Medical Treatment for GERD in Children

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LAST Resident Debate
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OVERVIEW

• Gastroesophageal reflux
• Pathophysiology of reflux
• Manifestations of reflux
• Complications of reflux: GERD
• Management of GERD
Gastroesophageal Reflux

- Reflux = passage of gastric contents into the esophagus
- Presents with regurgitation or “spitting up” in infants
- Incidence may be as high as 15% in adolescents with sx similar to adults
- Occurs daily in healthy thriving infants:
Where’s Nydam?
Gastroesophageal Reflux

- HPZ at GE junction
- Theoretical LES
  - $< 5$ mm Hg = reflux
  - $\sim$ no reflux $\geq 30$ mm Hg
- Length of intra-abdominal esophagus
  - $\geq 3$ cm $< 20\%$ reflux
  - $\leq 1$ cm $80+\%$ reflux
- Diaphragm contribution
  - Crural “pinch” mechanism correlates with LES peak pressure
  - $>\text{ during inspiration}$
Gastroesophageal Reflux

- Passage of acidic gastric contents into esophagus
- Injury to esophageal mucosa
- Leads to GERD
MANIFESTATIONS OF GERD
MANIFESTATIONS OF GERD: INFANTS

- Regurgitation or chalasia
- Post-prandial irritability
- Failure to thrive due to poor feeding; ? Painful swallowing
- Sandifer’s syndrome abnormal posturing due to GER
### Extra-esophageal Manifestations of GER

<table>
<thead>
<tr>
<th>Pulmonary</th>
<th>ENT</th>
<th>Others</th>
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<tbody>
<tr>
<td>• Asthma</td>
<td>• Cough</td>
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**Pulmonary**
- Asthma
- Bronchitis
- Bronchiectasis
- Pulmonary fibrosis
- COPD
- Pneumonia

**ENT**
- Cough
- Laryngitis
- Hoarseness
- Pharyngitis
- Vocal cord granuloma
- Otitis media

**Others**
- Dental
- Chest pain
- Sleep apnea
## Complications of GERD

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<tr>
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<td>FTT</td>
<td>Dental</td>
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<td>Anemia</td>
<td>Pulmonary</td>
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<tr>
<td>Barrett’s</td>
<td>Difficult feeding</td>
<td>ENT</td>
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<td>Adenocarcinoma</td>
<td>Poor quality of life</td>
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Management of GERD

• Medical
  – Lifestyle changes
  – Positioning
  – Thickeners
  – Pro-motility agents
  – Antacids
  – Acid Suppression therapy

• Surgical: anatomic approach
  – Restoration of intra-abdominal esophagus
  – Fundoplication strengthening of HPZ at LES
  – Approximation of crura
Lifestyle Modifications

• Weight reduction

• Avoid eating before bed

• Avoidance of tobacco, spicy foods, caffeine, alcohol chocolate & mints

• 20-30% response reported in adults. Better than placebo
Positioning

- Supine & lateral positions increase GER
- Prone and reverse-Trendelenberg reduce GER
- Chalasia chairs and variety of devices
- NO proven efficacy but make parents feel better
Thickeners

- Milk thickeners reduce chalasia in infants
- Cornstarch thickeners may reduce esophageal acid exposure time
- Majority of agents have questionable benefit i.e. largely cosmetic
Pro-kinetic Agents

- Dopamine antagonists, increase cholinergic tone and intestinal smooth muscle contraction
- Increase tone of LES
- Increase esophageal peristalsis
- Increase gastric emptying
- Available agents (reglan, cisapride) have high incidence of adverse events in children or are off the market
Metoclopramide, thickened feedings and positioning for GERD in children under two years.

- Craig et al. Cochrane Database Syst Rev 2004:18;CD003502
  - 20 trials; 771 children
    - 8 studies: thickened feedings
    - 5 studies: positioning
    - 7 studies: reglan
Craig et al. Reglan, thickeners and positioning

- **Thickeners**
  - No effect on acid reflux
  - Improved regurgitation scores
- **Positioning**
  - No objective effect (NOT justifiable)
- **Reglan/Cisapride**
  - Improved regurgitation scores
  - Decreased acid reflux
  - High incidence of adverse events
  - Cisapride withdrawn from the market
Antacids

- Limited experience reported in children
- May have some efficacy in mild GERD
- Have significant effects on bone metabolism in growing children
- Not generally used in children
Acid Suppression Therapy

Actions of Gastrin
(on acid secretion)

- H+ Cells
- Ach
- Histidine
- Gastrin
- D cell
- Ach
- Vagus nerve (CN X)
- Capillary bed

Gastric Lumen

Zantac

Prilosec OTC
**Histamine Antagonists**

- Inhibit histamine stimulated production of acid
- Acid secretion begins to rise 30 minutes following dose
- Rapid development of tachyphylaxis/tolerance
- Limited data in children
Proton Pump Inhibitors

• Inhibits secretion of acid by parietal cell proton pump

• Excellent relief of symptoms, esophagitis and complications of GERD

• Mainstay of GERD therapy with proven efficacy in adults and children
Updated Guidelines for the Diagnosis and Treatment of GERD.

