



Bringing Up Gastroesophageal Reflux in Children

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In this article:

1. Do all babies who have reflux need therapy?
2. When do infants out-grow reflux?
3. Who needs investigations for reflux?
4. What is the best test for reflux?
5. What medications are available for treating reflux?

Gastroesophageal reflux is defined as the retrograde movement of gastric contents into the esophagus. This is a normal physiologic occurrence where the event is brief, asymptomatic, and self-resolved. When there is the presence of end-organ damage and pathology related to this phenomenon, it is considered to be gastroesophageal reflux disease (GERD).

GERD has become one of the most common conditions that is referred to the pediatric gastroenterologist. It is very common in infancy with regurgitations occurring in 50% of infants in the first

three months of life. Symptoms peak at approximately four months, followed by a decline, with only 5% to 10% of infants between 10 and 12 months being symptomatic.

GERD is much less common in older children and tends to follow a pattern similar to that seen in adults. There are a myriad of different clinical presentations of GERD in infants and children, usually quite different from the typical symptoms presented by the adult (Table 1).

The typical manifestation in the infant results from vomiting and regurgitation, and is the most common reason for a visit to the physician by the anxious new parent. These infants are usually thriving, and parents require reassurance with minimal intervention.

More significant symptoms would include persistent vomiting, abdominal pain, poor weight gain, feeding intolerance or refusal, esophagitis, and respiratory disorders.

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GI Reflux

Table 1

GERD signs and symptoms

| Signs | Symptoms |
|-------------------|---|
| GI related | Regurgitation Esophageal inflammation |
| Respiratory | Apnea Recurring pneumonias Chronic cough Difficult to control asthma |
| Otolaryngeal | Stridor Hoarseness Otitis media Sinusitis |
| Neuro-behavioural | Posturing/arching Sandifer's syndrome |

GERD: gastroesophageal reflux disease
GI: gastrointestinal

GERD is likely a multifactorial disorder. Physiologic anti-reflux mechanisms include a normally positioned and functioning lower esophageal sphincter (LES), adequate esophageal clearance, an intact esophageal mucosal barrier, and normal gastric motility and emptying. LES hypotonia, traditionally important, is no longer considered to be significant in the pathogenesis of GERD in infancy. Studies have demonstrated a well-developed LES tone even in pre-term infants. It is now clearly

Table 2

Factors for pre-disposing infants to GERD

- Short esophagus
- Relatively large feeds
- Possible decreased gastric compliance and volume
- Patient supine positioning

Jonathan's situation

Jonathan is a seven-month-old baby boy referred for evaluation of reflux. Unremarkable previous history:

- Normal birth and development
- Breast fed and thriving
- Spits up every feed
- Physical examination normal

established that transient LES relaxation (TLESR) is the most responsible factor for the development of GERD. Several factors are identified and implicated in pre-disposing infants to GERD (Table 2).

What is the diagnostic evaluation?

In the majority of children, a careful history and physical examination will reliably identify GERD.



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Table 3

Diagnostic conditions concerning GERD

Gastrointestinal

Pyloric stenosis
Stricture, ring, web
Malrotation with Volvulus
Achalasia
Rumination
Hepaasbiliary
Pancreatic
Food allergy
Eosinophilic esophagitis

Neurologic

Increased intracranial pressures

Renal

Urinary tract infection
Hydronephrosis
Renal calculi

Metabolic

Galactosemia
Hereditary fructose intolerance

Toxins

The challenge for the practitioner is to distinguish between other causes of vomiting (Table 3). For those patients in whom the diagnosis is less obvious, investigations should be individualized to address specific questions or exclude certain disease entities. The barium swallow is a common first line investigation that is useful for excluding anatomic abnormalities. However, it is not a good indicator of gastric motility and is not a sensitive test for GERD.

The 24-hour pH probe test is widely considered to be the gold standard, and, as such, is possibly overused. In essence, multiple electrodes on a single probe are used to monitor the pH of the distal esophagus for a 24-hour

period. This data is stored on a portable recording device, and when retrieved is compared to existing age appropriate normal values (See Figures 1a and 1b). This test can be used to correlate the association of GERD with extra-intestinal symptoms, to assess for GERD in patients with an atypical clinical history, and to determine the efficacy of acid suppression therapy. However, in patients with an obvious history for GERD, there is little benefit from a 24-hour pH probe.

