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Pediatric Gastroesophageal Reflux Disease

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Introduction

Gastroesophageal reflux is the return of stomach contents into the esophagus. It is normal in the newborn due to an immature gastroesophageal sphincter. Gastroesophageal reflux disease (GERD) is a common condition found in 3.3% of the pediatric population that occurs when the physiological barrier of the esophageal sphincter opens during a transient lower esophageal sphincter relaxation (TLESR) period (Rinsma et al., 2016) resulting in complications like mucosal erosion, bleeding, dysphagia or failure to thrive (Quitadamo, Umarrino, Saiano, 2015). GERD in children can be directly related to late maturation of the gastroesophageal (GE) sphincter or an impaired hormonal or neurotransmitter response. A high pressure gradient surrounding the GE sphincter aides in maintaining forward flow of food and stomach content. When either the position of the sphincter or the thick mucosal lining of the GE sphincter are affected, GERD is likely to occur. Recurrent reflux results in inflammation of the esophageal epithelium or esophagitis. It has also been linked to reactive airway disease and otitis media with effusion (Gorecka-Tutega, Jastrzebska, Skladzien, Fyderek, 2016).

Epidemiology and Etiology

- Infant reflux shows up in the first few months of life, peaks at four months and resolves in almost all children by the age of 2.
- One out of 300 have significant reflux and associated complications, and it is the most common esophageal disorder for all pediatric patients.
- Symptoms in children are more likely to be chronic with increased and decreased periods of symptomatology (Khan & Orenstein, 2016).
- Physiologic GER is the regurgitation that occurs without effort or pain while pathologic GERD in infants and children have frequent and/or persistent symptoms that affect their nutritional or respiratory status.

Signs and Symptoms

Most clinical manifestations of GERD relate to the pathological effects of acid found outside of the stomach. Symptoms of heartburn and regurgitation are the classic findings (Falk & Vivian, 2015). Infantile reflux happens most commonly after meals as simple regurgitation. Children have regurgitation in the early years or complaints of abdominal and chest pain as they age. Sleep has been found to be interrupted with or without obstructive sleep apnea when they have GER (Machado et al, 2016). Children with chest pain presentation had a low prevalence of cardiac disorders, and should be evaluated by a pediatric gastroenterologists for GERD (Park, Choi & Jeong, 2016). Some older children may have neck contortions or refuse food with GERD. This is called Sandifer syndrome. Respiratory symptoms are also age specific. Infants can present with obstructive sleep apnea, stridor or lower airway disease where reflux has worsened primary airway disease like laryngomalacia or bronchopulmonary dysplasia (Khan & Orenstein, 2016). Older children are more likely to have asthma or otolaryngologic issues such as laryngitis or sinusitis related to GERD.

Management

Lifestyle modifications along with conservative pharmaceutical therapy is the treatment. Infants may require thickening of feeds. These feeds should be used with caution in pre-term infants due to the association with necrotizing enterocolitis (Beal, Silverman, & Bellant, et. al. 2012). A hypoallergenic diet may be trialed prior to medications. Over half of infants will have improved symptomatology with prone positioning or upright carrying after feeding, avoidance of smoke exposure and formula changes (Khan & Orenstein, 2016) Children should avoid high acid foods or reflux-inducing foods and beverages. A left side position or head elevated during sleep after infancy may be helpful. Any obese patient should reduce their weight.

Pathophysiology

Multiple factors determine whether reflux occurs or not; duration of esophageal exposure to reflux episodes, causticity of the reflux material, and the susceptibility of the esophageal tissue to harm (Khan & Orenstein, 2016).

