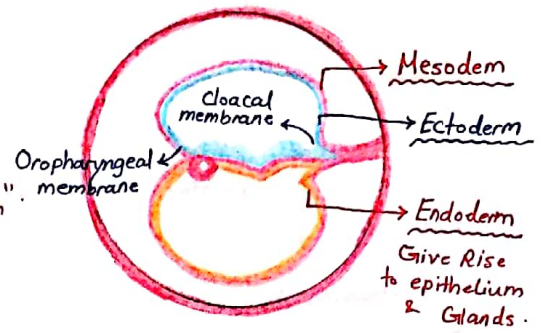


Embryology of Gastrointestinal Tract

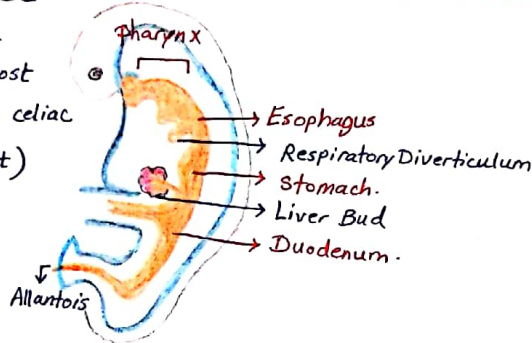
- At the beginning of fourth week the Primordial gut closed at its Cranial end with Oropharyngeal membrane & caudal end with cloacal membrane.
- The Gut is divided into 3 parts :- Foregut, Midgut, Hindgut.



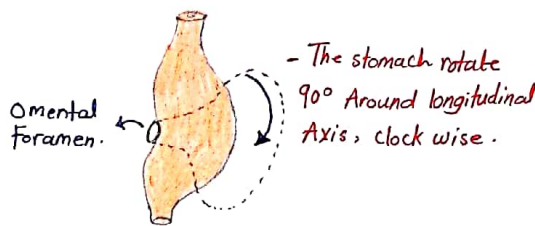
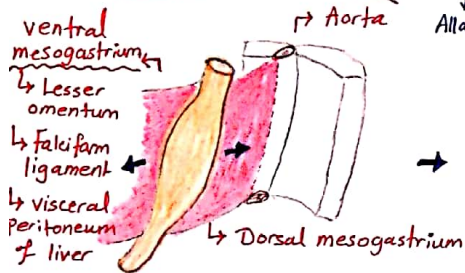
1) Development of Foregut :-

"Extends from esophagus to 2nd part of duodenum"

- All of the derivatives except Pharynx, respiratory tract, most of the Esophagus supplied by celiac Trunk. (The Artery of foregut)

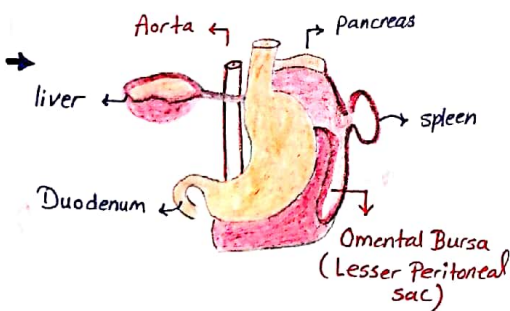


1) Development of stomach :-



- During 4th week, slight dilation of foregut occur → fusiform enlargement oriented in median plane → stomach enlarges ventrodorsally

- Dorsal Border grows more quickly than ventral Border resulting in Greater Curvature of the stomach.



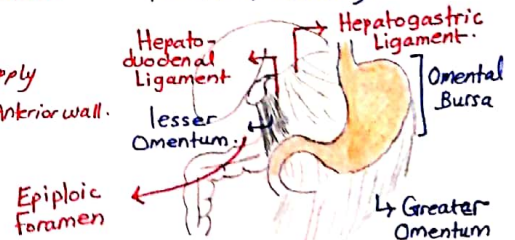
- As a result of the rotation:

- Lesser curvature become to the right & greater curvature to the left.
- Cranial end move to the left & caudal end move superior & to the right
- Explains why right vagus nerve supply posterior wall & left vagus supply Anterior wall.

Omental Bursa

- A potential space behind the stomach, formed by dorsal mesogastrium as the stomach rotates.

