



Nissen Fundoplication

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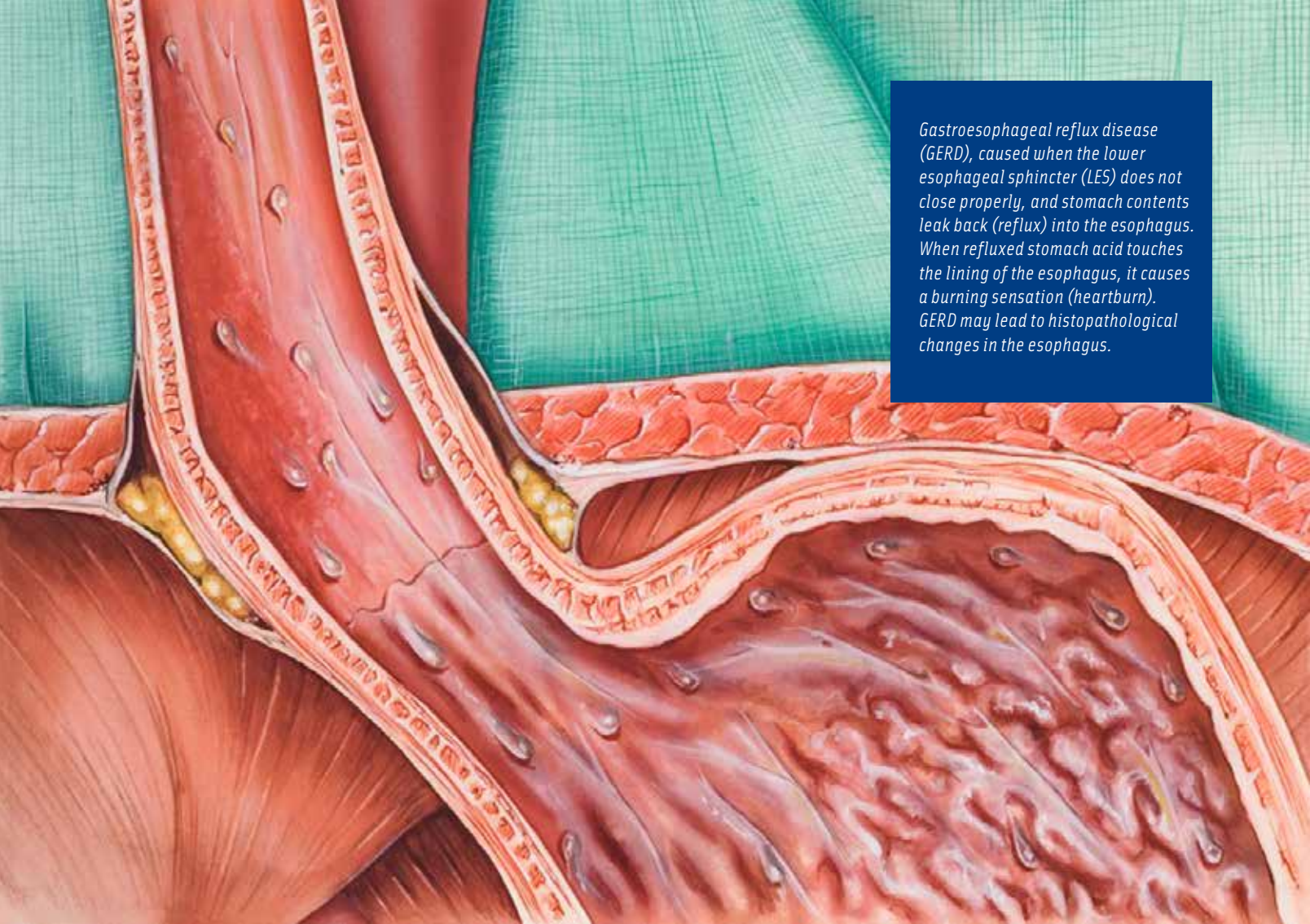
Nissen fundoplication is a surgical procedure used to treat gastroesophageal reflux disease, or GERD, and hiatus hernias. For GERD, it is usually performed when medical therapy has failed, but with paraesophageal hiatus hernia, it is encouraged as the first solution to treat the condition.

