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A REVIEW ON GERD (GASTROESOPHAGEAL REFLUX DISEASE) AND ITS MANAGEMENT

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Abstract

The backward movement of stomach contents into the esophagus is an indicator of gastroesophageal reflux disease (GERD), a chronic illness that causes symptoms like regurgitation, heartburn, and chest pain. It is brought on by problems with the lower esophageal sphincter (LES), delayed stomach emptying, poor esophageal clearance, and elevated intra-abdominal pressure. A common condition in the world that affects both adults and children, GERD is impacted by dietary practices, lifestyle choices, obesity, and some medications. Pharmacological treatment, lifestyle changes, and, in extreme or unresponsive cases, surgery are all part of the management of GERD. Weight loss, abstaining from trigger foods, raising the head of the bed, and giving up alcohol and tobacco are examples of lifestyle modifications. Proton pump inhibitors (PPIs), H2 receptor antagonists, and prokinetics is the mainstays of pharmacologic care. Substances that seek to enhance esophageal motility and decrease acid secretion. Patients who are not responding to medicinal therapy or who have anatomical problems may be candidates for surgical and endoscopic procedures, such as magnetic sphincter augmentation and Nissen fundoplication. Because weight loss reduces intra-abdominal pressure and reflux episodes, recent study also highlights the importance of managing obesity, including bariatric surgery, in relieving GERD symptoms. Individualized treatment plans based on patient complications, symptom frequency, and illness severity are necessary for effective long-term care. Keywords: Fundoplication, bariatric surgery, obesity, lifestyle modification, heartburn, proton pump inhibitors, and gastroesophageal reflux disease

Keywords*:* Gastroesophageal Reflux Disease, Heartburn, Proton Pump Inhibitors, Fundoplication, Bariatric Surgery, Obesity, Lifestyle Modification.

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Introduction

Definition

Gastroesophageal reflux disease (GERD) is a chronic digestive disorder in which stomach acid or contents flow back into the esophagus [1-4]. It is a chronic illness that causes stomach contents to reflux back into the oesophagus, causing symptoms like indigestion, heartburn, and discomfort in the chest. Increased intra-abdominal pressure, delayed stomach emptying, reduced esophageal clearance, or failure of the lower esophageal sphincter (LES) is the cause [3-6]. Due to dietary changes, obesity, and lifestyle modifications, GERD is one of the most prevalent gastrointestinal disorders in the world, affecting both adults and children. In recent decades, its incidence has been continuously rising.

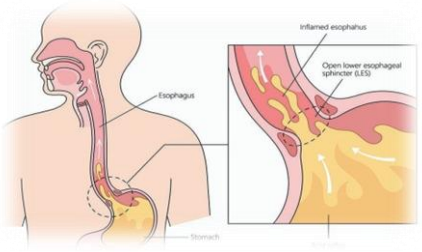

Fig 01: Image of Gastroesophageal reflux disease.

While random reflux is common, severe or ongoing symptoms can considerably impair quality of life and increase the risk of problems including Barrett's oesophagus, oesophagitis, or even esophageal cancer. Many times, GERD is diagnosed clinically based on distinctive symptoms, but in more complex cases, may need for manometry, Ph monitoring, or endoscopy [5, 7].

History

Hippocrates, an ancient Greek physician, was the first to describe reflux symptoms including heartburn and vomiting. Physicians in the 17th and 18th centuries referred to heartburn as "pyrosis" and associated it with posture and diet. By the 1800s, reflux was distinguished from indigestion and ulcers. Reflux esophagitis was clearly stated by Tileston in 1935 as acid-induced injury. More precise reflux diagnosis was made possible by the use of barium swallowing X-rays and, later, endoscopy. The lower esophageal sphincter was strengthened in 1955 with the introduction of Nissen fundoplication surgery. The late 20th century saw a paradigm shift with the introduction of proton pump inhibitors (PPIs) in the 1980s was a significant advancement that revolutionized treatment. In the 21st century, GERD is recognized as one of the most prevalent gastrointestinal disorders worldwide. Advances in high-resolution with the use of modern instruments like pH monitoring and manometry, GERD is now acknowledged as one of the most prevalent digestive disorders in the world. And manometry, which improves diagnosis and care [9-10].

Epidemiological Significance of GERD

Global prevalence

Approximately 10–30% of persons worldwide suffer from GERD, one of the most prevalent gastrointestinal conditions. It is more common in Western countries, but because to food choices, obesity, and changing lifestyles, it is fast increasing in Asia and developing countries [11-15].

