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Rotation of the intestine.

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 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. 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. (Omphalocele / umbilical hernia) 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).