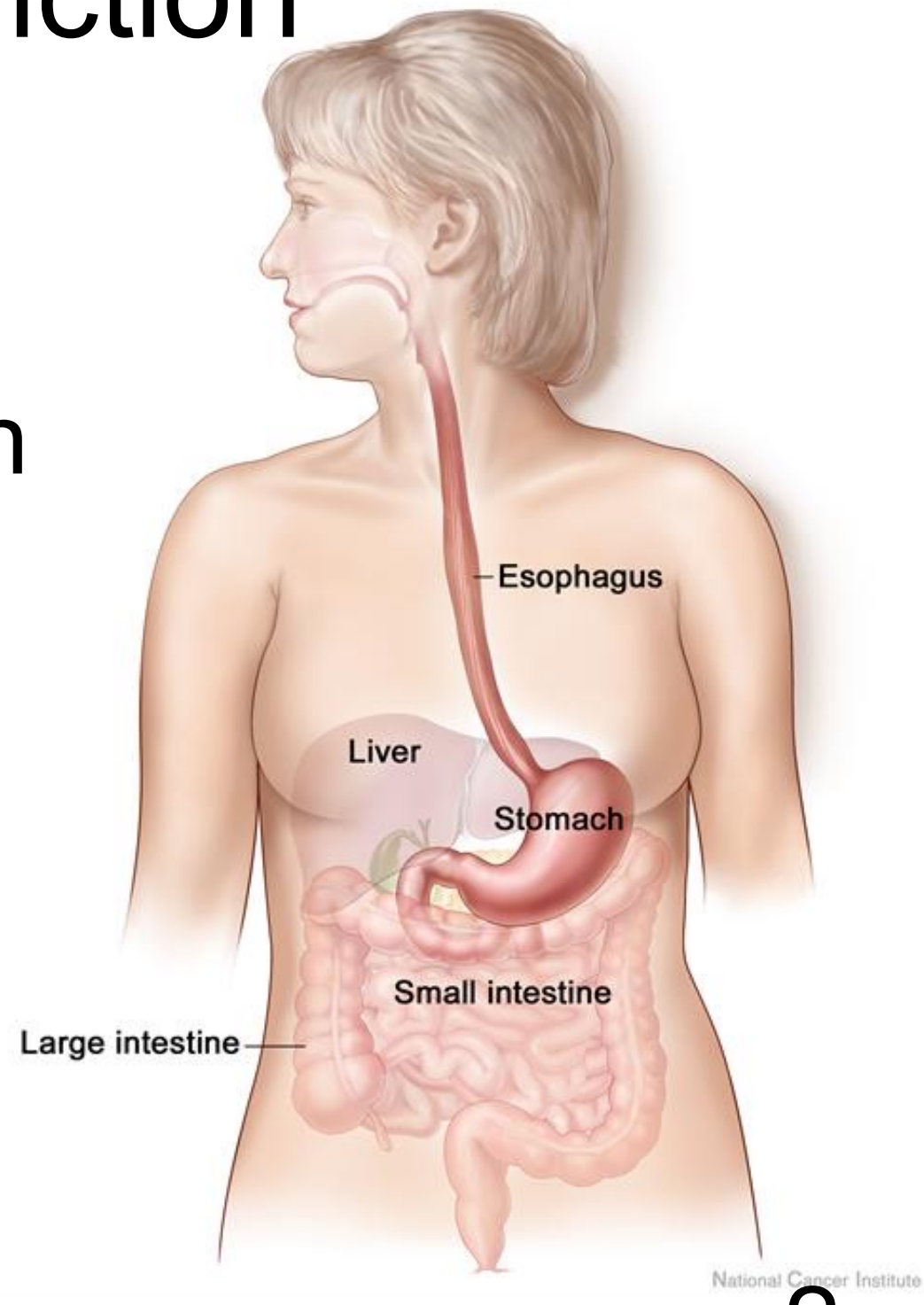
Tumors of the Esophagus and Gastro-esophageal Junction

Tumors of the Esophagus and GE Junction

Esophagus – hollow muscular tube which joins throat with stomach

A **Tumo**r is an abnormal growth. Tumors can be

- Benign
- Malignant (cancer)



Benign Tumors of the Esophagus

- Benign tumors can increase in size but do not tend to spread to other organs
- Benign tumors of the esophagus can cause problems with eating and swallowing, but are not life-threatening
- Leiomyomas are examples of benign tumors of the esophagus.

Malignant Tumors of the Esophagus = Cancer

Malignant tumors are also known as cancer

Malignant tumors can increase in size and in some cases can spread to other organs