Nissen fundoplication is a procedure for strengthening the valve muscle between the stomach and the esophagus preventing stomach acids from being forced back into the esophagus. Normally, the lower esophageal sphincter acts as a one-way valve and only opens when swallowing. The lower esophageal sphincter should otherwise remain closed and prevent the back up of any stomach secretions into the esophagus. If the lower esophageal sphincter becomes weakened or abnormally relaxes, the stomach secretions can reflux and cause associated symptoms. These changes in the lower esophageal sphincter also can be exacerbated by the presence of a hiatal hernia. This occurs when a portion of the stomach protrudes through the diaphragm and goes into the chest. Nissen fundoplication offers a high percentage positive outcome of correcting this condition. A recent study found that 90 percent of patients undergoing this procedure are symptom-free after 10 years.

Dr Rudolph Nissen (1896-1981) first performed the procedure in 1955 and published the results of two cases in a 1956 edition of *Swiss Medical Weekly*. In 1961, he published a more detailed overview of the

LEARNING OBJECTIVES

- ▲ Learn about the history associated with Nissen fundoplication
- ▲ Discover the condition this procedure helps to relieve
- ▲ Compare and contrast the difference between the open and laparoscopic operations for this procedure
- ▲ Review the surgical steps when performing the laparoscopic method
- ▲ Examine the post-op timeline including diet restrictions



Gastroesophageal reflux disease (GERD), caused when the lower esophageal sphincter (LES) does not close properly, and stomach contents leak back (reflux) into the esophagus. When refluxed stomach acid touches the lining of the esophagus, it causes a burning sensation (heartburn). GERD may lead to histopathological changes in the esophagus.

procedure, in which he originally referred to the surgery as gastroplication. The procedure has borne his name since it gained popularity in the 1970s.

In a fundoplication, the gastric fundus of the stomach is plicated around the lower end of the esophagus and stitched in place, reinforcing the closing function of the lower esophageal sphincter. The esophageal hiatus is narrowed down by sutures to prevent or treat concurrent hiatal hernia, in which the fundus slides up through the enlarged esophageal hiatus of the diaphragm.

In a Nissen fundoplication, the fundus is wrapped 360 degrees around the esophagus. In contrast, surgery for achalasia is generally accompanied by either a Dor or Toupet partial fundoplication, which is less likely than a Nissen wrap to aggravate the dysphagia that characterizes achalasia. In a Dor or anterior fundoplication, the fundus is laid over the top of the esophagus; while in a Toupet or posterior fundoplication, the fundus is wrapped around the back of the esophagus.

OPEN PROCEDURE

The Nissen fundoplication can be performed laparoscopically or by an open procedure consisting of a wide incision into the abdomen. The surgeon will wrap the upper portion of the stomach around the esophagus, which will create pressure on the lower part of the esophagus to prevent stomach acid from moving upward. If a hiatal hernia exists, the stomach will be placed entirely back in to the abdomen. The surgeon will then tighten the opening of the diaphragm where the hernia pushed through.

The open procedure usually takes about two to four hours and the average hospital stay is an average of two to four days. Possible complications from the surgery may include infection, uncontrollable bleeding, difficulty swallowing, return of reflux symptoms, limited ability to burp or vomit, gas pains, damage to organs, anesthesia-related issues, and in rare cases, the procedure may need to be repeated. In such instances, the wrap may have been too tight or slipped, forming a new hernia.

