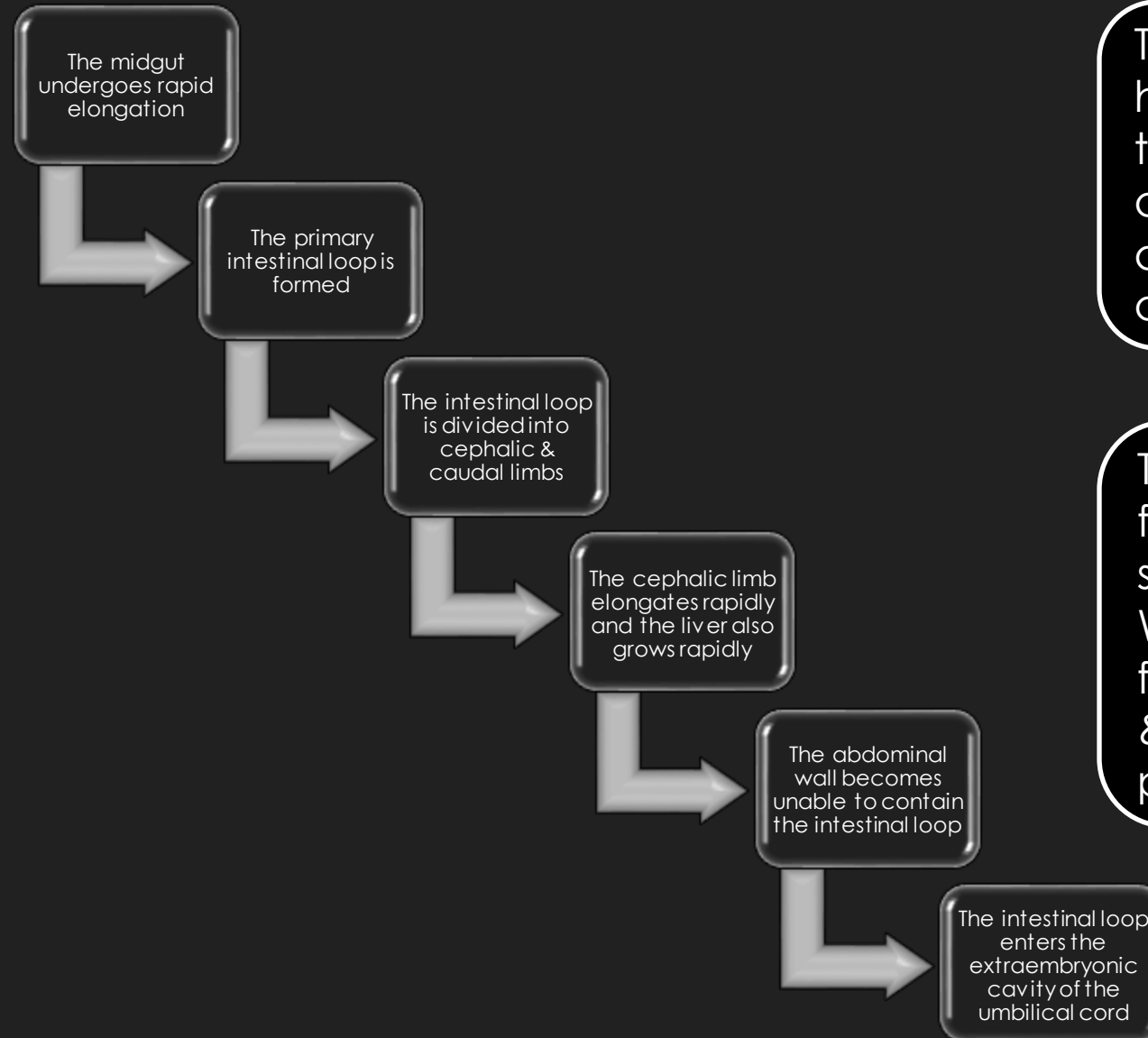


Summary of the
Midgut, Hindgut &
Associated
Embryopathological
conditions

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Physiological Herniation of the Midgut



The physiological herniation begins at the 6th week of development & ends at the 10th week of development.

The cephalic limb forms most of the small intestine. While the caudal limb forms the distal ileum & the “large intestine” part of the midgut.

Rotation of the Midgut

Rotation occurs around the the superior mesenteric artery.