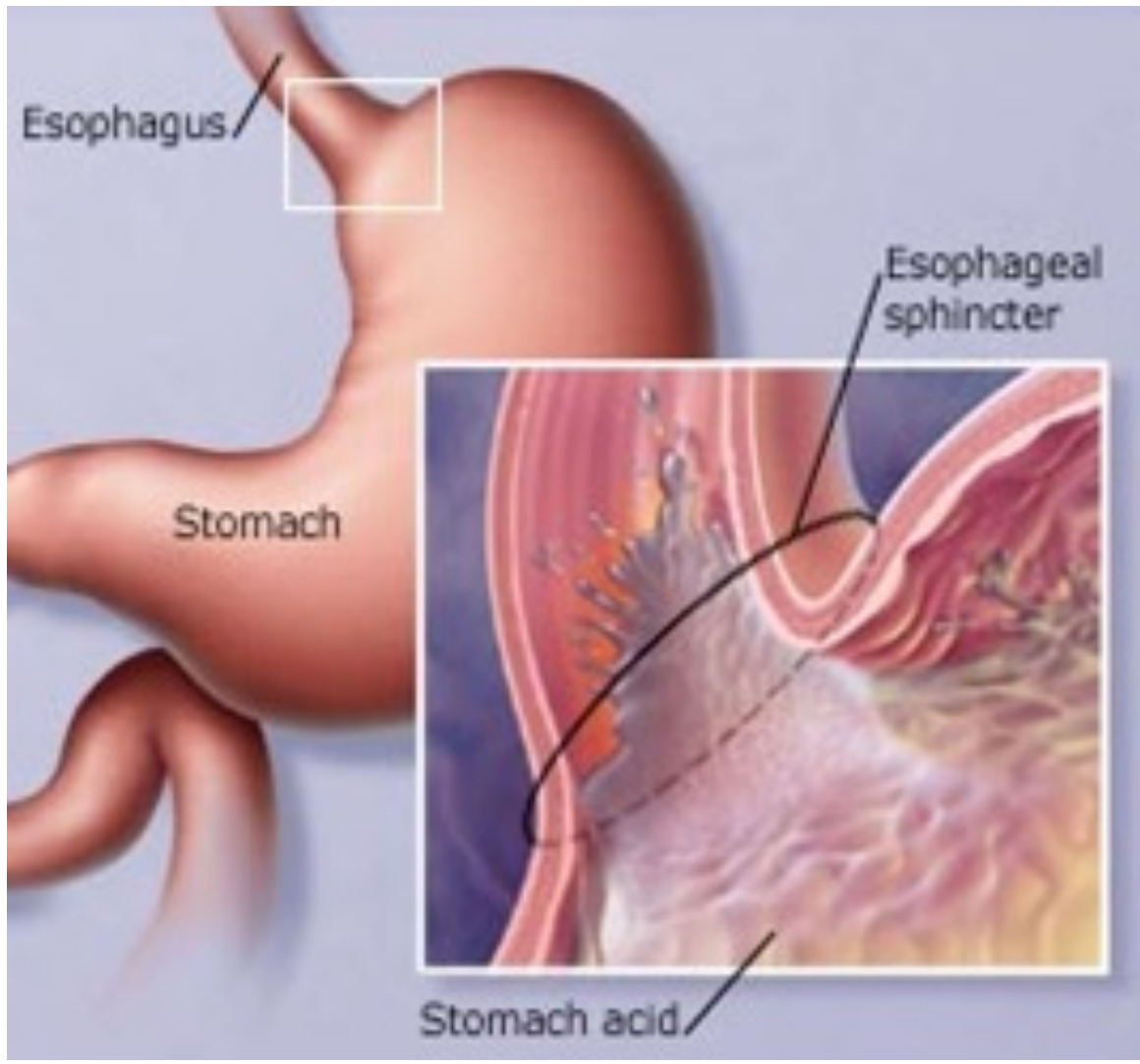
Malignant tumors of the esophagus can cause problems with eating and swallowing, and can be life-threatening

Types of Esophageal Cancer

- Adenocarcinoma - Generally located at the bottom of the esophagus or at the junction with the stomach. Frequently caused by gastroesophageal reflux
- Squamous Cell Carcinoma - Can occur anywhere along the esophagus

Gastroesophageal Reflux

- Esophageal sphincter normally prevents stomach acid from reaching distal (lower) esophagus
- Sphincter incompetence leads to reflux
- Esophageal lining (mucosa) is not designed to handle acid



Gastro-esophageal Reflux

Esophagus lined by squamous (pale) mucosa

Stomach secretes acid to aid digestion

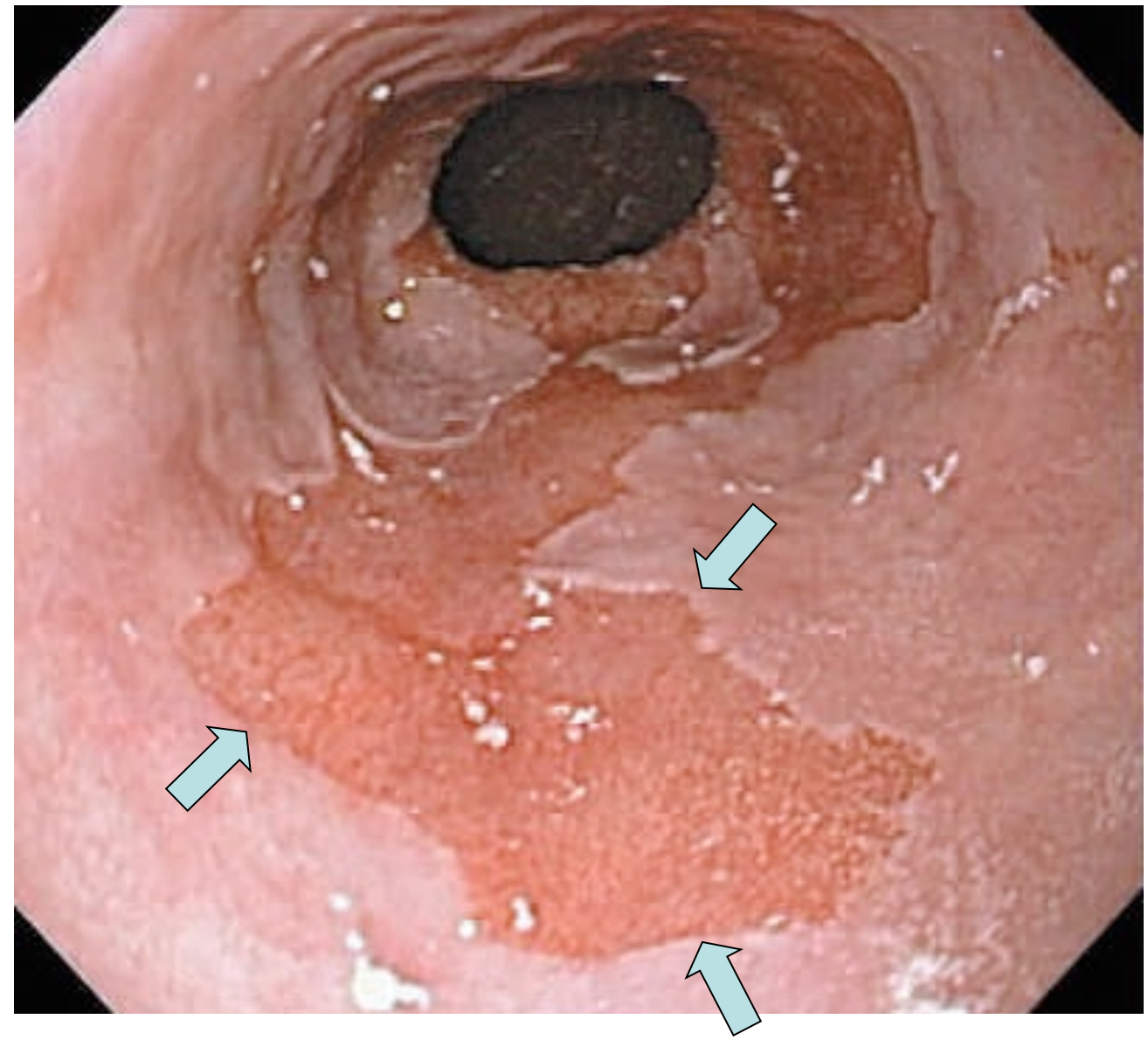
Lower esophageal sphincter prevents acid from entering into esophagus (reflux)