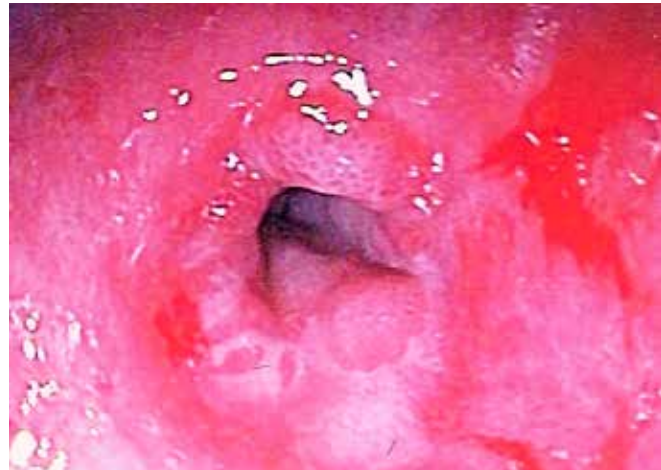
LAPAROSCOPIC PROCEDURE

During the laparoscopic procedure, gas is pumped into the abdomen to improve viewing. Numerous options exist for port placement during a laparoscopic Nissen fundoplication. The surgeon will use one of two techniques for insertion of port A, which serves as the camera port. The first technique involves insertion of a 10-mm trocar inserted via Hassan technique in the supraumbilical location. The second technique, and the one used in this case, uses a 5-mm optiview system to insert the supraumbilical trocar. Four 5-mm trocars are inserted subcostally under direct visualization: port B is placed subcostally in the right midclavicular line, port C is placed subcostally just to the right of midline, port D is placed subcostally just to the left of midline and port E is placed subcostally in the left midclavicular line. An atraumatic liver retractor should be sintered into port B. This allows for the left lobe of the liver to be retracted to expose the hiatus. This retractor is typically held by a surgical assistant or self-retaining system. Port C and D will be used for the dissection. Port E can be used as needed for insertion of various instruments including graspers, clamps or electrocautery. The dissection is now carried out in a similar fashion as in the open procedure.

With the liver retractor inserted, the hiatus should now be noticeable. Typically, the left triangular ligament is left in situ, but in may be divided for further mobilization if needed. A laparoscopic atraumatic Babcock grasper may be inserted through port E to grasp the stomach or epiphrenic fat pad and retract it caudally. The gastrohepatic ligament is then opened above and below the hepatic branch of the anterior vagus nerve. The dissection should continue toward the diaphragm to expose the right crus. Blunt dissection is

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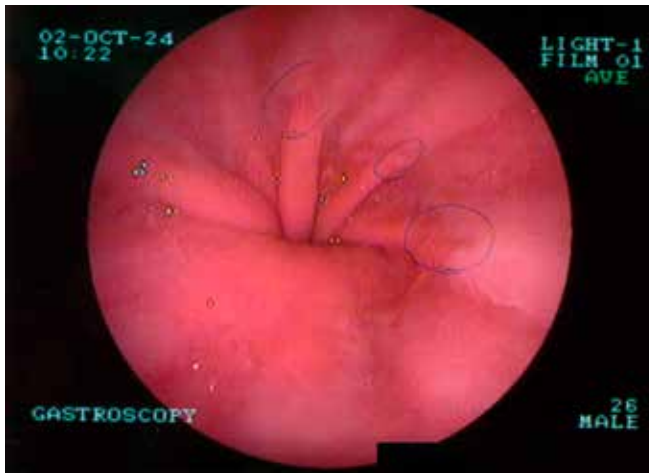
needed to delineate the right crus from the esophagus. The posterior vagus nerve needs to be identified so it can be preserved. The dissection can be continued superiorly over the anterior surface of the esophagus and down the left crus.



Upper GI endoscopy depicting hiatal hernia.

Care needs to be taken to avoid a possible accessory left gastric artery running with the hepatic branch of the anterior vagus nerve. The phrenoesophageal ligament is the reflection of the subdiaphragmatic fascia onto the transversalis fascia of the anterior abdominal wall. The phrenoesophageal ligament is divided. The anterior vagus nerve should be identified and preserved. Freeing the intrathoracic esophagus as much as 6 cm may be necessary to gain the appropriate intraabdominal esophageal length. All branches of the vagus nerves should be preserved. The anterior branches have numerous anatomic variations and are included in the fundoplication. Blunt dissection is used to free the distal esophagus from its posterior attachments. Once the esophagus has been freed circumferentially, a nylon tap, a Penrose drain or instrument can be inserted through port E and used to encircle the esophagus. The esophagus is then retracted anteriorly through to expose the posterior hiatus. The hiatus will be dissected meticulously to delineate the diaphragmatic crus. The distal 6 cm of the posterior esophagus will need to be fully mobilized. Care should be taken to preserve the inferior phrenic artery. In approximately 5% of patients, the left inferior phrenic arises from the left gastric artery and runs along the edge of the right hiatal pillar. If this is the case, it must be ligated to facilitate hiatal mobilization.

