

Early-Stage Cancer of the Esophagus and GE Junction

Anatomy

Food moves from the throat

→ esophagus

→ stomach

→ small bowel (jejunum)



Types of Esophageal Cancer

There are two common types of esophageal cancer

- Adenocarcinoma
- Squamous Cell Carcinoma

In many ways, these two different types of esophageal cancer behave the same.

We will see later in this video, however, that the treatment **can** be different depending upon whether the cancer is adenocarcinoma or squamous cell carcinoma.

Cancer Staging

Staging refers to the tests to determine

- How large is the tumor?
- Has there been spread to lymph nodes?
- Has it spread to other parts of the body?

Treatment options depend upon the cancer stage

Esophageal Cancer Staging

- **T** = Tumor - How deep has cancer grown into the wall of the esophagus?
- **N** = Nodes - Has cancer spread to the lymph nodes?
- **M** = Metastasis - Has the cancer spread to other parts of the body? lungs or liver?

Layers of the Wall of the Esophagus

- Mucosa - Inner layer
- Muscle Wall (muscularis)
- Lymph nodes located in fat outside the muscle



Early Stage Cancers

Cancers start on the very inside of the layer called the mucosa



Locally-advanced Cancers

Over time, cancers can grow into the muscular wall



Lymph Nodes

In some cases, cancer cells can break off from the main tumor and spread to lymph nodes



T Stage

Cancers are categorized based upon the thickness of the tumor, known as the T stage



N Stage

Cancers are categorized by whether there is spread to the lymph nodes.

- **N0** cancers have not spread to the lymph nodes
- **N1** cancers have spread to the lymph nodes.



M Stage

Some cancers can also spread from the esophagus to the lungs or liver

- **M0** cancers have not spread to other parts of the body
- **M1** cancers have spread to other parts of the body such as lungs or liver



PET scan

A PET scan is similar to a CT scan, and uses a small amount of tracer to light up areas of cancer.



Endoscopic Ultrasound

Endoscopic ultrasound (EUS) is a procedure similar to upper endoscopy (EGD) which has an ultrasound probe at the bottom of the scope. This allows measuring the thickness of the cancer. Endoscopic ultrasound can help determine the T stage of the cancer.



Laparoscopy

Some esophageal cancers can spread inside the abdominal cavity. These areas of spread can be very small, as small as a grain of rice.

In order to detect spread within the abdominal cavity, a procedure called a laparoscopy can be performed in some patients.



Laparoscopy

A laparoscopy is performed under a general anesthetic.

- Several incisions $1/4"$ long
- A telescope is inserted to look inside the abdominal cavity.
- Biopsies can be performed.



Treatment Plans

- Superficial (T1) ⇒ Endoscopic Therapy
- Localized (T1b/T2) ⇒ Surgery
- Locally-advanced (T3/N1) ⇒ Chemo ± Radiation →Surgery
- Metastatic (M1) ⇒ Chemotherapy

Localized Cancers

Patients with locally-advanced esophageal cancer have smaller tumors which have not invaded all the way through the muscle wall and are too large to remove by endoscopic therapy



Localized Cancers

Localized cancers rarely spread to the lymph nodes, which means that surgery alone can often remove the cancer completely.

Localized cancers are less likely to need chemotherapy or radiation because the cancer is localized to the wall of the esophagus.



Localized Cancers

Localized cancers are not very common, because most people don't know that they have esophageal cancer until they have difficulty eating. The majority of patients who have difficulty eating have a T3 tumor *and* usually need either chemotherapy and/or radiation to prevent recurrences



Diagnosis

Localized cancers are generally diagnosed with a combination of endoscopic ultrasound and PET scan.

- Endoscopic ultrasound can determine the T stage
- PET scan can look at the nearby lymph nodes



Surgery

Surgery to remove the esophagus is frequently done for localized esophageal cancers



Surgery for Localized Esophageal Cancer

If surgery is performed, the cancer in the esophagus is examined by the pathologist to confirm the precise thickness of the tumor and its T stage

About 25% of the time, the pathologist finds that the tumor is actually T3 or N1, in which case chemotherapy and/or radiation is needed after surgery.

