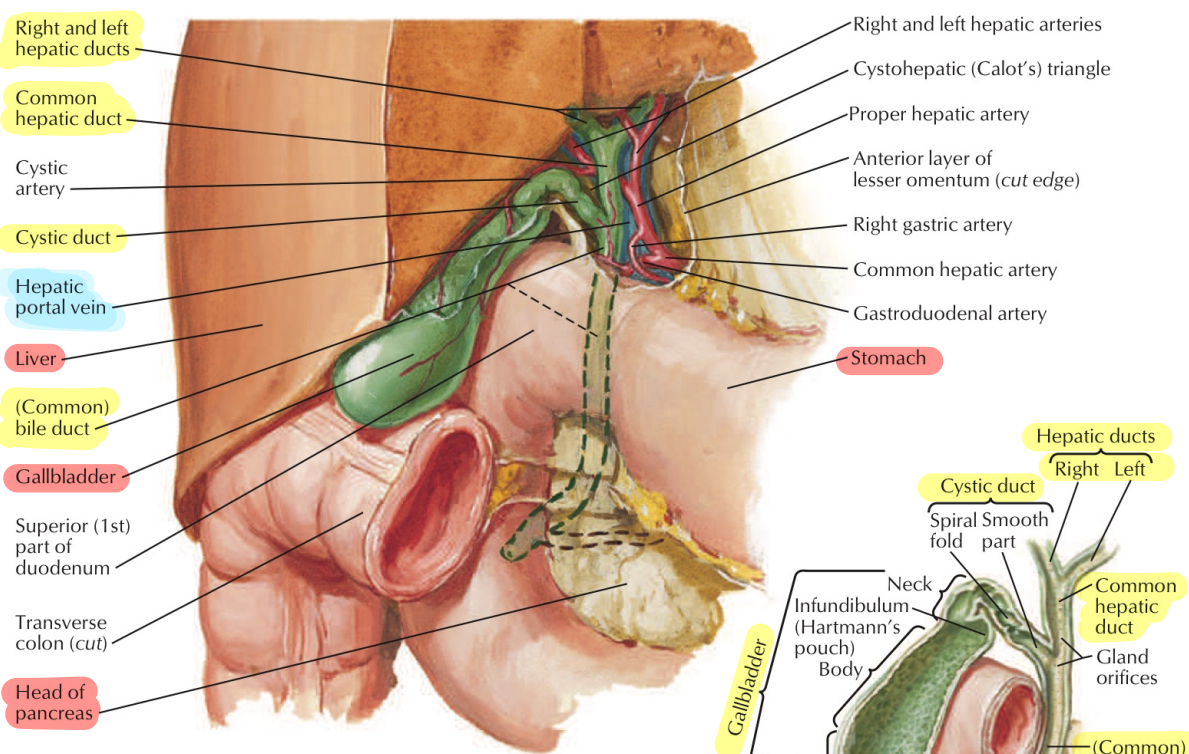
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Hepaticopancreatic ampulla (Ampulla of Vater)

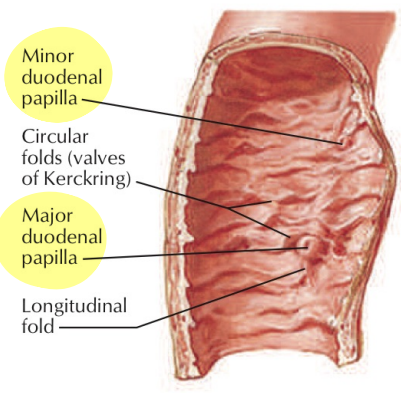


The Common bile duct passes behind the 1st part of duodenum then pierce the head of pancreas and open in the 2nd Part..

