Reflux, GERD and Breastfeeding

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Disclosure: I am the author of textbooks and receive royalties on their sales.

Overview
• Regurgitation is common in infants
• Symptomatic GERD is rare in infants
• Irritability is associated with feeding problems or allergy
• Management changes can improve feeding related irritability
• Pharmacological GERD treatments are unproven in infants

GER
• Passive
• Involuntary
• Relaxation and opening of LES

Vomiting
• Active
• Emetic reflex
• Gastric and duodenal contents
• Peristalsis

Infant susceptibility to GER
• Shorter esophagus
• Lower tone LES
• Body position
• Liquid feeds

Natural Evolution of Regurgitation in Healthy Infants
• N=163, 80% retention to 1 yr, prospective
• Parental education and ebf promotion
• Indonesia
• Regurgitation (effortless) vs vomiting (force)
• Mothers kept diary one week of each month - regurgitation, vomiting, feeding refusal, back arching, irritability.
Hegar et al results
• 80% of infants regurgitated daily at 1 mo
• 10% regurgitated at all at 1 year
• Exclusively bf infants less likely to regurgitate
• Transient reduction in weight gain in mixed fed infants who vomited >4x/d
• Only mixed fed infants (n=11) had severe symptoms that required drop out for tx

Natural History of Reflux
Infant GER Questionnaire Revised (I-GERQ-R) scores declined from 1 through 6 mos
128 healthy infants
no significant differences between predominant bf and ff
note colic as potential confounder
Van Howe and Storms BMC Pediatrics 2010, 10:7
Gastroesophageal reflux symptoms in infants in a rural population: longitudinal data over the first six months.

Natural History of Reflux
Italy, 313 consecutive infants with (ROME II) regurgitation (surgery, flt, feeding or swallowing disorders excluded) 1/3 lost to follow-up
Breastfed infants recovered sooner (8.2 vs 9.6 mos)
Children of atopic parents had greater I-GERQ scores
By age 2, all vomiting resolved; one dx esophagitis and one CMP intolerance. Recc eval spitting >18 mos
TX - 72% education (small freq feeds, burping, positioning, reassurance) 3% domperidone, 6% thickening, antacids
Campanozzi et al Pediatrics Vol. 123 No. 3

Happy spitters

Uncomplicated GER
Good growth, not irritable
• Reassure and educate:
  - Grow out of regurgitation
  - Small, frequent feedings
  - Burping/pacing feeding
  - Holding upright after feeding

Measuring Reflux
• Esophageal pH probe
  - Esophageal pH <4 for >15-30 seconds
  - Reflux index - percentage of time refluxing
  - In infants under 1 year, 12% is NORMAL
  - Does not detect non-acid reflux
• Multichannel impedance
  - Detects non-acid reflux
  - Distinguishes liquid, gas, mixed reflux
  - Detects height of reflux
Positioning

10 preterm infants
Esophageal impedance manometry
Fewer liquid reflux episodes and faster gastric emptying when positioned on right side for one hour after gavage feed, then moved to left side.


The worst position
Regurgitation Treatment
Campanozzi et al
small frequent feeds,
burping, positioning,
parental reassurance

GERD
• Gastresophageal reflux disease
• Reflux associated with complications
  - Esophagitis
  - Failure to thrive
  - Feeding refusal
  - Bleeding
  - Respiratory difficulties

• Hunger
• GI pain – feeding imbalance, intolerances
• Rectal bleeding
• Reflux – overfeeding, respiratory disorders
• Colic – swallowing dysfunction, gut motility, intolerances

Distress during and after feeding

When you hear hoofbeats: Think horses first
• Occam’s Razor
• growing appropriately?
• Starvation stool – scant and green

Hunger

Hyperlactation
Hyperlactation

- Infant irritability, colic, watery, green or mucousy 'explosive' stools, reflux/vomiting
- Case series
  - Livingstone 1996 (finish the first breast first)
  - Smillie, Campbell and Iwinski 2005 (right brain feeding - one breast per feed)
  - van Veldhuizen-Staas 2007 - morning pump out, then block feeding, repeat if needed with longer blocks

“Breastmilk shake” Tina Smillie

- Breast massage before feeding to trigger MER and mix fat into ‘foremilk’
- Unrestricted breastfeeding

Only block feed if the baby is growing excessively!