On the other hand, in 75% of cases surgery is all the therapy that is required and there is no need for chemotherapy and/or radiation

Chemotherapy + Radiation for Localized Esophageal Cancer

An alternative to surgery is to start with a combination of chemotherapy and radiation therapy.

We know that in some cases, chemotherapy + radiation can be curative for esophageal cancer without the need for surgery.

For adenocarcinoma, about 25% of cases are cured with chemotherapy + radiation

For squamous cell carcinoma, about 40% of cases are cured with chemotherapy + radiation

Followup after Chemotherapy + Radiation

The challenge here is that it's difficult to know right away whether chemotherapy + radiation has been effective for esophageal cancer.

In most cases, scans and upper endoscopy performed after chemotherapy + radiation show no signs of cancer, but only a minority of cases are actually cured.

It can take up to two years to know with certainty whether or not an esophageal cancer has been cured by chemotherapy + radiation.

Chemotherapy + Radiation CROSS Trial

Chemotherapy + Radiation → Surgery ⇒ Longer Survival

Chemotherapy and radiation were given together over six weeks

Chemotherapy + Radiation CROSS Trial

A typical schedule for chemotherapy + radiation:

- Chemotherapy once per week for six weeks
- Radiation five days per week for six weeks (28 treatments)
- PET scan 4 weeks after the end of radiation
- EGD every 3-6 months for 2 years
- CT scan every 6-12 months

Chemotherapy + Radiation - Side Effects

Radiation kills cancer cells, but can also cause irritation of the lining of the esophagus.

This can make swallowing more challenging the last two weeks of therapy.

A feeding tube is sometimes needed to help with hydration and nutrition.

Chemotherapy

Chemotherapy drugs are administered intravenously.

There are several options for intravenous access:

- Peripheral IVs in the hand
- PICC line (Peripheral Inserted Central Catheter)
- Central Venous Port

Peripheral IVs

Some patients can be treated with an intravenous line placed in the hand or arm for each dose of chemotherapy. The catheter is placed at the beginning of each dose and removed that day.



PICC Lines

A PICC line is placed in Radiology and stays in place during the treatment course



Central Venous Port

A central venous port is an implantable device that makes the administration of chemotherapy easier



Central Venous Port

A central venous port is typically placed underneath the skin below the right collarbone



Central Venous Port

When it is time for chemotherapy, a needle is inserted through the skin into the port



Restaging

CT or PET scan will be performed after preoperative therapy

Surgery for Esophageal Cancer

Surgery for esophageal cancer is performed for:

- Superficial Tumors (T1) not removed by endoscopy
- Localized Tumors (T2 N0 M0)
- Locally Advanced (T3 M0) after preop therapy