Chronic reflux of acid from stomach into esophagus irritates and damages esophageal mucosa

Esophageal mucosa changes due to acid

Barrett's Esophagus

- Red areas show Barrett's changes due to acid reflux
- More severe cases have larger areas of Barrett's changes



Barrett's Esophagus

Acid causes lining of lower esophagus to change to resemble lining of stomach (which is designed to resist acid)

Risk of Barrett's increased by:

- Obesity
- Smoking
- Gastro-esophageal reflux (GERD)

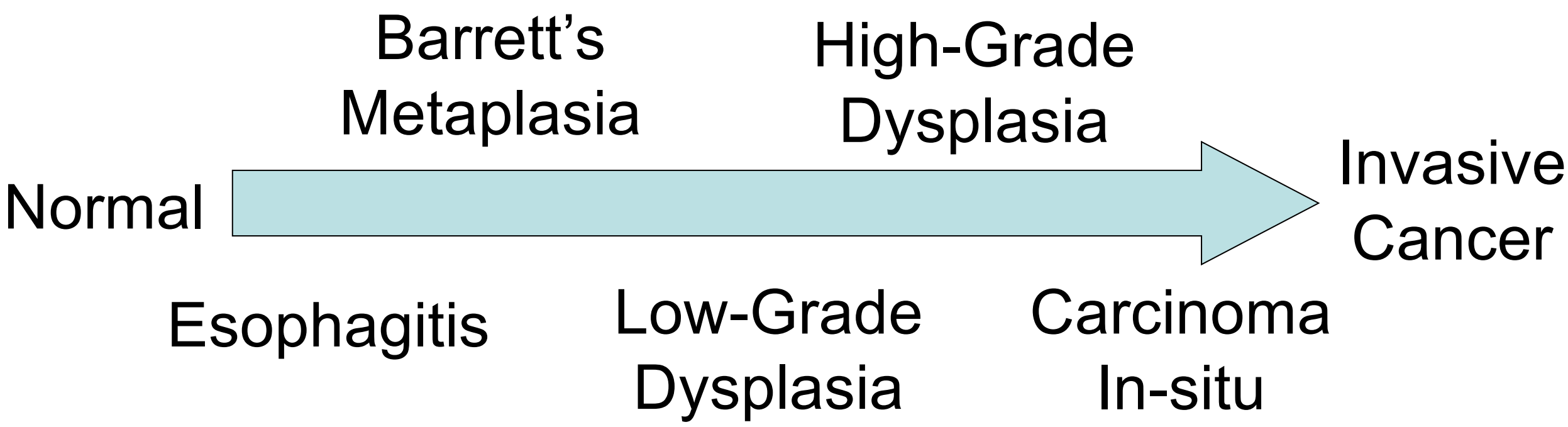
Esophageal Dysplasia

Some patients with Barrett's esophagus can develop dysplasia, which is a pre-cancerous condition.

Barrett's esophagus: Cancer risk 0.5% per year = 1 in 200 develop cancer every year

High-grade dysplasia: Cancer risk 5% per year = 1 in 20 develop cancer every year

Adenocarcinoma
Stages of pre-cancerous growth



Dysplasia is a pre-cancerous condition which can lead to cancer

Cancer Staging

Staging refers to the tests to determine how large a tumor is, whether it has spread to nearby lymph nodes, and whether it has spread to other parts of the body.

Staging is important in order to find the right treatment for a particular patient

