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DEPARTMENT: ANATOMY

COURSE: ANA 206

**Question:** Discuss the rotation of the intestine

Our intestines are formed while we are fetuses in the womb, during the tenth week of gestation. 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. the midgut begins to extend into the umbilical coelom and forms the umbilical loop, whereby 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 sagittal.

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|  | |  | | --- | | The midgut is supplied with blood by the superior mesenteric artery and innervated by the vagus nerve (CN X). Within the whole midgut and rectum unit there exists only one dorsal mesenterium, the ventral being readsorbed. Differentiation occurs in a cranio caudal sequence within a time window of roughly one week. |      |  |  |  | | --- | --- | --- | | the midgut begins to extend into the umbilical coelom and forms the umbilical loop, whereby 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 asMeckel’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 cranio-caudal growth gradient, the cranial pedicle forms 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. | |  |  |

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| As development proceeds the intestinal loop turns further around its own axis. 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. ([Omphalocele / umbilical hernia](http://www.embryology.ch/anglais/sdigestive/patholdigest04.html" \l "omphalozele)) |  |

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| 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 mesenterium also turns with it and in its insertion it crosses over the inferior part of the duodenum. ([Malrotation and congenital high cecum](http://www.embryology.ch/anglais/sdigestive/patholdigest04.html" \l "malrotation))intestinal malrotation, also called twisted intestines, occurs when the [intestine](https://www.chp.edu/our-services/transplant/intestine/education/intestine-disease-states) 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.

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What Causes Intestinal Malrotation?

When rotation is incomplete and the intestine does not become fixed into that position, this creates intestinal malrotation.

The malrotated intestine is prone to twisting in on its own blood supply, blocking the flow. This is called intestinal volvulus. When intestinal volvulus involves the entire small bowel, it is referred to as mid-gut volvulus.