Retraction of the Herniated Intestinal Loop

The retraction of the herniated intestinal loop (midgut) to the abdominal cavity:

- Begins at the 10th week of development.
- Occurs because of the expansion of the space of the abdominal cavity.

The proximal portion of the jejunum

- The first part of the midgut to re-enter the abdominal cavity.
- After it re-enters the abdominal cavity, it is going to lie in the upper left side of the abdominal cavity.

The caecal bud

- The last part of the midgut to re-enter the abdominal cavity.
- After it re-enters the abdominal cavity, it is going to lie in the right upper quadrant below the right lobe of the liver.
- It is going to enlarge to form the caecum & the appendicular diverticulum.
- Then, it is going to descend downwards into the right iliac fossa; placing the ascending colon & the hepatic flexure on the right side of the abdominal wall.
- The appendix forms as the colon is descending; that's why most frequently it acquires a retrocaecal/ retrocolic position.

Development of the Peritoneum & Mesenteries of the Intestines

Ascending & Descending Colon

They initially have mesenteries, but then their mesenteries press against the posterior abdominal wall & they become retroperitoneal.

Transverse Colon

It is intraperitoneal, & its mesentery (transverse mesocolon) is formed initially by the dorsal mesentery.

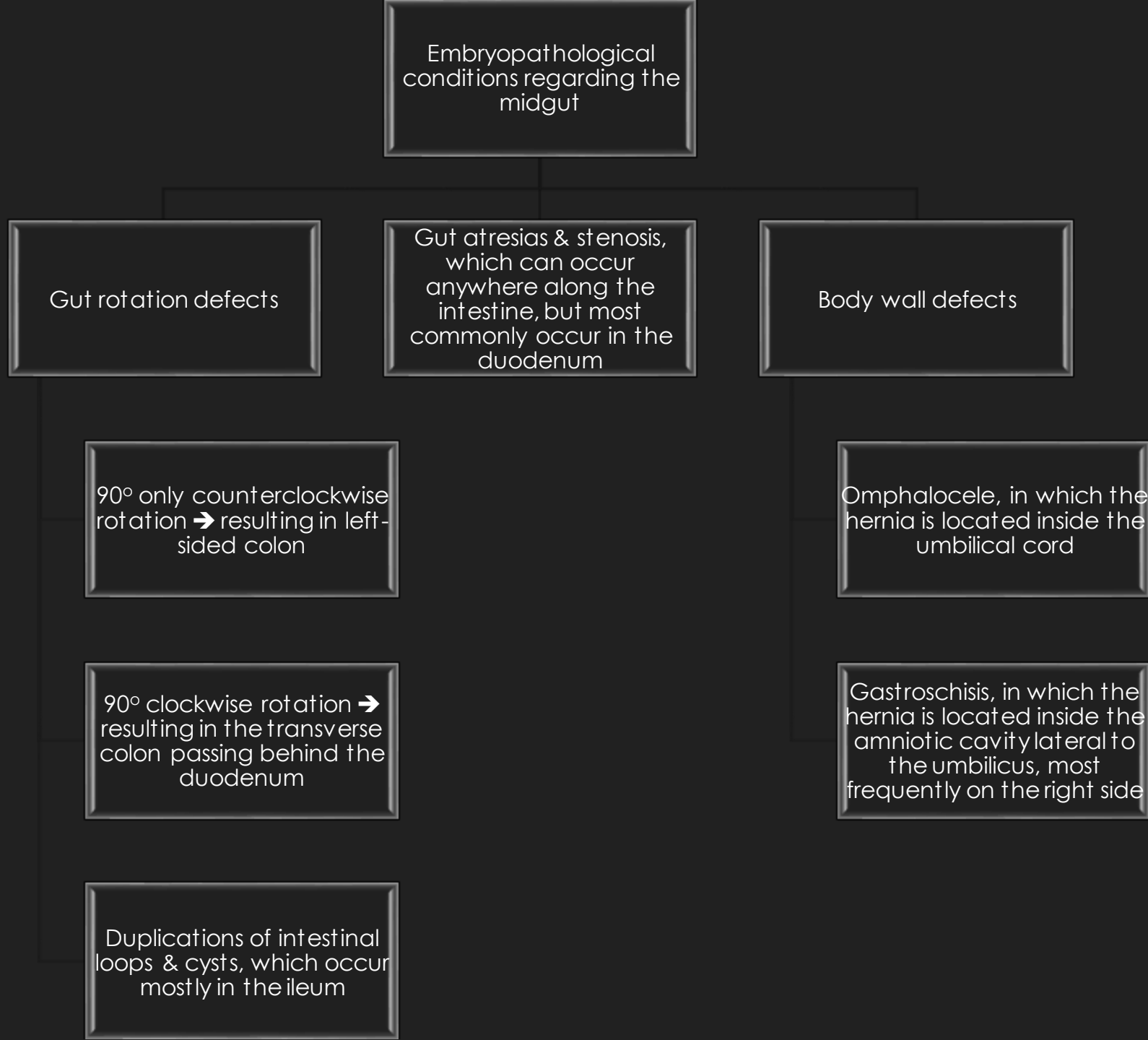
Then, it fuses with part of the 2-layered ascending sheet of the greater omentum, forming a 4-layered transverse mesocolon.