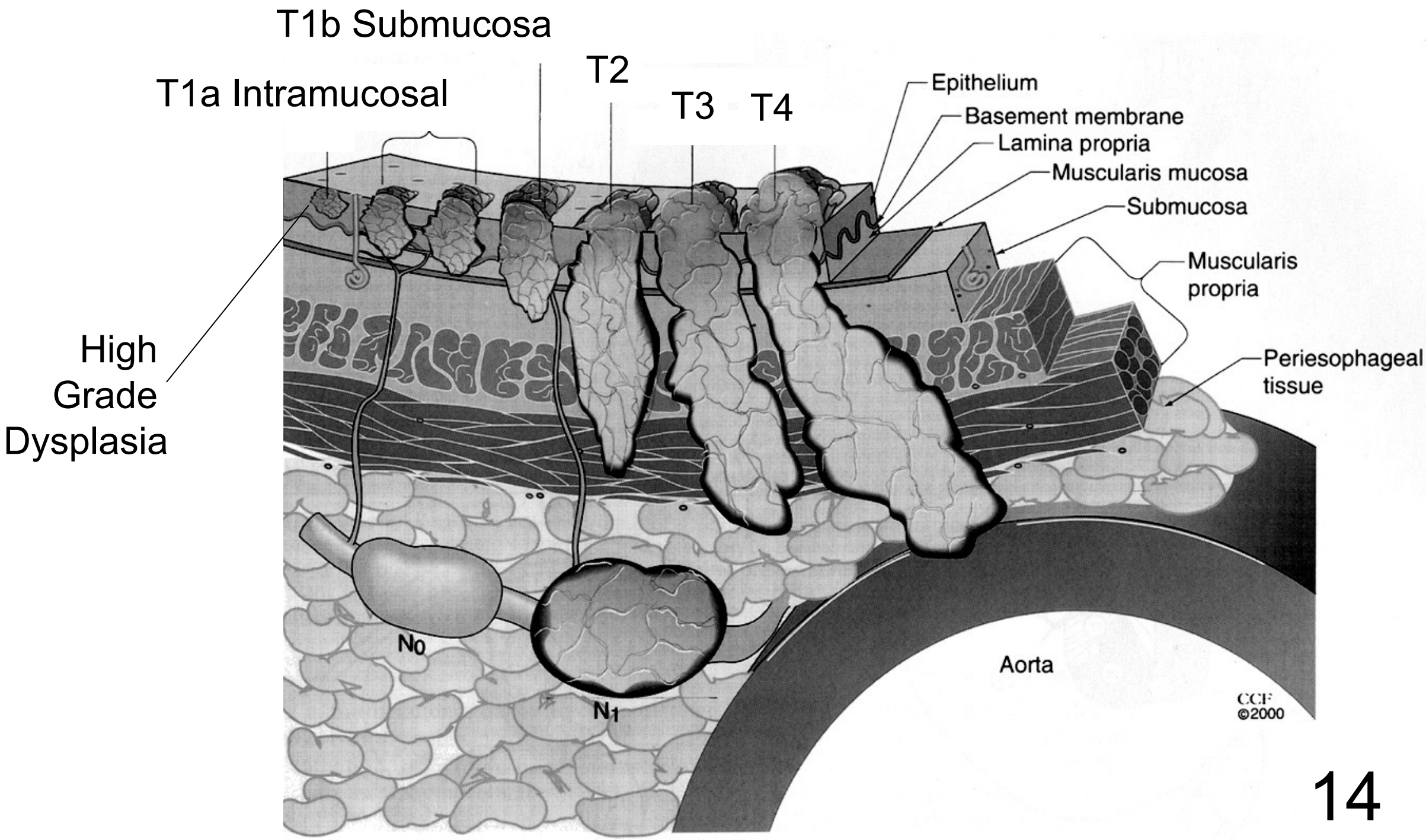
Esophageal Cancer Staging

T Tumor – How deep has the tumor grown into the wall of the esophagus?

N Nodes – Has tumor spread to the lymph nearby nodes?

M Metastasis – Has the tumor spread to sites such as the lungs or liver?

Esophageal Cancer T Stage

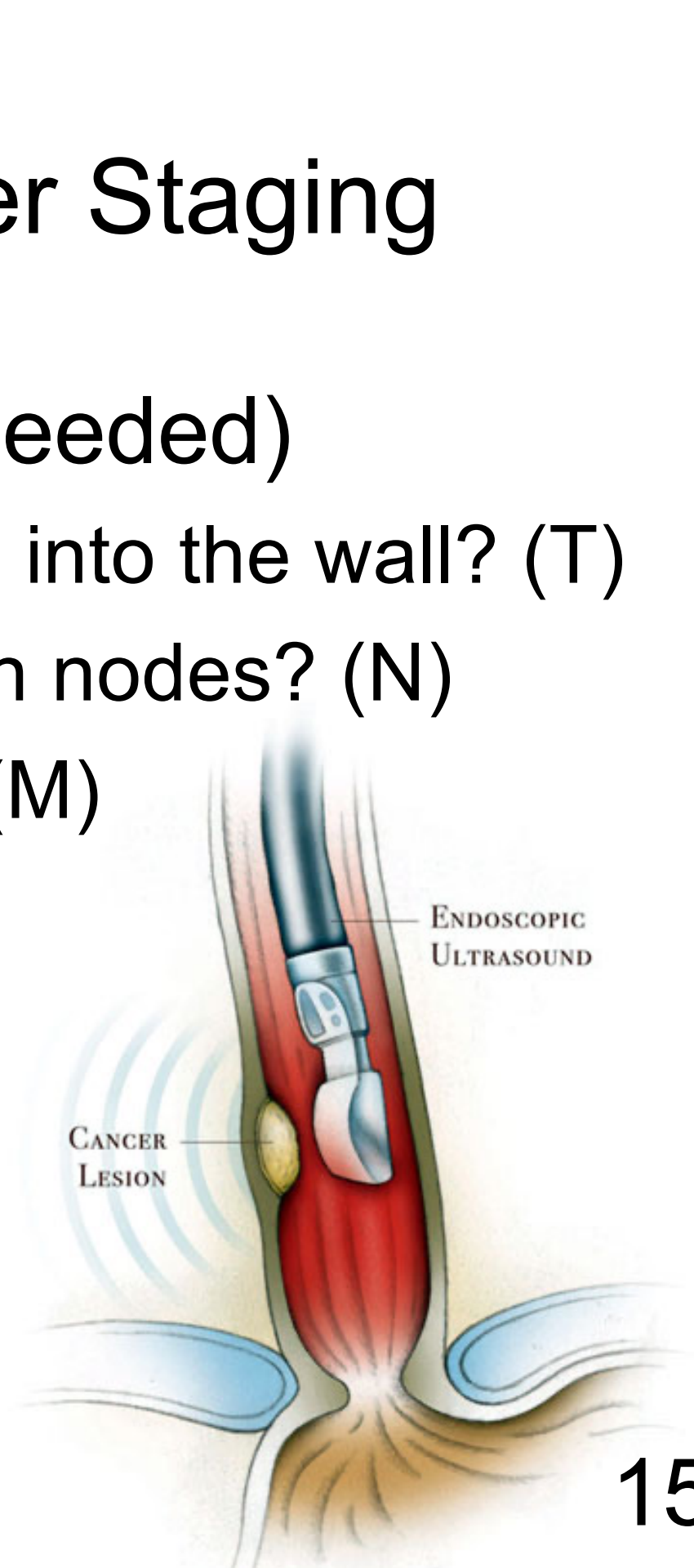


Esophageal Cancer Staging

Endoscopic Ultrasound (if needed)