Conservative Treatment

- 40 infants, prospective, I-GERQ-R >16
- Primary care education intervention, 2 wks:
  FF – extensively hydrolized formula, low volume feeds, thickened (rice cereal)
  BF – maternal cow and soy elimination
- Positioning avoid sitting and supine <1hr pc
- Avoid cigarette smoke exposure
- Orenstein & McGowan (J Pediatr 2008;152:310-4)

Orenstein & McGowan, cont’d

- 78% improved
- 59% improved 5 points
- 25% normalized
- Crying, arching and regurgitation improves most

Authors advise challenge of dietary interventions after several weeks

pH buffering vs. feeding interval

- Mitchell 2001

Term stomach capacity ~20 ml

Bergman 2013
But sometimes it is a zebra

- Bryan Vartebadian (Colic Solved) – mitochondrial disorders and low gut motility
- Baby J – chromosomal deletion syndrome with dysphagia

Colic

- Sympathetic NS hyperactivation and crying increase vomiting

Douglas & Hill Medical Hypotheses 2013

The Crying Baby

- Treat health, feeding or sensory problems
- Cue based feeding
- Proximal care (carrying, cuddling, co-sleeping)

Australian Doctor 2013; 24 May 31-38

Colic and Feeding Difficulties

- Infants with colic had more feeding difficulties: disorganized suck, s:sw:br difficulty, less rhythmic suck, arrhythmic jaw movement, less responsiveness, more discomfort p.c.
- Colic group had more GE reflux events (dx by abdominal ultrasound after 2 oz sugar water)
- Reflux tracked with fussiness and poorer responsiveness during feeding

Miller-Loncar Arch Dis Child 2004;89:908–912

Colic and Feeding Difficulties

- controls recruited for study of infant feeding, sleep and behavior, 79% of cases from sleep and crying clinic (IDC of RI WCH)
- 43 infants ages 6-8 weeks
- Almost all bottle fed (2&3 bf), study required 2 bottle feedings per day for NOMAS
- Divided into colic/not colic by 3/3/3 criteria

Miller-Loncar Arch Dis Child 2004;89:908–912
Conditions associated with severe, chronic GERD

- Neurological impairment
- Congenital abnormalities of esophagus
- Cystic fibrosis
- Respiratory malformations/malacias*
- Obesity
- Family history, including esophagitis

Bharwani (2011); *Bibi (2001)

Post GI Surgery

Neurologically impaired

- Reduced muscle tone in aerodigestive tract
- Co-morbid laryngomalacia and cardiac defects

Use Supportive positioning for Down Syndrome

Down Syndrome

Laryngomalacia and Neurological impairment
Positioning for Respiratory Issues

semi-prone head extension

Postprandial semi-prone positioning

If GER impacts growth

Check swallowing function:
- Coordination of suck:swallow:breathe
- Nasal congestion
- Failure to take respiratory pauses
- Check for tongue-tie

...if GER impacts growth

Assess milk intake
- If sufficient, refer to physician for metabolic and GI workup (allergy, celiac)
- If insufficient, work on bf management

Thickeners have disadvantages

- Do not decrease reflux index
- May reduce some sx
- NEC in infants (Simply Thick, xanthan gum)
- Malabsorption – guar gum
- Obesity (rice cereal)
- Require taking baby off breast

May be necessary for extreme swallowing problems with recurrent respiratory infections
Irritability

- Reflux is an uncommon cause of irritability in young infants <3 months
- Studies show acid suppression does not impact irritability

Heine et al

- pH probe after bf or ff, gastroscopy, upper GI
- Infants < 3 mos, only one had GER, 0 had esophagitis
- > 3 mos, 10/26 had GER, 7 esophagitis
- Vomiting after most feeds = GER (pH)
- Bloody vomit = esophagitis (3) or gastritis (1)
- Sleep disturbance, back arching had no relationship with reflux height or prevalence

GERD

Reflex is only considered pathological if it is associated with esophageal mucosal injury, failure to thrive or respiratory complications (for example aspiration pneumonia, persistent wheeze, stridor, apneic episodes)


GERD? and Irritability

Heine et al Archives of Disease in Childhood 1995; 73: 121-125
- Retrospective review, infants hospitalized for irritability and presumptive GERD. N= 70 (males 1.7 to 1 female) 1-9 mos old
- 50% had been bf, most for <1 mo, 18% still predominantly bf at admission
- 50% had feeding difficulties – 28 arching, 2 crying, 2 choking, 3 feed refusal (11 FTT/ 3 on ng tube)

Heine et al

- Barium swallow – fair to poor agreement with pH probe
- Thickening and acid suppression were ineffective (all 7 infants with esophagitis were already on H2 blockers)
- “Our study suggests that pathological GOR is a cause of irritability mainly in infants over 3 months of age who present with overt regurgitative reflux.”