1. The lower esophageal sphincter (LES) is anatomically supported by the crura of the diaphragm and the gastroesophageal junction (GEJ). This with the valve-like junction stop the return of gastric contents. When the LES is relaxed or when hiatal herniation prevent the LES from being proportionately pressurized, reflux is more likely to occur during events of strain. The length of a reflux episode is increased when the swallowing reflex is decreased as in sleep or by any disease state that results in defective esophageal peristalsis. The pathological disease state is cyclical. The more chronic the episodes of reflux are, the more likely esophageal peristalsis will be defective, the greater the decrease in LES tone, and inflammation to the esophagus shortens its structure and induces hiatal herniation (Khan & Orenstein, 2016).
2. TLESR is the mechanism that allows reflux to happen. It is defined as the simultaneous relaxation of both the LES and the surrounding crura, a pressure drop of up to 2 mm Hg and lasts up to a minute in duration. The vagovagal reflex regulates the TLESR mechanism. This reflex is made up of afferent mechanoreceptors in the proximal stomach, the brainstem, and efferents in the LES (Khan & Orenstein, 2016). It is not fully known whether GERD is caused by more TLESRs or by a higher likelihood of having reflux during TLESR, but positions that force the GEJ below the air-fluid interface of the stomach, increased movement, straining, obesity, large-volume or hyperosmolar meals, gastroparesis, large sliding hiatal hernias and increased respiratory effort do increase the chance of reflux.
3. Infants with congenital diseases that require surgical management may have long-term sequelae, particularly GER. Though the majority of GER diagnosis are made to patients who do not have a congenital gastrointestinal malformation, GER is most common in infants and children with gastrointestinal malformations (Mareglia, et al, 2015). Being mindful of this high risk population can improve the speed of diagnosis and better individualize care.

Treatment

Medications

- **Antacids:** most often used non-prescribed medication treatment for GERD. They are available over the counter and with their acid neutralization action directly affect the pathophysiology of GERD (Quitadamo, Ummarino & Staiano, 2015).
- **Histamine-2 receptor antagonists (H2RAs):** inhibit histamine receptors on the gastric parietal cells. They are very safe for the pediatric population and work well for mild to moderate GERD (Quitadamo, Ummarino & Staiano, 2015).
- **Proton pump inhibitors (PPIs):** block the hydrogen–potassium adenosine triphosphatase channels of the final common pathway in gastric acid secretion. Children need larger doses on a dose per weight basis than adults. PPIs are used over H2RAs in the treatment of severe and erosive esophagitis (Khan & Orenstein, 2016).
- **Prokinetic agents:** increase LES pressure and improve gastric emptying. Metoclopramide, when used longer than 3 months, has been linked to tardive dyskinesia which can be irreversible (Taketomo, 2015). A recent systematic review gave conflicting evidence; no recommendations could be made (Falk & Vivian, 2015).

Surgery

- Fundoplication, may be necessary when GERD is intractable to medical management and complications of esophagitis, strictures, or risk for morbidity from chronic pulmonary disease is significant (Lightdale & Gremse, 2013; Khan & Orenstein, 2016). A gastrostomy may be used in combination for feeding and venting as impaired nutrition is a common complication (Falk & Vivian, 2015).

Diagnosis

History and physical examination is the initial tool for diagnosis of GERD. Standardized questionnaires the Infant Gastroesophageal Reflux Questionnaire, can be used to rule out other diagnosis. Differential diagnosis that would need to be ruled out includes milk and other food allergies, eosinophilic esophagitis, pyloric stenosis, intestinal obstruction or infection (Khan & Orenstein, 2016). Diagnostic tools used to assist in diagnosing GERD include endoscopy, pH monitoring and pH monitoring with 24 hour multiple intraluminal impedance studies, and a barium swallow or esophagram (figure 1). Endoscopy has a history of poor sensitivity, but is called for when proton pump inhibitor medication trial fails to improve symptoms or for dysphagia, odynophagia, hematemesis, weight loss or anorexia (Falk & Vivian, 2015). It can diagnose erosive esophagitis, strictures or Barrett esophagus (Khan & Orenstein, 2016), see Figure 2.

