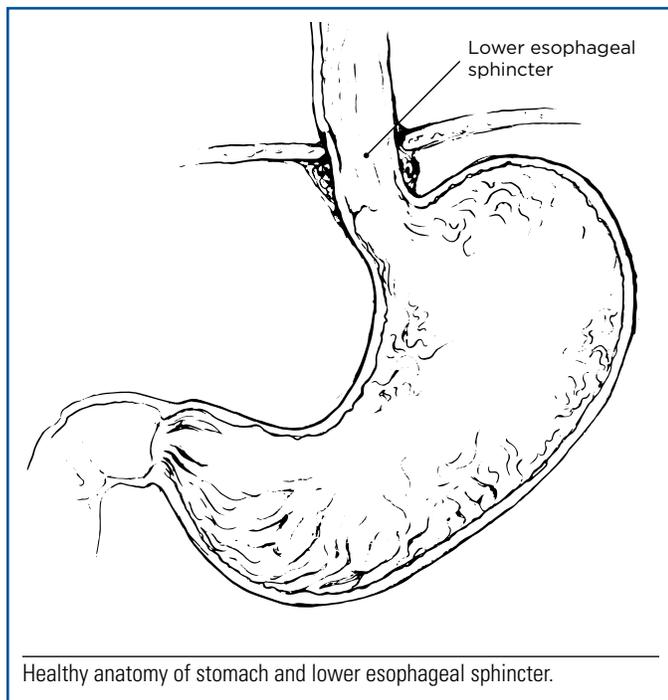


Gastroesophageal Reflux

Gastroesophageal reflux (GER) is the involuntary passage of gastric contents into the esophagus. Physiologic GER occurs on a regular basis in healthy infants and is characterized by passive spitting up without other associated complications. It usually resolves by 12 months of age. Less frequently, pathologic GER occurs when regurgitation of gastric contents is accompanied by other symptoms or complications and may be particularly problematic for premature infants. Severity may be related to the pH and volume of fluid that is refluxed into the esophagus, larynx, or mouth. Symptomatic GER may be referred to as gastroesophageal reflux disease (GERD) and is characterized by forceful vomiting (rather than the more passive spitting up of GER) and often poor weight gain or weight loss, irritability, and dysphagia. Other complications include esophagitis, neurobehavioral changes, hematemesis, growth failure, and respiratory problems such as apnea (controversial).



Some proposed causes and contributing factors for GERD in the neonatal population include

- delayed gastric emptying time (controversial)

- presence of an indwelling naso- or oral gastric feeding tube
- large fluid volume relative to size
- supine positioning
- short or narrow esophagus
- shorter lower esophageal sphincter positioned slightly above the diaphragm (rather than below as in adults)
- exposure to tobacco
- medications such as theophylline and caffeine as well as antenatal steroids
- certain clinical conditions and syndromes (such as gastroschisis and omphalocele; bronchopulmonary dysplasia; congenital diaphragmatic hernia; tracheo-esophageal fistula; neurologic and neuromuscular abnormalities including myotonic dystrophy, cystic fibrosis, cerebral palsy, hiatal hernia, laryngomalacia, swallowing dysfunction, and genetic abnormalities including Trisomy 21 and Cornelia de Lange).

Diagnosis is based on patient history and physical exam, with full exploration of the differential diagnosis to rule out other disorders that may present with vomiting. A thorough feeding history, growth patterns, and relevant medical and familial history are requisite to the diagnosis of GERD. Diagnostic tests such as upper gastrointestinal series, gastric emptying study, video swallow study, esophagogastroduodenoscopy with biopsy, esophageal pH probe monitoring, or dual pH-multichannel intraluminal impedance (pH-MII) may be considered to aid with diagnosis (Mousa et al., 2011).

Management of GERD aims to prevent and alleviate symptoms while promoting normal growth and the resolution of inflammation in the esophagus. A stepwise approach starting with the least invasive and inexpensive therapies is recommended, because reflux may improve with maturity without unnecessary and unproven therapies. Nonpharmacologic treatment may include

- left lateral positioning after feedings (right side down)
- slowing bolus feeding times or changing to continuous feedings



- removing the naso- or oral gastric tube in between feedings
- smaller, more frequent feedings (which may require higher calorie formulas to meet nutritional needs)
- placement of nasojejun tube for continuous feedings if there are airway concerns
- using extensively hydrolyzed protein formula (which can improve gastrointestinal mobility; Corvaglia, Mariani, Aceti, Galletti, & Faldella, 2013).

Pharmacologic management is only used in an infant who continues to have pathologic GERD despite nonpharmacologic intervention. Benefits versus adverse effects of the medications should be carefully considered. Recent findings have shown that acid-suppressive medications, including H2 antagonists and proton-pump inhibitors, and motility agents have little evidence to support prolonged use and are associated with an increased risk of necrotizing enterocolitis and infection (Ho et al., 2015). One goal is acid suppression or neutralization, which may be achieved by using histamine antagonists (ranitidine, famotidine) or proton-pump inhibitors (omeprazole, lansoprazole). Prokinetic agents (metoclopramide, erythromycin) may be used to improve motility of the esophagus and stomach. Surgical intervention is considered only when medical management fails, leading to failure to thrive, reflux-induced aspiration and pneumonia, esophagitis, Barrett's esophagus, and acute life-threatening

events. A Nissen fundoplication is the most common surgical procedure performed to treat GERD and may be performed openly or laparoscopically. There is a higher risk of mortality associated with the Nissen procedure for infants with neurological impairments (Zhang et al., 2016).