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Gastroscopy depicting a hiatal hernia.

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repair it routinely. Sutures will be placed from posterior to anterior and should narrow the hiatus to approximately 2.5 cm in diameter. In patients without a hernia or only with a small hernia, 1 or 2 0-0 nonabsorbable sutures are sufficient. More sutures may be needed to larger hernias. Sutures may be tied intracorporeally or extracorporeally per surgeon preference. Some surgeons may place additional sutures anteriorly or use mesh for repair of large hiatal hernias.

After hiatal repair, the surgeon will insert a 10mm instrument adjacent to the esophagus. Patterson et al recommend the use of a 56-F bougie across the gastroesophageal junction during the hiatal repair and fundoplication to decrease the risk of postoperative dysphagia. Other literature has found equivalent outcomes without the use of bougies.

The Penrose drain and nylon tape or instrument used to encircle the esophagus is then removed. Laparoscopic atraumatic Babcock forceps are used to grasp the fundus of the stomach and bring it behind the esophagus. After inspection of the abdomen to ensure hemostasis, all instruments and ports need to be removed under direct visualization. The fascia of any 10-mm ports used will need to be closed using nonabsorbable sutures. The skin of all five ports will be closed with an absorbable suture in subcuticular fashion.

POSSIBLE COMPLICATIONS

There are several complication for this procedure including the esophagus or stomach being inadvertently damaged, which can cause bleeding, perforation or abscess complications. Esophageal or stomach damage is typically repaired immediately. Patients also may experience dysphagia, and abdominal bloating or increased amount of gas is common. Rare complications include a patient's lungs or spleen being injured, which may lead to difficulty breathing or other complications such as pneumonia or excessive bleeding. Approximately 10 percent of patients continue to experience GERD symptoms, such as heartburn, following the procedure.

POST OP

Small tape pieces are placed under gauze and sealed with clear tape dressings over each incision. These dressings generally can be removed 48 hours after the operation.

If the procedure was done open, the patient's incision will most likely be closed with staples to be removed at the post-op visit, about 10 to 14 days after the operation.

Post-operative treatment after Nissen fundoplication generally follows these guidelines:

- Discharge from the hospital
- Avoid lifting more than 10 pounds for four weeks
- Avoid excessive bending or twisting for one to two weeks

Typically, a patient is able to return to work in one to three weeks.

OTHER CONSIDERATIONS

Following Nissen fundoplication surgery, a patient's diet will be restricted. The strict diet will help control diarrhea, excess gas and swallowing problems.

Immediately following the surgery, a patient will be restricts to a clear liquid diet. Clear liquids can include