- How deep has cancer grown into the wall? (T)
- Is there involvement of lymph nodes? (N)
- Is there spread to the liver? (M)

Outpatient procedure



Esophageal Cancer Staging

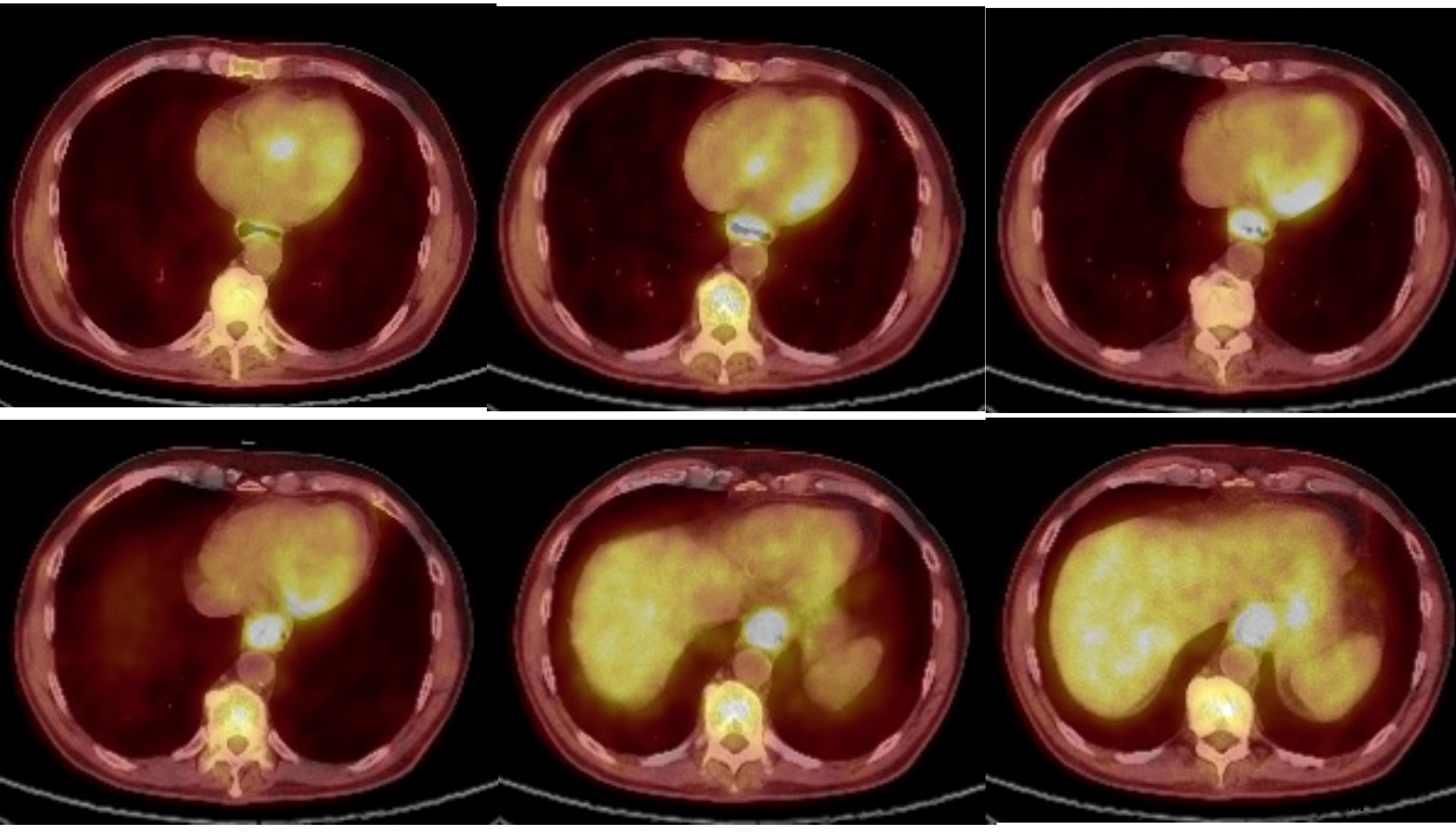
PET Scan

- Is there evidence of distant spread?
- Is there spread to the liver?
- Is there spread to the lungs?

PET scan helps to determine the M stage

Similar to CT scan (scanner more open than MRI scanners)

PET/CT



Laparoscopy for Staging

Diagnostic Laparoscopy

- Is there spread to the liver?
- Is there spread within the abdominal cavity?

Requires general anesthesia in OR

Can be done as an outpatient

Can be performed at the beginning of an operation to remove the tumor or as a separate procedure

Esophageal Cancer Stage

T__ Tumor – How deep has the tumor grown into the wall of the esophagus?

N__ Nodes – Has tumor spread to the lymph nearby nodes?

M__ Metastasis – Has the tumor spread to sites such as the lungs or liver?

Esophageal Cancer Treatment

Treatment is based upon stage and the ability of a patient to undergo treatment

In some cases, treatment decisions are straightforward, while in others, decision-making is more complex

Complex cases often require consultation with other specialists

Esophageal Cancer Treatments

Superficial	Endoscopic Therapy
Localized	Esophagectomy
Locally Advanced	Chemotherapy ± Radiation → Surgery (Neoadjuvant Therapy)
Metastatic	Chemotherapy ± RT