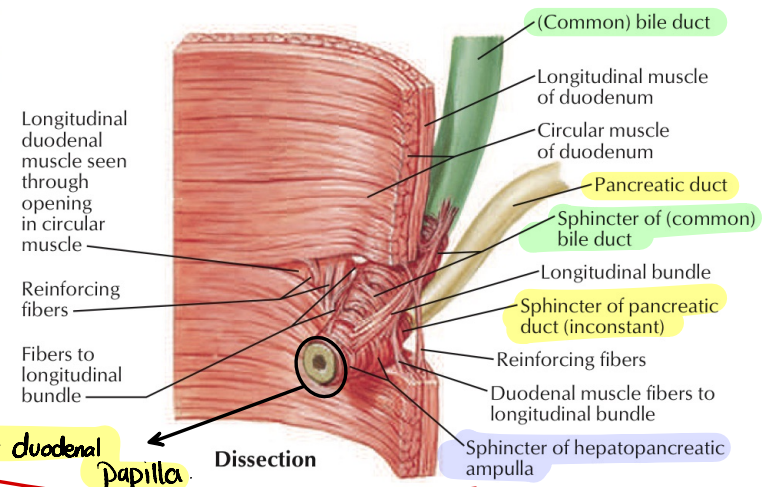
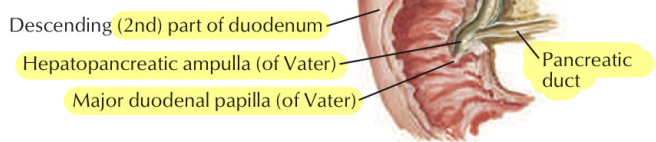
The Superior mesenteric artery and Vein



F. Netter M.D.



Interior of descending (2nd) part of duodenum



Sphincter of oddi → **major duodenal papilla**

3rd part of the Duodenum → Horizontally



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

Anteriorly:

- The root of the mesentery of the small intestine
- the superior mesenteric vessels contained within the ^{Supply 2} mesentery

Posteriorly:

- The right ureter
- the right psoas muscle
- the inferior vena cava
- the aorta

left Side ← coils of jejunum -

Posteriorly:

The right ureter
the right psoas muscle
the inferior vena cava
the aorta

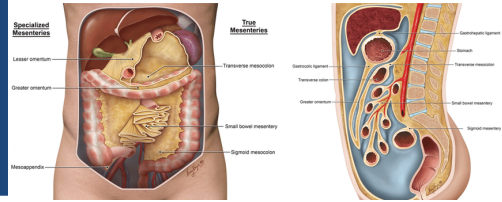
Superiorly:

The head of the pancreas

Inferiorly:

Coils of jejunum

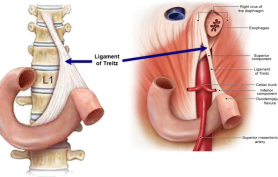
2 layers of peritoneum attached to the posterior abdominal wall. the free edge of it contain the small intestine (jejunum + ileum). Start at the level of L2, 1 inch to the left, end on the right side in front of Sacroiliac joint. (passes Obliquely) * the root of mesentery is 6 inch * the free edge 6m in the Short → long Abdominal Cavity.



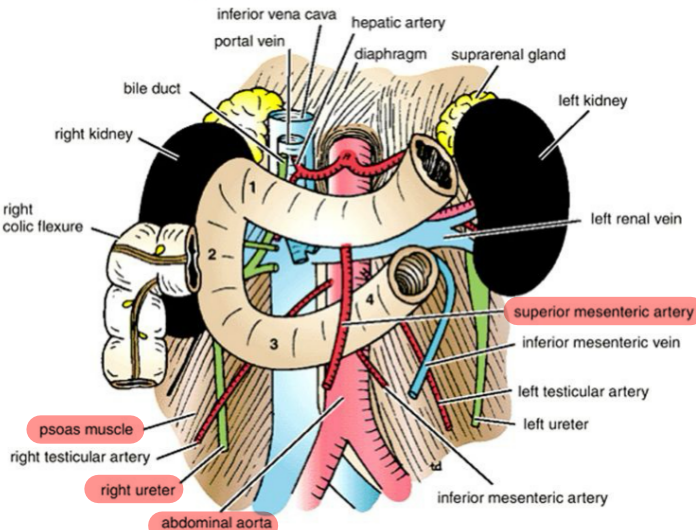
located in the posterior abdominal wall and cross the structure that lie on it like 8

4th part of the Duodenum

أهمية jejunum and ileum
إنهم يتحركون



- 1" long
- Runs upward to the left
- End in the duodejejunal junction at the level of the 2nd lumbar vertebrae 1" 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).



Ant.

- The beginning of the root of the mesentery
- coils of the jejunum.

Post.

- Lt. psoas major
- the sympathetic chain left margin of the aorta.

Sup. → excess of the head of pancreas

- Uncinate process of the pancreas.

