



Case Report

About one case of common mesentery: embryological study, morphological profile and interest of the doppler ultrasound

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ABSTRACT

Common mesentery is an anatomical abnormality resulting from a defect in the embryonic development of the digestive tract, resulting in a fetal disposition of the intestine in patients. It is mostly revealed during the neonatal period and in children with severe accidents of occlusion. At the anatomo-embryological level, the common mesentery is the consequence of malrotation and attachment of the primary intestinal loop during its embryological development. Attachment abnormalities may or may not be associated with rotation abnormalities (the latter favor them), and they are of 2 types: excessive attachments or attachments defects.

We report the case of an 8-years-old female patient received in the emergency room for severe abdominal pain, inability to pass stools and gas, and bilious and incoercible vomiting for 2 days. The surgical exploration showed a volvulus of the small bowel with a 270° clockwise rotation, and the presence of a complete common mesentery and numerous mesenteric lymphadenopathies. The stomach and colon were distended, with adhesions between the colon and the small bowel, but no ischemia or intestinal perforation was noted. The operative procedures consisted of untwisting the volvulated loops in an anti-clockwise direction (270°), a release of adhesions, an appendectomy. We also emptied the small intestine and repositioned it.

Common mesentery is a rare pathological state and its incidence is poorly understood due to clinical latency. But a good knowledge of embryology, attentive listening to patients and an accurate reading of the various radiological examinations can lead us thinking about malrotation. The occurrence of occlusive accidents is the main frequent cause of discovery of this abnormality.

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1. Introduction

Complications related to the persistence of bowel rotation abnormalities such as common mesentery are well known during the neonatal period. However, some few observations of late accidents occurring in adults have been described in the literature.^{1,2} The anatomical organization in the common mesentery is defined as the persistence of

an embryonic anatomical disposition, secondary to an abnormality of rotation of the primary umbilical loop, characterized by a meso common to the entire intestinal loop, and an extremely short mesenteric root.^{1,2}

The small bowel volvulus is a serious complication (and very often indicative) of the existence of a common mesentery. It is a twisting of part or all of the small bowel on its mesenteric axis, causing the transit of intestinal content to stop.^{3,4} The common mesentery represents a medico-surgical emergency, given the significant risk

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of intestinal parietal ischemia, which is life-threatening. Although this pathology is most often encountered during the neonatal period and in infants by frequent episodes of bilious vomiting, there are, as reported by some authors, spontaneously resolving episodes in children over two years of age.^{5,6}

Imaging modalities (as x-rays, fluoroscopy, abdominal ultrasound or abdomino-pelvic CT) play an important role in the diagnosis of volvulus on the common mesentery. Although fluoroscopy is the gold standard for diagnosing chronic common mesentery volvulus, color Doppler ultrasound can be very contributory and confirm the diagnosis.

We report the case of an 8-years-old female patient in whom the common mesentery was revealed by an intestinal obstruction in small bowel, leading to a volvulus by malrotation. The diagnosis made by ultrasound allowed early surgical management of the patient. We will also explain the embryological events in order to better understand mechanisms leading to this rare pathology.

2. Clinical Case

We report the case of an 8-years-old female patient admitted to the emergency room for severe abdominal pain, with inability to pass stools and gas, and bilious and incoercible vomiting for 2 days. The physical exam carried out in the emergency room found: a tender, painful but not distended abdomen; the temperature was 38.2 °C and the heart rate was normal.

Biological tests carried out reported a blood count within normal limits, a prothrombin time (PT) at 94.48%, a activated partial thromboplastin time (aPTT) at 17.7 and international normalized ratio (INR) at 1.34. Abdominal ultrasound revealed a twisted aspect of the small bowel, as a right paraumbilical and supraumbilical mass (Figure 1); inversion of the mesenteric vessels identified by color Doppler with the superior mesenteric vein located to the left of the corresponding mesenteric artery associated with tortuous vascular images (Figure 2); significant upstream fluid distension with gastric stasis; coelio-mesenteric and deep ganglia. The abdominal ultrasound therefore concluded to an upper bowel obstruction on volvulus of the small intestine, due to a malrotation.

The patient was transferred for surgery the next day. The surgical exploration showed a volvulus of the small bowel with a 270° clockwise rotation (Figures 3, 4 and 5), and the presence of a complete common mesentery and numerous mesenteric lymphadenopathies. The stomach and colon were distended, with adhesions between the colon and the small bowel, but no ischemia or intestinal perforation was noted. The operative procedures consisted of untwisting the volvulated loops in an anti-clockwise direction (270°), a release of adhesions, an appendectomy. We also emptied the small intestine and repositioned it. the patient was

discharged on the fourth postoperative day.



