

# Transoral Incisionless Fundoplication (TIF)-A minimally invasive endoscopic technique for gastroesophageal reflux disease (GERD)

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**Abstract:** GERD or acid reflux is a digestive disorder wherein stomach contents rise up into the esophagus, resulting in either symptoms or complications. It basically involves the lower esophageal sphincter (LES). In most cases, GERD can be relieved through diet and lifestyle changes; however, some people may require medication or surgery. GERD is a highly prevalent disease condition throughout the world. The factors involved in the etiopathogenesis of reflux are multifactorial. Some of the factors include malfunctioning LES, smoking, food, caffeine, obesity, etc. Patients usually have a post-prandial burning sensation, chest pain, regurgitation and many more. Long term complications include esophageal ulceration, stricture, Barrett's esophagus and sometimes esophageal cancer. Some of the preventive measures can help prevent symptoms like weight loss and dietary changes. Treatment includes- anti-acid medications like antacids, PPIs and H2 blockers. Refractory cases can be treated with endoscopic procedures like-TIF and surgery like Nissen's fundoplication. Transoral incisionless fundoplication (TIF) is an advanced endoscopy procedure that provides relief from acid reflux (heartburn) symptoms associated with chronic GERD. Fundoplication procedures have been used to effectively treat patients with GERD for over 50 years. The TIF procedure differs from a traditional fundoplication procedure because it is performed through the mouth rather than through laparoscopy or open abdominal incisions. Overall TIF is a safer alternative to the classical Nissen's fundoplication.

**Keywords:** Transoral incisionless fundoplication (TIF), gastroesophageal reflux disease (GERD), abdominal incisions, surgery, endoscopic.

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## I. INTRODUCTION

### **GERD:**

Gastroesophageal reflux disease (GERD), also known as acid reflux, is a long term condition in which stomach contents rise up into the esophagus, resulting in either symptoms or complications [1,2,3].

It is a digestive disorder that affects the lower esophageal sphincter (LES), the ring of muscle between the esophagus and stomach. Many people, including obese and pregnant women, suffer from heartburn or acid indigestion caused by GERD. In most cases, GERD can be relieved through diet and lifestyle changes; however, some people may require medication or surgery [4].

The prevalence of GERD is increasing worldwide although there are marked differences in the reported prevalence, ranging from 2.5% to 6.6% in Eastern Asia up to 13.8% to 25.8% in North America [5].

### **RISK FACTORS:**

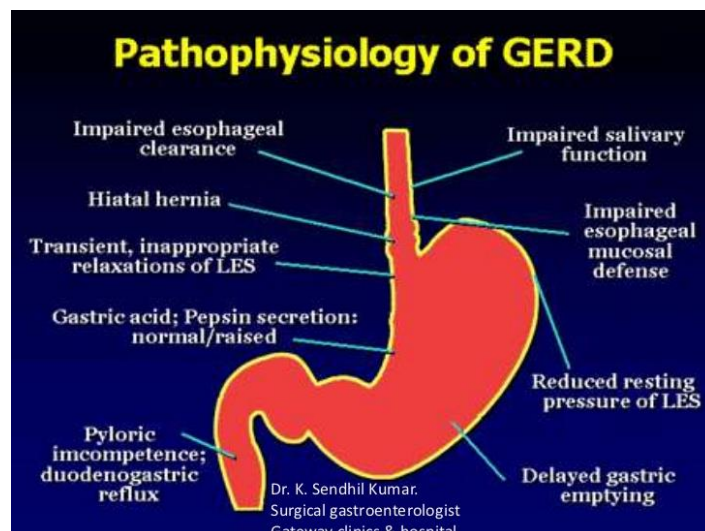
These are other common risk factors for acid reflux disease:



- Eating large meals or lying down right after a meal
- Being overweight or obese
- Eating a heavy meal and lying on your back or bending over at the waist
- Snacking close to bedtime
- Eating certain foods, such as citrus, tomato, chocolate, mint, garlic, onions, or spicy or fatty foods
- Drinking certain beverages, such as alcohol, carbonated drinks, coffee, or tea
- Smoking
- Being pregnant
- Taking aspirin, ibuprofen, certain muscle relaxers, or blood pressure medications [6].