Public health Burden

It causes sleep problems, chest discomfort, and psychological stress, GERD is a chronic and recurrent disease that lowers quality of life. The burden on society is increased as a result of decreased production and work absenteeism [16-20].

Complications and Morbidity

Barrett's esophagus, strictures, reflux esophagitis, and esophageal cancer are among the severe side effects of GERD that might develop if treatment is not received. These illnesses raise healthcare expenses and have a high morbidity rate.

Economic Impact:

The costs of medicine, frequent endoscopic operations, and hospital stays are the main sources of healthcare resources used to manage GERD. Early and efficient management lessens the financial strain overall.

Management's Significance

In order to lower complications, enhance patient outcomes, and limit the disease burden at the community level, proper care by medication, surgery, or endoscopic procedures is essential.

Symptoms of GERD

Gastroesophageal reflux Disease (GERD) symptoms can range in severity and frequency from mild and random to severe and ongoing. They can be broadly classified as atypical (extra-esophageal) and typical (esophageal) symptoms.

Typical Symptoms

These are the most common clinical features directly related to acid reflux:

- **Heartburn:** A burning sensation or discomfort that rises from the upper abdomen to the chest, often occurring after meals or when lying down.
- **Regurgitation:** The backflow of sour or bitter-tasting gastric contents into the throat or mouth.
- **Dysphagia:** A feeling of difficulty or discomfort when swallowing, often due to inflammation or stricture formation in the esophagus.
- **Chest pain:** Non-cardiac chest pain that can mimic angina but is related to esophageal acid exposure.

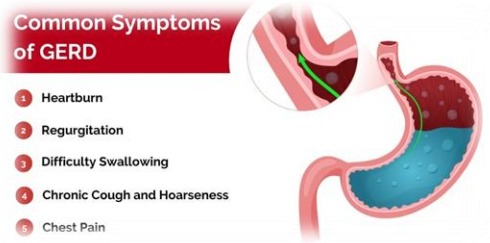

Fig 02: Symptoms of Gastroesophageal reflux Disease.

Atypical or Extra-esophageal Symptoms

- These occur when gastric reflux affects areas outside the esophagus:
- Chronic cough or throat clearing
- Hoarseness and voice changes (due to laryngeal irritation)
- Asthma-like symptoms or worsening of pre-existing asthma
- Sore throat or pharyngitis
- Dental erosion from acid exposure.

Symptom Patterns

GERD symptoms are often worse after large or fatty meals, when bending over, or lying flat, and improve with antacids or upright posture. Symptom severity does not

always correlate with the degree of esophageal damage, which makes clinical evaluation important.

Etiological Agents (Causes) of GERD

Acid reflux from the stomach into the esophagus causes gastroesophageal reflux disease (GERD). Numerous conditions disrupt the usual barrier between the stomach and esophagus, causing this to happen.

Weak Lower Esophageal Sphincter (LES)

The LES is a valve that separates the stomach and esophagus. Heartburn is caused by acid moving up into the esophagus when it weakens or relaxes too frequently. This can happen in obesity, hiatal hernia, or pregnancy.

Hiatal Hernia

Through the diaphragm, a portion of the stomach ascends into the chest. Acid reflux is facilitated and the valve is weakened as a result.

Slow Stomach Emptying

Pressure increases when food remains in the stomach for an extended period of time. Acid is forced upward into the esophagus as a result [21].

Poor Esophageal Movement

Inadequate Movement of the Esophagus Acid remains longer and irritates the lining of the esophagus if food and acid are not adequately forced down.

Increased Pressure in the Abdomen

Pregnancy, obesity, and tight clothing are some of the conditions that might cause an increase in abdominal pressure. Acid is forced upward into the esophagus as a result [22].

Unhealthy Diet and Habits.

Poor Diet and Behavior Reflux can be brought on by eating foods high in fat, spice, or acidity, drinking coffee or alcohol, smoking, or lying down right after eating.

6. Hormonal Changes

Progesterone relaxes the LES and other body muscles during pregnancy, which results in reflux.

Fig 03: Etiological Agents (Causes) of Gastroesophageal reflux Disease

Pathophysiology of Gastroesophageal Reflux Disease (GERD)

Fig 04: Patophysiology of Gastroesophageal reflux Disease.

