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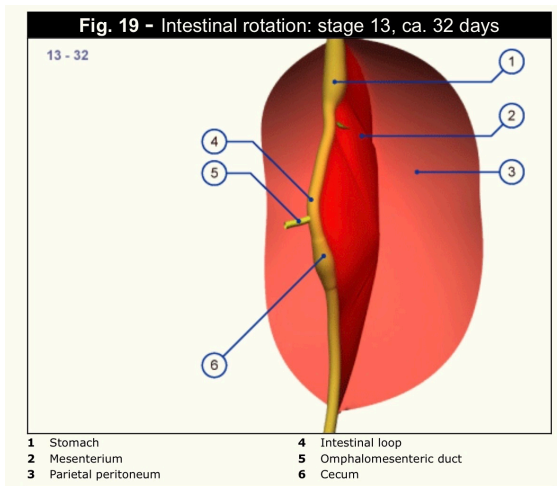
Question: Discuss the rotation of the intestine.

As the intestines develop, they normally move from the base of the umbilical cord back into the abdominal cavity. As the intestine returns to the abdomen, it makes two rotations and settles into its normal position. During normal abdominal development, the 3 divisions of the GI tract (i.e, foregut, midgut, hindgut) herniate out from the abdominal cavity, where they then undergo a 270 degree counterclockwise rotation around the superior mesenteric vessels. Following this rotation, the bowels return to the abdominal cavity, with fixation of the duodenojejunal loop to the left of the midline and the cecum in the right lower quadrant.

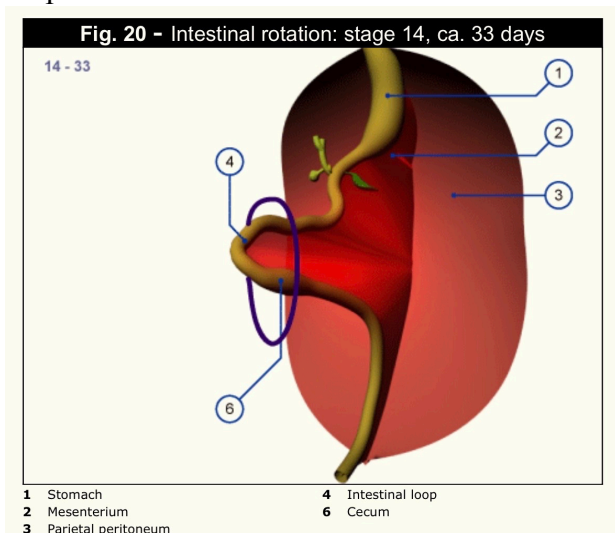
The midgut extends from the apex of the duodenal loop which is fixed to the large liver anlage via the bile duct, to the last third of the transverse colon. Its parts are:

- Inferior part of the duodenum with the duodeno-jejunal bend
- Jejunum
- Ileum with the ileocaecal valve
- Cecum with vermiform appendix
- Ascending colon
- Transverse colon (2/3)

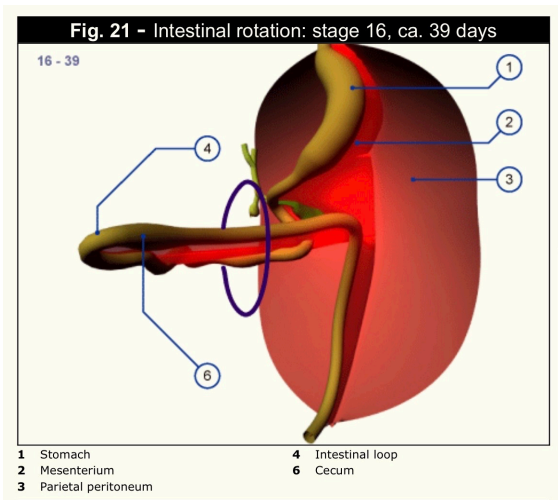
The midgut is supplied with blood by the superior mesenteric artery and innervated by the vagus nerve (CNX). Within the whole midgut and rectum unit there exists only one dorsal mesenteric, the ventral being reabsorbed. Differentiation occurs in a cranio-caudal sequence within a time window of roughly one week. On day 32, the midgut extends into the umbilical coelom and forms the umbilical loop, where by initially from the apex only a wide connection to the umbilical vesicle exists. In the further development this junction becomes constricted to become the omphalomesenteric duct. Mostly it is later obliterated, but can also partially remain as a Meckel's diverticulum. In the beginning the umbilical loop is positioned sagittally.



