

Surgery of the Esophagus

Surgery for Esophageal Cancer

Surgery for esophageal cancer is generally performed in several situations:

- Superficial Tumors (T1) that can't be completely removed by endoscopy
- Localized Tumors (T2N0)
- Locally Advanced Tumors (T3 or N+) after preoperative therapy.

Goals of Surgery

- Remove tumor from esophagus
- Remove surrounding lymph nodes
- Create a new esophagus



Resection

The *Ivor Lewis* esophagectomy, shown here, removes the lower 2/3 of the esophagus, the tumor, and the surrounding lymph nodes.



Reconstruction

A new esophagus is created from the stomach in the abdomen by fashioning it into a tube.



Ivor Lewis esophagectomy

The new esophagus is now brought up into the chest. A new connection is made between the esophagus and the stomach, called an *anastomosis*.



Minimally-invasive Ivor Lewis

- Small incisions abdomen and chest
- Surgical telescope and instruments
- Smaller incisions → faster recovery and less discomfort



Minimally-invasive Ivor Lewis

We have found this is the best option for most of our patients. In some cases, an open approach is still necessary.



Open Ivor Lewis

In some cases, an open approach is still necessary.



Total Esophagectomy

For patients with tumors in the upper esophagus, we need to remove more of the esophagus



Total Esophagectomy

For those patients, we need to remove the whole esophagus



Minimally-invasive McKeown Esophagectomy

In this case, a connection between the esophagus and the stomach is made in the neck.



Risks of Surgery

An esophagectomy is a substantial operation, and in some cases there can be postoperative complications. We're going to talk about two of these complications and what you can do to reduce your risk of complications:

- Anastomotic leak

- Pneumonia

Anastomotic Leak

The anastomosis is surgical connection between the esophagus and the stomach.



Anastomotic Leak

If anastomosis does not heal properly:

- Leakage of fluid from the esophagus
- Infection in the space between the lungs
- Requires additional time in the hospital



Anastomotic Leak

If an anastomotic leak does occur:

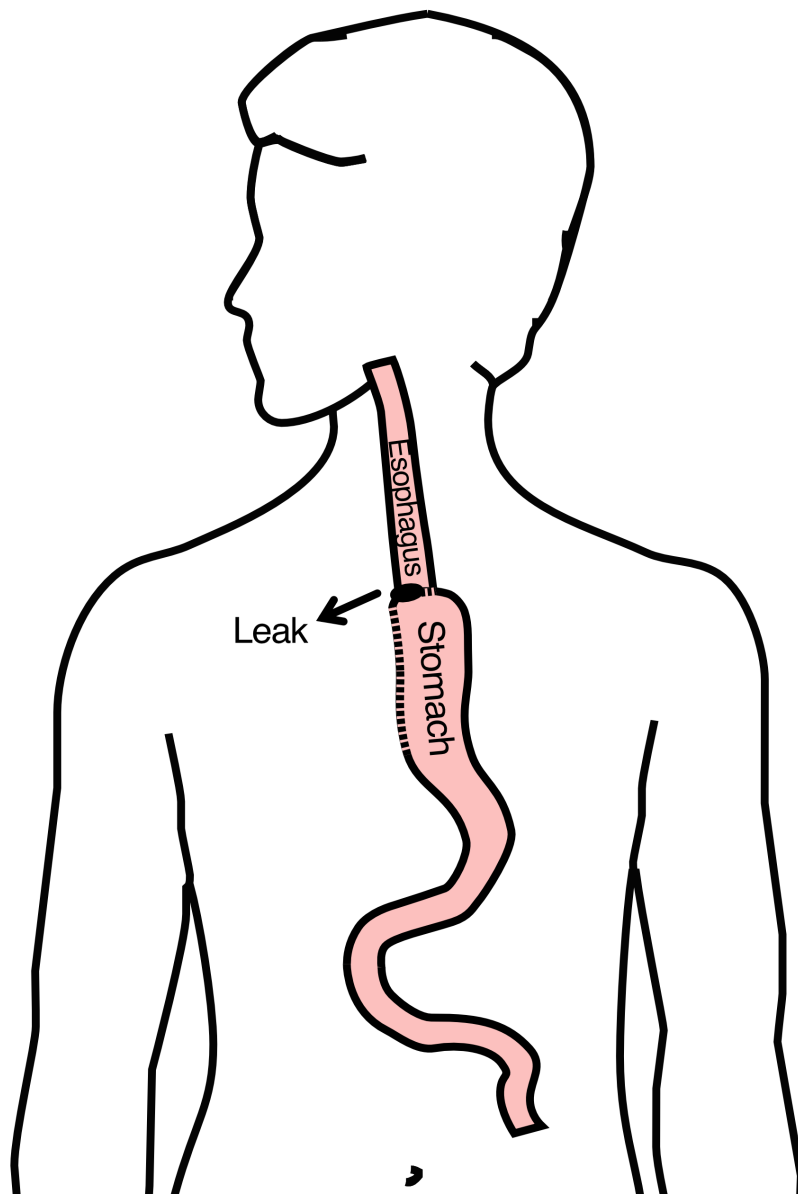
- Some leaks will seal on their own
- A stent may be required to help healing
- Occasionally additional surgery is required