Upper gastrointestinal endoscopy with esophageal biopsies provides supportive evidence for GERD. It is not a diagnostic test, but rather should be used to assess for complications associated with GERD, including esophagitis, stricture formation, and the development of Barrett's esophagus. Furthermore, biopsies are useful in excluding less common



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The most common GI adverse events were dyspepsia (8.8% vs 6.2% placebo), diarrhea (5.6% vs 3.8% placebo), and abdominal pain (4.1% vs 2.8% placebo). See prescribing information for complete details.

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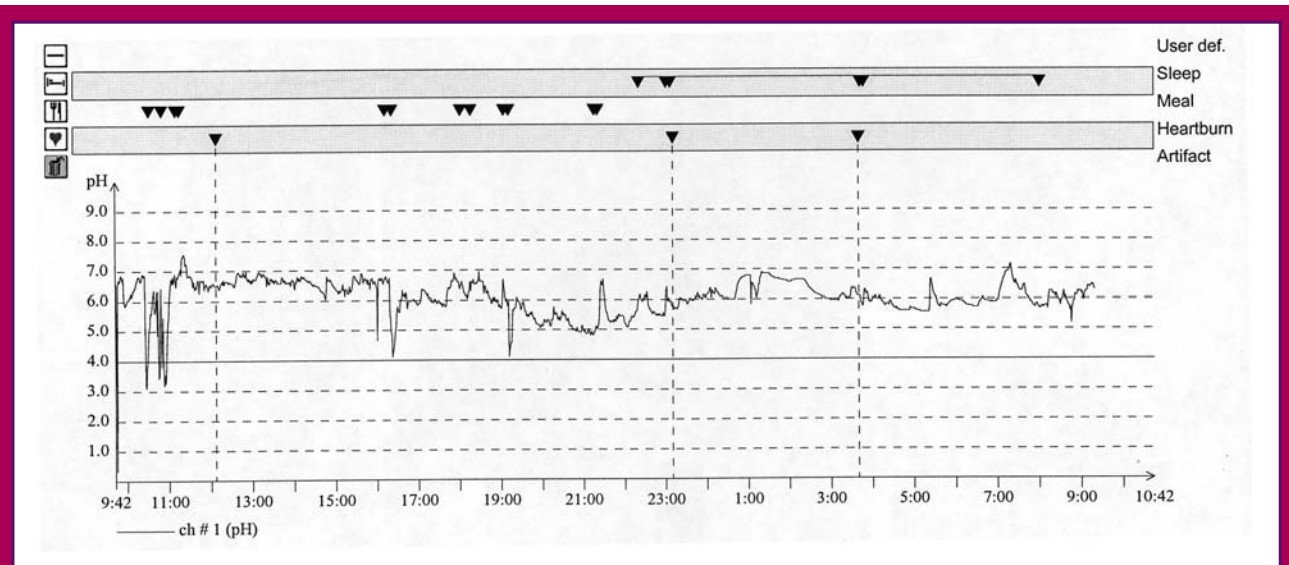


Figure 1a. Normal pH probe.