Feeding Refusal

Manifestation of pain or stress with feeding
- Check s:sw:br coordination
- Check respiratory function
- Rarely sensory issues
- Check family history of allergy (and infant eczema, blood or mucous in stools)
Overfeeding

Tongue tie

Difficulty Coordinating Swallowing

Dysphagia

Improving s:sw:br coordination
- Refer for evaluation/tx of tongue-tie or oral motor dysfunction
- Prone feeding positions (mom reclined)
- Head extension
- Feeding in sling or while walking
- Feeding while sleepy in sidelying
- Managing flow from breast (pressure during MER)
- Keep hands off baby’s head

Cervical Auscultation
Walking while feeding

Reducing Flow

Semi-prone feeding

Nipple shield may slow flow

Allergy and GI symptoms

- Food allergy (particularly cow milk protein) associated with GERD, constipation, anal fissure and some cases of excessive crying.

Heine Gastroesophageal reflux disease, colic and constipation in infants with food allergy Curr Opin Allergy Clin Immunol 6:220–225. 2006 (review article)
Eczema

Large dose oral exposure may provoke tolerance


Elemental Formula

• 10 ill children, chronic GERD with eosinophilic esophagitis (one infant, 8 mo old)
• All had mucous emesis (raw egg white)
• 6 weeks on neocate, apple and corn
• Resolution (8) amelioration (2)
• Biopsy demonstrated EE improvement
• Challenge revealed exacerbation with allergens: cow milk, soy, wheat, peanut, egg.


Mucous “Egg White” Emesis – T-cell mediated hypersensitivity

Food protein intolerance & distress attrib reflux esophagitis

• N=19, 14 pH probes, 1 had GERD
• 9/17 had esophagitis
• Irritability began early – 1 week (14 were still being bf) bf .5 - 63 weeks
• resolved on amino acid formula (Neocate)
• Challenge with small percentage of previously best tolerated formula, 63% relapsed, postulate T cell mediated hypersensitivity


Elimination Diet & Colic

• Tx group eliminated milk, soy, eggs, nuts, peanuts, wheat and fish. Drank supplied rice drink and fresh rice bread (funded by rice growers) 1 wk
• Control group eliminated artificial colors and flavors, drank supplied soy/dairy drink & ate chocolate granola bars (wheat).
• 74% response tx (37% control), 3hrs less crying/48h
• But 2/3 of infants still cried >360 min/48 hours

Growth is slower no matter how cow milk allergic infants are fed

- weight for age and length for age were lower in cow milk allergic children at 6, 9, and 12 mos.
- All breastfed first 4 full months
- Continued bf, soy, hydrolyzed casein or rice
- Solids controlled (poorer eaters gained less too)

Agostoni et al Growth of infants with IgE-mediated cow's milk allergy fed different formulas in the complementary feeding period Pediatric Allergy and Immunology 18 (7) : 599–606 Nov 2007

Boyle Meta-analysis n=19,000

Blood in Stools - Arvola et al

- 40 infants with rectal bleeding (67% ebf), randomized to cow milk elimination diet; 64 healthy controls
- Follow up at 1 month and 1 year
- Cow milk elimination did not reduce bleeding (only 18% had cow milk allergy)
- Persistent cow milk allergy associated with eczema and colon mucosa irritation

Rectal Bleeding in Infancy: Clinical, Allergological, and Microbiological Examination Pediatrics 2006;117:e760-e768

Arvola recommendations

- “Rectal bleeding in infants is often a benign and self-limited disorder” p. e761
- Cow milk challenge is essential for those who become symptom free during elimination trial.
**Allergic Proctocolitis**
- Blood and mucous in stool with fussiness
- Generally requires maternal and infant cow milk and soy elimination diet

www.Allergicproctocolitis.org

**Chronic Constipation as a symptom of Cow Milk Allergy**
- 21/27 infants/toddlers with constipation resolved with cow milk elimination (1 mo) and relapsed with challenge (x2)