Anastomotic Leak

Risk of a leak depends upon:

- Type of operation performed
- Overall nutritional status of patient
- Experience of the surgeon



Pneumonia

Pneumonia can occur in about 10-15% of patients after esophagectomy.

Pneumonia requires treatment with antibiotics and frequently requires a longer hospitalization.



Preventing Pneumonia

There are several ways to help prevent pneumonia after surgery:

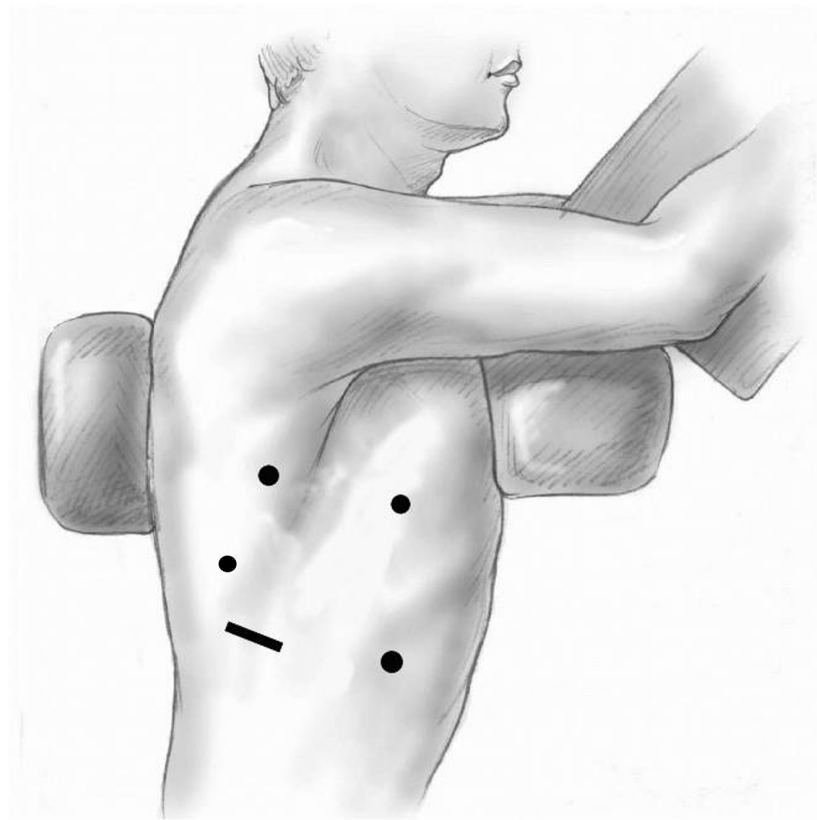
- Deep breathing
- Coughing
- Walking

After surgery, this means:

- Sitting in a chair most of the day
- Walking in the halls as soon as possible

Minimally-invasive Esophagectomy





Risks of Surgery

Risks related to anesthesia

- Heart attack (5%)
- Irregular heart rhythm (15%)
- Pneumonia (10%)
- Blood clots in legs (<5%)
- Pulmonary embolism (2%)