When the reflux of stomach contents into the oesophagus causes discomfort or damage to the mucosa, it is known as gastro-oesophageal reflux disease (GERD). The pathogenesis of GERD is complex and includes a number of physiological, pharmacological, and mechanical elements that interfere with the gastro-oesophageal junction's natural anti-reflux barriers [23]

Lower Esophageal Sphincter (LES) Dysfunction

A hiatal hernia occurs when a portion of the stomach protrudes through the diaphragm into the thoracic cavity. This anatomical alteration weakens the gastroesophageal junction, reduces LES pressure, and facilitates reflux, particularly when lying down or after meals.

Hiatal Hernia

When a portion of the stomach passes through the diaphragm and enters the thoracic cavity, it is referred as a hiatal hernia. This anatomical alteration increases reflux easier, especially after meals or when lying down, weakens the gastroesophageal junction, and reduces LES pressure [24].

Impaired Esophageal Clearance

Normal peristalsis helps clear refluxed acid from the esophagus. Impaired motility or reduced saliva production (as seen in aging or certain diseases) delays acid clearance, increasing mucosal exposure and injury.

Delayed Gastric Emptying

Higher intragastric pressure occurs due to conditions like gastroparesis or greater gastric volume after heavy meals that slow down stomach emptying. By making it more likely for stomach contents to pass through the LES barrier, this increases reflux [25].

Composition of Refluxate

The refluxed material frequently consists of pancreatic enzymes, pepsin, bile salts, and acid, along with which promote inflammation and mucosal damage. A prolonged exposure may result in Barrett's esophagus or erosive esophagitis.

Mucosal Defense Mechanisms

The protective mechanisms of the esophageal mucosa include tight epithelial junctions, mucus secretion, and bicarbonate buffering. Even minor reflux occurrences can cause serious harm when these barriers are weakened [25].

Diagnosis

The diagnosis of GERD is based on a combination of clinical symptoms, patient history, and diagnostic tests to confirm reflux and assess its severity [26].

1Clinical Evaluation

Symptom-based diagnosis is the first step.

Typical symptoms include heartburn, acid regurgitation, chest discomfort, and difficulty swallowing (dysphagia). If symptoms improve after a trial of acid-suppressing therapy (like proton pump inhibitors), GERD is likely.

2. Empirical Therapy (PPI Test)

A short course (2–4 weeks) of proton pump inhibitors (PPIs) is given. Symptom relief following PPI therapy supports a diagnosis of GERD. This method is simple and widely used in primary care [27].

3. Endoscopy (Esophagogastroduodenoscopy – EGD)

It used when symptoms are severe or persistent or when complications (e.g., ulcers, strictures, and Barrett's esophagus) are suspected. Allows direct visualization of the esophageal lining to detect inflammation or damage [28].

4. Ambulatory 24-hour pH Monitoring

Measures acid exposure in the esophagus over 24 hours. It's the gold standard for confirming GERD, especially when endoscopy is normal or diagnosis is uncertain [29].

5. Esophageal Manometry

Evaluates the pressure and movement of the esophagus and LES function. Used before surgery or when motility disorders are suspected [30-31].

6. Barium Swallow (Contrast Radiography)

A special X-ray taken after drinking a barium solution. Helps detect hiatal hernia, structural problems, or reflux into the esophagus. Less sensitive for diagnosing GERD directly .

7. Impedance-pH Monitoring

Detects both acidic and non-acidic reflux events. Useful for patients who have GERD symptoms but do not respond to PPIs.

8. Treatment

As the initial line of treatment, a medical expert is likely to suggest attempting nonprescription medications and lifestyle modifications. More tests and prescription medication can be suggested if you don't feel better after a few weeks.

1. Prescription Medicines

GERD can be treated with prescription medications such as:

- Proton pump inhibitors with prescription strength. These consist of dexlansoprazole (Dexilant), pantoprazole (Protonix), rabeprazole (Aciphex), omeprazole (Prilosec), lansoprazole (Prevacid), and esomeprazole (Nexium). These medications can cause nausea, headaches, diarrhea, or, in rare cases, low levels of magnesium or vitamin B-12, even though they are usually well tolerated.
- Pharmaceutical-grade H-2 blockers. These consist of nizatidine and famotidine at prescription strength (28). These medications typically have well-tolerated, minor side effects.
- Potassium-competitive acid blockers or P-CABs. If existing medications haven't worked for someone with severe acid reflux, this new class of medications might be suggested. Among them are tegoprazan (K-Cab) and vonoprazan (Voquezna).

