

* esophageal abnormalities

* atresia OR fistula

* happens in $\frac{1}{3000}$ births \Rightarrow not very common

* fistula \rightarrow a connection between trachea & esophagus

* atresia \rightarrow closed blind end

* in the picture to the right:

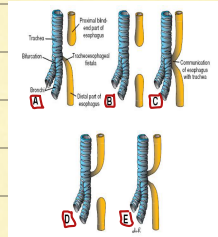
(A): proximal esophageal atresia & distal tracheoesophageal fistula \rightarrow most common type: (90%) of all these cases \rightarrow

(B): double atresia without fistula

(C): like the (H) shape fistula

(D): Distal atresia

(E): Double fistula



\downarrow
Because it's the most common we will focus on it

* Proximal atresia & distal tracheoesophageal fistula

\rightarrow What happens to a baby born with this abnormality?

- amniotic fluid around the baby is increased \rightarrow (يعجز الطبيب البيسي قبل ما يتولد ولاحظ انه كثير كيرة)
(since the proximal part is closed \rightarrow the fluid that enters the esophagus returns back to amniotic sac)

- يمكن البيسي يتولد و اللم يتولد فكل ما يدخل جيبه يصير بظلمة (bc the tract is closed)

- expansion in abdomen: ان فيه

- noise (خبر كيرة) \rightarrow coming from the trachea through the fistula that fills the stomach with air (bc they are connected) \rightarrow inflation + noise (due to air)

- the baby will have infections \rightarrow bc the lung is connected to stomach so materials in the stomach will reach the lung & that causes: acute pneumonia

* This case is accompanied with other abnormalities

\hookrightarrow mostly (in 30%) \rightarrow cardiac anomaly \rightarrow like: - interventricular septal defect

- interatrial septal defect

- fallot's tetralogy

and other abnormalities

* all types of defects need urgent surgeries to correct the anomaly \rightarrow وترجع الأمور طبيعية

* Esophagus \rightarrow at the beginning: it's high up inside the chest (normally)

then \downarrow

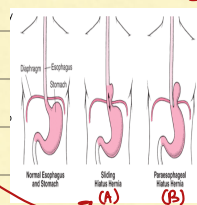
it descends downwards slowly to the abdomen \Rightarrow Why? bc the heart & lungs are enlarged \rightarrow so they exert a pressure

* Esophageal abnormalities:

① Stenosis (تضييق)

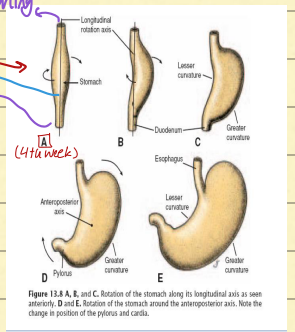
② Congenital hiatal hernia (A)

\hookrightarrow part of the stomach ascends upwards above the diaphragm



* Development of the stomach → the most important → bc duodenum & pancreas developments follow the stomach

* at the beginning: in the 4th week → the stomach is a fusiform dilatation

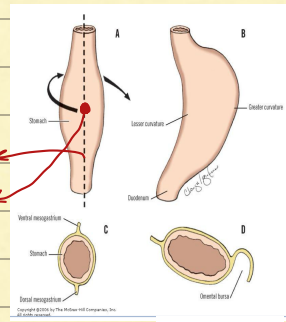


→ after that → changes around the longitudinal axis
 → the left border → forms the anterior surface
 ↳ pulling with it the left vagus (left → anterior) to supply the ant surface
 (rotation 90° clockwise)

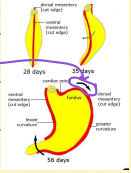
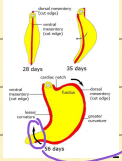
→ the right border → turns to the posterior side
 ↳ so it forms the post. surface
 ↳ & the right vagus becomes post.

