RADY 403 Pediatric Vomiting

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Focused Patient History and Workup

• 4 week old M infant presents with 5 days of worsening vomiting.
• Initially mother describes vomiting as spit-ups however progressed to **projectile vomiting** during the past 2 days.
• Otherwise healthy, born at term, no prior surgeries, takes no medications, makes 3-4 wet diapers per day.
• Physical Exam: Well-developed & non-toxic appearing, abdomen is soft, non-tender, no palpable masses felt.
Differential Diagnosis of Neonatal and Pediatric Vomiting

- Pyloric Stenosis
- Malrotation with Volvulus
- Intussusception
- GERD
- Intestinal atresia, stenosis, or duplication
- Foreign body
- Food protein-induced
- Infectious etiology
List of Imaging Studies

• Pyloric Stenosis Ultrasound
• Fluoroscopy Upper GI Series
• CT Abdomen Pelvis W Contrast
Pyloric Stenosis Ultrasound (Long Pylorus)
Pyloric Stenosis Ultrasound (Long Pylorus)

Stomach
Thickened Pylorus
Pyloric Stenosis Ultrasound (Long Pylorus)
Pyloric Stenosis Ultrasound (Long Pylorus)

Stomach

Thickened Pylorus (15 mm in length)
Pyloric Stenosis Ultrasound (Long Pylorus)

Stomach

Thickened Pylorus
(4.2 mm muscle wall)
Pyloric Stenosis Ultrasound (Transverse Pylorus)

Thickened Pylorus (4.2 mm muscle wall)
Pyloric Stenosis Ultrasound Formal Read

• Pyloric muscle thickening, with a single muscular wall measuring up to 4.2 mm. The channel measures approximately 15 mm in length.

• Fluid did not pass from the stomach into the proximal small after administration of Pedialyte. The muscle thickness persisted.
Patient Treatment and Outcome

• Patient underwent pyloromyotomy – pyloric muscle is divided down to the submucosa.
  • Operation is curative and has a very low morbidity

• Patient developed intermittent episodes of vomiting and umbilical draining 2 days s/p surgery. Suspected surgical leak.
Upper GI Fluoroscopy

- Stomach
- Duodenum
- Contrast
Contrast filled the distal stomach. Contrast was slow to pass through the pylorus. No extraluminal contrast was visualized to suggest leak. The stomach and duodenum appear normal position. The duodenojejunal junction is in normal position.
Patient Outcome

• Found to have fascial dehiscence of umbilicus after draining
  • Multiple exploratory laparotomies performed

• Subsequently patient received a CT Abdomen & Pelvis with contrast for abdominal distension s/p multiple exploratory laparotomies.
Multiple dilated fluid filled small bowel loops in the left hemiabdomen (yellow arrows) without discrete transition point. Possibly ileus versus partial small bowel obstruction.

Area loculated fluid in the right upper quadrant, inferior to the pylorus, may demonstrate subtle rim enhancement (red arrows). Concerning for possible intra-abdominal abscess/phlegmon.
Patient Outcome

• Found to have intraabdominal abscess
  • Interventional radiology drain placement
  • Currently on broad-spectrum antibiotics

Ultrasound image showing hyperechoic needle (yellow arrows) advancement into the intraabdominal abscess (red arrows).
Initial Imaging in Suspected Pyloric Stenosis

- ACR Appropriateness

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>US abdomen (UGI tract)</td>
<td>Usually Appropriate</td>
<td>0</td>
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<tr>
<td>Fluoroscopy upper GI series</td>
<td>May Be Appropriate</td>
<td>TextEditingController</td>
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<tr>
<td>Radiography abdomen</td>
<td>Usually Not Appropriate</td>
<td>0</td>
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<tr>
<td>Fluoroscopy contrast enema</td>
<td>Usually Not Appropriate</td>
<td>0</td>
</tr>
<tr>
<td>Nuclear medicine gastroesophageal reflux scan</td>
<td>Usually Not Appropriate</td>
<td>0</td>
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</tbody>
</table>
Imaging Findings in Pyloric Stenosis

• Ultrasound
  • Hypertrophied muscle is hypoechoic with hyperechoic central mucosa
  • Diagnostic measurements:
    • Pyloric muscle thickness >3 mm
    • Length (longitudinal measurement) >15-17 mm
    • Pyloric volume >1.5 cm³
    • Pyloric transverse diameter >13 mm

• Fluoroscopy
  • Delayed gastric emptying
  • Peristatic waves (caterpillar sign)
  • Elongated pylorus with a narrow lumen
Sonographic Signs of Pyloric Stenosis

• Antral Nipple Sign
  • Pyloric mucosa protruding into the gastric antrum

• Cervix Sign
  • Indentation of pylorus into the fluid-filled antrum

• Target Sign
  • Hypertrophied hypoechoic muscle surrounding echogenic mucosa

Sample ultrasound image demonstrating the antral nipple sign and cervix sign.
UNC Top Three

• If suspicious for hypertrophic pyloric stenosis, obtain a pyloric ultrasound.

• Diagnostic measurements of pyloric stenosis include pyloric muscle thickness > 3 mm, pyloric longitudinal length > 15-17 mm, pyloric volume > 1.5 cm³, and pyloric transverse diameter >13 mm

• Specific imaging findings may be associated 3 signs: antral nipple sign, cervix sign, and target sign.
References


• Amini, B., O'Shea, P. Pyloric stenosis. Reference article, Radiopaedia.org. (accessed on 15 Sep 2022) https://doi.org/10.53347/rid-1941


• Gaillard, F., Glick, Y. Target sign (pyloric stenosis). Reference article, Radiopaedia.org. (accessed on 16 Sep 2022) https://radiopaedia.org/articles/2147