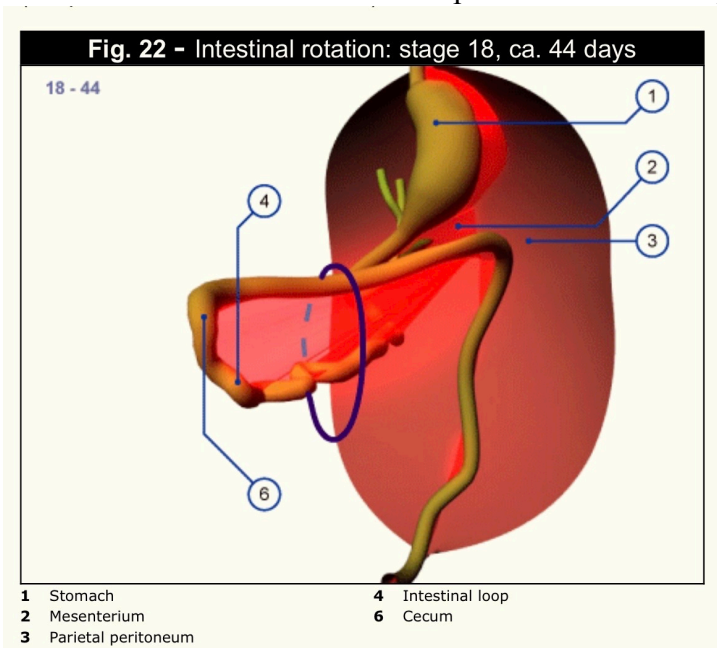
Only when the umbilical loop lengthens and grows into the umbilical coelom does it experience a rotation of 90 degrees in a clockwise direction as seen from the embryo. The cranial pedicle comes to lie to the right and the caudal to the left. The umbilical loop now has a horizontal position. Through the craniotomy-caudal growth gradient, the cranial pedicle from first through lengthening of several loops in the umbilical coelom.



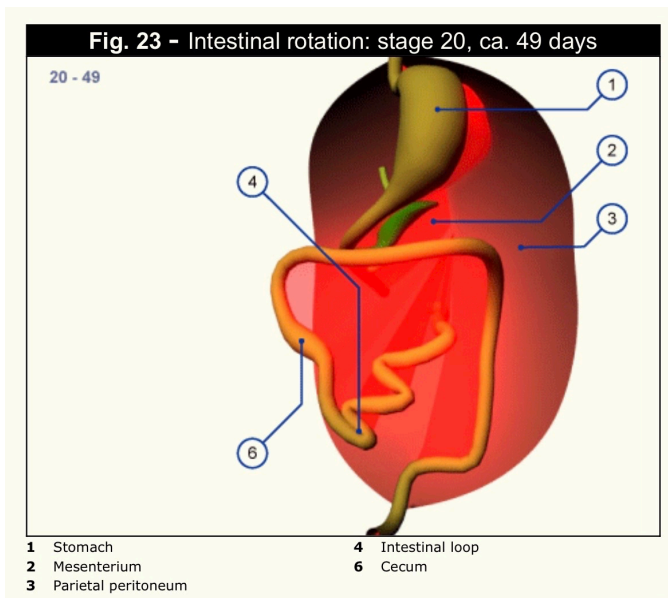
The developing umbilical loop extends further into the umbilical coelom because there is no more room for it within the embryo's abdominal cavity. It is the time of the strongest flexion of the embryo. Very soon a thickening in the region of the caudal pedicle of the intestinal tube is also to be seen: the cecum. Visually, it becomes an important fixed point for purposes of orientation.



As development proceeds the intestinal loop turns further around its own axis. In stage 18 the extension of the intestinal loop into the umbilical coelom has reached its maximum. This physiologic navel hernia remains in existence up to the 9th week of pregnancy.



At first the loops of the small intestine return into the abdominal cavity and come to lie in the left half surrounded by the horizontal and descending part of the colon that never left the abdominal cavity. The rotation now amounts to more than 180 degrees and the colon is also shifted more and more into the abdominal space. The repositioning of the physiologic umbilical hernia is facilitated by the righting of the embryo's body.



Thus after the reintegration of the intestinal loops into the abdominal cavity from the physiologic umbilical hernia, the derivatives of the originally caudal pedicle occupies the upper and ventral part of the abdominal cavity. At the end of the embryonic period this part migrates downwards into the iliac fossa, whereby an additional rotation occurs. The whole rotation of the intestines thus amounts to approximately 270 degrees. As a consequence, the mesenteric also turns with it and its insertion it crosses over the inferior part of the duodenum.

Malrotation And Congenital High Cecum

Intestinal malrotation, also called twisted intestines occurs when the intestine does not twist correctly. Instead, the way in which it twists blocks the intestine. Sometimes, abnormal tissue referred to as Ladd's bands attaches the cecum to the duodenum (beginning of the small intestine) and may create a blockage in the duodenum.