#### ETIOLOGY:

The lower esophageal sphincter(LES) regulates food passage from the esophagus to the stomach. The LES contains both intrinsic smooth muscle and skeletal muscle. Episodes of transient lower esophageal sphincter relaxation are a normal phenomenon, but they occur more frequently in the GERD patients, causing reflux of gastric contents into the esophagus. Transient lower esophageal sphincter relaxation is more common after meals as it is stimulated by fat in the duodenum. It is more likely to occur if there is a hiatal sac containing acid. Patients with severe reflux often have a hiatal hernia and decreased resting lower esophageal sphincter pressure. However, pressure can be high in mild to moderate reflux.



The severity of mucosal damage depends on the duration of contact with gastric contents, characteristics of the gastric contents (acid, pepsin, and bile salts are damaging to the mucosa), and resistance of the epithelium to damage. The reasons are not clear for symptoms such as heartburn, regurgitation, or dysphagia that persist despite therapy with proton-pump inhibitors and remain unexplained by endoscopy, manometry, or acid monitoring. Possibilities include hypersensitivity or functional syndromes, but there is a lack of evidence. [7,8].

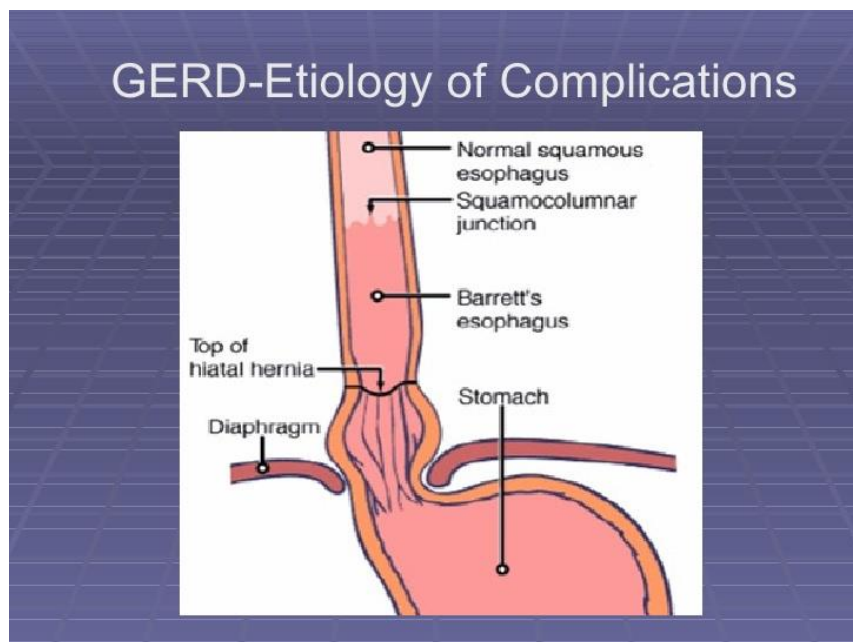
### SYMPTOMS:

Common signs and symptoms of GERD include:

- A burning sensation in your chest (heartburn), usually after eating, which might be worse at night
- Chest pain
- Difficulty swallowing
- Regurgitation of food or sour liquid
- A sensation of a lump in your throat
- If you have nighttime acid reflux, you might also experience:
  - A chronic cough
  - Laryngitis
  - New or worsening asthma
  - Disrupted sleep [9].

### COMPLICATIONS:

- Narrowing of the esophagus (esophageal stricture). Damage to the lower esophagus from stomach acid causes scar tissue to form. The scar tissue narrows the food pathway, leading to problems with swallowing.
- An open sore in the esophagus (esophageal ulcer). Stomach acid can wear away tissue in the esophagus, causing an open sore to form. An esophageal ulcer can bleed, cause pain and make swallowing difficult.
- Precancerous changes to the esophagus (Barrett's esophagus). Damage from acid can cause changes in the tissue lining the lower esophagus. These changes are associated with an increased risk of esophageal cancer [9].