* in development → anterior surface: slow in development → just
 ↳ so it forms the lesser curvature of the stomach
 ↳ post. surface: very rapid in development → SSF
 ↳ so it forms the greater curvature of the stomach
 ↳ or the right side previously (posterior & to the left)

* We have antero-posterior line → longitudinal axis
 ↳ the antero-posterior line (line (الخط) الأمامي-الخلفي)

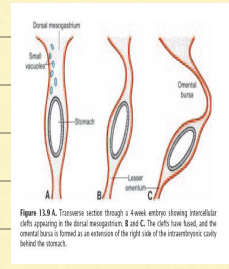


* With the rotation → changes in pyloric sphincter & cardiac sphincter
 ↳ goes downwards to the left
 ↳ upwards and to the right

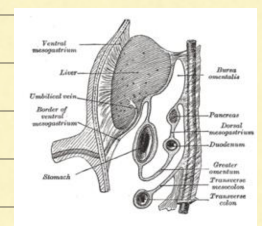
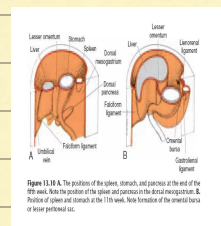


* Now the rotation that happened + these changes → the lesser sac is formed (behind the stomach)
 ↳ = omental bursa (in embryo)
 ↳ lesser sac (الجيوب الخلفي)

* ventral & dorsal mesogastrium → 2 layers of peritoneum
 ↳ ventral surface of the stomach → ant. abd. wall
 ↳ dorsal surface → post. abd. wall
 ↳ omentum mesentery ligament



* On the 5th week of development → spleen is formed
 How is it formed? in the mesodermal proliferation between the 2 leaves of dorsal mesogastrium
 (it's composed of 2 layers → spleen)

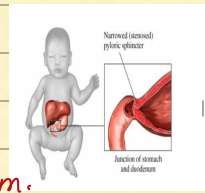


at the end after the spleen is formed → the mesogastrium (especially the dorsal mesogastrium)
 (left kidney) ← spleen (توجد ال spleen مع ال kidney)
 ← leinorenal ligament (رباط الكلى)
 (between the spleen & the stomach) ← Gastro-splenic / splenicogastric / gastroleinal ligament

* Abnormalities in the stomach development

تتبعي: تتكون فيها ال spleen
 ال ligaments ال
 ال ماسية بال spleen

* Pyloric stenosis:

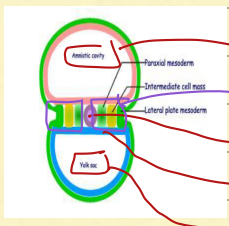


in the pylorus we have a sphincter formed by the excessive thickening of inner circular smooth m.
 زيادة عن الطبيعة (hypertrophy)
 (no drainage) (مما يترتب عن ذلك انسداد في مخرج)

So: the feature for those babies: projectile vomiting (forceful vomiting)
 (تطرح ال vomiting بقوة ويكون مسرع)

Easy to be treated

سبعولوا ال sphincter و حيزولو ال Stenosis
 عكس بالطول بدل بالعرض فيفتح و يرجع ال Stenosis



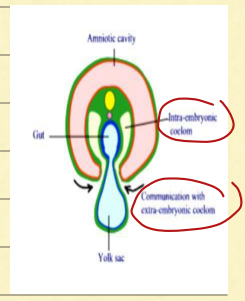
amniotic cavity → paraxial mesoderm
 mesoderm: 3 → intermediate mesoderm
 endoderm → lateral mesoderm →
 ectoderm →
 Yolk sac

لأنه bc it forms somatic + splanchnic

ال ال يعين في ال abd. cavity
 ال ال ال parietal peritoneum

* Parietal cavity is formed from the intra-embryonic coelom

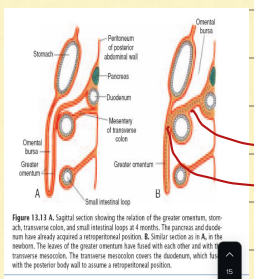
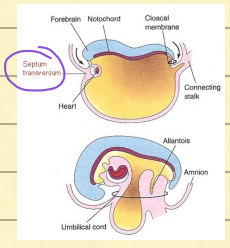
connected to the extra-embryonic coelom
 بالساية يتكون



then → closure مبرعني
 abd. cavity ال يتكون ال

ال ال ال مبرعني connection

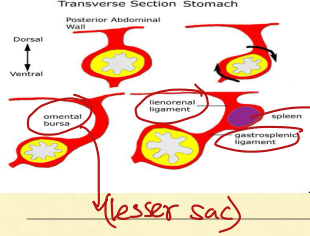
development of septum transversum نتيجة
 ال ال يتكون ال parietal peritoneum



the connection of the stomach to post. abd. wall is by: dorsal mesogastrium
 to ant. abd. wall is by: ventral mesogastrium/mesentery

* Dorsal mesogastrium ال ال ال
 Greater omentum + leinorenal + gastro-splenic ligaments
 + mesocolon of transverse colon + mesocolon to sigmoid colon

