Malrotation and Volvulus in Adults

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Case Presentation

HPI: Pt is a 19 yo male who presented with RLQ abdominal pain x 1 day. Denies n/v, fever, changes in appetite or bowel habits. No similar previous episodes.

PMHx/PSHx: None
Meds: None
NKDA
SocHx/FHx: denies
Case Presentation

PE: 99 122/78 63 100%

Alert and oriented, NAD
S1S2 RRR

Clear chest

Soft abdomen, nondistended. RLQ tenderness without rebound or guarding
Case Presentation

Laboratory Work

![Graphical representation of laboratory results.](./images/laboratory_results.png)
CT scan
CT Scan

- Reversal of SMA and SMV
- Colon on the left side, small bowel on the right
- Tubular fluid filled structure in anterior abdomen just left to the midline with 2 appendicolith (~1.3cm)

DX: Appendicitis with malrotation
Case Presentation

OR: - Exploratory laparotomy, appendectomy via midline epigastric incision
Path: Mainly periappendicitis with fecolith.

POD#1: + flatus, tolerated diet, D/C home
Case Presentation

POD #5: Pt presented to ED with persistent nausea and bilious vomiting x 3 days. Constipation since surgery. No fever, pain.

PE: 98.6  127/83  98  98%
+ normal BS, well healed incision, soft nondistended nontender abd
Case Presentation

Laboratory Work

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Case Presentation

CT scan: GI malrotation with stomach and proximal small bowel dilated – VOLVULUS

NGT inserted with return of bilious content

Resuscitated
Case Presentation

OR for Exploratory laparotomy, Ladd’s procedure via RUQ transverse incision

1. Entire small bowel eviscerated – dusky distended SB and congested mesentary
2. Root of the mesentary inspected – untwisted 180 degrees
3. Appendectomy site inspected
4. Adhesion bands lysed along the duodenum medially and laterally
5. Normal pink color of the small bowel noted
6. SB returned to the right side and colon to left side with mesentary opened down the midline
Case Presentation

POD #1-2: NPO, NGT, awaiting bowel function
POD #3: + flatus, NGT discontinued
POD #4: +BM and flatus, started diet
POD #5: tolerated regular diet, discharged home
Questions?
Malrotation and Volvulus

Malrotation: abnormalities of intestinal position and attachment.
- nonrotation; incomplete rotation, reverse rotation

Volvulus: Twisting of bowel around the axis of the superior mesentary artery
Epidemiology

Incidence: 1 out of 500 live births; also found in 0.2 – 1% of autopsies

- many cases discovered during laparotomy or work up for other entities

Symptomatic malrotation: 75-90% of cases occur <1 year of age, 50-64% <1 month, 25-40% within one week of life

Volvulus: 68-71% occur as neonates; 2:1 male to female ratio during 1st wk of life but equalizes after one year
Embryology

Stage I
- 6th – 10th week of gestation
- GI tract lengthens, leaves the abdominal cavity and herniates into umbilical cord
- 90 degree counterclock rotation and return of bowel into abdominal cavity

Disruption in Stage I – Omphalocele
Embryology

Stage II
- 11th Week of gestation
- further counterclockwise rotation within the abdominal cavity
  completing 270 degree rotation

Disruption in Stage II – malrotation, reverse rotation, nonrotation
Embryology

Stage III
- Fusion and anchoring of mesentery
- Cecum descends to RLQ
- Ascending and descending colon attaches to the posterior abdomen

Disruption in Stage III – unattached duodenum, mobile cecum
## Symptoms and Signs

<table>
<thead>
<tr>
<th>Neonates</th>
<th>Older Children/Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilious vomiting</td>
<td>Chronic vomiting, nonbilious</td>
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<tr>
<td>Upper abdominal distention</td>
<td>Intermittent colicky pain</td>
</tr>
<tr>
<td>Hypovolemia</td>
<td>Diarrhea/constipation</td>
</tr>
<tr>
<td>Bloody stool</td>
<td>Malnutrition</td>
</tr>
<tr>
<td>Shock, peritonitis</td>
<td>*</td>
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*Chronic symptoms can lead to delay in diagnosis.*
Diagnostic Tests

• Plain radiograph may or may not be helpful

• Upper GI series can delineate the course of duodenum and locate Ligament of Treitz in its abnormal position
  – Bird beak sign
  – Corkscrew sign
  – Abnormal duodenum shape with jejunum not crossing midline
Diagnostic Tests

• Ultrasound is not very useful in setting of malrotation. However it can reveal abnormalities of mesenteric vasculature

• CT scans can demonstrate presence of SBO, transition points, relationship of SMA and SMV, location of small bowel and colon, “WHIRLING SIGN”
Imaging Tests

Birdbeak sign

Corkscrew

WHIRL SIGN
Treatment

- Symptomatic patient regardless of age found to have malrotation must undergo Ladd’s procedure
  - Division of Ladd’s bands
  - Detorsioning of midgut volvulus
  - Appendectomy
  - Widening of the mesentery base
Treatment

• Asymptomatic, incidentally found malrotation is recommended to be corrected surgically.
  – Before advent of parenteral nutrition, mortality of volvulus was 23-33%.
  – Currently, it ranges from 3% to 9%.
  – Risk of mortality increases 25x with presence of necrotic bowel.
Treatment

• There are no predictors for developing volvulus with ischemia and surgery remains to be the only solution as corrective measure.
• Although rare now, with advanced imaging, vague chronic symptoms in adults can lead to devastating ischemic bowel and death.
• Benefits and risks should be weighed individually.
Conclusions

• Understanding of embryology and anatomy is important in identifying malrotation.

• Symptomatic intestinal malrotation and volvulus is rare condition in adult population.

• High index of suspicion should be followed with prompt work-up and treatment.

• The goal is to prevent any non-reversible ischemic injury to the bowel.
References

• Dassinger M, Smith S. Coran: Pediatric Surgery 7th Edition
• Parish A, Cuffari C: Intestinal Malrotation. www.eMedicine.com
www.downstatesurgery.org

QUESTIONS?