Nursing Implications

Pediatric feeding complications like GERD can lead to serious complicated and longstanding issues. Only by working as an interdisciplinary team can the patient best be treated. As in all pediatric patients, nutrition is measured by growth and development. These markers require many view points best cared for by an interdisciplinary team with nursing as the center participant (McCornish et al, 2016).

Complications

Esophagitis, particularly prolonged or chronic esophagitis, can result in strictures located in the distal esophagus that can need repeated dilations and ultimately fundoplication. Over time, metaplastic changes in the esophageal tissue can lead to Barrett esophagus which is a precursor to esophageal adenocarcinoma. This is rare in children, but progressive Barrett lesions should be monitored closely regardless of the patients age (Khan & Orenstein, 2016).

Complications can be specific to age. Infants exhibit failure to thrive (FTT) and apnea. FTT may be directly caused by the lack of calories due to frequent regurgitation. As many as half of apnea cases in infants are attributed to GERD and improve with treatment of GERD. Apparent life-threatening events (ALTE) caused by GERD are obstructive from a laryngospasm. Current evidence shows that GERD is not causal for ALTEs. Infants who already have laryngomalacia or microragathia have stridor under GER conditions (Khan & Orenstein, 2016).

Childhood symptoms mirror adult symptoms. Reflux laryngitis or laryngopharyngeal reflux presenting with hoarseness or a cough is from GERD. This can lead to ulcers, granulomas, polyps or subglottic stenosis. A quarter of children with diagnosed asthma also have GERD symptoms. GERD can be a provocative factor for their asthma symptoms and they may benefit from anti-GERD therapies (Khan & Orenstein, 2016).

Dental erosions on the lingual surface of the teeth are also found to be from GERD, but can also be complications from bulimia or juice consumption (Khan & Orenstein, 2016).