* Duodenum → retroperitoneal ال ال ال
 posteriorly: there's disappearance of peritoneum
 except first & last inches



spleen

(lesser sac)

- * Ventral mesentery → comes from ant. wall of the stomach → ant. abd. wall & diaphragm
 - : (مذبة) → lesser omentum + coronary ligament + falciform ligament + ligamentum teres
 - triangular ligament: \leftarrow \leftarrow \leftarrow (obliterated umbilical vein)
- * falciform ligament : extending from the liver to ventral body wall (ant. abd. wall)
- * Greater omentum → double layers : \leftarrow \leftarrow
 - : \leftarrow \leftarrow → transverse colon (which has a mesocolon that ends in ant border of pancreas)

Embryo 2 part 2 :-

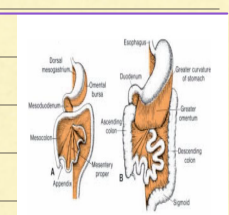


Figure 13.12 A. Derivatives of the dorsal mesentery at the end of the third month. The dorsal mesogastrium hangs out on the left side of the stomach, where it forms part of the lesser omentum. The greater omentum hangs down from the greater curvature of the stomach in front of the transverse colon.

- * Greater omentum → attached to the greater curvature of the stomach
 - 2 layers of peritoneum that descend downward in abdominal cavity
 - transverse colon \leftarrow \leftarrow \leftarrow behind the stomach
- * the transverse colon has a mesocolon → attached to anterior border of pancreas
- * Lesser omentum → attached to anterior abd. wall
 - formed from the ventral mesogastrium
 - falciform ligament \leftarrow \leftarrow attached to ant. abd. wall
 - its relation to septum transversum : septum transversum is in the chest & has a relation with the development of diaphragm + heart + mesogastrium
- * falciform ligament : descends from the liver to the body wall
- * Lesser omentum : from the stomach to the liver + attached to the 1st part of duodenum
- * free margin of the falciform ligament → contains the umbilical vein
 - undergoes obliteration → ligamentum teres
- falciform ligament \leftarrow \leftarrow (round ligament of the liver)
- * lesser omentum
 - hepatoduodenal (with the duodenum)
 - hepatogastric (with the stomach)
 - its relation to foramen of Winslow & the foramen of Winslow is directly under the free edge of lesser omentum

Liver & Gall bladder development

- * the liver starts to develop from the liver bud
- * the liver develops before the common bile duct
- * liver bud : proliferation / outgrowth of endodermal epithelium of distal part of the foregut (the end of duodenum)
 - it penetrates the septum transversum to reach the 2nd part of duodenum

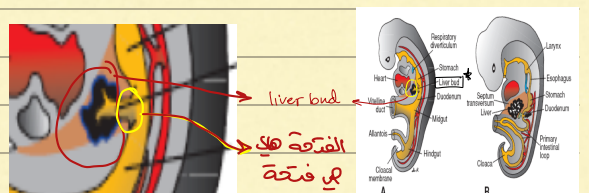


Figure 13.14 A, B. 3-mm embryo (approximately 25 days) showing the primitive gastrointestinal tract and formation of the liver bud. The bud is formed by endoderm lining the foregut. A, 3.5-mm embryo (approximately 32 days). Epithelial liver cords penetrate the mesenchyme of the septum transversum.

↳ (septum transversum is mesodermal) → parenchyma of the liver (الكبد)

through the mesodermal: infiltration (التصريف) layer

above it (فوقه)

* septum transversum: participates in the development of heart + diaphragm + liver

* after that: a hepatic diverticulum of the foregut is formed

* at the end: the bile duct formation

↳ also a proliferation → solid column → canalization (duct) (تقسيم القناة)

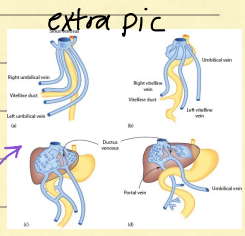
* also in the development of the liver, we have vitelline & umbilical veins

↳ they form the blood sinusoids of the liver

* Kupffer cells + CT → are derived from the mesoderm of septum transversum

↳ mesenchymal tissue (نسيج الوتر)

وأساسي تكوين الكبد لكن بالإنزيمات (التي تنتجها خلايا الكبد + CT + Kupffer cells)



* abnormalities in liver & gall bladder development:

- ① hepatic duct distension (A)
- ② Double gall bladder + 1 cystic duct (B)
- ③ Accessory hepatic duct
- ④ Extrahepatic biliary atresia (نسبتها: 1/15000) → not very important

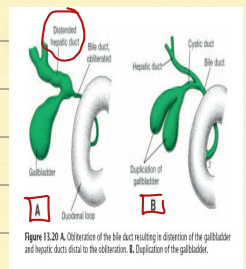
* What is the treatment?