Goals of Surgery

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



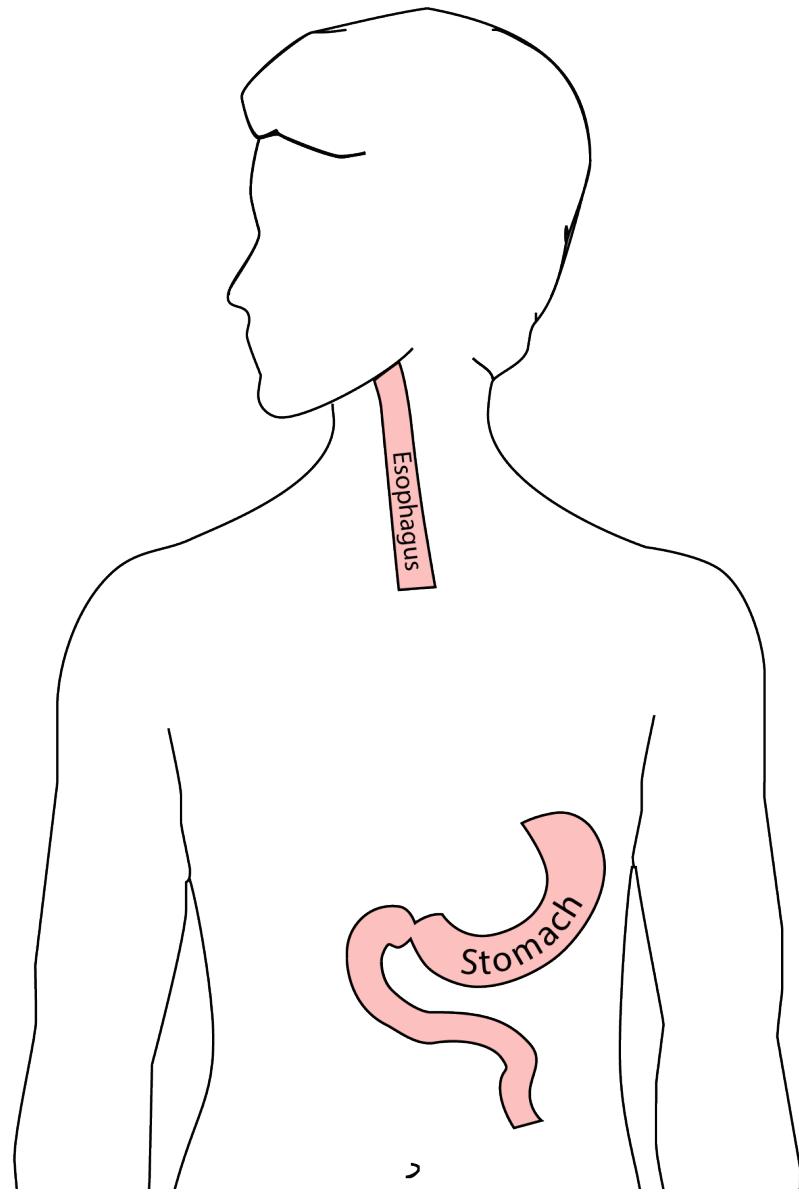
Ivor Lewis (Transthoracic) Esophagectomy

- Removes tumor and lower 1/3 esophagus
- Removes surrounding lymph nodes
- GI tract reconstructed



Reconstruction

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 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



Open Ivor Lewis

Mininally-invasive approach feasible in 95% of cases

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
We need to remove the whole esophagus, including the portion in the neck



McKeown Esophagectomy



All of esophagus removed



Risks of Esophagectomy

Esophagectomy is a complex operation, with a real risk of complications.

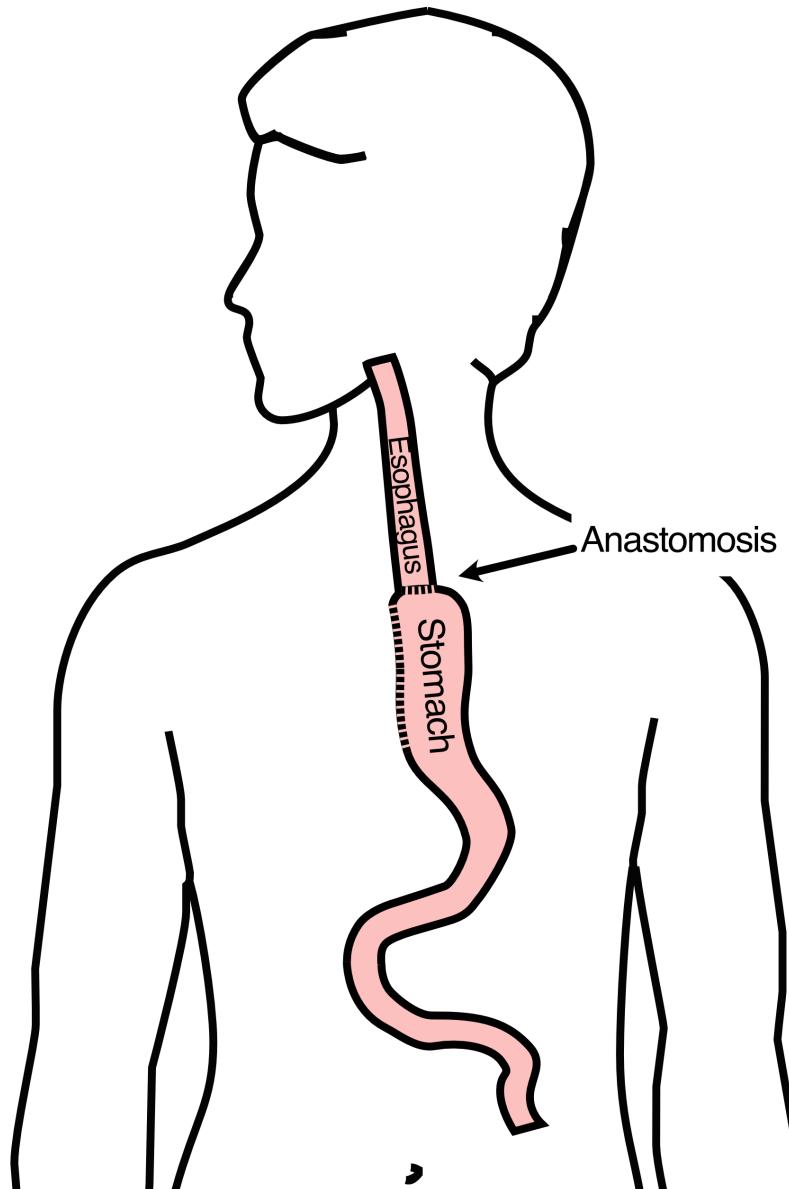
Two significant complications:

- Anastomotic leak

- Pneumonia

Anastomotic Leak

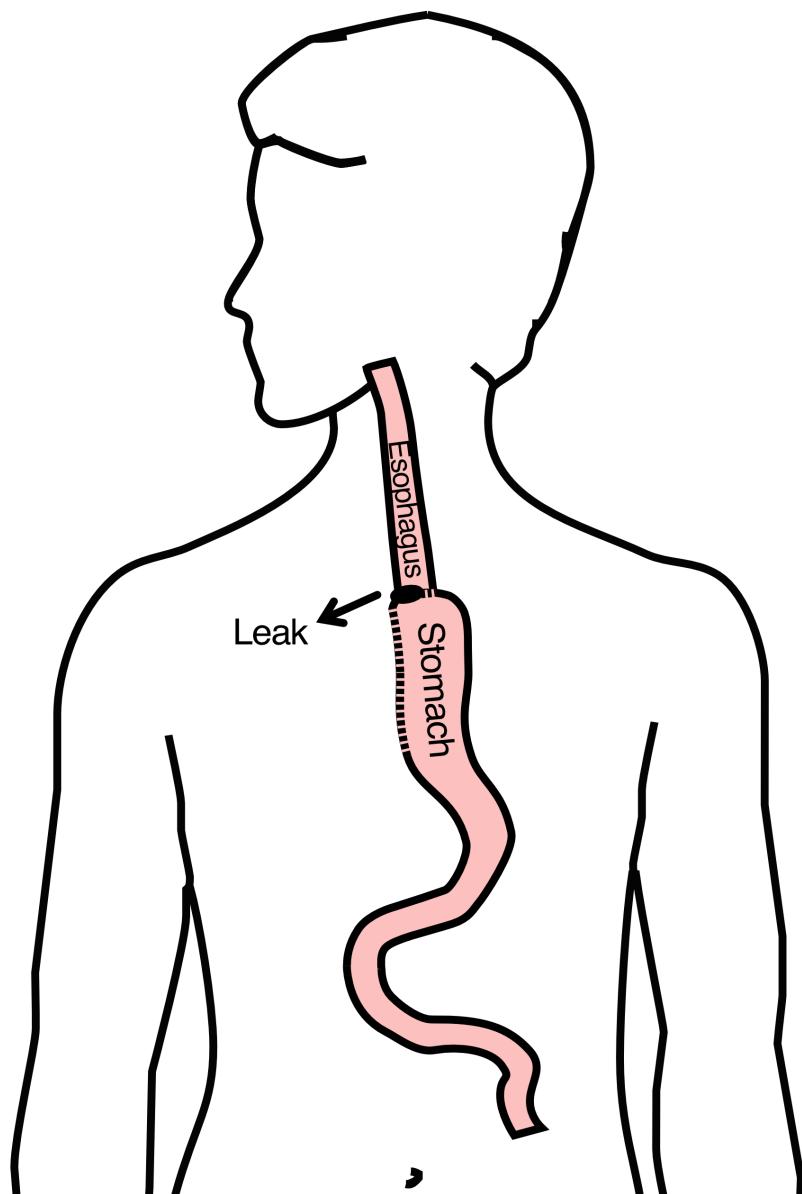
The anastomosis is surgical connection between the esophagus and the stomach.