Esophageal Cancer Treatments

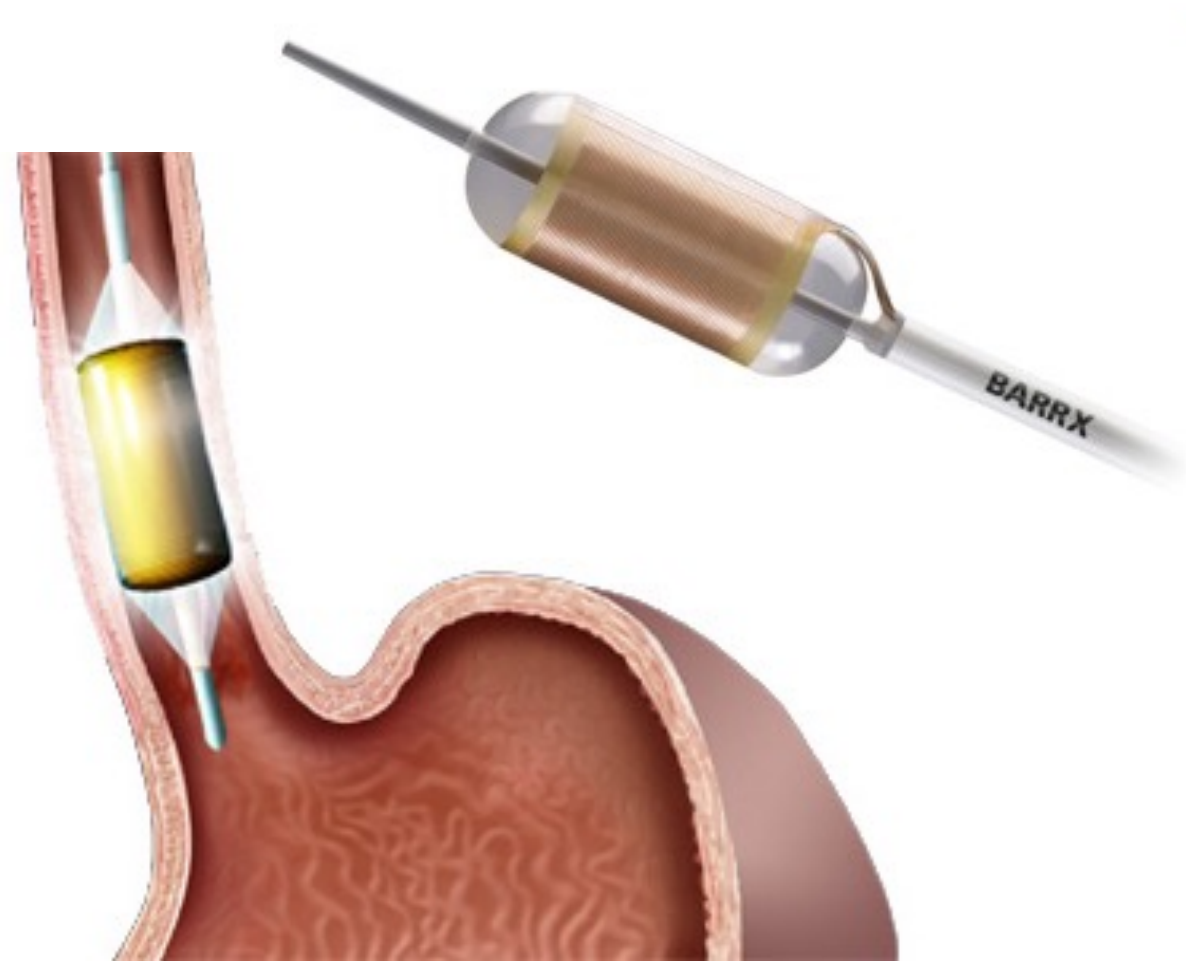
Superficial T1a = Stage I	Endoscopic Therapy
Localized T1b T2 = Stage II	Esophagectomy
Locally Advanced T3 = Stage III	Chemotherapy ± Radiation → Surgery Neoadjuvant Therapy
Metastatic M1 = Stage IV	Chemotherapy ± RT

Esophageal Cancer Treatment Dysplasia (pre-cancer)

- High-grade dysplasia can be caused by Barrett's esophagus and can lead to the development of esophageal cancer if left untreated
- Radio-frequency ablation is an endoscopic therapy which can destroy the abnormal dysplasia and allow regrowth of normal esophageal lining (and prevent cancer)

Esophageal Dysplasia
Endoscopic RF Ablation

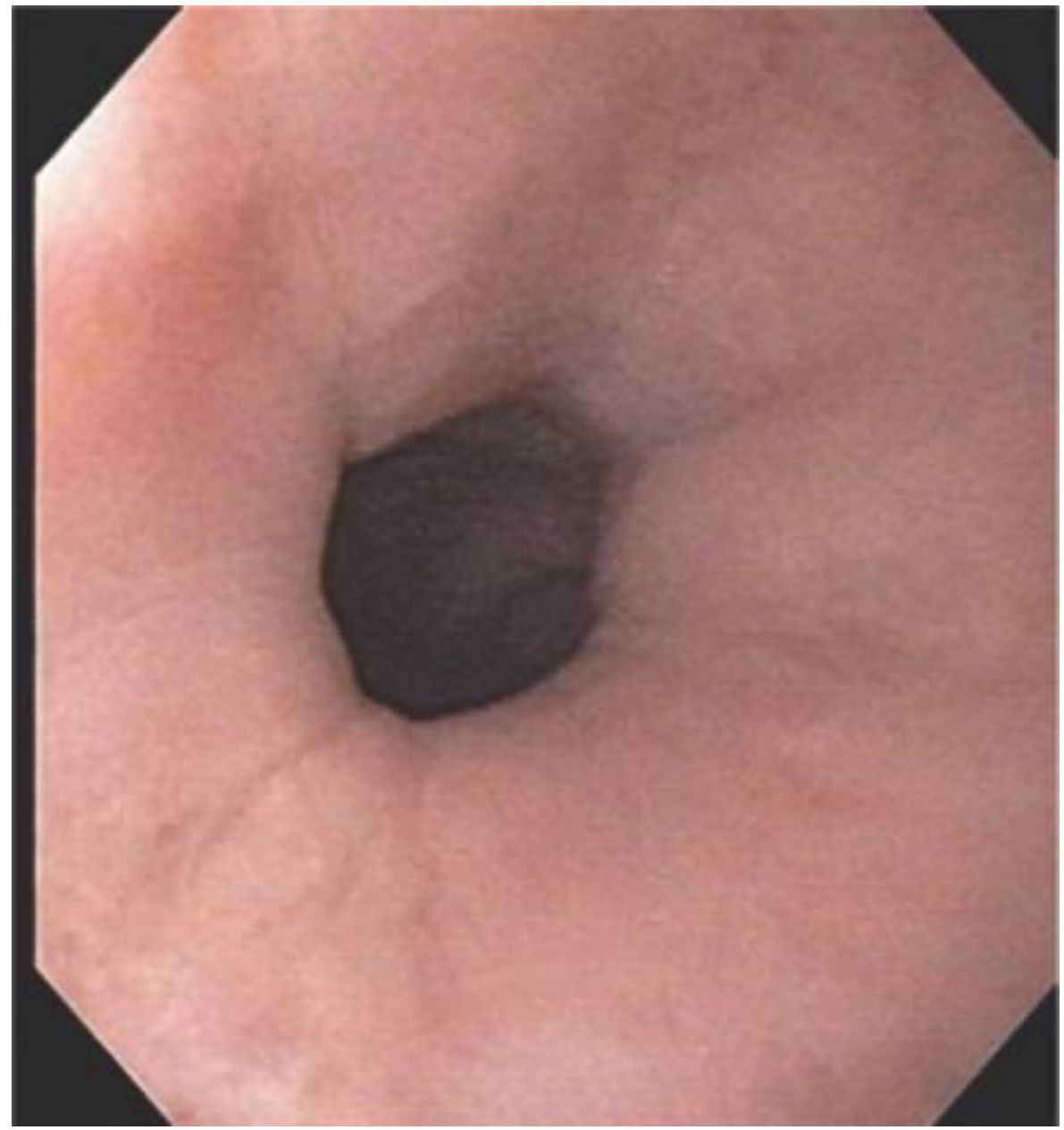
Ablation destroys abnormal mucosa and allows overgrowth of normal squamous mucosa



