Regurgitation in Infants

100

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Gastroesophageal reflux (GER) is defined as the involuntary passage of gastric contents from the stomach into the esophagus. *GER disease* (GERD) on the other hand is a condition that develops if GER causes troublesome symptoms and/or complications such as pain, poor growth, and esophagitis [1]. *Regurgitation* is defined as the effortless return of stomach contents into the mouth. *Vomiting* is a coordinated reflex and is defined as expulsion of the refluxed gastric contents from the mouth (Fig. 100.1). However, the difference between regurgitation and vomiting is not always clearcut [1–3].

Regurgitation is a common problem in infancy, affecting about 50 % of all babies at the age of 2 months [1]. Most of the infants do not experience long-term symptoms; however, symptoms can result in significant parental anxiety and infant discomfort [2]. Most reflux episodes are asymptomatic, brief, and limited to the distal esophagus. "Excessive regurgitation" is one of the symptoms of GERD, but the terms regurgitation and GERD should not be used as synonyms.

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About 70 % of healthy infants have regurgitation that is physiologic, resolving without intervention in about 95 %, by the age of 12–14 months [4] (Fig. 100.2). Daily regurgitation occurs more frequently in infants during the first 6 months of life than in older infants and children. Frequent regurgitation, defined as more than three times per day, occurs in about 25 % of infants during the first months of life.

Various studies report a comparable incidence of regurgitation in unselected populations of formula versus breast-fed infants. Exclusively breastfed infants regurgitate less than partially breastfed babies [5]. This observation fits with the knowledge that GER and symptoms of GER (GERD) may be indistinguishable from those of food allergy [6]. Moreover, the association between GERD and cow milk hypersensitivity was observed in both infants and children with severe GERD [7, 8].

The Infant with Uncomplicated Regurgitation

Uncomplicated regurgitation in otherwise healthy infants is not a disease. Common causes include overfeeding and air swallowed during feeding, crying, or coughing. The typical presentation of uncomplicated infant GER is an effortless, painless regurgitation in a healthy-appearing child with normal growth, the so-called happy spitter.

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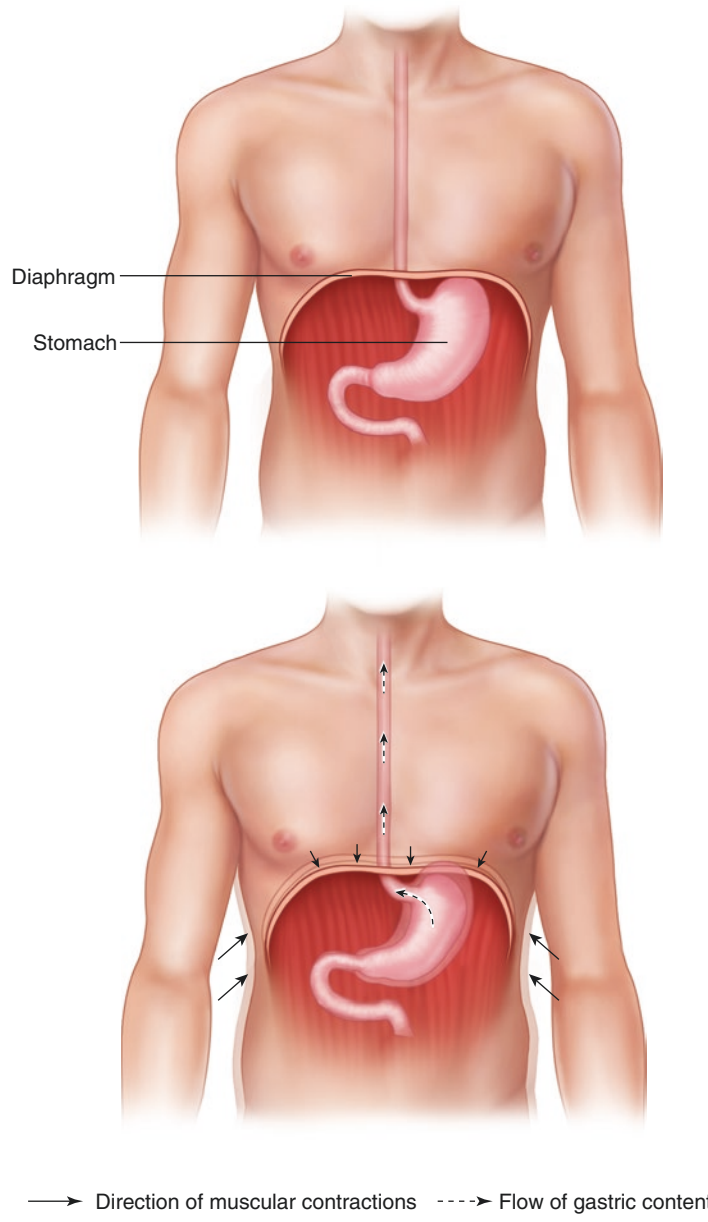
Fig. 100.1 Mechanism of vomiting