Jejunum & Ileum

They are intraperitoneal organs & their mesentery is called "mesentery proper".

The mesentery proper is derived from the dorsal mesentery, and it undergoes elongation.

The mesentery proper is originally continuous with the mesentery of the ascending colon, but after the ascending colon becomes retroperitoneal, the mesentery proper acquires a new line of attachment; which begins from the distal inch of the duodenum & extends to the ileocaecal junction.



Gut rotation defects

Which can lead to volvulus, then ischemia & tissue degeneration.

Incomplete rotation

- The midgut rotates only 90° counterclockwise.
- Results in left-sided colon.

Inverted rotation

- The midgut rotates 90° clockwise.
- Results in the transverse colon lying behind the duodenum & the superior mesenteric artery.

Duplications of intestinal loops & cysts

- Most commonly occur in the ileum.
- Vary from long segments to small diverticulum.

	Omphalocele	Gastroschisis
Location of the hernia	In the umbilical cord as a result of unreturned physiological hernia.	In the amniotic cavity lateral to the umbilical cord (mostly on the right side).
The covering of the herniated viscera	It is covered by the amnion & the peritoneum.	It is not covered by the amnion neither by the peritoneum; which makes it exposed to the amniotic fluid.
Association with other defects	Associated with severe malformations, such as cardiac anomalies & neural tube defects.	No association with other defects.
Association with chromosomal abnormalities	50% of the cases showed so.	No association with chromosomal abnormalities.
Treatment	Could be treated without surgical interventions if the herniated tissue is still healthy & normal.	Could be treated without surgical interventions if the herniated tissue is still healthy & normal.

Important Topics of the Hindgut

The Cloaca

It is endodermal in origin.

It is attached to the hindgut posteriorly; participating in the formation of the anorectal canal. Also, it is attached to the allantois anteriorly; participating in the formation of the urogenital sinus.

The Urorectal Septum

It is a layer of mesoderm separating the allantois from the hindgut; & it has a significant role in the formation of the anorectal canal & the urogenital system.

At the end of its course, the urorectal septum forms the perineal body.

The Anal Canal

The upper half of the anal canal is formed by the endoderm of the hindgut, while the lower half is formed by the ectoderm of the proctodeum.

Thus the upper & lower halves of the hindgut have different blood supply, lymphatic drainage & innervation.

The Pectinate Line

Present at the junction between the upper & lower halves of the anal canal, just below the anal columns.

The type of epithelium above the pectinate line is simple columnar, and the type of epithelium below the pectinate line is stratified squamous.

Anorectal malformations

Narrowing of the anal passage

Anal opening covered by unruptured membrane

Imperforate anus

Formation of fistulas

Occurs in both males & females

perineal fistula, rectobulbarurethral fistula, rectoprostatic fistula and rectobladderneck fistula, are the main anorectal malformations in males

rectoperineal fistula, rectovestibular fistula, rectovaginal fistula, are the main anorectal malformations in females

Tissues that contain parts of different embryological origins (one part from endoderm while the other from ectoderm for example like the anal canal) are prone to embryopathological malformations.

اللهم سخّر لأهل غزّة ملائكة السماء
وجنود الأرض، اللهم برّدًا وسلامًا على
أهل غزّة، وكن لهم عونًا و نصيرًا يا رب
العالمين 🙏