Esophageal Dysplasia
Endoscopic Radiofrequency Ablation

Before

After

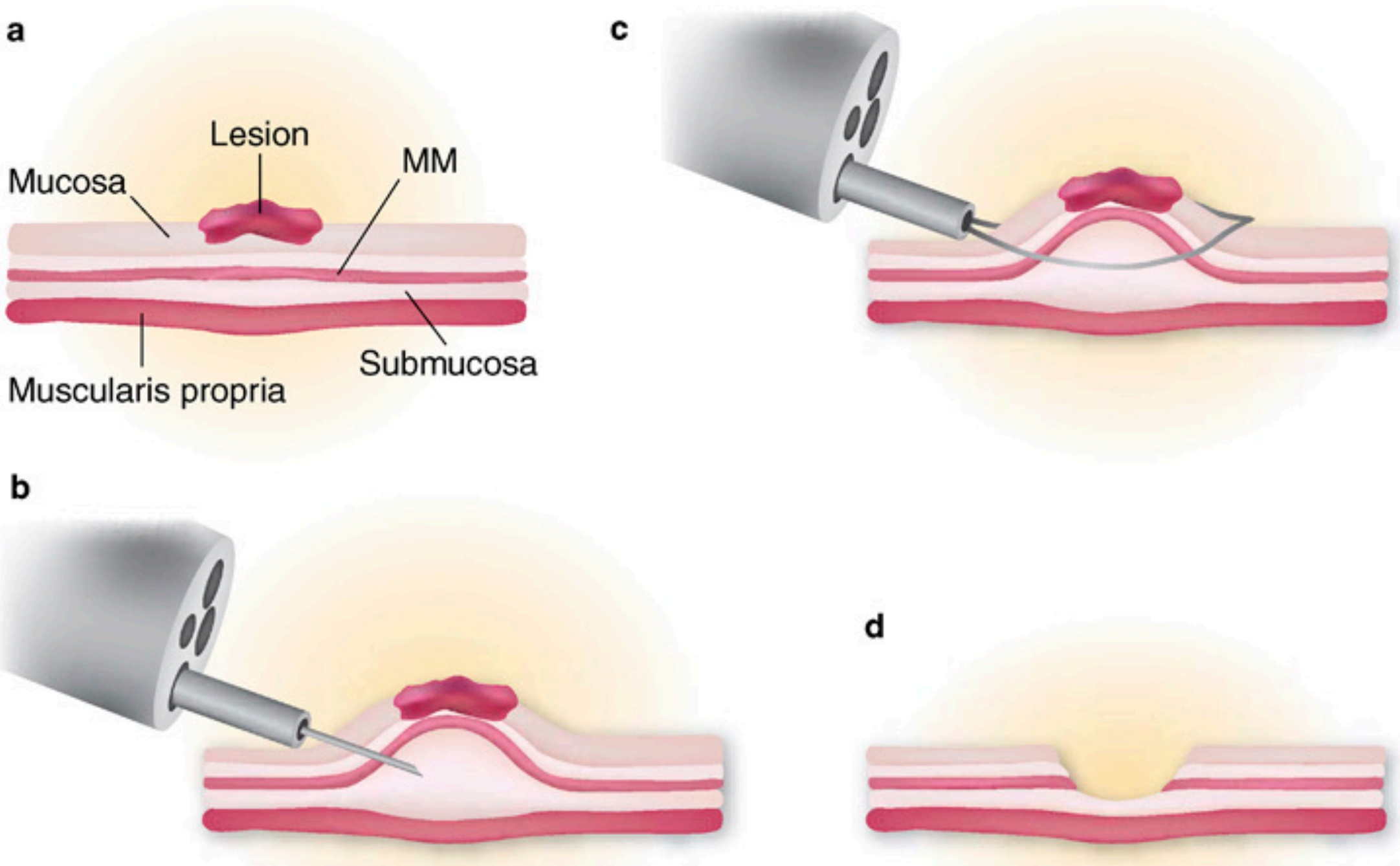


Superficial (T1a) Esophageal Cancer
Endoscopic Mucosal Resection

An adenocarcinoma involving just the top layer (mucosa) can be treated by endoscopy using endoscopic mucosal resection

Endoscopic mucosal resection (EMR) is appropriate for treatment of T1aN0 tumors

Superficial (T1a) Esophageal Cancer
Endoscopic Mucosal Resection



Superficial (T1a) Esophageal Cancer
Endoscopic Mucosal Resection

Endoscopic therapy is usually performed as an outpatient.