Fig. 1: Transversal ultrasound section showing a hyperechoic mass with a spiral twist

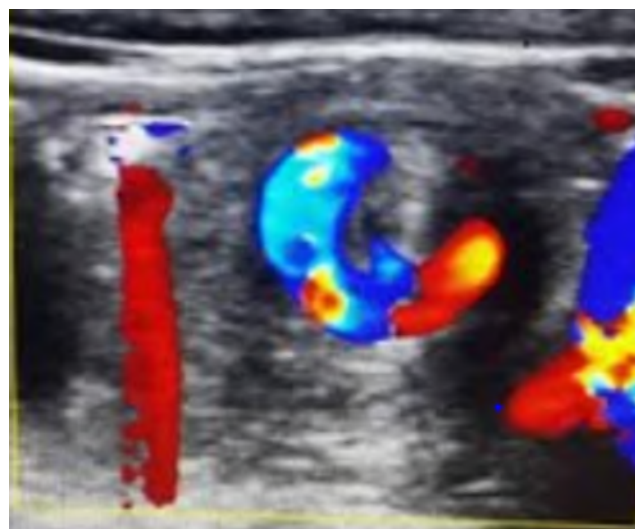


Fig. 2: Transversal ultrasound section showing a hyperechoic mass with a spiral twist

3. Discussion

Common mesentery is an anatomical defect resulting from a defect in the embryonic development of the digestive tract, leading to a fetal disposition of the intestine. It is especially revealed in the neonatal period and in children with severe occlusion accidents. These abnormalities are well described in publications of Dott, Ladd and Dharmel.⁷ Despite these descriptions, we find only a few observations of late accidents occurring in adults linked to the persistence of the common mesentery. The normal anatomical situation



Fig. 3: Intraoperative view 1



Fig. 5: Intraoperative view 3

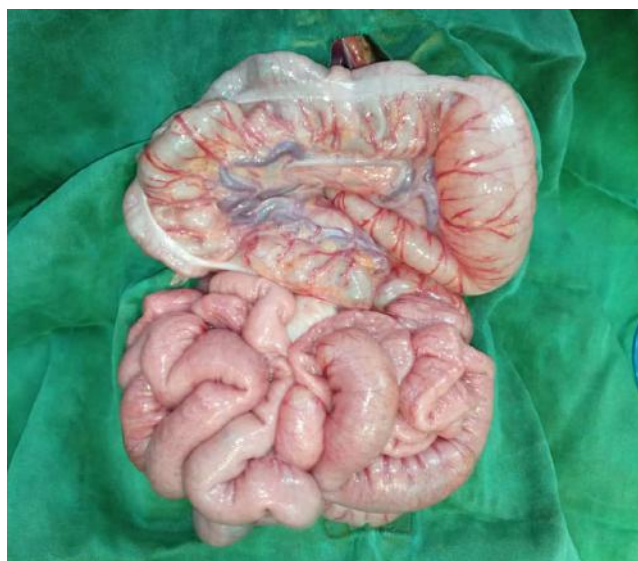


Fig. 4: Intraoperative view 2

is when the small intestine is fixed posteriorly by a meso: the mesentery. The large intestine is attached to it by a meso called the mesocolon. These 2 mesos (mesocolon and mesentery) are independent. Ileocecal and duodeno-jejunal junctions are normally distant. There is no possible volvulus in this case. Embryologically, the rotation phenomenon only concerns the segment of the primary intestinal loop supplied by the superior mesenteric artery.

The common mesentery is explained by the persistence of an embryonic anatomical configuration, characterized by a meso common to the entire intestinal loop, secondary to an abnormality of rotation and fixation of the primary umbilical loop. Its frequency is estimated at 0.2% and the

age of discovery is 14 to 40 years.⁸ At the end of the 5th week of embryonic life, the primary intestinal loop returns to the abdominal cavity. It then undergoes a rotation of 270° in the anti-clockwise direction, passing through successive rotation stages of 90° and 180° . The midgut initially in a sagittal plan assumes the position that it occupies in adults.^{3,9} On the anatomico-embryological level, the common mesentery is the consequence of malrotation and attachment of the primary intestinal loop during its embryological development (Figure 6). These rotation abnormalities were divided into 5 types by Dott.⁹⁻¹¹