#### PREVENTION:

1. Lose weight. Obesity is the leading cause of GERD. Extra stomach fat places pressure on your abdomen, pushing gastric juices up into your esophagus.
2. Avoid foods known to cause reflux. If you're at risk for GERD, avoid Fatty foods, Spicy foods, Acidic foods, like tomatoes and citrus, Mint, Chocolate, Onions, Coffee or any caffeinated beverage and Carbonated beverages.
3. Eat smaller meals. Large meals fill the stomach and put pressure on the LES, making reflux and GERD more likely.
4. Don't lie down after eating. Wait at least three hours before you lie down after a meal.
5. Elevate your bed.
6. Review your medications. There are a number of medications that can increase your risk of GERD, either by relaxing the LES, interfering with the digestive process, or further irritating an already inflamed esophagus. These medications include:
  - Non-steroidal anti-inflammatory drugs, or NSAIDs
  - Calcium channel blockers (often used to treat high blood pressure)
  - Certain asthma medications, including beta-agonists like albuterol
  - Anticholinergics, medications used to treat conditions such as seasonal allergies and glaucoma
  - Bisphosphonates used to boost bone density
  - Sedatives and painkillers
  - Some antibiotics
  - Potassium
  - Iron tablets
7. Quit smoking.
8. Cut back on alcohol.
9. Wear loose-fitting clothes.
10. Try a gluten-free diet.

#### TREATMENT:

Most of the doctors recommend that you first try lifestyle modifications and over-the-counter medications.

Over-the-counter medications

- Antacids that neutralize stomach acid.
- Medications to reduce acid production.
- Medications that block acid production and heal the esophagus.

#### Prescription medications

- Prescription-strength H-2-receptor blockers-Ranitidine, Famotidine.
- Prescription-strength proton pump inhibitors-Pantoprazole, Omeprazole.
- Medication to strengthen the lower esophageal sphincter-Baclofen [10].

#### Surgery and other procedures

GERD can usually be controlled with medication. But if medications don't help or you wish to avoid long-term medication use, your doctor might recommend:

1. **Fundoplication** is the most common surgery for GERD [11].
2. **Endoscopic techniques-** Transoral Incisionless Fundoplication (TIF).

### Transoral Incisionless Fundoplication (TIF)

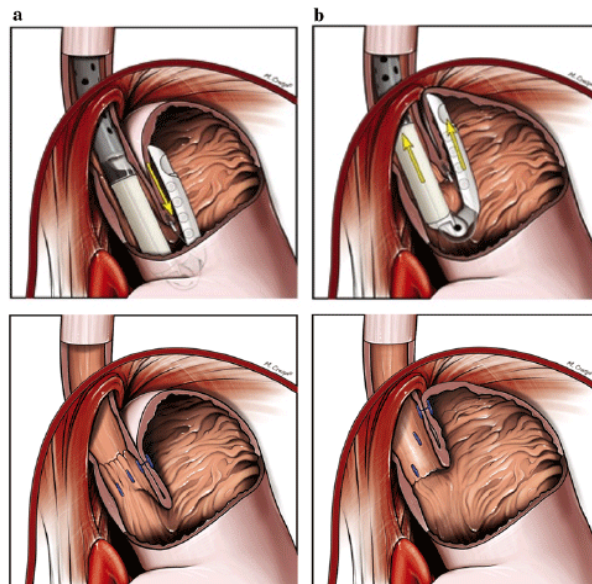
Transoral incisionless fundoplication (TIF) is an advanced endoscopy procedure that provides relief from acid reflux (heartburn) symptoms associated with chronic GERD [12].

The TIF procedure is performed from inside the patient's stomach without incisions. This procedure delivers patient outcomes similar to those provided by conventional ARS procedures, but is less invasive, has fewer adverse effects, and does not limit future treatment options. Following the principles of ARS, the TIF procedure repairs the anti-reflux barrier by reducing a hiatal hernia ( $\leq 2$  cm) and creating a valve 2 to 4 cm in length and greater than 270-degree circumferential wrap, thus restoring the dynamics of the angle of His [14].