Risks of Surgery

Risks related to Surgery

- Anastomotic leak (5%)
- Stricture at anastomosis (15%)

- Death within 90 days of surgery
 - Low risk patients = 2%
 - Intermediate risk = 10%
 - High risk = 30%

Risks of Surgery

Table 1: Risks of Death within 90 Days of Surgery

	Age <75	Age >75
Normal Muscle (75%)	2%	10%
Low Muscle (25%)	10%	30%

Day Prior to Surgery

- Clear liquids for 24 hours prior to surgery
- Check with Pre-op nurse regarding medicines day prior to surgery
- No tube feedings the night before surgery

Day of Surgery

- Arrive at 5am – nothing to eat or drink after midnight.
- OK to take medicines with a sip of water (or coffee) but no cream.
- Surgery will be cancelled if you have cream or milk in the morning.
- Waiting room for family and friends on 5th floor
- Post-operative care in STICU (11th floor)

Anesthesia

Epidural catheter for pain control

- Remains in place for 2-5 days
- Dose can be adjusted as needed
- Can make it more difficult to empty the bladder
- May require foley (bladder) catheter to stay in place until epidural

Intensive Care Unit (1-2 days)

Multiple lines and tubes:

- NG tube in nose (stays in 2-7 days)
- Catheter in bladder (2-5 days)
- Chest tube right chest (2-4 days)
- Abdominal drains (2 or 3)

ICU

- Catheter in bladder removed → make certain the bladder empties properly
- Chest tube removed (day 2-4) → follow-up chest x-ray
- Fluid emptied from drains every few hours
- Start tube feedings by feeding
- Feeding jejunostomy (stays in 8 weeks)

Feeding Jejunostomy

- Feeding tube placed in small intestine
- Pump feedings require 16 hours (overnight)
- Run from 6pm to 10am



Feeding Jejunostomy - Typical Regimen

- Jejunostomy tube feeds for 16 hours (6pm to 10am)
 - Men: 75mL/hour x 16 hours = 5 cartons
 - Women: 60mL/hour x 16 hours = 4 cartons
- Water 240ml (8oz) via syringe 4x/day

Hospital nurses will teach you how to use the feeding tube pump

We want to make sure you can manage the pump before going home

Feeding Jejunostomy - Diabetes

Jejunostomy feeding tend to elevate blood sugars: Insulin may be required

Typical pattern:

- Jejunostomy feeds 6pm to 10am
- Insulin at 6pm (70/30)
- Insulin at MN (70/30)
- No insulin if feedings are not run

Activity

- Up in chair most of the day
- Walking in hallway with help from nurse/Physical Therapist
- Goals:
 - Improve lung function
 - Prevent muscle loss

Nasogastric Tube (NG)

NG is placed through the nose into the stomach to remove fluid from the stomach and allow healing.

NG tube is removed after confirmation by x-ray that the stomach is starting to empty properly

Nasogastric Tube (NG)

X-ray on the 2nd to 4th day after surgery

- Will require standing up for 5-10 minutes
- Dye is injected into the NG tube
- If stomach empties, NG tube is removed

Modified Barium Swallow

Tests whether swallowing muscles are working properly

- Performed after nasogastric (NG) tube removed
- Drink a white chalky liquids in while x-rays are taken

70% have good swallowing function → 1oz of water every hour

Protein Shakes

Most are taking protein shakes when they go home

Protein shakes are started after tolerating water

- 2 oz per hour to start - 4 oz per hour if 2oz are tolerated well

Discharge

Goal: Ready to leave hospital day #6/7 after surgery

- Tube feeds at night (6pm to 10am)
- Protein shakes by mouth (70% of patients)
 - 4oz every 2 hours
 - Water by mouth 2 oz at a time Water through feeding tube (8oz 4x/day)

Nutrition at Home

Most patients go home with:

- Protein shakes by mouth 4oz at a time
- Tube feeds at night (4-5 cartons)
- Water through the feeding tube 8oz 4 times per day

Medicines at Home

- Proton pump inhibitor (acid blocker) for one year
- Reglan (metoclopramide) - stomach emptying: 6 weeks
- Lopressor (metoprolol) - prevent atrial fibrillation: 2 weeks

