Less is More: Current Management of Reflux and Hernias in Neonates

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NO DISCLOSURES
Objectives

Gastroesophageal Reflux
- Assessment
- Operative considerations (min dissection, loose floppy wrap, speed)
- Outcomes

Inguinal Hernias
- Assessment
- Operative considerations (premies, cord injury stats)
- Outcomes

GASTROESOPHAGEAL REFLUX
How Does Reflux Work?

Opening Mechanisms

Closing Mechanisms

Clearance

Mucosal Resistance
### Opening Mechanisms
- Intra-abdominal pressure
- Gastric volume
- Delayed gastric emptying
- Gastric contractions

### Closing Mechanisms
- Pinch cock action
- Intra-abdominal esophagus
- Angle of His
- High pressure zone

### Clearance
- Gravity
- Peristalsis

### Mucosal Resistance
- Gravity
- Peristalsis
Opening Mechanisms
- Intra-abdominal pressure
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Clearance
- Gravity
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Mucosal Resistance
- Gravity
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Reflux
Reflux - Assessment

- Clinical symptoms
  - Weight loss
  - Sandifer syndrome
  - Desaturations/Aspiration/Laryngospasm
  - Bilious/non bilious
  - Formula? When suctioned

- Imaging (UGI)
- pH probe/DeMeester scoring
  - Measure of esophageal exposure to pH<4

- Impedance probes
  - Measures exposure in setting of medical therapy

Pre-op Evaluation Variable...and Doesn’t Correlate with High ARS Volume
Reflux – Operative Considerations (Adults)

• “An Analysis of Operations for Reflux Disease: Identifying the Important Technical Elements”
  – Reduce hiatal hernia
  – Complete mobilization of GE junction
  – Tighten hiatus
  – Divide short gastrics
  – Appropriate length and tightness of wrap
  – Posterior fixation of wrap
  – Coronal fixation of wrap


Reflux – Operative Considerations (Infants)

**Adults**

• Reduce hiatal hernia
• Complete mobilization of GE junction
• Tighten hiatus
• Divide short gastrics
• Appropriate length and tightness of wrap
• Posterior fixation of wrap
• Coronal fixation of wrap

**Infants**

• Reduce hiatal hernia
• Complete mobilization of GE junction
• Tighten hiatus
• Divide short gastrics
• Appropriate length and tightness of wrap
• Posterior fixation of wrap
• Coronal fixation of wrap
Regional Variation in Anti-Reflux Procedures

South and West have OR >2x Northeast for receiving ARP

Reflux – Length and Diameter of Wrap

Effective Nissen Fundoplication Length and Bougie Diameter Size in Young Children Undergoing Laparoscopic Nissen Fundoplication

By Daniel J. Ostlie, Kelly A. Miller, and George W. Holcomb III
Kansas City, Missouri

• Appropriate length: 2cm
• Appropriately calibrated bougie

Table 1. Recommended Bougie Size for Esophageal Calibration According to Patient Weight

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Bougie Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5-4.0</td>
<td>20-24</td>
</tr>
<tr>
<td>4.0-6.5</td>
<td>24-29</td>
</tr>
<tr>
<td>6.5-7.0</td>
<td>29-32</td>
</tr>
<tr>
<td>7.0-8.5</td>
<td>32-34</td>
</tr>
<tr>
<td>8.5-10.0</td>
<td>34-36</td>
</tr>
<tr>
<td>10.0-15.0</td>
<td>36-40</td>
</tr>
</tbody>
</table>

Reflux – Operative Considerations (Infants)

- Insert clips of video
  - Highlight: minimal dissection of hiatus
  - Lack of crural stitches
  - Speed
  - Small working space
  - Considerations for congenital heart disease (big liver, balance of $O_2/CO_2$)

Reflux – Outcomes with Max/Min Dissection

RCT: Maximum vs Minimal Dissection

Take home message:
- Transmigration 30% vs 8% ($P=0.0020$)
- Re-operation 18% vs 3% ($P=0.006$)
Fundoplication Volume

INGUINAL HERNIAS
Children's Healthcare of Atlanta | Emory University

Hernias - Assessment

- Kids' Inpatient Database
- 3% inguinal hernias in premature infants
- 16% incarceration rate
  - 11% < 36 weeks EGA
  - 9% at 36-39 weeks EGA
  - 21% >40 weeks EGA
- Supports idea of repair prior to discharge


Children's Healthcare of Atlanta | Emory University

Hernias – When is the best time to repair?
Hernias – Operate early or wait?

Does timing of neonatal inguinal hernia repair affect outcomes?

Jason P. Sulkowski 1, Jennifer N. Cooper 2, Eileen M. Doggan 3, Ozlem Balci 3, Seema P. Anandalwar 4, Martin L. Blakely 4, Kurt Heiss 5, Shawn Rangel 6, Peter C. Minneci 7, Katherine J. Deans 7

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6 Department of Pediatric Surgery, Children’s Hospital of Los Angeles, Los Angeles, CA
7 Department of Pediatric Surgery, Children’s Hospital of Pittsburgh, Pittsburgh, PA

Significant variability between hospital systems

Delayed: sicker, more congenital anomalies

Early:
- 2.3% incarceration
- 8.1% reoperation

Delayed:
- 9.5% incarceration
- 3.2% reoperation

COULD THERE BE A BETTER WAY?

Laparoscopic Inguinal Hernia Repair

- Inferior Epigastric A.
- Gonadal A.
- Vas Deferens
Hernias – Open vs. Laparoscopic

- Unilateral: no difference; Bilateral: laparoscopic faster
- Recurrence rate: no different (follow up limited for lap)
- Post-op complications: higher for open (wound infection, hydrocele, iatrogenic cryptorchidism, testicular atrophy)


Operative Considerations – “Burnia”

- Girls only, quick operative times, no increased recurrence at 2 years

Less is More...

**REFLUX**
- Fewer fundoplications
- Less hiatal dissection
- Fewer re-do’s
- Less objective data is a motivation for more objective criteria

**HERNIA**
- Early: less incarceration
- Late: less recurrence
- Laparoscopic approach
- “Burnia” alone?

QUESTIONS?

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### APSA Position Paper on Laparoscopic Antireflux Operations in Infants and Children for GERD


- Reviewed literature comparing laparoscopic to open antireflux operations to date
- Professional Association Position on four main topics
  - Indications
  - Comparison of lap vs. open
  - Operations in NI vs non-NI children
  - Learning curve

### Indications
- No difference in indications for laparoscopy vs open
- No prospective randomized control trials comparing long-term medical management to surgery
APSA Position Paper on laparoscopic antireflux operations in infants and children for GERD

• Laparoscopic vs. Open Fundoplication
  – Operative time longer
  – Shorter time to start feeding
  – Decreased length of stay
  – Initially higher reoperative rate after laparoscopy
  – No difference in type of wrap
  – No literature to prove that there are less pulmonary complications after laparoscopy

• Neurologically impaired vs. neurologically normal children
  – No literature comparing lap vs. open
  – Pts. with wretching preoperatively have higher rates of wrap disruption
  – Mortality is higher in NI children and usually due to secondary causes
APSA Position Paper on laparoscopic antireflux operations in infants and children for GERD

- Learning curve
  - Anywhere between 25 and 50 cases
  - Operative times steadily decrease
  - Intraoperative complications also decrease