1. Type I: there is no rotation (non-rotation), it is exceptional, the bowel remains sagittal. It is seen in the omphalocele and the extrophy of the cloaca, incompatible with life.
2. Type II: rotation stops at 90° , this leads to the so-called common mesentery position. There is no duodeno-jejunal junction, the colon is on the left and the small bowel on the right.
3. Type III: rotation stops at 180° , this is the most common form. The colon runs along the left half of the abdominal cavity. The cecum is located at the top of abdomen, in the middle epigastric position. The small bowel is in the right half of abdomen. It is this position that favors the volvulus of the intestinal loop, because of the noticeable approach of the root of the mesentery.
4. Type IV: rotation stops between 180 and 270° . The colon is on the left, the cecum is in a subhepatic position, and the small bowel is moved slightly from its normal position to the right. In the same way as in type III a volvulus can occur.
5. Type V: reverse rotation. This time the rotation is clockwise and can stop at varying degrees. There are

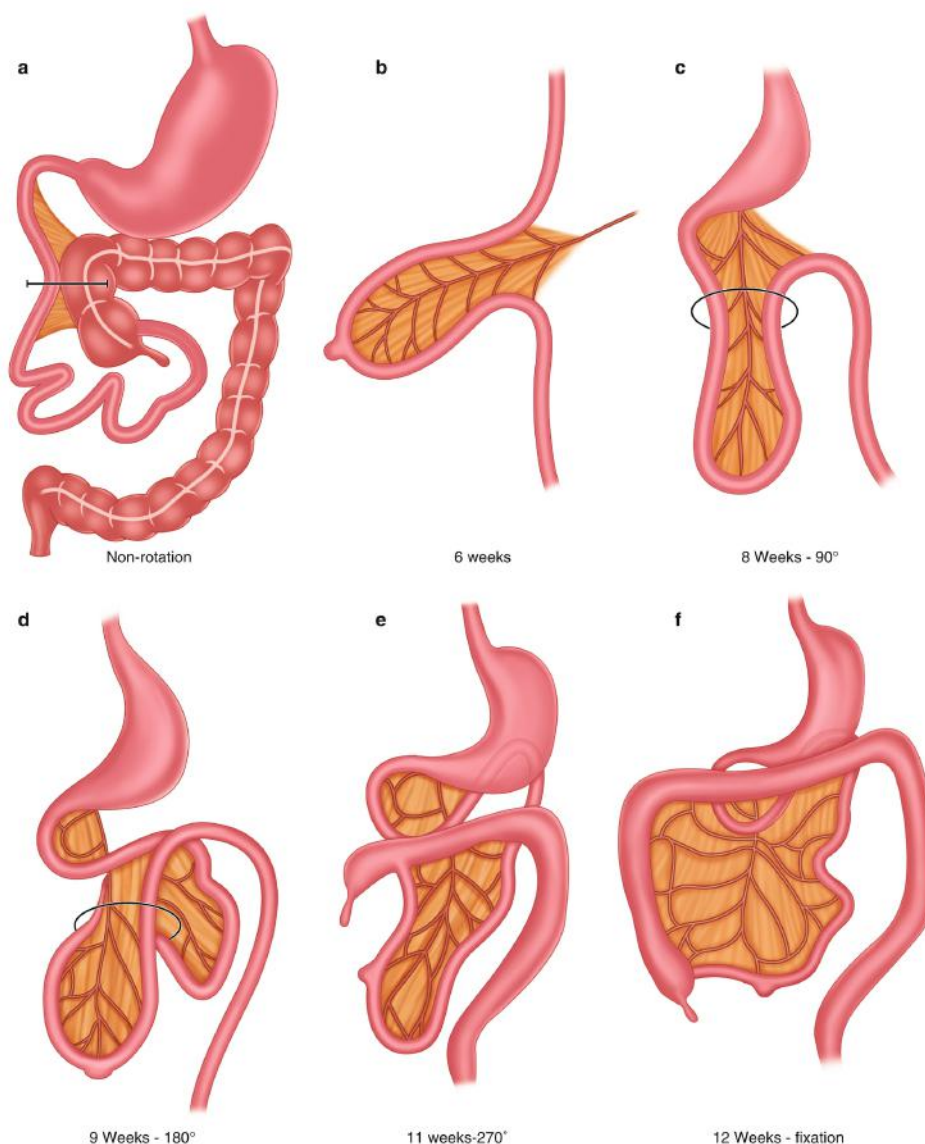


Fig. 6: Rotation of the primary intestinal loop

2 possible cases depending on whether the mesenteric artery passes behind or in front of the colon.

