Fussy infants
Frantic parents
Frustrated providers
A case-based approach to managing infant fussiness

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Pediatric Gastroenterology
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Objectives

- Common GI causes of infant fussiness
- Diagnosis
- Management
Disclosures

- None
Case 1: “My baby has reflux”

– Excessive fussiness
– Excessive spit up
– Posturing
– Coughing/choking/gagging
– Poor feeding/growth
– Hypervigilance
– Post partum depression
Case 1: “My baby has reflux”

- Happy baby with excessive spit up
- Exam and vitals: perfect
- Growth: perfect
- Diagnosis: benign reflux
- Parents want to know why their baby spits up so much.
Infant reflux is due to:

A. Excessive stomach acid
B. Increased gastric emptying
C. Reduced tone of the lower esophageal sphincter
D. Inappropriate relaxation of the lower esophageal sphincter
Pathophysiology
Case 1: “My baby has reflux”

- Happy baby with excessive spit up
- Exam and vitals: perfect
- Growth: perfect
- Diagnosis: benign reflux
- Parents want to know conservative measures they can take
Which is best position?

A. Prone
B. Supine
C. Left side down
D. Right side down
E. Doesn’t matter
Position

- Upright
- Prone (tummy time)
- Reassurance
  - Invest in burp clothes
Other ways to decrease spit up?

A. Stop breastfeeding
B. Thickened feeds
C. Smaller more frequent meals
D. Back patting to promote burping
E. Start smoking
Case 2: “My baby has reflux”

- Fussy baby, excessive spit, back arching, difficulty with feeding
- Exam and Vitals: normal (screaming)
- Growth: perfect
- Diagnosis: GERD?
What’s the next best test to diagnose GERD?

A. History and physical exam
B. Trial of acid suppression
C. Imaging study (UGI series or abdominal US)
D. Impedance or pH monitoring
Impedance monitoring

- Proximal pH-monitoring
- Distal pH-monitoring

Monitoring device: records pH in esophagus
pH
What’s a normal amount of GE reflux for a baby (in 24 hrs)?

A. 0 – 5
B. 5 – 10
C. 10 – 20
D. 20 – 30
E. >30
Impedance detected reflux

• Lopes-Alonso et al. 2006
  – 21 asymptomatic preterm neonates

• Mousa et al. 2014
  – 117 infants (0–12 months)

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>95%</th>
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<tbody>
<tr>
<td>Preterm neonates</td>
<td>71</td>
<td>101</td>
</tr>
<tr>
<td>Infants</td>
<td>54</td>
<td>93</td>
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</tbody>
</table>
Case 2: “My baby has reflux”

• Fussy baby, excessive spit, back arching, difficulty with feeding
• Exam and Vitals: normal (screaming)
• Growth: perfect
• Diagnosis: GERD?
What’s the likelihood that GE reflux is causing the fussiness?

A. 0%
B. 15%
C. 50%
D. 85%
E. 100%
Temporal Association Between Reflux-like Behaviors and Gastroesophageal Reflux in Preterm and Term Infants.

Reflux $\rightarrow$ Symptoms?

Acid $\rightarrow$ Symptoms?
Fussy infants
N = 60

Esophagitis
Excessive Acid
N = 30

Omeprazole
N = 15

Placebo
N = 15

1) Acid Exposure
2) Crying

## Acid Suppression

<table>
<thead>
<tr>
<th>Medication</th>
<th>Control</th>
<th>Better than Placebo?</th>
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</thead>
<tbody>
<tr>
<td>Omeprazole 1, 2</td>
<td>Placebo</td>
<td>No</td>
</tr>
<tr>
<td>Lansoprazole 3, 4</td>
<td>Placebo</td>
<td>No</td>
</tr>
<tr>
<td>Pantoprazole 3, 5</td>
<td>Placebo</td>
<td>No</td>
</tr>
<tr>
<td>Esomeprazole 3, 6, 7</td>
<td>Placebo</td>
<td>No</td>
</tr>
<tr>
<td>Rabeprazole 8</td>
<td>Placebo</td>
<td>No</td>
</tr>
</tbody>
</table>

8) Hussain et al. JPGN, 2014
GERD

Something else

GER
Case 3: “My baby has reflux”

- 2 month with screaming, lots of spit up/vomit
- Exam: screaming; eczema
- Growth: so-so but good enough
- Family history atopy
- You suspect milk protein allergy.
Next step?