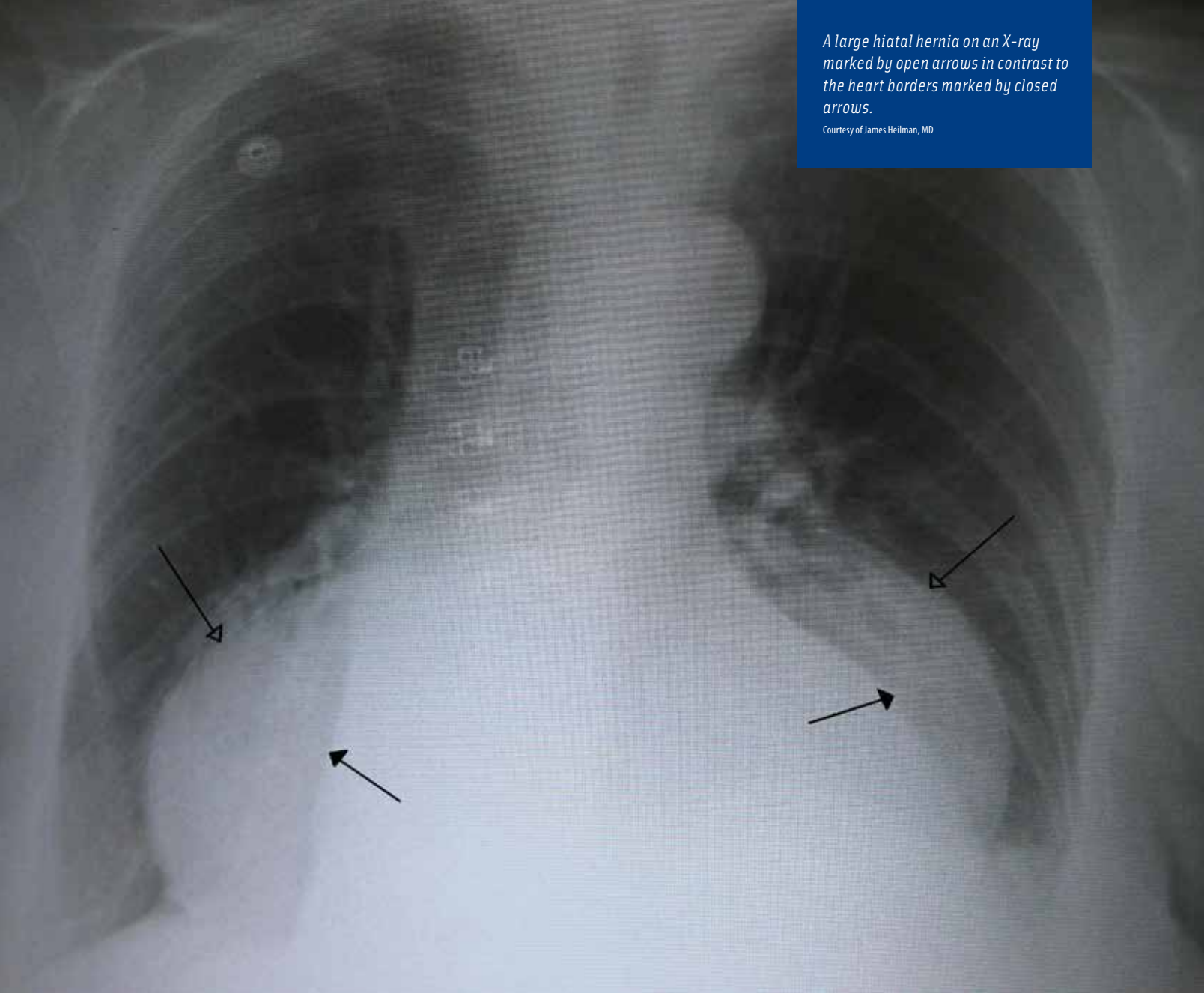


X-ray of the abdomen and chest in a patient with a gastrostomy. Radiocontrast was injected into the stomach and quickly seen migrating upwards through the entire esophagus. The patient had severe reflux.

Courtesy of Steven Fruitsmaak

A large hiatal hernia on an X-ray marked by open arrows in contrast to the heart borders marked by closed arrows.

Courtesy of James Heilman, MD



apple juice, cranberry juice, grape juice, chicken broth, beef broth, flavored gelatin and decaf tea. Carbonated drinks are not allowed for six to eight weeks after the operation.

Patients will then be allowed a full liquid diet, which includes milk, cream of wheat or rice, strained creamed soups, vanilla ice cream, sherbet, plain yogurt, carnation instant breakfast (no chocolate).

Patients also will be advised to:

- Eat small, frequent meals (six to eight per day)
- Drink ½ cup of fluid with meals
- Eat sweet foods at the end of the meal
- Sit upright while eating and stay upright for 30

minutes following. Sit upright for two hours before sleeping

- Take small bites and chew food thoroughly
- Eat foods that are soft; avoid foods that are gummy
- Avoid drinking through a straw
- Do not chew gum or tobacco because of the excess air that can produce excess gas
- Avoid foods that give one indigestion
- Avoid caffeine, carbonated beverages, alcohol, citrus fruits and juices, tomato products and chocolate