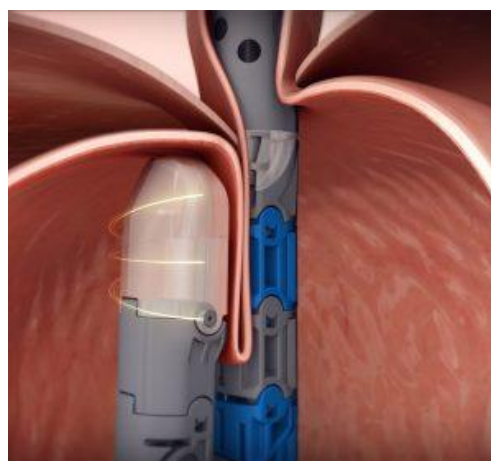
Insights about TIF procedure:

- The device uses the oral pathway, no incisions needed
- Esophagus partially wrapped 270-300°
- Allows for belching and vomiting
- Short recovery [13].

Fig. 2 A TIF 1 procedure with gastrogastric plications placed at the level of the Z-line. B TIF 2 technique creates an esophagogastric fundoplication proximal to the Z-line



**A Less Invasive Approach to Fundoplication**-Fundoplication procedures has been used to effectively treat patients with GERD for over 50 years. The TIF procedure differs from a traditional fundoplication procedure because it is performed through the mouth rather than through laparoscopy or open abdominal incisions.



### TIF As an Alternative to Nissen Fundoplication

Doctors can use TIF instead of a laparoscopic surgical procedure called Nissen fundoplication. With Nissen fundoplication, doctors make an incision and then wrap the top of the stomach around the esophagus to recreate a valve.

Doctors can use TIF instead of Nissen fundoplication to avoid unwanted side effects that Nissen fundoplication may produce, including:

- Trouble swallowing
- Difficulty eating for several months
- Trapped air resulting in belching or bloating
- A hernia at the incision location

Unfortunately, a valve created using Nissen fundoplication may fail within eight to 10 years. At that point, patients may need a repeat procedure. Doctors can use TIF to repair a valve previously created with Nissen fundoplication [12].

## 2. METHODOLOGY

In this review article of Transoral Incisionless Fundoplication (TIF) for the GERD treatment, the data is pooled from various pieces of literature referring the web to understand the etiopathology, prevalence, complications and treatment options for the GERD patients and the significance of a TIF procedure and its superiority over Nissen's fundoplication.

To understand this medically common and relevant phenomenon and its treatment, we collected information from the studies done in the past globally throughout the world.

We included studies done in the past decades and got some relevant correlation listed below in the results and conclusion.

It is clear that the modern endoscopic technique of TIF is to a lot of extents superior to the classic Nissen fundoplication in the patients with treatment failure after medical management.

## 3. RESULTS AND CONCLUSIONS

GERD is a very common and highly prevalent condition affecting people throughout the world. It is multifactorial and presents with a variety of symptoms like acid reflux, heartburn, regurgitation, fullness, and difficulty swallowing. Long-standing and uncontrolled acid reflux can lead to ulceration, stricture and sometimes dysplasia of the esophagus.

The treatment options can be provided depending on the severity of the symptoms and amount of damage done to the esophagus. Mild symptoms can be treated with lifestyle modifications like weight loss, dietary modification, and avoidance to other triggering factors. Over the counter medication like antacids can be used as well. Prescription of medications like proton pump inhibitors (Pantoprazole, esomeprazole) can lead to not only improvement of the symptoms but also healing of the damage caused by acid reflux to some extent.

More complicated or refractory cases can be treated with endoscopic (TIF) or surgical procedures (Nissen Fundoplication). TIF has several advantages over surgical procedures. TIF can be done in an outpatient setting. TIF can be used instead of Nissen fundoplication to avoid unwanted side effects that Nissen fundoplication like trouble swallowing, difficulty eating for several months, trapped air resulting in belching or bloating and hernia at the incision location. It is clear that the modern endoscopic technique of TIF is to a lot of extents superior to the classic Nissen fundoplication in the patients with treatment failure after medical management.

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