- if the function is normal

↳ we do nothing

- if there's decrease in secretion OR obstruction

↳ surgery



* Duodenum development:

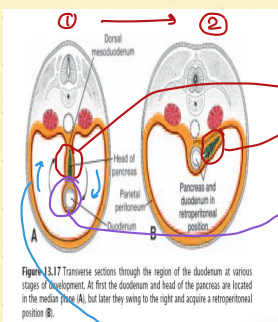
* duodenum → upper 1/2 (cephalic part) → follows the foregut → B.S: celiac trunk
 lower 1/2 → follows the midgut → B.S: superior mesenteric artery

* When the stomach rotates 90° clockwise → the duodenum rotates with it 90°

So: L → the (C) shape faces the left side

↳ the common bile duct rotates with it

So: L → it becomes on the medial side of duodenum



↳ the pancreas

↳ the duodenum

Figure 13.17 Transverse sections through the region of the duodenum at various stages of development. At first the duodenum and head of the pancreas are located in the median plane (A), but later they swing to the right and acquire a retroperitoneal position (B).

↳ rotation → so the duodenum forms a (C) shape

* Pancreas + duodenum → retroperitoneal organs → (they go to the posterior abd. wall)

↳ after they were covered by 2 layers of peritoneum → the posterior one disappears

so they become retroperitoneal

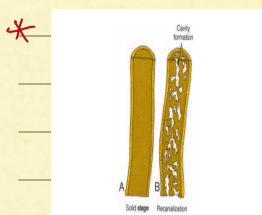


Figure 13.18 Upper portion of the duodenum showing the solid stage (A) and cavity formation (B) produced by recanalization.

the duodenum at the beginning was a solid structure (proliferated cells)

↳ but then it undergoes invagination and disappearance from inside

then it forms one cavity internally

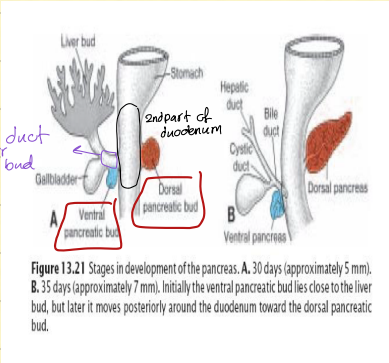
* Pancreas development → formed from a ventral pancreatic bud & dorsal pancreatic bud

bile duct or the liver bud
 (on the inferior surface)

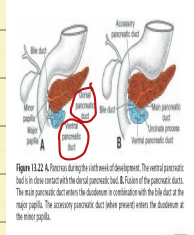
on the right side of duodenum

Both are in the 2nd part of duodenum

on the left side of duodenum



* When the duodenum rotates with the stomach 90° clockwise
 → the ventral pancreatic bud lies inferior to the dorsal pancreatic bud
 (the dorsal bud doesn't rotate)



* The dorsal pancreatic bud forms all parts of the pancreas except:
 ① Lower part of the head
 ② uncinata process
 formed by the ventral buds

* The main pancreatic duct (or Wirsung duct)

formed by:
 ① the distal part of the dorsal pancreatic bud
 ② the entire ventral pancreatic bud

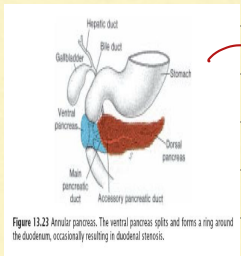
* The proximal part of the dorsal pancreatic bud ^{enter → obliterated} / _{or} forms the accessory pancreatic duct (is also called: santorini pancreatic duct)

* We have finished the duct part → now: pancreatic islets (endocrine part) (islets of langerhans)

its development is from the parenchyma of pancreatic tissue & scatter throughout the pancreas

* Insulin secretion → 5th month
 ⊕
 Glucagon
 ⊕
 Somatostatin

* Abnormalities of pancreas :-



① annular pancreas (most common defect)

→ in the development → instead of the rotation of the ventral bud to be under the dorsal bud → obstruction of duodenum

② Ectopic pancreas

→ we can find the pancreas at any site except its normal site/position

→ could be in → - the mucosa of the stomach

→ - meckel's diverticulum