Blood supply of duodenum

• Arteries

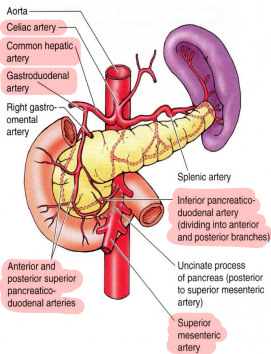
1- upper half (1st part + upper 1/2 of 2nd part) is supplied by the **superior pancreaticoduodenal artery**, a branch of the gastroduodenal artery.

2- The lower half (lower 1/2 of 2nd part + 3rd + 4th part) is supplied by the **inferior pancreaticoduodenal artery**, a branch of the superior mesenteric artery

the Duodenum is divided into 2 parts → Upper [Forgut] . lower [Midgut] .

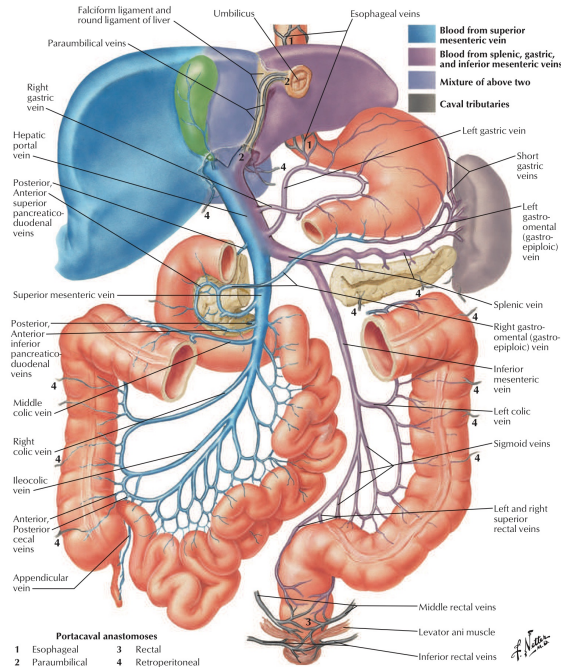
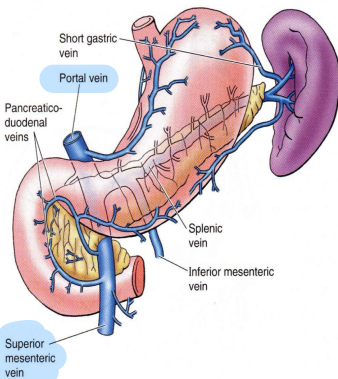
هَيْبُ سَوِيلِي بِيْعَسْمَه ؟
The major duodenal papilla

Superior pancreaticoduodenal Branch from The Hepatic which is a Branch from The Celiac Trunk .



Veins of duodenum

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



Lymphatic drainage

- The lymph vessels follow the arteries
- **drain upward** → via pancreaticoduodenal nodes → the gastroduodenal nodes → the celiac nodes
- **drain downward** → via pancreaticoduodenal nodes → the superior mesenteric nodes around the origin of the superior mesenteric artery.

Nerve Supply to the Duodenum

Sympathetic

↓
Origin: The Sympathetic Chain in the Chest ^{سلسلة}
Preganglionic fibers after it pierce the Diaphragm go to 8
1. The Celiac ganglia around the Celiac Trunk and Synapse on it. Supply the Foregut. ^{أدوية}
2. Superior mesenteric ganglia around the Superior mesenteric and Synapse on it. Supply the Midgut. ^{أدوية}

they both reach the organ through the blood vessels around it there is plexus of nerves.

Called: Thoracic Sympathetic Chain from (T6-9)



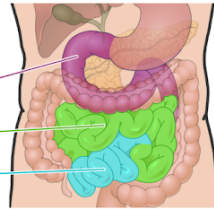
Postganglionic fiber with the Blood Vessels.

parasympathetic

↓ ^{from the medulla Oblongata in the brain}
* Origin: The Vagus ^{عصب} nerve Synapse on the Myenteric ganglia on the wall of the Organ.
2. Messengers plexus on the Submucosa.
the postganglionic is Very Short go to the Wall of organ.