Intermittently, an episode of vomiting, even forceful vomiting may occur. Irritability may accompany regurgitation and vomiting; however, in the absence of other warning symptoms, it is not an indication for extensive diagnostic testing. Recurrent regurgitation generally decreases over the first year and disappears about 18 months of age [9]. If there are "warning signs" suggestive of GERD or other pathologic underlying diseases, consultation with a pediatric gastroenterologist is recommended. The same approach is to consider if symptoms persist over the age of 18 months [3].

Uncomplicated regurgitation is a benign condition with a good prognosis, needing no other intervention than parental education and anticipatory guidance (Fig. 100.3). Modification of

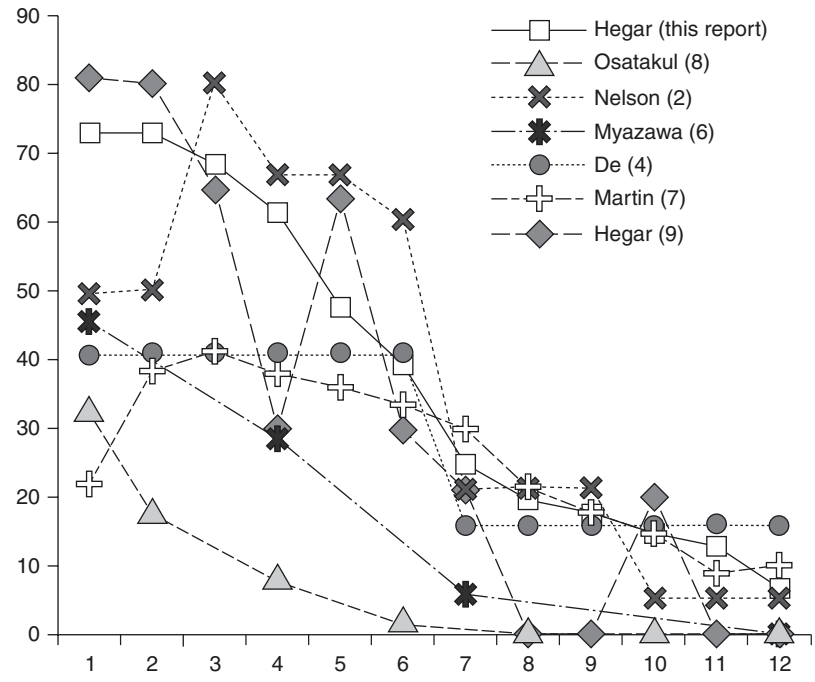


Fig. 100.2 Natural evolution of physiologic regurgitation (Data from Hegar et al. [5])

milk composition (adition of thickening agents), feeding frequency, volume, and sleep position may be indicated [10, 11]. Overfeeding exacerbates recurrent regurgitation.

Thickening of feeding formula has been demonstrated to reduce almost consistently the frequency and volume of regurgitation and result in an increased caloric intake [12–14]. Use of a thickened formula (or commercial anti-regurgitation formulae, if available) may decrease visible regurgitation but does not result in a measurable decrease in the frequency of esophageal reflux episodes.

Prone positioning decreases the amount of acid esophageal exposure measured by pH probe compared with that measured in the supine position. However, prone and lateral positions are associated with an increased incidence of sudden infant death syndrome (SIDS). The risk of SIDS outweighs the benefit of prone or lateral sleep position on GER; therefore, in most infants from birth to 12 months of age, supine positioning during sleep is recommended [3].

There is no evidence that antisecretory or promotility agents improve physiologic infant regurgitation [3].

In infants with persistent uncomplicated regurgitation and no respond to previous management, a 2–4-week trial of protein hydrolysate- or amino acid-based formula or a trial of milk-free diet for the breast-feeding mother is appropriate in order to exclude cow's milk allergy [3, 7, 8].