• DeVault et al. Am J Gastroenterology 2005:100;190-200

– 33 RCT trials; >3000 patients
  • Placebo 24-27% reduction of symptoms/esophagitis
  • 50-60% with Histamine antagonists
  • 80-85% with PPIs
Trevor Nydam, Alice in Bucketland, Eldorado Canyon, 9/2005
Are they really comparable?

  - 27 children aged 1-11 years
    - 76% symptoms improved to baseline
    - All 27 had documented healing of esophagitis by 8 weeks
Omeprazole for chronic erosive esophagitis in children: a multicenter study of efficacy, safety, tolerability and dose requirements.


  - 57 children aged 1-16 years
    - 95% esophagitis healed at follow-up endoscopy
    - Reflux symptoms improved in 100%
Efficacy and safety of lansoprazole in adolescents with asymptomatic erosive and non-erosive GERD.

  - 87 children aged 12-17 years
    - 95% healing of esophagitis by 8th week
    - 75% reduction in symptoms for non-erosive
    - 100% reduction in symptoms for erosive disease
The Surgical Approach

- Increase length of intra-abdominal esophagus
- Closure of hiatus to augment crural mechanism
- Augmentation of the angle of His
- Nissen fundoplication is the mainstay
- Laparoscopic vs. open also debatable
The value of 24-hr pH study in evaluating the results of laparoscopic anti-reflux surgery in children.

  - 53 patients underwent laparoscopic fundoplication monitored with endoscopy and pH studies post-op
    - 18 normal patients, 67% had no complaints, 33% had endoscopic evidence of operative failure
    - 37 neurologically impaired, 40% had endoscopic evidence of operative failure
    - Mortality rate of 4% (n=2)
The surgical management of GERD in children: a combined hospital study of 7467 patients


- Retrospective review >7000 charts via questionnaire
  - “excellent” long term results in 95% of neurologically normal children & 85% neurologically impaired
  - 40% of children <1 year of age
  - Outcomes “Excellent” & “good” not defined
  - Minimal endoscopic follow-up
  - Only 12% had esophagitis
  - Indications for surgery unclear
The first decade’s experience with laparoscopic Nissen fundoplication in infants and children.

  
  - 1048 patients underwent laparoscopic fundoplication
    - Very low complication rate 4%
    - Recurrence rate of GERD 3.1%
    - Ages ranged from 5 days to 18 years: no mean age or median age reported
    - Follow-up: “pts instructed to contact the office if they had any problems with their wrap” (Objective)
    - Only first 30 patients had endoscopic follow-up
Comparison of medical and surgical therapy for complicated GERD in veterans.

  - 247 VA patients
    - Both medical and surgical treatment effective in reducing esophagitis scores
    - At 2 years improved esophagitis scores in surgical vs. medical
Long-term outcome of medical and surgical therapies for GERD: Follow-up of a randomized control trial.

  - 239 patients
    - 92% of medical patients vs. 62% of surgical patients still using anti-reflux medications
    - Off medication reflux symptoms were less in the surgical group after one week
    - No difference in esophagitis scores by endoscopy, frequency of need for treatment of esophageal strictures, or rates of adenocarcinoma
    - Survival reduced for surgical patients rr 1.57(95%; 1-2.5)
Summary

• GERD is self limiting in the majority of infants and can be managed medically

• Mild or moderate GERD can be managed effectively with medication in infants and older children

• Proton pump inhibitors are safe and efficacious for the treatment of refractory GERD

• Outcomes for long term PPI therapy in children and adolescents as well as adults are unknown
Summary

• The prospect of a surgical cure for GERD is attractive

• A curative operation with few adverse effects would be preferable to a lifetime of medication

• No long term data available in children

• Anti-reflux operations are not curative in adults. Over half of patients are taking medication at 5 years

• The indications for surgery in children and adults needs to be better defined

• Future studies in children should address more objective (i.e. endoscopic evaluation) measures of outcomes
Conclusions

• Medical management of GER is superior to surgery for the majority of patients with GERD

• Surgical intervention with its concomitant risk of morbidity, mortality and failure should be reserved for those patients with severe refractory GERD or in children with recurrent life threatening aspiration due to reflux
A 32-year-old Denver man who was missing in Rocky Mountain National Park has been found. Park rangers found Trevor Nydam Saturday night during near whiteout conditions. Authorities say Nydam was last seen by his partner early Saturday morning in the Chasm Junction area. He split off from his partner and went out on the climb on his own. A search was launched when he didn't show up at a designated meeting place. Nydam had mountaineering boots and crampons with him, but no snowshoes or overnight gear. He was found near Mount Lady Washington. "It took longer than expected and I was doing everything I could to get down in time," Nydam said. "I certainly didn't want it to turn into a big production, but they were doing their job and they did it well." Nydum was a little dehydrated, but otherwise ok, he said. The snowy conditions put him behind schedule. Rescuers at Rocky Mountain National Park are asking Nydam to follow up with them Sunday.