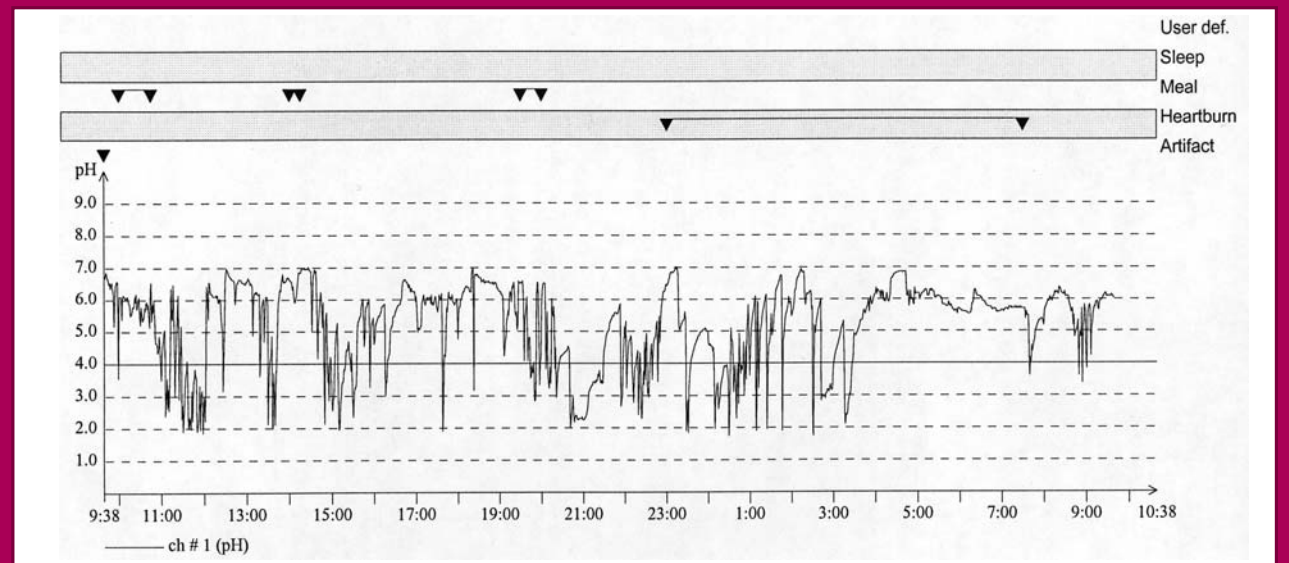


Figure 1b. Abnormal pH probe.

causes of esophagitis, including Crohn's disease, eosinophilic esophagitis, or infectious etiologies (e.g., candida, cytomegalovirus etc.). Typical histological features include basal cell hyperplasia, increased length of the stromal papillae, and increased intraepithelial eosinophils..

Other diagnostic tests are available in specialized centres. These include radionuclide scintigraphy, which may have certain advantages over

the above investigations. It is non-invasive and requires less radiation than barium contrast radiography. Furthermore, it may detect non-acid, as well as acid reflux episodes in addition to evidence of aspiration. However, a paucity of age appropriate normative data and non-standardization are setbacks. Esophageal manometry has not been proven useful in the evaluation of GERD, but may have a role in the patient being

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considered for anti-reflux surgery. Ultrasonography and intraluminal impedance techniques are described, but experience and availability are limited.

What is the required management?

The aim of therapy is to eliminate symptoms, prevent the complications of GERD and optimize the quality of life of patients and families. Management consists of conservative/lifestyle measures, pharmacotherapy and, for a small group of patients, surgical intervention.

Thickening an infant's feed with one-tablespoon rice cereal per ounce of formula has been shown to decrease the episodes of regurgitation, however, the acid exposure to the esophagus as determined by esophageal probe monitoring is unchanged. It is useful for the "happy spitter." Prone positioning is associated with less GERD, however, there is increased risk of sudden infant death syndrome and is, therefore, not advised for infants when asleep; but is acceptable for babies when awake, particularly post-prandially. Supine positioning is recommended for infants under one as per the American Academy of Pediatrics guidelines. In older children weight loss, and avoidance of foods that aggravate GER are appropriate measures (Table 4). In addition elevation of the head of the bed and left side positioning may be useful.

For patients who do not respond to these simple measures, or those with complications of GERD, pharmacotherapy is available. There is no drug that addresses TLESR, prokinetics and acid suppression therapy have been clearly effective in the management of GERD. Prokinetics increase gastric emptying, esophageal clearance and the LES tone thereby