Figure 1 Barium Esophagram

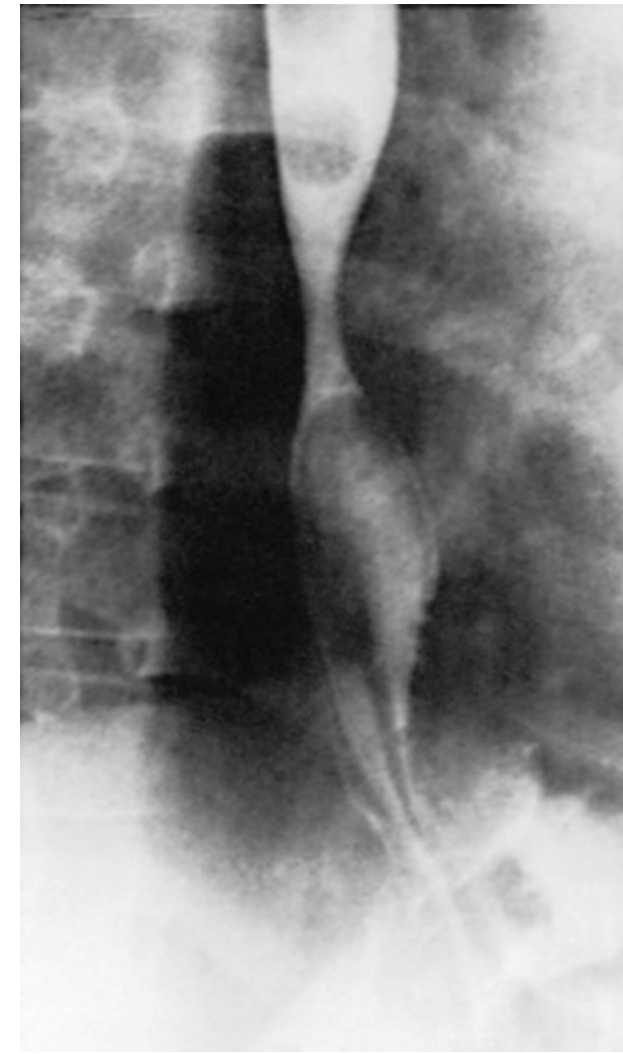
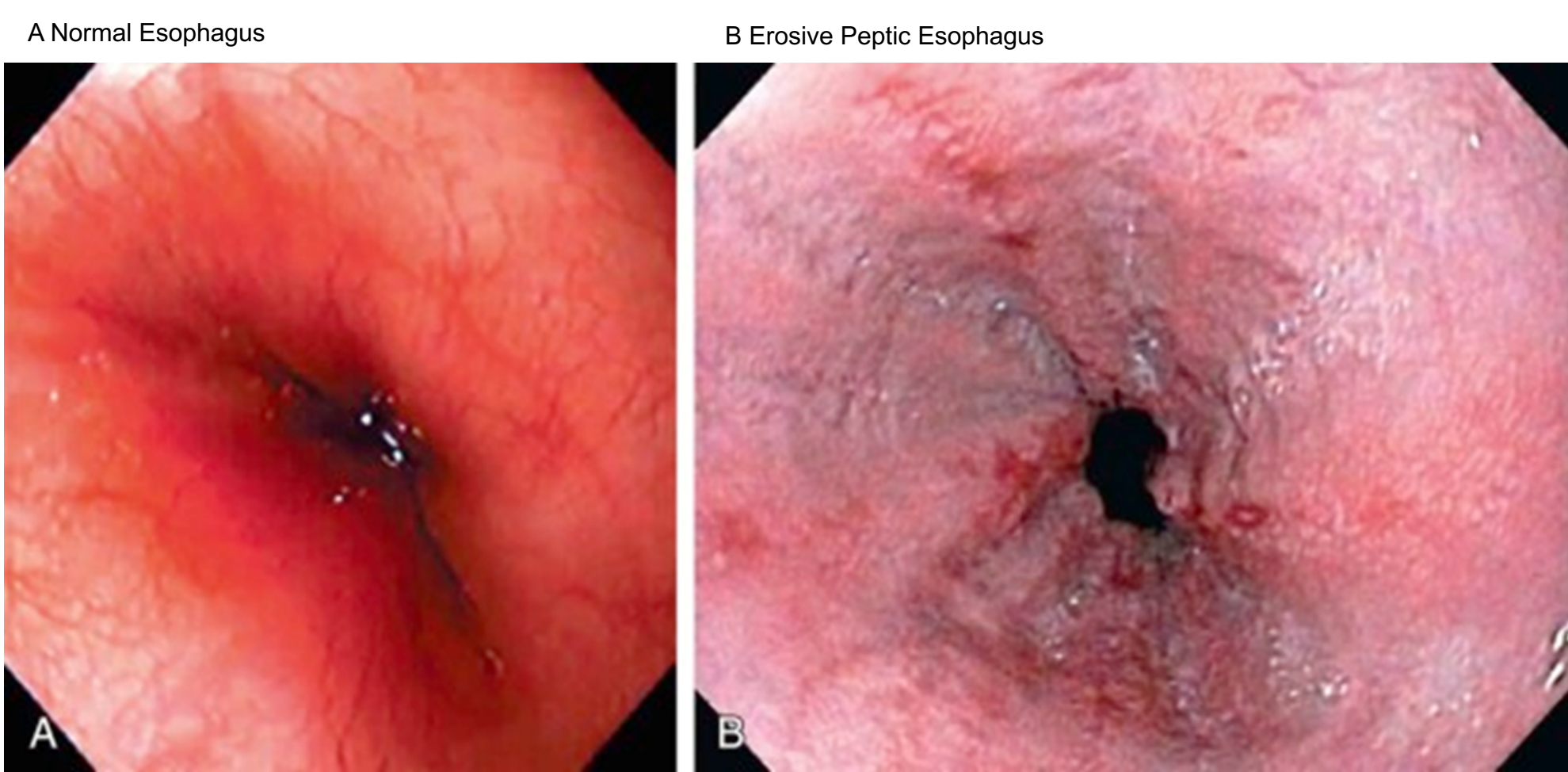


Figure 2 Endoscopy of esophagus



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