Bowel fixation abnormalities may or may not be associated with rotation abnormalities (the latter favor them), and they are of 2 types: excessive fixation or fixation defects. Fixation defect can be complete or partial. When associated with the common mesentery they can lead to volvulus due to the mobility of mesos and the configuration of the mesentery root. Excessive fixation is more frequent and produces abnormal intestinal adhesions or peritoneal flanges. Common mesentery is therefore a rare pathology and its incidence is poorly understood due to clinical latency. But a good knowledge of embryology, attentive listening to patients and an accurate reading of the various

radiological examinations can point to malrotation.¹² The occurrence of occlusive accidents is the most frequent cause of discovery of this abnormality.

Complications related to the persistence of bowel rotation abnormalities such as common mesenteries are well known during the neonatal period. However, few observations of late accidents occurring in adults have been described in the literature.^{13–16} The anatomical configuration in the common mesentery is defined as the persistence of an embryonic anatomy, secondary to a rotation disorder of the primary umbilical loop, characterized by a meso common to the entire intestinal loop, and an extremely short mesentery root (Figure 6).¹⁷ In Theory, the umbilical loop which is placed in a vertical plane at the 5th week of embryonic development, undergoes

a 270° counterclockwise rotation around an axis represented by the superior mesenteric artery, before attaching to the primitive posterior parietal peritoneum during the 11th week. It is at the end of this rotation that the digestive tract acquires its final position in the peritoneal cavity. However, abnormalities can occur during this embryological stage of rotation.

Small bowel volvulus is a serious complication of the common mesentery.^{1,2,4,8} Therefore, the early radiological diagnosis allows the surgeon an optimal management, thus avoiding unnecessary bowel resections. Fluoroscopy is no longer routinely used in the diagnosis of malrotation, as approximately 20% of children with malrotation have a normally positioned cecum.¹⁸ In addition, the mobility of the cecum in young children leads to a great variability of normal positions of the cecum in about 15% of patients.¹⁸

Fluoroscopy confirms the diagnosis because of:

1. The location of the duodeno-jejunal junction angle abnormally to the right of the center line.
2. The abnormal position of the first bowel loops to the right of the midline.
3. Upstream gastro-duodenal dilation.
4. The presence of a twist spiral creating a "cockade" image downwards.

Furthermore, the practice of this exam requires good technique; Duodeno-jejunal junction has a good diagnostic value under fluoroscopy, but this sign can be difficult to highlight in the event of superimpositions with the first jejunal loops.^{19–21}

With the advent of high-frequency probes, ultrasound makes it easier to suggest the diagnosis of malrotation when the mesenteric vessels are inverted.^{22,23} However, some studies reveal that the inversion of mesenteric vessels can also be observed in patients with normal midgut^{10,24} and in patients with abdominal masses and distal ileocolic invagination.^{24,25} Some authors showed cases of poor rotation occurring in patients with a normal orientation of the mesenteric vessels.^{10,23,26}

The volvulus will be mentioned in front of the addition of a "whirl sign". This sign can also be absent or discreet depending on the degree of torsion of the primitive loop, or masked by gaseous interpositions.^{20,22,23,27,28} In our study, the diagnosis was evoked on the basis of clinical and ultrasonographic arguments, in particular the notion of bilious vomiting, the bad position of the mesenteric vessels and twist spirals. The X-ray had not been performed. The fluoroscopy either, given the notion of uncontrollable vomiting and the notion of urgency. The diagnosis evoked allowed early surgical management of the patient. The surgery revealed a volvulus in the common mesentery without any necrosis sign. Doppler ultrasound has the advantage of being a reproductive and non-irradiating technique, and its cost remains accessible in our context.

4. Conclusion

The common mesentery is explained by the persistence of an embryonic anatomical configuration, characterized by a meso common to the entire intestinal loop, secondary to an abnormality of rotation and fixation of the primary umbilical loop. Common mesentery is a rare pathology and its incidence is poorly understood due to clinical latency. But a good knowledge of embryology, attentive listening to patients and an accurate reading of the various radiological examinations can lead to malrotation. The occurrence of occlusive accidents is the most frequent cause of discovery of this abnormality.

5. Source of Funding

None.

6. Conflict of Interest

The authors declare no conflict of interest through this work.

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