Table 4

Aggravation factors for GERD

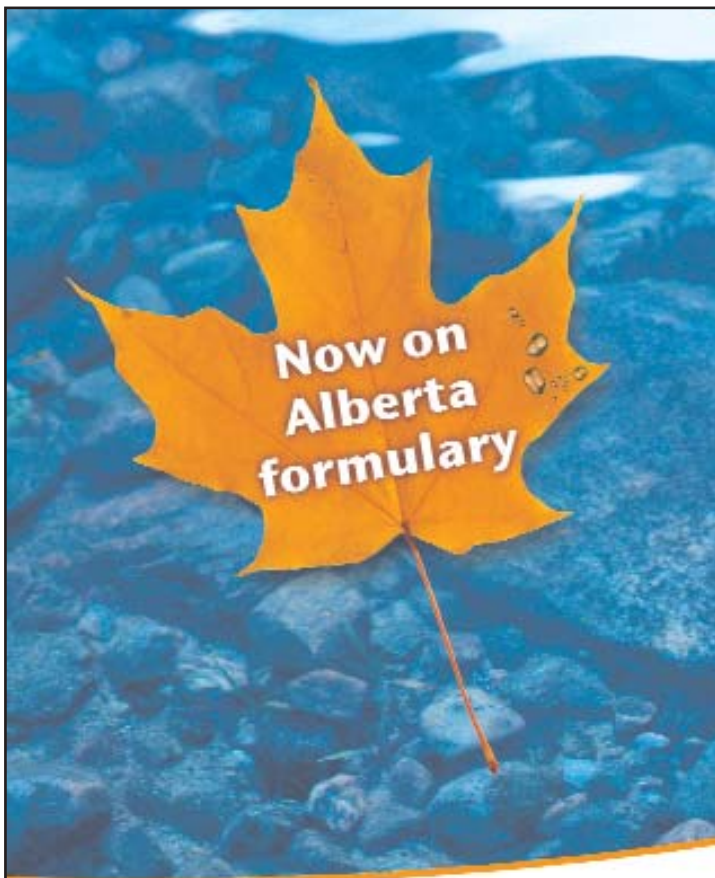
Foods

- Chocolate
- Peppermints
- Fatty foods
- Tomato products
- Citrus/fruit juices


Medications

- Anti-cholinergics
- Second colloid antigen channel blockers
- Theophylline
- β -blockers

reducing exposure of the esophageal mucosa to the noxious refluxate. Of the prokinetic drugs, cisapride was extensively used. However, due to reports of fatal arrhythmias, it was removed from the market in July 2000. Other promotility



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Table 5

Pharmacotherapy for GERD

Prokinetics

| | |
|----------------|--|
| Domperidone | 1.2-2.4 mg/kg per day ÷ TID/QID (Max. 80 mg/24 hours) |
| Metaclopramide | 0.1-0.4 mg/kg per day ÷ QID |
| Bethanecol | 0.1-0.2 mg/kg per day ÷ 26 hours |

Acid Suppression

| | |
|--------------|--------------------------------|
| Ranitidine | 3-5 mg/kg per day ÷ BID/TID |
| Nizatidine | 10 mg/kg per day ÷ BID |
| Omeprazole | 0.7-3.3 mg/kg per day ÷ OD/BID |
| Lansoprazole | 1.5 mg/kg per day ÷ OD/BID |
| Pantoprazole | No pediatric data |

Table 6

Indications for anti-reflux surgery

- Failure of medical therapy
- Life-threatening complications
- Apneas
- Recurring pneumonias
- Unresolving respiratory diseases

Take-home message



Important points to remember, concerning diagnosis and management of GERD:

- All that vomits is **not** GERD
- Conservative management and lifestyle changes are all that may be necessary
- Refer for advice, if it is complicated GERD

agents may be less efficacious. Both metoclopramide and bethanecol have narrow therapeutic margins with considerable side-effects (metoclopramide-agitation, insomnia, extra-pyramidal reactions; bethanecol-cramps, diarrhea, bronchospasm, blurred vision and urine incontinence) and, therefore, should be used with caution. Domperidone has a reduced side effect profile and is well-used; how-

ever, studies are equivocal. Acid suppression therapy heals esophagitis in almost all cases. Clinically important side-effects are uncommon with histamine receptor antagonist (*e.g.*, ranitidine), and proton pump inhibitors (*e.g.*, omeprazole) (Table 5). Although the use of proton pump inhibitors in children is increasing, they should be employed with caution. They are potent acid suppression agents and stimulate gastrin hypersecretion. Furthermore, they are associated with the development of gastric polyps. Moreover, rebound hypersecretion and recurrence of symptoms are associated with withdrawal of therapy.

There has been a trend of performing fewer anti-reflux procedures in Canadian centres. However, for a small group of patients surgical intervention is appropriate and must be considered (Table 6). A laproscopic approach may be more cost effective and may have reduced morbidity and mortality. [CME](#)

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Suggested Readings

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