INTESTINAL MALROTATION IS STILL HERE

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So what?
Intestinal malrotation is defined as a spectrum of anomalies in rotation and fixation of the small and large bowels during the embryological development. They appear between 5 and 11 gestational weeks, when the gastrointestinal tract goes through physiological herniation in the umbilical cord, followed by a return to the abdominal cavity, rotation of the intestinal loops towards their normal anatomic position and mesenteric fixation.

A rate of 1 in 500 live births is established with symptomatic malrotation in 1:6000 live births.
Embryology – Rotation of Midgut

Courtesy of Dr. Robert Acland, Department of Anatomical Sciences, University of Louisville

Downloaded from YouTube
<table>
<thead>
<tr>
<th>Classification</th>
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</thead>
<tbody>
<tr>
<td>1. Non rotation</td>
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<tr>
<td>2. Incomplete/partial rotation</td>
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<tr>
<td>3. Reversed/clockwise rotation</td>
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<td>4. Malfixation</td>
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**Differential Diagnosis**

<table>
<thead>
<tr>
<th>INFANTS</th>
<th>ADULTS</th>
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<tbody>
<tr>
<td>• gastro esophageal reflux</td>
<td>• mesenteric ischemia</td>
</tr>
<tr>
<td>• duodenal atresia</td>
<td>• Crohn’s disease</td>
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<tr>
<td>• necrotizing enterocolitis</td>
<td>• peritonitis</td>
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<tr>
<td>• intestinal obstruction</td>
<td>• pancreatitis</td>
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<tr>
<td>• neonatal sepsis</td>
<td>• Irritable bowel syndrome.</td>
</tr>
</tbody>
</table>
ASSOCIATIONS

- Meckel’s diverticulum
- Situs ambiguous
- Polysplenia syndrome
- Cardiovascular pathology

Fulcher A.S., Turner M.A.; Abdominal Manifestations of Situs Anomalies in Adults; RadioGraphics 2002;22:1439–1456
FLUOROSCOPY

- upper gastrointestinal series, a small bowel follow-through and barium enema
- anatomic position of the duodenojejunal junction
Rotation of duodenum + distal large bowel by 90° counterclockwise
Rotation of duodenum by an additional 90° counterclockwise
Final 90° counterclockwise rotation of duodenum
Final position of normal bowel rotation

Normal Position of Duodenum
Nonrotation of Duodenum
Corkscrew Duodenum and Jejunum

Partial Duodenal Rotation with Jejunum in Right Upper Quadrant
Partial Duodenal Rotation with Duodenojejunal Junction over Right Pedicle
Redundant Duodenum Malrotation to Right of Spine
Whirlpool sign, with the SMV (arrowheads) winding around the SMA, is a sonographic feature associated with volvulus in cases of intestinal malrotation.

Chao H.C., Kong M.S., Chen J.Y. et al; Sonographic Features Related to Volvulus in Neonatal Intestinal Malrotation; J Ultrasound Med 2000;19:371–376
Pickhardt P.J., Bhalla S.; Intestinal Malrotation in Adolescents and Adults: Spectrum of Clinical and Imaging Features; Am J Roentgenol 2002;179:1429–1435
Normal fetus at 32 weeks of gestation. Coronal T1-weighted fast gradient-refocused echo MR image shows high signal intensity of meconium. Whole colon is evident, and meconium no longer is present in small bowel.

In pregnant women
In patients allergic to iodine contrast media
Fetal Imaging

Inaoka T., Sugimori H., Sasaki Y. et al; VIBE MRI for Evaluating the Normal and Abnormal Gastrointestinal Tract in Fetuses; Am J Roentgenol 2007;189:W303-W308
COMPLICATIONS

- Midgut Volvulus
- Mesenteric Ischemia
- Internal hernias
- Short Bowel Syndrome
- Malabsorption

Filston H.C., Kirks D.R.; Malrotation—the ubiquitous anomaly; J Pediatr Surg 198;16:614-20
TREATMENT

- Surgical
- Conservative
- Follow-up
- Observation

Intestinal malrotation is:

- An anomaly with potential risk of complications and lethal exit.
- With broad spectrum of clinical and radiographic presentations.
- Raise of incidental findings in computed tomography in children and adults.
- All imaging modalities are useful.

As early as 1932 Ladd wrote: “Malrotation is a condition rare enough that it is likely to escape the mind, and it is common enough to be important.”

THANK YOU!
References:

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