2. Training via deep breathing

For some people, diaphragmatic breathing is a practice that can help reduce the symptoms of GERD. This workout is performed following a meal. Instead of breathing slowly into the chest, it implies inhaling deeply into the diaphragm. Ideally, a qualified medical practitioner should instruct diaphragmatic breathing techniques.

3. Surgery and other Procedures

GERD can usually be controlled with medicine. But if medicines don't help or you wish to avoid long-term medicine use, a healthcare professional might recommend.

They are following procedures:

- Fundoplication
- LINX device
- Transoral incisionless fundoplication (TIF)
- Hiatal hernia repair
- Other Procedures

Fundoplication:

Fundoplication is a surgical procedure for treating severe gastroesophageal reflux disease (GERD) and hiatal hernias. The operation involves wrapping the top part of the stomach, known as the fundus, around the lower esophagus to reinforce the weakened valve (lower esophageal sphincter) that prevents stomach acid from flowing upward.

Types of Fundoplication

The fundoplication that is done depends on how much of the stomach is wrapped around the esophagus. The main types of fundoplication are total (or complete) fundoplication, such as the "Nissen fundoplication" (360-degree wrap), and partial fundoplication, like the "Toupet fundoplication" (270-degree posterior wrap) or "Dor fundoplication" (180-degree anterior wrap). by surgical approach, such as "laparoscopic" (minimally invasive with small incisions) versus "open" (requiring a larger incision) [32].

Nissen Fundoplication

Procedure: A full 360-degree wrap of the stomach fundus around the esophagus.

Purpose: To create a complete valve to prevent acid reflux.

Best for: Severe GERD or large hiatal hernias.

Toupet fundoplication

Procedure: A partial 270-degree posterior wrap.

Purpose: To create a valve that still allows for burping and vomiting, which can be beneficial for patients who have difficulty with gas.

Best for: Patients with mild to moderate GERD or weak esophageal muscles.

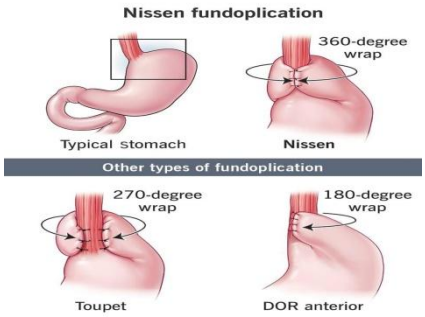

Fig 05: Procedure of Toupet fundoplication.

DOR Fundoplication

Procedure: A partial 180-degree anterior wrap.

Purpose: To provide a less restrictive valve that still addresses reflux.

Best for: Similar indications to Toupet, often chosen for specific anatomical situations or when a full wrap is not desired.

Based on Indian health clinic and hospital information, the most commonly preferred surgical procedure for GERD in India is Laparoscopic Fundoplication, with the Nissen fundoplication variation being the most widely performed. This minimally invasive procedure has become the "gold standard" for patients with severe GERD symptoms that do not respond to medication and lifestyle changes.

Laparoscopic fundoplication is a minimally invasive surgical procedure to treat acid reflux (GERD) and hiatal hernias by wrapping the upper part of the stomach, the fundus, around the lower esophagus to create a one-way valve. The procedure involves small incisions, a laparoscope (a thin tube with a camera and light) inserted through a port, and specialized instruments to perform the wrap and close the hiatus. This surgery strengthens the lower esophageal sphincter (LES), preventing stomach acid and digestive fluid from backing up into the esophagus.

Open surgery: Involves a single larger incision in the chest or abdomen, which may be necessary if the procedure is complex.

LINX Device

The LINX Reflux Management System (LINX device) is composed of from several types of titanium beads with magnetic cores that are joined in a ring shape through titanium wires. The LINX device is set up around the lower end of the esophagus during surgery. Whenever patients still have symptoms of gastroesophageal reflux disease (GERD) even consuming acid pills, such as proton pump inhibitor drugs, as part of medical therapy, it is utilized to treat the condition. The device is typically used for patients who have persistent GERD symptoms despite medical therapy and who are candidates for anti-reflux surgery.