Iacono et al J Pediatrics 126(1) 34-39, Jan 1995

**... Constipation....**
- Most had biochemical evidence of allergy
- 4 had symptoms of CMPA; 15 had family history
- 6 infants did not improve, 1 had IgE aby

Iacono et al J Pediatrics 126(1) 34-39, Jan 1995

**Chronic Constipation**
- Cell mediated food intolerance can cause chronic constipation resistant to laxatives
- Some children also had elevated IgE
- 12 month food elimination allowed tolerance and tracked patch test results
- All resolved after 24 months


**Symptoms may be causes too**
Crying, frowning, mouthing, passing gas, burping, spitting up, stridor, yawning, drooling, stretching all preceded and succeeded reflux
Hiccough, sneeze, thumb sucking, gag or cough occurred after reflux in some infants
Cry or frown (discomfort) associated with reflux in 4 infants, postulate esophagitis


**Faranchak methods**
- 10 infants 2-32 weeks old
- Apple juice feeding (pH = 4)
- Seated in car seat with minimal handling
- 2 hr pH probe split screen with videotaping behavior
- Coded behaviors occurring with and without, before and after reflux events
- 2 infants excluded for constant reflux
Feranchak, continued

- Quiet period before reflux in 40% - infant stopped crying, was quiet, refluxed, and then cried with increased intensity.
- Increased abdominal PP – cough, sneeze, cry
- Increased thoracic NP – stridor, hiccup
- LES relaxation – belching (mouthing, sucking, stretch & yawn) assoc with mylohyoid activity 43% of time

Arching

Arching with Gravity, not GOR

Sandifer’s sign – after feeds

- Dystonic torsion of head, neck, back, arms (arched back, twisted neck, lifted chin)
- Deviation of eyes
- Mouthing movements
- Baby becomes quiet during episode, may fuss afterward

Sandifer’s Sign

Confounders

- Infantile Spasm/West Syndrome
  - Flexion seizures
  - Irritability
  - Developmental regression
  - Characteristic EEG pattern
  - Delayed treatment can result in permanent brain injury

Infantile Spasms

Acid Suppression may not be helpful

“Clinical trials reveal that PPI therapy is not an effective treatment for common infant GERD-associated symptoms. Evidence supporting safety of PPI use in infants is conflicting…”

Higgenbotham, Effectiveness and Safety of PPIs in Infantile GERD. Annals of Pharmacotherapy 44(3) 2010

European Guidelines/AAP endorsed

- “Cessation of breastfeeding should not be recommended.” p. 191
- Maternal cow milk and egg elimination if sx particularly troublesome in bf infants.
- Empiric treatment with medications NOT recommended in infants.


GERD label increases parent willingness to medicate

Even when informed that acid-suppressing drugs are ineffective!
Parents given the same mechanism for crying and regurgitation without the GERD label were less interested in medicating, even if allowed to assume drugs are effective.


Prokinetics - Reglan

- Significant placebo effect, no better than placebo in blinded trials
- Significant adverse effects – neurological (irritability, dystonia, apnea) vomiting
- Evidence for use is poor


Fluids used in VFSS poorly represent infant foods

Liquid barium is 3.4 x more viscous than pre-thickened formula

“Whilst liquid barium shows some similarities to the viscosity of both hand-thickened cow and soy milk infant formulas, the considerable differences in density and yield stress show that it is not truly representative of handthickened infant formula. Consequently, behaviours seen during infant VFSS may not be representative of patterns occurring during typical feeds. Use of liquid barium may yield false-negative or false-positive results due to differences in viscosity.”

J. Cichero et al.: Rheological and Material Properties of Liquid Barium Dysphagia 26(3) 2011
Summary

Regurgitation in a thriving infant: parental education and reassurance
  small feeds
  frequent feeds
  burping
  positioning

Irritability during or after feeds
Check for: tongue-tie, feeding problems, fast flow/overfeeding, swallowing problems
Feeding modifications usually helpful

Feeding Refusal
Look for:
  Swallowing problems
  Allergy (eczema or mucous emesis)
  GERD

Questions?

Esophagitis is rare in infants under 3 months
Rectal bleeding is often due to a transient infection
Reflux treatments have low efficacy in infants
Sandifer's sign is diagnostic of GERD

For more information:
http://www.cwgenna.com/clinicalcornerpage.html