- The omental Bursa communicate with Greater peritoneal sac through Omental foramen (epiploic foramen, foramen of Winslow)



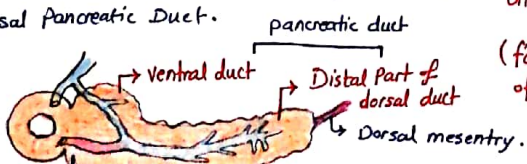
2) Development of duodenum :-

- Early in the fourth week the duodenum develops from the foregut (supplied by celiac trunk) & midgut (supplied by superior mesenteric Artery).

3) Development of Pancreas:

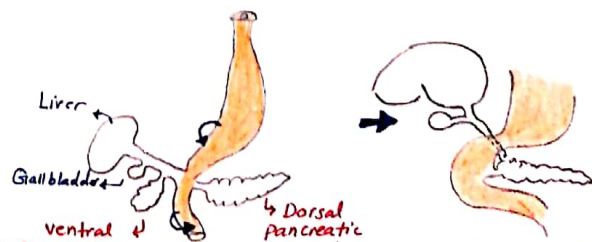
- Develop between layers of mesentery, from dorsal & ventral pancreatic ducts that Arise from caudal foregut.

- As the stomach rotates, ventral Pancreatic bud is carried posteriorly & its duct is fused with Dorsal Pancreatic Duct.



In 9% of cases the proximal Part of dorsal duct Persist as Accessory pancreatic bud & open into minor duodenal papilla

develop near the entry of Bile duct to the duodenum. (forms the head of pancreas) & main Pancreatic duct.



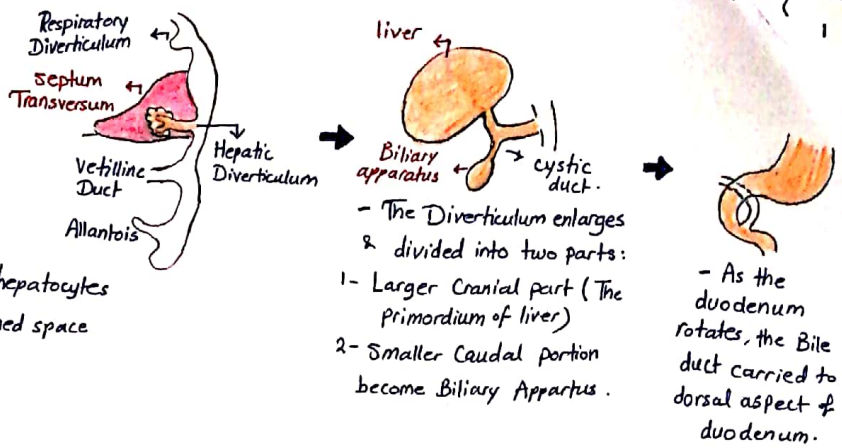
- Duodenal loop rotate to the right & lie retroperitoneally

- C-shaped loop projects ventrally. Lumen initially obliterated then recanalized.

* Insulin secretion begin at 10 weeks.

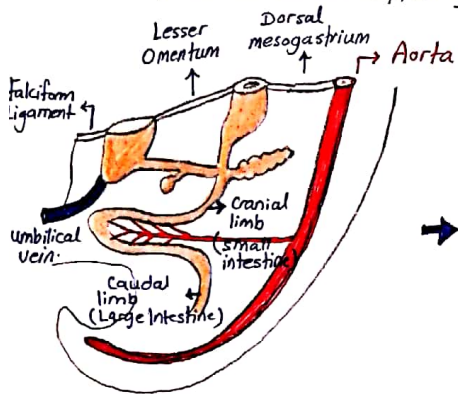
4) Development of liver & Biliary Apparatus:

- Early in 4th week the caudal part of foregut develop ventral outgrowth → hepatic diverticulum
- it extend into septum Transversum (forms the Diaphragm)
- Proliferating endodermal cells → Interlacing cords of hepatocytes
- hepatic cords Anastomose around epithelium-lined space
- Primordia of hepatic sinusoids.
- Hematopoiesis begin in Liver during sixth week.
- Bile formation begin around 12 weeks.
- Falciform Ligament Arise from ventral mesogastrium & attach liver to Anterior Abdominal wall, the umbilical vein pass in the free border of it, on its way from umbilical cord to the liver.