The small intestine has three areas:

- Duodenum
- Jejunum
- Ileum



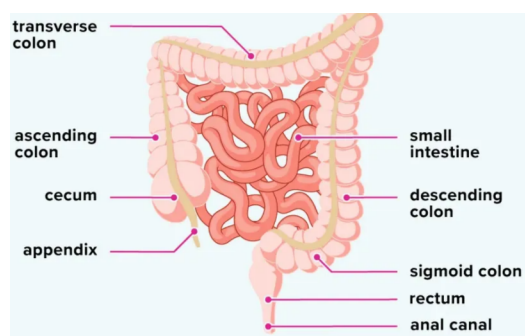
Jejunum and ileum 8

→ Both are **intrapertoneal** Organs why? because they are located in the **Mesentery** also they are **Mobile**

- The jejunum and ileum measure about 20 ft (6 m) long
- the upper two fifths is the jejunum & the lower 3/5 is the ileum
- Each has distinctive features
- there is a gradual change from one to the other
- The jejunum begins at the **duodenojejunal** flexure
- the ileum ends at the **ileocecal junction** in the **Cecum**
- The coils of jejunum and ileum are freely **mobile** and are attached to the posterior abdominal wall by a fan-shaped fold of peritoneum known as the **mesentery** of the small intestine

Ileocecal Junction → located on the right iliac fossa.
?? **Valve** ^{صمام} ^{طب}

A physiological Valve not Anatomical (no thickening of Smooth muscle), there is fold of mucosa, with the pressure (tension) of Cecum this opening will close → So all the material that enter the Cecum from the ileum it's forbidden to go back ... So it's not a **Sphincter**.



The large intestine located in the **edge of Abdominal Cavity**.

Jejunum and ileum Located in the **Umbilical Region on the middle** Surrounded by the large intestine.

Root of Mesentery attached to the posterior abdominal Wall, it's length 6 inch Originate from the left Side at the level of **L6**. end on the right Side in front of **Right Sacroiliac joint**.

2 layers of peritoneum attach to the Abdominal Cavity

سوءجوانیا ؟

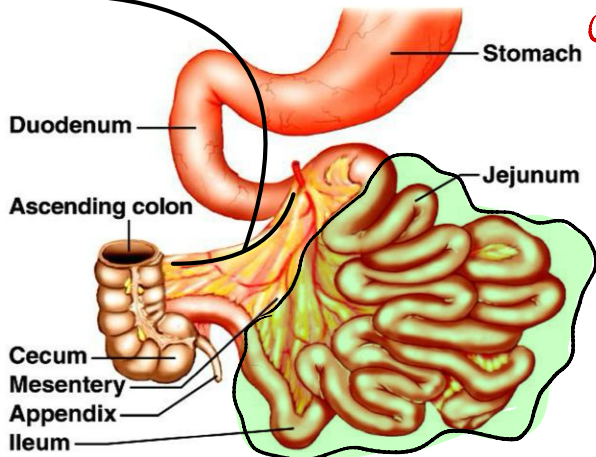
① Arteries from Superior mesenteric Vessels .

② lymph nodes .

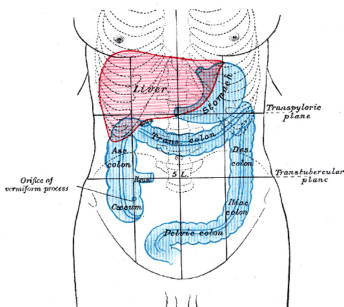
③ plexus of nerves .

Sympathetic
parasympathetic

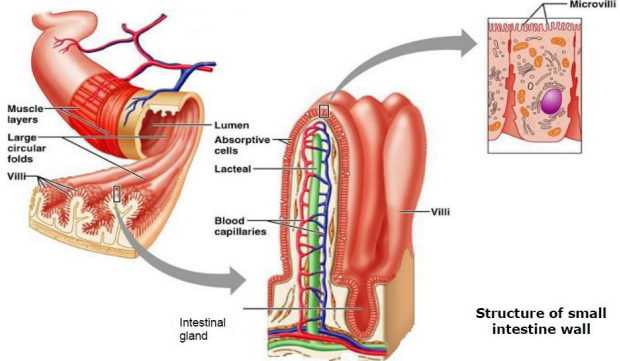
④ Fats .