Pain Medicines at Home

- Acetaminophen 1000mg every 6 hours
- Gabapentin 300mg every 8 hours
- Oxycodone 5mg every 6 hours

In most cases, oxycodone is no longer needed by 6 weeks after surgery

Sleeping

Reflux can occur the first few weeks/months after surgery

This improves over the first few months

A wedge pillow can be helpful for sleep



Postoperative Visit

You will be seen in the office 7-10 days after discharge

- Adjust medicines
- Remove staples
- Remove drains (if needed)

Jejunostomy Removal (8 weeks after surgery)

Jejunostomy tube is removed in the office once you can take in enough nutrients by mouth. May take 30 minutes and some local anesthetic to loosen up the tube for removal.

Nutritional Monitoring after Surgery

You may have some difficulty absorbing some nutrients:

- Iron
- Vitamin B12
- Vitamin D

Nutritional Monitoring after Surgery

About 3 months after the jejunostomy tube is removed, we will check blood levels:

- Iron (ferritin)
- Vitamin B12
- Vitamin D.

Nutritional Replacements after Surgery

Vitamin or iron replacements can be ordered by your primary care physician, medical oncologist, or surgeon.

If levels are low, repeat testing in several months may be needed.

Preparing for Cancer Treatment

- Primary Care Physician
- MyAtrium Portal
- Exercise
- Smoking Cessation

Primary Care Practitioner (PCP)

A PCP is critical to coordinate care between specialists.

We will update your PCP after each visit

If you do not have a PCP, call our referral line at (844) 235-6998

My Atrium Patient Portal

- Critical to good communication with your cancer care team
- Available for desktop or laptop or phone
- Sign up at my.atriumhealth.org

Exercise

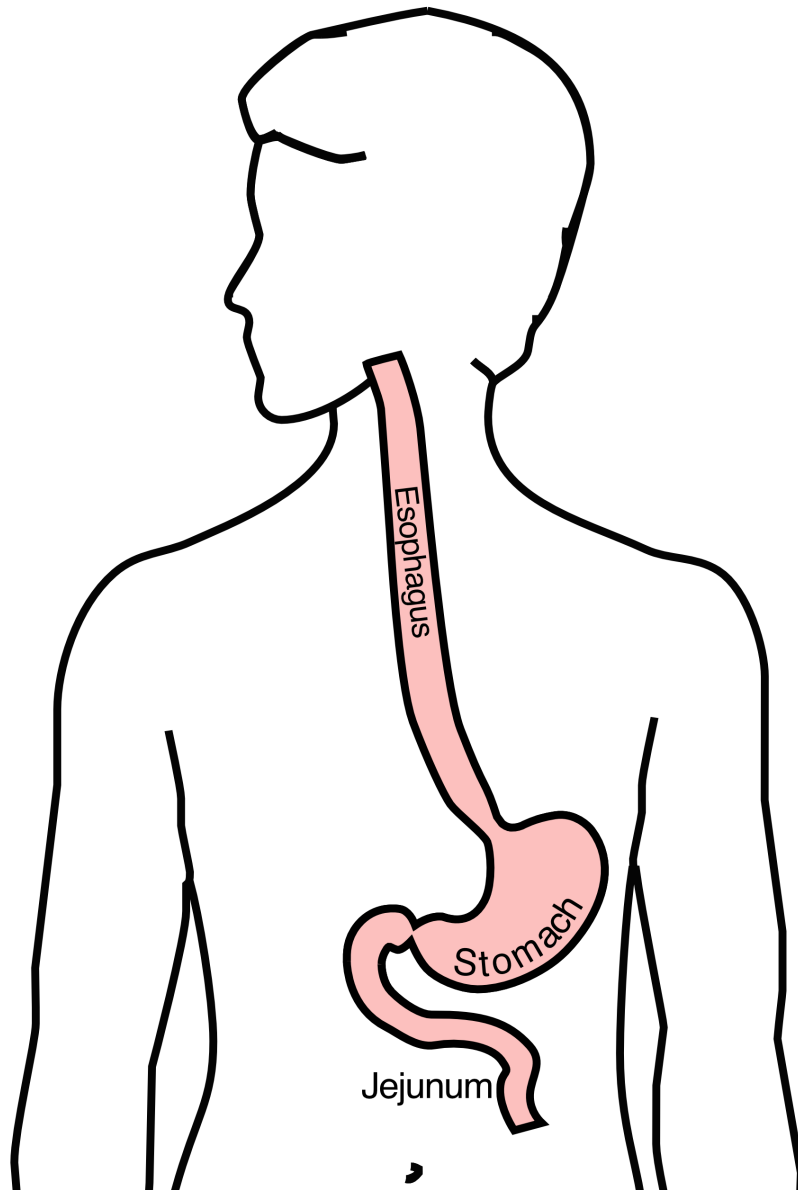
- Important to reduce the risk of complications from cancer treatment
- Goal is 30min/day of vigorous exercise 6 days/week
 - Working hard enough that you can't carry a conversation
 - Start slow and build up
 - Every day counts! (Aim for some activity every day)