Anastomotic Leak

If healing doesn't occur:

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



Anastomotic Leak

If leak occurs:

- Some leaks will seal
- Stent may be required to help healing
- Occasionally additional surgery is required



Anastomotic Leak

Risk of leak depends on:

- Type of operation performed
- Nutritional status of patient
- Experience of the surgeon



Pneumonia

- Occurs in 10-15% of patients after esophagectomy.
- Requires treatment with antibiotics
- Requires a longer hospitalization.



Preventing Pneumonia

Several ways to help prevent pneumonia:

- 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.
- Medicines OK w/ a sip of water
- sip of black coffee but **no cream**.
- Surgery will be cancelled if you have cream/milk
- Waiting room for family and friends on 5th floor

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

Intensive Care Unit (ICU) (2-4 days)

- Surgical ICU on 11th floor
- 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)

Intensive Care Unit (ICU)

- Bladder catheter removed → check that bladder empties properly
- Chest tube removed (day 2-4) → follow-up x-ray
- Fluid emptied from drains every few hours
- Start tube feedings by feeding
- Feeding jejunostomy (stays in 8 weeks)

Ward - 6 Tower

- Jejunostomy feeds started
- Up in a chair most of the day
- Walking in the halls
 - Start with assistance
 - Improves lung function
 - Prevents loss of muscle strength

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

Jejunostomy Tube

- Nutrition to bypasses the esophagus and stomach
- Placed in small intestine
- Pump administers feedings slowly
- Feeding done at night



Jejunostomy Typical Regimen

- Jejunostomy tube feeds for 16 hours (6pm-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 use of the feeding tube

Jejunostomy Feeds with Diabetes

Jejunostomy feedings elevate blood sugars

- 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

Jejunostomy Video

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



Activity after Surgery

- Up in chair most of the day
- Walking with help from nurse/Physical Therapist

- Goals:
 - Improve lung function
 - Prevent muscle loss

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

Oral Intake at Home

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 day #6/7 after surgery

- Night-time tube feedings (6pm to 10am)
- 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)

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
- More intake by mouth → tube feeds reduced

Spread out protein 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

Medicines at Home - Pain

Acetaminophen (Tylenol) 1000mg 4x/day

Gabapentin 300mg 3 times/day

Oxycodone

- As needed in addition to Tylenol/gabapentin
- Will begin reducing dose at first postop visit
- Can usually discontinue by 4 weeks
- NO DRIVING WHILE ON OXYCODONE

Non-steroidal Anti Inflammatory (NSAID)

Non-steroidal anti-inflammatories (Celebrex)

- 200 mg every 12 hours starting at 2 weeks

NO GOODY POWDERS OR BCs

- (Can cause permanent scarring at the surgery site)

Acid Blockers = Proton Pump Inhibitors

Examples include omeprazole and pantoprazole

- 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

Metoprolol = Beta Blockers

- Slows heart rate and lowers blood pressure
- Used to prevent rapid heart rate
- Patients not taking a beta blocker prior to surgery → wean after surgery
- Patients taking a beta blocker prior to surgery → return to prior dose and drug after surgery

Sleeping at Home

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 at 7-10 Days

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 and Remeron

Continue acid blockers for at least 1 year

Jejunostomy Removal

Jejunostomy tube is removed in the office once you can take in enough nutrients by mouth

Removal usually around 8 weeks after surgery

May take 30 minutes and some local anesthetic to loosen up the tube for removal.

Nutritional Monitoring after Surgery

You may have 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:

- Primary Care Provider (PCP)
- Medical Oncologist
- Surgeon

If levels are low

- Replacement
- Repeat testing in 3-6 months

Team Members - Physicians

Primary Care Provider

Gastroenterologist

Medical Oncologist (chemotherapy)

Radiation Oncologist (radiation)

Surgeons

- Jonathan Salo MD
- Jeffrey Hagen MD
- Michael Roach MD

Team Members - Support Staff

Dietitian - Liz Koch

Nurses

- Matthew Carpenter RN
- Brandon Galloway LPN

Navigator - Laura Swift