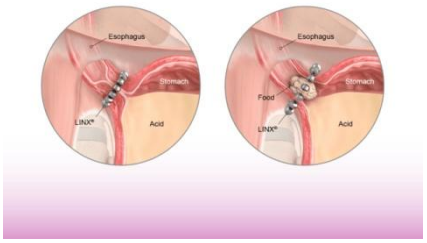

Fig 06: Image of LINX Reflux Management System (LINX device).

Transpolar incision less fundoplication (Endoscopic Procedure)

Transoral Incisionless Fundoplication (TIF) is a minimally invasive endoscopic procedure to treat chronic gastroesophageal reflux disease (GERD) without external incisions. A doctor uses a (TIF) device inserted through the mouth and an endoscope to fold the upper part of the stomach (fundus) around the esophagus and secure it with fasteners, recreating a valve to reduce reflux. This approach is an alternative to surgery for selected patients who are intolerant or unresponsive to medication, and it is performed on an outpatient basis with a quick recovery time. It results in less pain compared to traditional surgery, and most patients do not need strong pain medication.

Hiatal hernia Repair

Hiatal hernia repair is a surgical procedure to push the stomach back into the abdomen, close the enlarged opening in the diaphragm, and often reconstruct the lower esophageal valve to prevent acid reflux. It is performed using either laparoscopic techniques with small incisions or an open approach, and common procedures include a fundoplication, which wraps part of the stomach around the esophagus.

Specific to hiatal hernia surgery can include difficulty swallowing for a few months. General surgical risks include bleeding, infection, and blood clots. In rare cases, some patients may experience long-term complications, such as difficulty with swallowing, nausea, or abdominal pain.

Other procedures

Bariatric Surgery (Weight-loss surgery)

For obese patients with GERD, bariatric (weight-loss) surgery has become an option for treatment that offers both metabolic and mechanical advantages. These surgical procedures enhance esophageal motility, decrease acid exposure frequency, and reduce intra-abdominal pressure by producing rapid and permanent weight reduction. In addition, bariatric surgery can help with related comorbidities like obstructive sleep apnea, type 2 diabetes, and hypertension, all of which improve overall quality of life.

Lifestyle Modifications

A healthcare professional is likely to recommend trying lifestyle changes and nonprescription medicines as a first line of treatment. If you don't experience relief within a few weeks, prescription medicine and additional testing may be recommended.

- Changes in lifestyle include the following:
- Weight loss (if overweight).
- Stay away of dark chocolate, citrus juice, alcohol, and items made from tomatoes. Additionally, according to 2005 American College of Gastroenterology [ACG] standards, coffee, peppermint, and probably the onion-related genus should be avoided.
- Stay away of heavy meals.
- Not lying down for three hours after eating.
- Raising the bed's head by eight inches.
- Studies have demonstrated reduced exposure to distal esophageal acid following these modifications, in accordance with the ACG 2005 guidelines; however, there is a lack of evidence to support these conclusions.
- The first line of treatment for pregnant women with GERD is lifestyle changes. Encourage patients to consume small, frequent meals, prevent bending or stooping, raise the head of the bed, and avoid eating. (with the exception of drinks) three hours prior to bedtime [33].

Make sure to allow your healthcare professional know if you begin taking over-the-counter medications for GERD.

Conclusion

Gastroesophageal Reflux Disease (GERD) remains one of the most common chronic gastrointestinal disorders worldwide, with significant clinical, social, and economic implications. Its rising prevalence, particularly in association with obesity and lifestyle factors, highlights the need for early recognition and comprehensive management. Although proton pump inhibitors (PPIs) continue to serve as the mainstay of medical therapy, growing evidence supports the importance of a multifaceted approach that includes lifestyle modifications, weight management, and, when necessary, surgical or endoscopic interventions.

Understanding the pathophysiology of GERD enables clinicians to tailor treatment based on disease severity, symptom patterns, and patient-specific factors. Ongoing research into non-acid reflux mechanisms, novel pharmacological targets, and minimally invasive procedures holds promise for improved outcomes. Effective long-term management not only relieves symptoms and prevents complications such as Barrett's esophagus and adenocarcinoma but also enhances patient quality of life and reduces healthcare costs.

In conclusion, GERD is a preventable and manageable condition when approached holistically integrating lifestyle, medical, and surgical strategies guided by patient education and evidence-based practice.

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Conflict of Interest

No Conflict of Interest

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Inform Consent and Ethical Statement

Not Applicable

Author Contribution

All authors are contributed equally.

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