Smoking Cessation

- Smoking makes it more difficult to get through cancer treatment
 - Increases risk of complications after surgery
- Options for help with smoking cessation:
 - NC Quit Line 1-800-QUIT-NOW (1-800-784-8669)
 - American Lung Association freedomfromsmoking.org
 - 1:1 Smoking Cessation Counseling Clinics (Metro Charlotte)

GI Tract Anatomy

- Esophagus delivers food to the stomach
- Stomach stores food and delivers it in small quantities to the jejunum
- Jejunum begins digestion in the small intestines

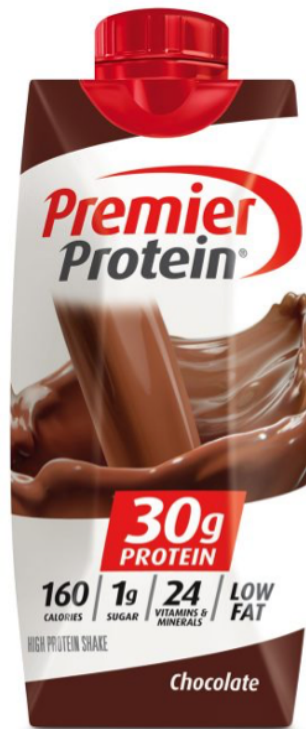


Protein Needs

- Men: Average 75 grams/day
- Women: Average 60 grams/day

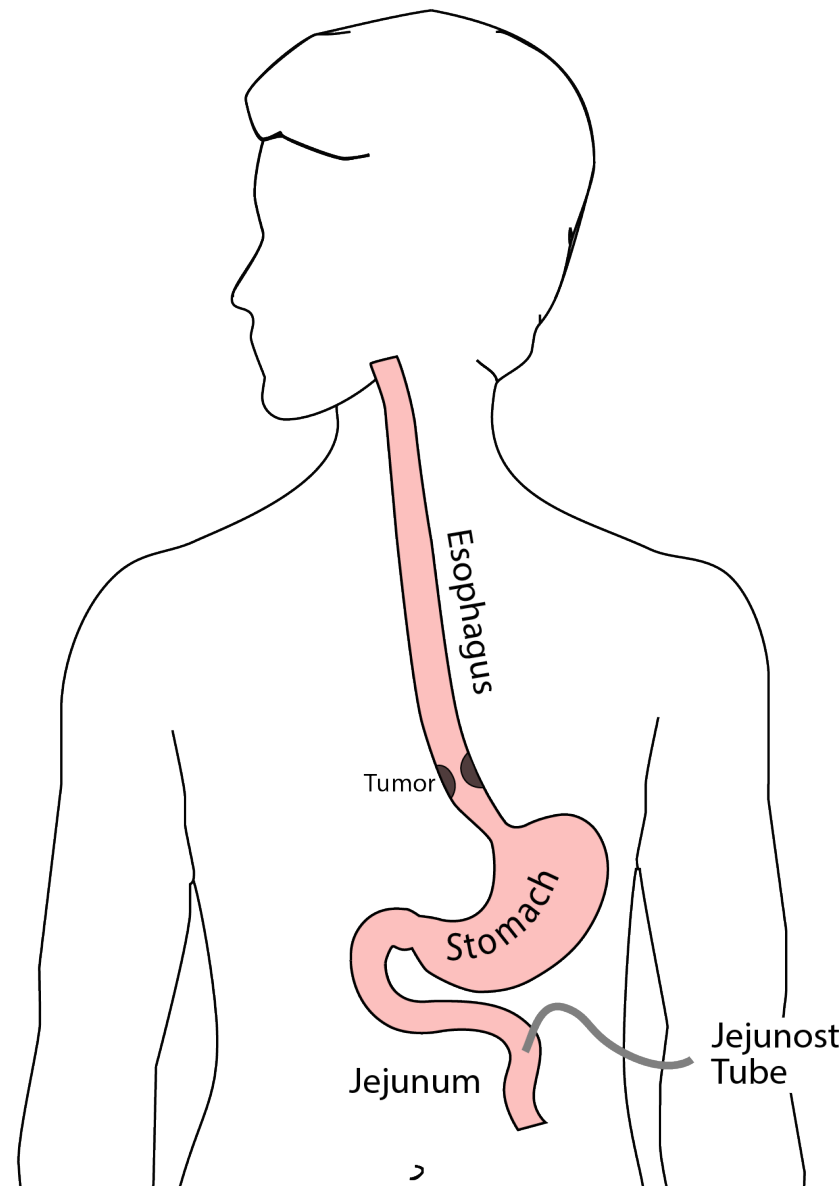
Protein Shakes

Protein Shakes can provide protein with minimal sugar

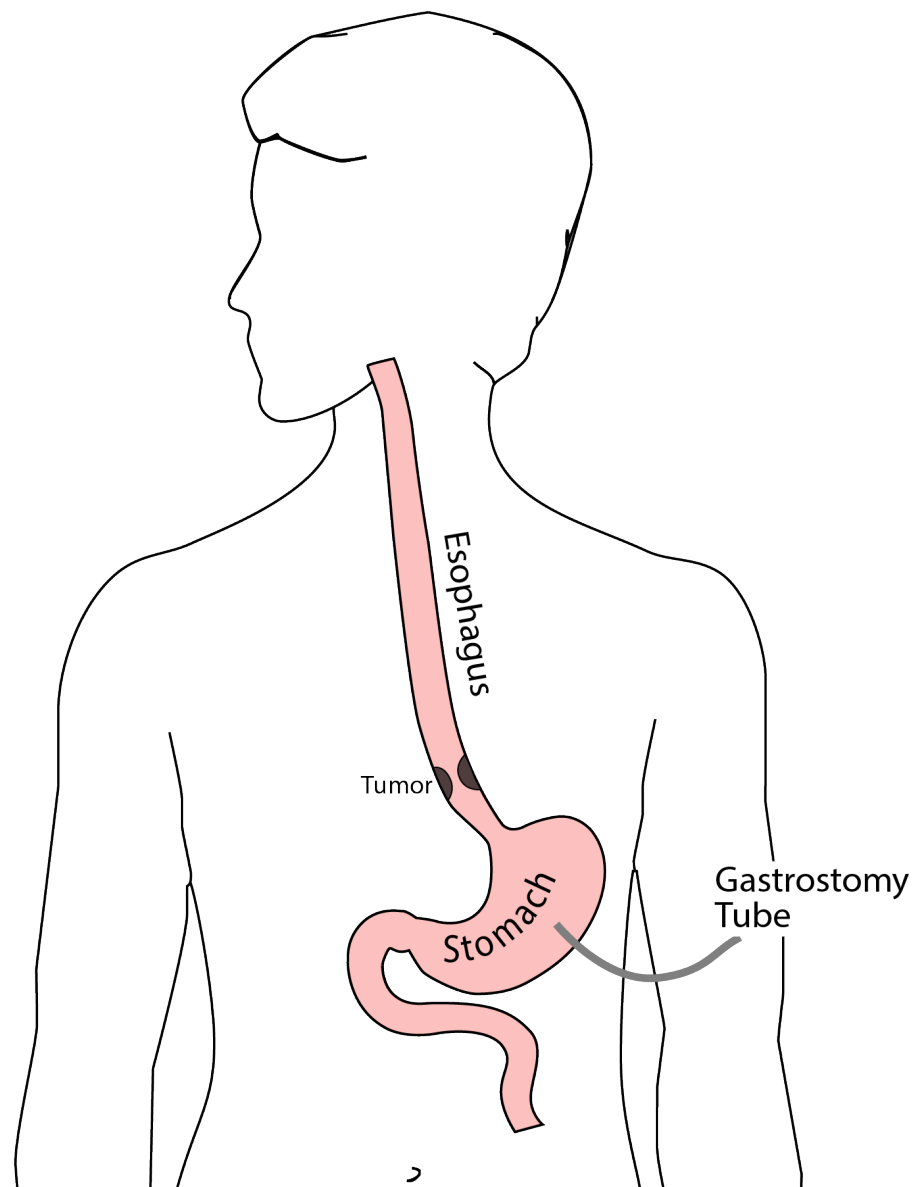


Protein Shakes

Feeding Tubes



Jejunostomy = Small Intestine



Gastrostomy = Stomach

Gastrostomy Tube

Feeding Gastrostomy

- Feeding with a syringe several times per day.
- Tube can be hidden underneath clothing
- Tube does not interfere with eating by mouth

- Removed easily in the office when no longer needed

Gastrostomy Tube Methods

A gastrostomy tube can be placed either by endoscopy, which is called a PEG tube