Regurtitation and Irritability

Reflux is an uncommon cause of irritability or unexplained crying in otherwise healthy infants. However, if irritability persists with no explanation other than suspected GERD, expert opinion suggests the following options. The practitioner may continue anticipatory guidance and training of parents in the management

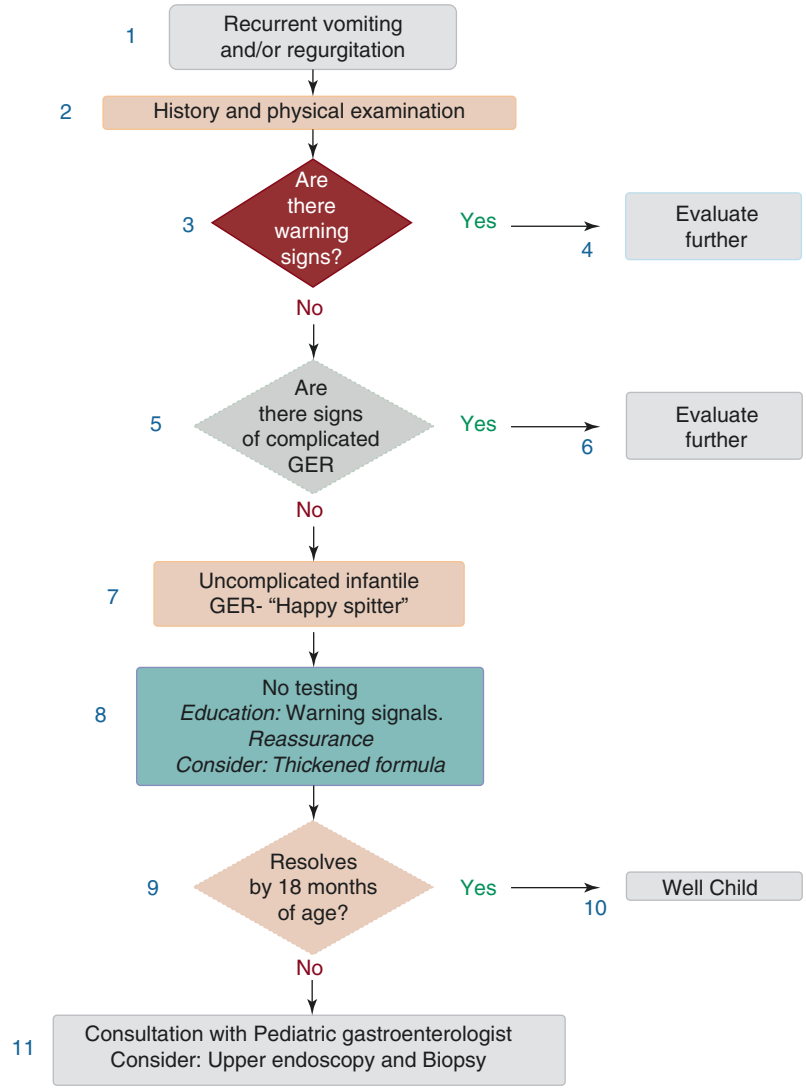


Fig. 100.3 Approach to the infant with uncomplicated recurrent regurgitation (happy spitter) [10]

of such infants with the expectation of improvement with time. Additional investigations to ascertain the relation between reflux episodes and symptoms or to diagnose reflux or other causes of esophagitis may be indicated (pH monitoring, impedance monitoring, endoscopy). A time-limited (2-week) trial of antisecretory therapy may be considered, but there is potential risk of adverse effects and clinical improvement following empiric therapy maybe due to spontaneous symptom resolution or a placebo response. The risk/benefit ratio of these approaches is not clear [3].

The Infant with Recurrent Regurgitation Poor Weight Gain

Poor weight gain is a crucial warning sign that necessitates clinical management. These infants need a complete diagnostic workup, starting with a dietary history to evaluate caloric intake. A feeding history should be obtained that includes an estimate of energy offered and ingested per day, an estimate of energy loss through regurgitation, a description of formula preparation and feeding schedule, an assessment

Table 100.1 Differential diagnosis of vomiting in infants and children

Gastrointestinal obstruction
Pyloric stenosis
Malrotation with intermittent volvulus
Intestinal duplication
Hirschsprung disease
Antral/duodenal web
Foreign body
Incarcerated hernia
Other gastrointestinal disorders
Achalasia
Gastroparesis
Gastroenteritis
Peptic ulcer
Eosinophilic esophagitis/gastroenteritis
Food allergy
Inflammatory bowel disease
Pancreatitis
Appendicitis
Neurologic
Hydrocephalus
Subdural hematoma
Intracranial hemorrhage
Intracranial mass
Infant migraine
Chiari malformation
Infectious
Sepsis
Meningitis
Urinary tract infection
Pneumonia
Otitis media
Hepatitis
Metabolic/endocrine
Galactosemia
Hereditary fructose intolerance
Urea cycle defects
Amino and organic acidemias
Congenital adrenal hyperplasia
Renal
Obstructive uropathy
Renal insufficiency
Toxic
Lead
Iron
Vitamins A and D
Medications—ipecac, digoxin, theophylline, etc.
Cardiac
Congestive heart failure
Vascular ring
Others
Pediatric falsification disorder (Munchausen syndrome by proxy)
Child neglect or abuse
Self-induced vomiting
Cyclic vomiting syndrome
Autonomic dysfunction

of breast milk sufficiency, and a description of infant sucking and swallowing behavior. Parents should be advised not to reduce intake to the point of energy deprivation in the attempt to prevent regurgitation. If problems identified by history seem to explain the symptoms and can be addressed, close outpatient monitoring of weight gain will determine whether further evaluation is indicated [3].