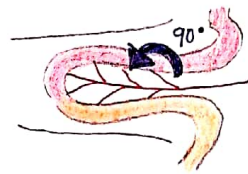


2) Development of Midgut:- "from the duodenum distal to opening of Bile duct to the right 2/3rds of Transverse Colon"

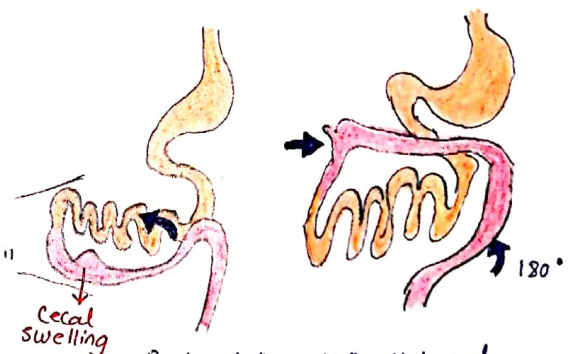
- All of the derivatives supplied by superior mesenteric Artery.



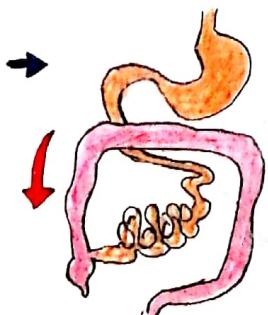
- The midgut elongates to form ventral U-shaped loop that project into umbilical cord. "physiological umbilical herniation" - at 6th week-
- Not enough room in the Abdomen for rapidly growing midgut.



- first 90° rotation of the Herniated loop "Counterclockwise" Around the axis of superior mesenteric Artery.
- Bring the cranial limb (small intestine) to the right & caudal end (Large intestine) to the left.



- During 10th week the Abdominal cavity enlarges & there's reduction of physiological hernia, the small intestine return first and occupy central part of Abdomen, the large intestine undergo further 180° rotation counterclockwise

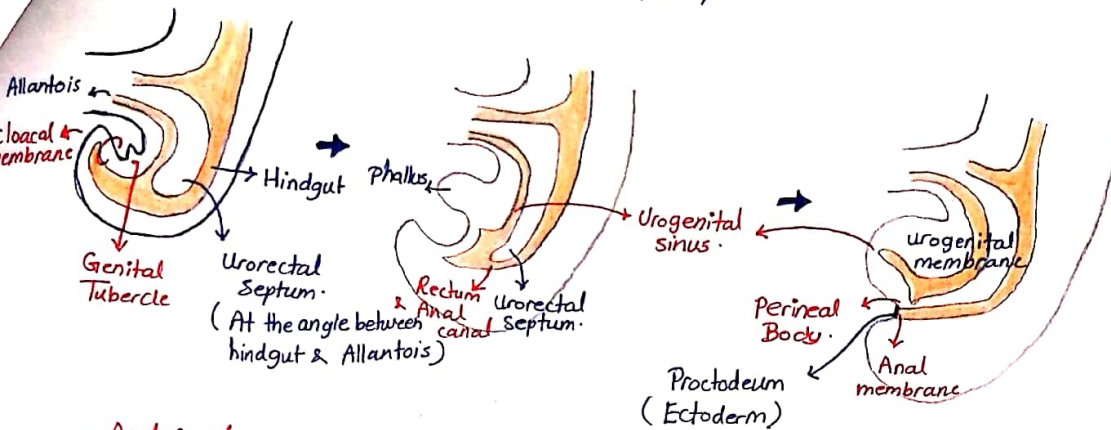


- The cecum & Appendix descend later.
- The unequal growth of walls of cecum result in appendix entering medial side.

Development of Hindgut:

"form distal third of Transverse colon to upper part of Anal canal" + Epithelium of urinary bladder & most of urethra.

- All derivatives supplied by Inferior Mesenteric Artery.



- Perineal Body \Rightarrow a tendinous center of the perineum which is the Area of fusion of urorectal septum with cloacal membrane.

- Anal Canal:

- Superior 2/3 derived from Hindgut
- Inferior 1/3 derived from proctodeum.

Junction of endoderm (from Hindgut) with ectoderm (from Proctodeum) is known as Pectinate line