References

- Corvaglia, L., Mariani, E., Aceti, A., Galletti, S., & Faldella, G. (2013). Extensively hydrolyzed protein formula reduces acid gastro-esophageal reflux in symptomatic preterm infants. *Early Human Development, 89*(7), 453–455.
- Ho, T., Dukhovny, D., Zupancic, J. A., Goldman, D.A., Horbar, J. D., & Pursley, D. M. (2015). Choosing wisely in newborn medicine: Five opportunities to increase value. *Pediatrics, 136*(2), e482–e489.
- Mousa, H. M., Rosen, R., Woodley, F. W., Orsi, M., Armas, D., Faure, C., . . . Nurko, S. (2011). Esophageal impedance monitoring for gastro-esophageal reflux. *Journal of Pediatric Gastroenterology & Nutrition, 52*(2), 129–139.
- Zhang, P., Tian, J., Jing, L., Wang, Q., Tian, J., & Lun, L. (2016). Laparoscopic vs. open Nissen's fundoplication for gastro-oesophageal reflux disease in children: A meta-analysis. *International Journal of Surgery, 34*, 10–16.

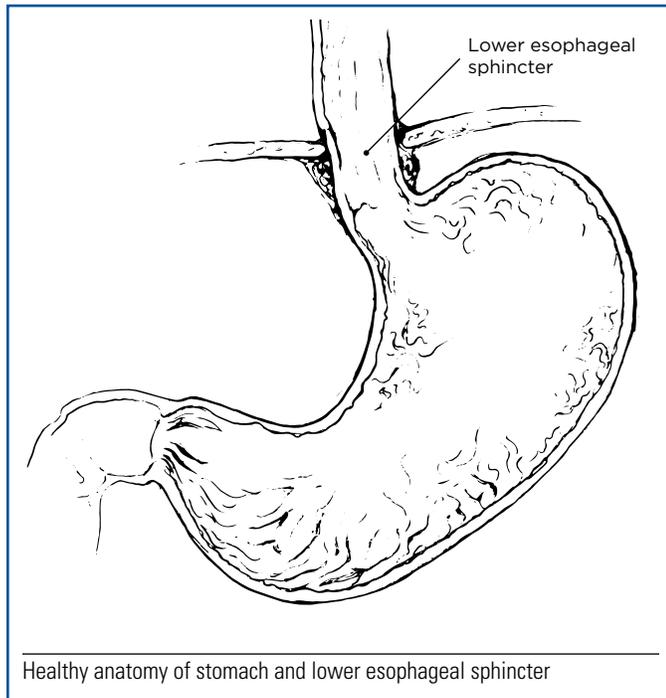
Bibliography

- Henry, S. M. (2004). Discerning differences: Gastroesophageal reflux and gastroesophageal reflux disease in infants. *Advances in Neonatal Care, 4*(4), 235–247.
- Poets, C. F. (2004). Gastroesophageal reflux: A critical review of its role in preterm infants. *Pediatrics, 113*(2), e128–e132.
- Schurr, P., & Findlater, C. K. (2012). Neonatal mythbusters: Evaluating the evidence for and against pharmacologic and nonpharmacologic management of gastroesophageal reflux. *Neonatal Network, 31*(4), 229–241.



Gastroesophageal Reflux: Information for Parents

You may have been told that your baby has reflux, which is short for *gastroesophageal reflux* (GER). Reflux happens when food from the stomach moves back into the esophagus or mouth. This can happen in healthy babies and adults. A baby with “normal” reflux may spit up often but does not have any other problems. This usually goes away before your baby is 1 year of age.



A more serious form of reflux, called *gastroesophageal reflux disease* (GERD), can cause problems, especially for babies in the neonatal intensive care unit. This kind

of reflux is defined by stronger vomiting and other symptoms. Your baby may have trouble gaining weight or may lose weight. He or she may cry a lot or act like he or she has trouble swallowing. Your baby may have blood-tinged vomit and problems with breathing and may need some tests to be sure that there is nothing else causing the vomiting. To help your baby with reflux, your baby’s provider may try positioning your baby a certain way after feedings, giving smaller feedings more often, or increasing the time of a feeding. If these things do not work, medicine may be used. If you have any questions, ask your baby’s provider about what you can do to help your baby have less reflux or about the side effects and possible risks of medications being given to your baby.

Surgery is only considered when medicine does not help. Surgery will be discussed if your baby cannot gain enough weight or if the vomiting causes a lot of problems with breathing (sometimes this is due to aspiration).

When you take your baby to see your pediatric provider after you have gone home, let him or her know how much and how often your baby is spitting up or vomiting. If your baby is going home on medication, please make sure to give the right amount at the right times. It is important not to change your baby’s diet or medicines without talking to your pediatric provider. Talk about how well you think the feedings are going so that the medicines can be changed or stopped as needed.