A gastrostomy tube can also be placed by laparoscopy, which is usually preferred if surgery on the esophagus is planned in the future.

Your surgeon will help you decide which kind of tube is best for you. This is especially important if you will need esophageal surgery in the future, as the stomach is frequently used to make a new esophagus

Gastrostomy Tube

- Outpatient Placement (go home the same day)
- Central venous port can be placed at the same time (if needed)

Jejunostomy tube

The other type of feeding tube is a jejunostomy.

A jejunostomy tube is placed into the small intestines. Because the small intestine is used to receiving food in small quantities, a jejunostomy tube requires the use of a pump to deliver feedings gradually over a matter of hours.

In general, feedings are done at night in order to allow you to be active during the day

Jejunostomy Video

A video is available to help become familiar with the feeding jejunostomy



Gastrostomy = Stomach

Epidural Catheter for Pain Control

- Remains in place for 2-5 days
- Dosage can be adjusted as needed

- Can make it more difficult to urinate
- May require foley catheter in bladder
- Foley catheter removed after epidural removed

ICU Stay (2-4 days)

- NG tube in nose to drain stomach and esophagus
- Catheter in bladder
- Chest tube right chest
- Abdominal drains (usually 2)
- Feeding jejunostomy (usually stays in 8 wks)

Ward - 6Tower

- Jejunostomy feeds started
 - Nurses will instruct you and family how to operate the pump
- Up in a chair most of the day
- Walking in the halls
 - Start with assistance
 - Improves lung function
 - Prevents loss of muscle

Jejunostomy Feeds

Jejunostomy tube feeds

- Start continuous (24 hours)
- Convert to night-time only (16 hours)

Water administered through feeding tube

- Usually 8oz 4 times/day
- Important to prevent dehydration

Diabetic patients may need insulin

Jejunostomy Feeds with Diabetes

Jejunostomy feedings may cause blood sugars to be elevated

- Insulin may be required along with feeds

Typical Pattern for tube feeds

- Feeds run via pump from 6pm to 10am
- Insulin at 6pm (70/30 insulin)
- Insulin at Midnight (70/30 insulin)
- No insulin if tube feedings are not run

Nasogastric (NG) Tube

Tube passed through nose into stomach

- Drains fluid from stomach
- Prevents vomiting

Upper GI X-ray on 2nd or 3rd day after surgery

- If stomach empties well → NG tube removed
- Otherwise, X-ray repeated 2-3 days later

Swallowing Evaluation

Once NG tube has been removed:

Modified barium swallow in radiology Drink a white chalky liquid (barium) Look for proper swallowing function