A. Perform allergy testing
B. Remove milk from mom’s diet (infant is exclusively breastfed)
C. Change to soy formula
D. Change to milk protein hydrolysate formula
E. Change to amino acid formula
Milk protein allergy

- Nonspecific
- Common $^{1,2}$
  - 5% (ish)

## Diagnosis

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
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<tbody>
<tr>
<td>Parent Report</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>RAST</td>
<td>45</td>
<td>87</td>
</tr>
<tr>
<td>Skin prick</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>Patch</td>
<td>25</td>
<td>92</td>
</tr>
</tbody>
</table>

Milk protein allergy

- Nonspecific
- Common
  - 5% (ish)
- Allergy testing
  - Non-sensitive or specific
- 10 - 15% overlap with soy\(^1\)
- Dairy exclusion\(^2\)
  - 2-3 weeks

Case 4: “My baby has reflux”

- 2 month with screaming; not spitting
  - More than 3 hours per day
  - More than 3 days per week
- Exclusive amino acid formula failed
- Exam: screaming
- Growth: perfect
- Diagnosis: colic
- Reassurance
- Parents want medicine
What’s your next step?

A. Zantac
B. Proton pump inhibitor
C. Gripe water
D. Gas drops
E. Probiotic
Colic

• Causes
  – Incomplete carbohydrate absorption
  – Migraine
  – Serotonin
  – Microbiome
Microbiome in colic

De Weerth, et al. 2013
Microbiome in colic

Microbiome in colic

Inflammation?

Probiotic for colic
L. reuteri for colic

Study ID | Mean difference (95% CI) | % Weight
---|---|---
Savino et al 2010 | -125.00 (-171.98, -78.02) | 3.00
Savino et al 2007 | -66.80 (-78.41, -55.19) | 19.60
Szajewska et al 2013 | -55.20 (-60.16, -50.24) | 27.75
Sung et al 2014 | 11.00 (-78.62, 100.62) | 0.89
Mi et al 2015 | -55.10 (-59.26, -50.94) | 28.53
Overall (I-squared = 77.1%, P = 0.001) | -55.84 (-64.41, -47.26) | 100.00
Common infant formulations

- Lactobacillus reuteri
  - Biogaia
  - Gerber Soothe
- Bio-Kult (UK)
- Ultimate flora baby
- Formulas
Safe?

• Yes
Case 5: “My baby has reflux”

- 3 month old presents to ER with ALTE/BRUI
- Exam and vitals: normal
- Admitted to hospital
  - Normal labs, urine
  - Normal CXR
  - Normal EKG
Next best test?

A. EEG
B. UGI series
C. Swallow study
D. Impedance
Oropharyngeal Dysphagia Is Strongly Correlated With Apparent Life-Threatening Events

Duncan, Daniel R.†; Amirault, Janine†; Mitchell, Paul D.†; Larson, Kara‡; Rosen, Rachel L.†

<table>
<thead>
<tr>
<th></th>
<th>EKG</th>
<th>CXR</th>
<th>EEG</th>
<th>VFSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (n) of patients tested</td>
<td>70% (131)</td>
<td>64% (120)</td>
<td>18% (33)</td>
<td>29% (55)</td>
</tr>
<tr>
<td>% (n) abnormal</td>
<td>3% (4)</td>
<td>5% (10)</td>
<td>12% (4)</td>
<td>72% (40)</td>
</tr>
</tbody>
</table>

EKG = electrocardiogram; CXR = chest X ray; EEG = electroencephalogram; VFSS = video fluoroscopic swallow studies.
“My baby has reflux”

- Non-reassuring signs
  - Labs, urine
  - Sweat test
  - Abd US; UGI series
  - MBS
  - Constipation? BA, RSB, manometry
  - Head imaging
“My baby has reflux”

- Reassurance
- Screen for post partum depression
- Conservative measures
  - Thickened feeds
  - Position
- Milk protein exclusion
- Probiotic
- Acid suppression
Thanks