Free edge of Mesentery Contain the jejunum and ileum **6m** in length



Histology of the Small intestine :

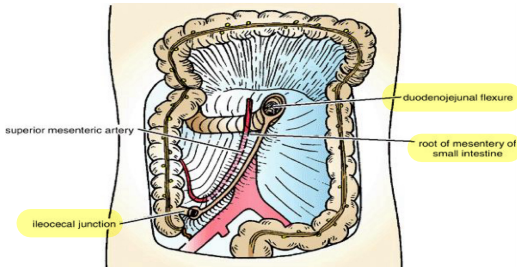


mesentery of the small intestine

- fan-shaped fold of peritoneum
- The long free edge of the fold encloses the mobile intestine.
- The short root of the fold is continuous with the parietal peritoneum on the posterior abdominal wall
- Along a line that extends downward and to the right from the left side of the second lumbar vertebra to the region of the right sacroiliac joint

Contents of the mesentery

- 1- The branches of the superior mesenteric artery and vein
- 2- Lymphatic vessels & lymphatic nodes
- 3- nerves



Difference between Jejunum & Ileum		
	jejunum	Ileum
length	Proximal 2/5	Distal 3/5
site	in the <u>upper part</u> of the peritoneal cavity below the left side of the transverse mesocolon	in the <u>lower part</u> of the cavity and in the pelvis
wall	thicker wall & redder	Thinner & less redder
Arcades in mesentery	- simple, only one or two arcades - with long infrequent branches - Long vasa recta	numerous short terminal vessels arise from a series of three or four or even more Arcade - Short vasa recta
Fat in mesentery	- the fat is deposited near the root - it is scanty near the intestinal wall - Less in amount → appear window wider	- the fat is deposited throughout mesentery - Big amount - No window appear
Diameter		smaller
villi	numerous	Less numerous
Plicae circularis (the permanent enfolding of the mucous membrane & submucosa)	They are: 1- larger 2- more numerous 3- closely set	they are: 1- smaller 2- more widely separated 3- in the lower part they are absent
Folding of the Submucosa through the mucosa		
Remember: the wage in the Stomach.		
Lymphatic follicles	No or few	Aggregations of lymphoid tissue (Peyer's patches) are present in the mucous membrane

What is the Arcades ?

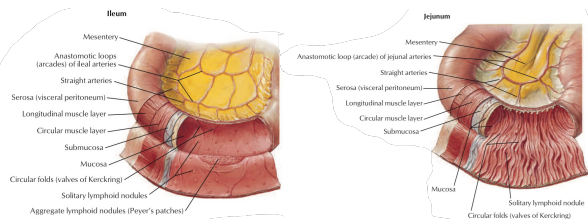
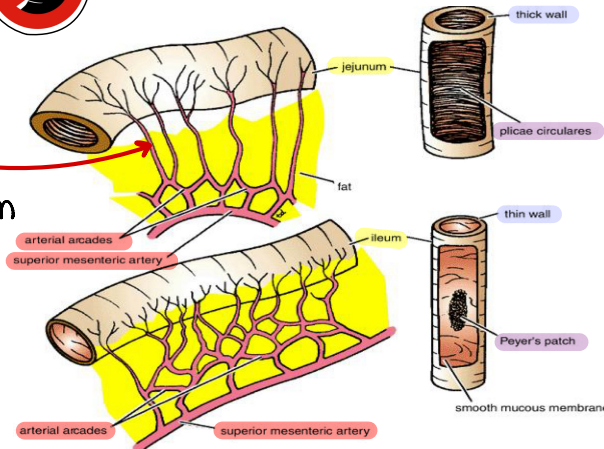
Branches from Superior Mesenteric Artery

Connection between the branches

نقل سبائيك

The end is always **Vasa Recta**.

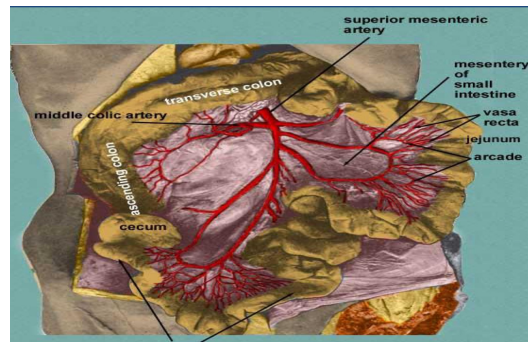
* the Artery go back to the wall of Organ and give direct Blood Supply.



Blood supply of Jejunum & Ileum

Arteries:

- The arterial supply is from branches of **the superior mesenteric artery**.
- The intestinal branches arise from **the left side** of the artery and run in the mesentery to reach the gut.
- They anastomosis with one another to form a series of **arcades**.
- The lowest part of the ileum is also supplied by the **ileocolic artery**.