- 70% of patients ⇒ liquids started by mouth

Discharge

Goal: ready to leave day #6/7 after surgery

- Night-time tube feedings (6pm to 10am)
- Some nutrition by mouth (70% of patients)
 - 1 oz of water per hour by mouth OR
 - Protein shakes 4oz every 2 hours

- Water through tube 8oz four times per day
- Home care nursing (feeding tube teaching)
- Home infusion (tube feeding supplies)

Medicines at Home - Pain

Acetaminophen (Tylenol) 4000mg/day (1000mg 4 times/day)

Gabapentin 300mg 3 times/day (works best if taken every day)

Oxycodone

- Take as needed in addition to Tylenol and gabapentin
- Will begin reducing dosage at first postoperative visit
- Most patients can discontinue by 4 weeks after surgery
- NO DRIVING WHILE ON OXYCODONE

Medicines at Home - Non-steroidals

Non-steroidal anti-inflammatories (Celebrex)

- 200 mg every 12 hours starting 2 weeks after surgery

NO GOODY POWDERS OR BCs

- (Can cause permanent scarring at the surgery site)

Medicines at Home - Acid Blockers

Acid blocker (Omeprazole, Nexium,etc)

- Will stay on for at 1-2 years to prevent acid reflux
- Important in preventing scarring at anastomosis (new connection between esophagus and stomach)
- To administer through feeding tube, open capsule and resuspend beads in 60mL (2oz) of water

Medicines at Home

Reglan – Helps stomach empty

- Will plan to stop after six weeks
- 0.1% risk of tardive dyskinesia (nervous tic)

Remeron – Helps improve appetite

- Can cause vivid dreams
- Used for several weeks after surgery
- Will stop within first three months of surgery

Medicines at Home - Beta Blockers

Metoprolol – Beta Blocker

- Slows heart rate and lowers blood pressure
- Used around the time of surgery to prevent fast heart rhythms
- In patients who were not taking a beta blocker prior to surgery, will plan to wean over a few weeks after surgery
- For patients who were taking a beta blocker medicine prior to surgery, will return to prior dosage and drug after surgery

Nutrition after Surgery

At discharge home:

- Protein shakes 4oz every 2 hrs
- Tube feeds 4-5 cans at night (6pm-10am)

10-12 Days: Increase protein shakes

- Tube feeds 3-4 cans at night

Three weeks: Post-esophagectomy Diet

8-12 weeks: Remove feeding tube (in office)

Transition from Tube Feeds → Eating

Dietitian will calculate daily protein goal

- Typically 60-75 grams protein/day
- Each carton of tube feeding has 15 grams
 - 75 grams protein = 5 cartons/night
- As intake by mouth increases, tube feeds are reduced

Important that protein is spread out during the day (20gm/meal)

- Three meals + 2-3 high-protein snacks

Post-esophagectomy Diet

- Soft Consistency
- High Protein
- Avoid sugary liquids (can cause ‘dumping’)
- Avoid raw vegetables (and salads)
- Eating
 - Small, frequent meals
 - Sit up for 30-45 minutes after eating
 - Avoid eating within 2 hours of bedtime

Wedge Pillow

Surgery to remove the esophageal tumor will lead to a tendency for reflux.

The most helpful strategy is a 30 degree wedge pillow. T

his should be half as high as it is long.

Available at Walmart.com



Postoperative Visit

Check surgical site

- Remove staples (if needed)

Adjust medicines as needed

- Insulin (for diabetic patients on insulin)

- Reduce beta blocker medicines

Advance diet

Reduce tube feeds

After surgery

Wean off medicines added after surgery

- Pain medicines
- Beta-blockers
- Reglan
- Remeron

Continue acid blockers for at least 1 year

May need additional systemic therapy afterwards

- Chemotherapy
- Immunotherapy (Optive = nivolumab)

Team Members

Primary Care Provider

Gastroenterologist

Medical Oncologist (chemotherapy)

Radiation Oncologist (radiation)

Surgeons

- Jonathan Salo
- Jeffrey Hagen
- Michael Roach

Dietitian - Liz Koch

Nurses - Brandon Galloway & Kit Sluder

Schedulers - Stacey Singleton & Toney Bethea