If chronic regurgitation and inadequate weight gain persist after observation and despite adequate energy intake, once other causes of vomiting have been ruled out. Infections (especially urinary tract), anatomic abnormalities, neurologic disorders, food allergy, and metabolic disease are among possible etiologies of

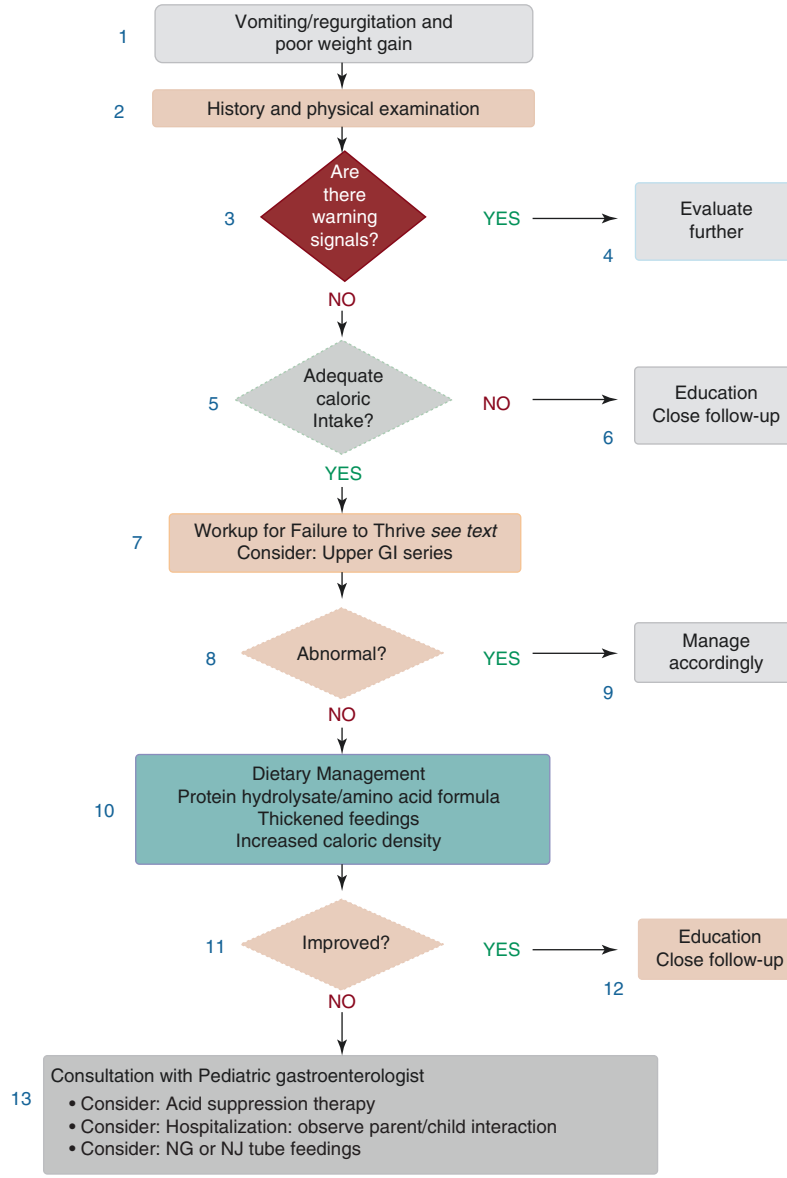


Fig. 100.4 Approach to the infant with recurrent regurgitation and poor weight gain

regurgitation and poor weight gain in infancy (Table 100.1).

A 2–4-week trial of extensively hydrolyzed or amino-acid-based formula is appropriate. Thickening the formula is recommended since it has been shown to help both irritability and weight gain. Depending on the results of investigations and response to dietary management, the infant should be referred to a pediatric specialist (Fig. 100.4). Hospitalization for observation and testing is appropriate in some infants with persistent failure to thrive. Therapy with H2 receptor antagonists and proton pump inhibitors may be suggested in cases with confirmed GERD [11]. Nasogastric or nasojejunal feeding is occasionally necessary to achieve weight gain in the infant with no other clear explanation for poor weight gain [15].

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