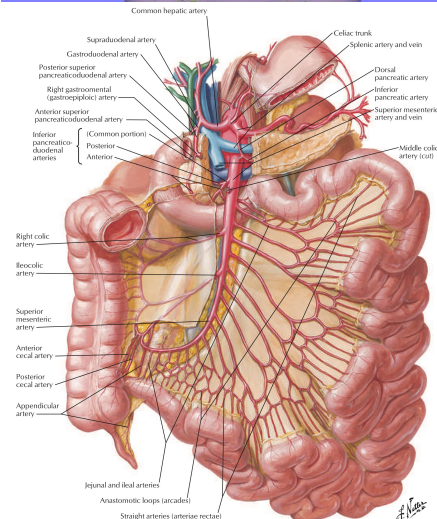
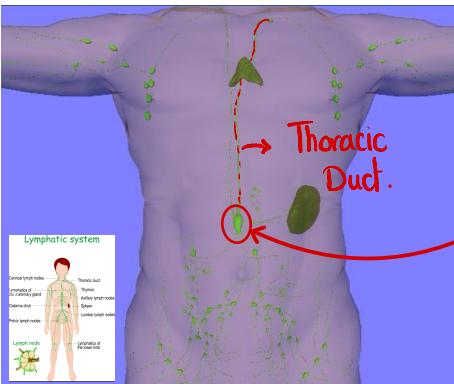


Veins:

- The veins correspond to the branches of the superior mesenteric artery **Tributaries**.
- Drain into the superior mesenteric vein.**

Lymphatic Drainage of jejunum & ileum

- The lymph vessels pass through many intermediate mesenteric nodes
- Finally reach **the superior mesenteric nodes** → around the origin of the superior mesenteric artery.



Lymphatic from the lower limb + pelvis + Abdomen Drain in the **Cisterna chyli** [A lymphatic Sac present in the Aortic orifice of Diaphragm, on the Right Side of Abdominal Aorta, **The thoracic duct** Start from it (it's Consider the main Lymphatic duct on the left Side, it end at the beginning of left Brachiocephalic Vein

We also have on the Right Side of Chest **Right lymphatic duct**

Nerve Supply to the Duodenum

اعلا دة

Sympathetic

parasympathetic

they both reach the organ through the blood vessels around it there is plexus of nerves.

Origin: The Sympathetic Chain in the Chest ^{سلسلة}

Origin: The Vagus ^{from the medulla oblongata in the brain.} nerve

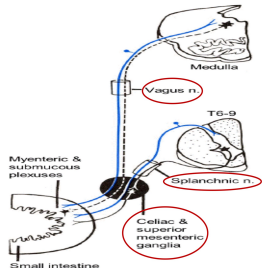
Preganglionic fibers after it pierce the Diaphragm go to 8

Called: Thoracic Sympathetic Chain from (T6-9)

* Origin: The Vagus nerve Synapse on the Myenteric ganglia on the wall of the Organ

1. the Celiac ganglia around the Celiac Trunk and Synapse on it. Supply the Foregut. ^{أد بطة}

2. Superior mesenteric ganglia Around the Superior mesenteric and Synapse on it. Supply the Midgut.



the postganglionic is very short go to the wall of organ.

Control:

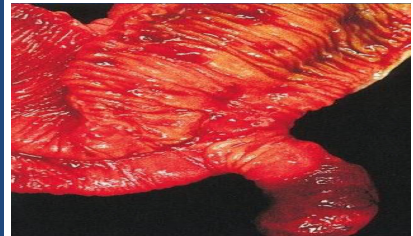
- Control:
1. Vasoconstrictor to the Blood Vessels
 2. No effect on the Secretion

Postganglionic fiber with the Blood Vessels.

1. Secretomotor of Gland
2. Peristaltic movement to the Smooth muscle

Meckel's Diverticulum:

- a congenital anomaly of the [ileum]
- Present in 2% of people
- 2 feet from ileocecal junction
- 2 inch long
- contains gastric or pancreatic tissue
- Remains of vitelline duct of embryo



[In-Direct]

between the midgut and the Umbilicus ⇒ Delivery Incomplete Obliteration will lead into Meckels Diverticulum

Appendicitis ^{كتر سبب}

The End (R)

1. infection
2. Ulcer
3. perforation