If the tumor cannot be completely removed with endoscopic therapy, additional therapy (such as surgery) may be required

Completeness of removal categorized:

- Favorable conditions
- Unfavorable conditions

Esophageal Cancer Therapy

Radiation Therapy: High energy x-ray beams kill tumor cells in the esophagus and lymph nodes

Chemotherapy: Drugs given intravenously (or by mouth) which kill tumor cells in esophagus, lymph nodes, lungs, and liver

Surgery: Removal of esophagus and lymph nodes with reconstruction of esophagus

Locally-advanced Esophageal CA

Chemotherapy ± Radiation → Surgery

Used for most T_2N_1 or T_3N_0 and some T_2N_0

- Chemotherapy + Radiation (5-6 weeks)

OR

- Chemotherapy (FLOT) – 8 weeks
- Repeat scans 4 weeks later (CT or PET)
- Surgery 6-10 weeks after end of radiation

Radiation Therapy (if done)

Administered before (or after) surgery

Treatments 5 days per week x 6 weeks

May cause some inflammation in esophagus which can make swallowing temporarily worse (before it gets better).

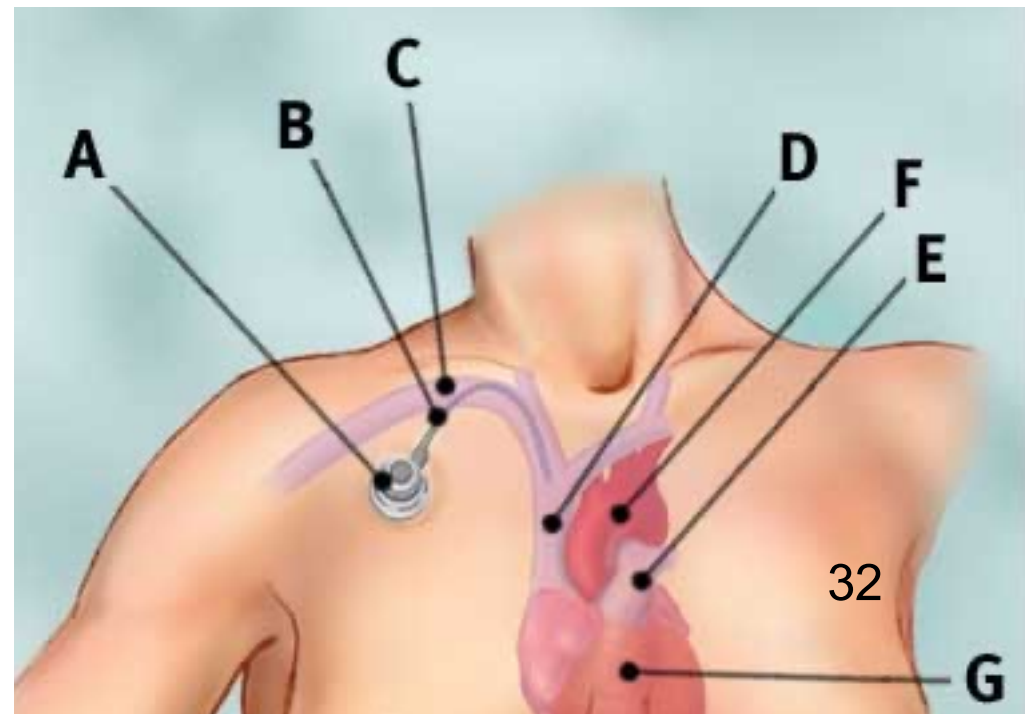
Chemotherapy

Administered along with radiation therapy

Variety of different regimens

- Most commonly once per week

May require a central venous port for administration of intravenous medicines



Central Venous Port

Outpatient procedure

Completely implanted (can shower, bathe)

Risks

- Infection (requires removal of port)
- Blood clot under skin
- Clotting of catheter (tube)
- Thrombosis (clotting) of the vein

Removed as outpatient procedure when no longer needed

Smoking and Cancer Therapy

Radiation therapy

- Smoking increased the risk of complications such as mucositis (inflammation of the mouth and throat)
- Radiation therapy is not as effective in smokers

Surgery

- Smoking increases the risk of heart and lung complications after surgery AND makes it more difficult for wounds to heal

Critical to stop smoking ***today***

Nutrition and Cancer Therapy

Good nutrition is important for cancer therapy:

- Cancer therapy is more effective in patients who can maintain nutrition during therapy
- Cancer therapy can make eating more difficult
- Our goal is to avoid weight and muscle loss during therapy

Some patients with difficulty taking enough nutrition by mouth will need a feeding tube before chemotherapy/radiation therapy

Nutrition Essentials

Protein → wound healing and muscle

- Average woman needs 60 grams/day
- Average man needs 75 grams/day
- Weight loss often means muscle loss

Carbohydrates → energy

- Starches are healthier than sugars

Fats → help food taste good

- American diet usually has too much fat

Nutritional Supplements

Protein shakes:

- Contain protein (only)
- Usually have very little sugar
- OK for people with lactose intolerance

Ensure/Boost

- Protein + carbohydrates + vitamins
- Tend to contain a lot a sugar/corn syrup
- May not be as palatable as protein shakes

Protein Shakes

Protein shakes:

- Pre-mixed (in cartons or cans)
- Protein powder
  (requires blender bottle)

Protein shakes will be an important part of recovery after surgery

May be helpful to find a “favorite flavor” before surgery

Protein Shakes

Making your own Protein Shake

Fill bottle half full of water
(or almond milk)

Add powder (usually two scoops)

Stir to dissolve

Add water

Add shaker ball (optional)

Shake

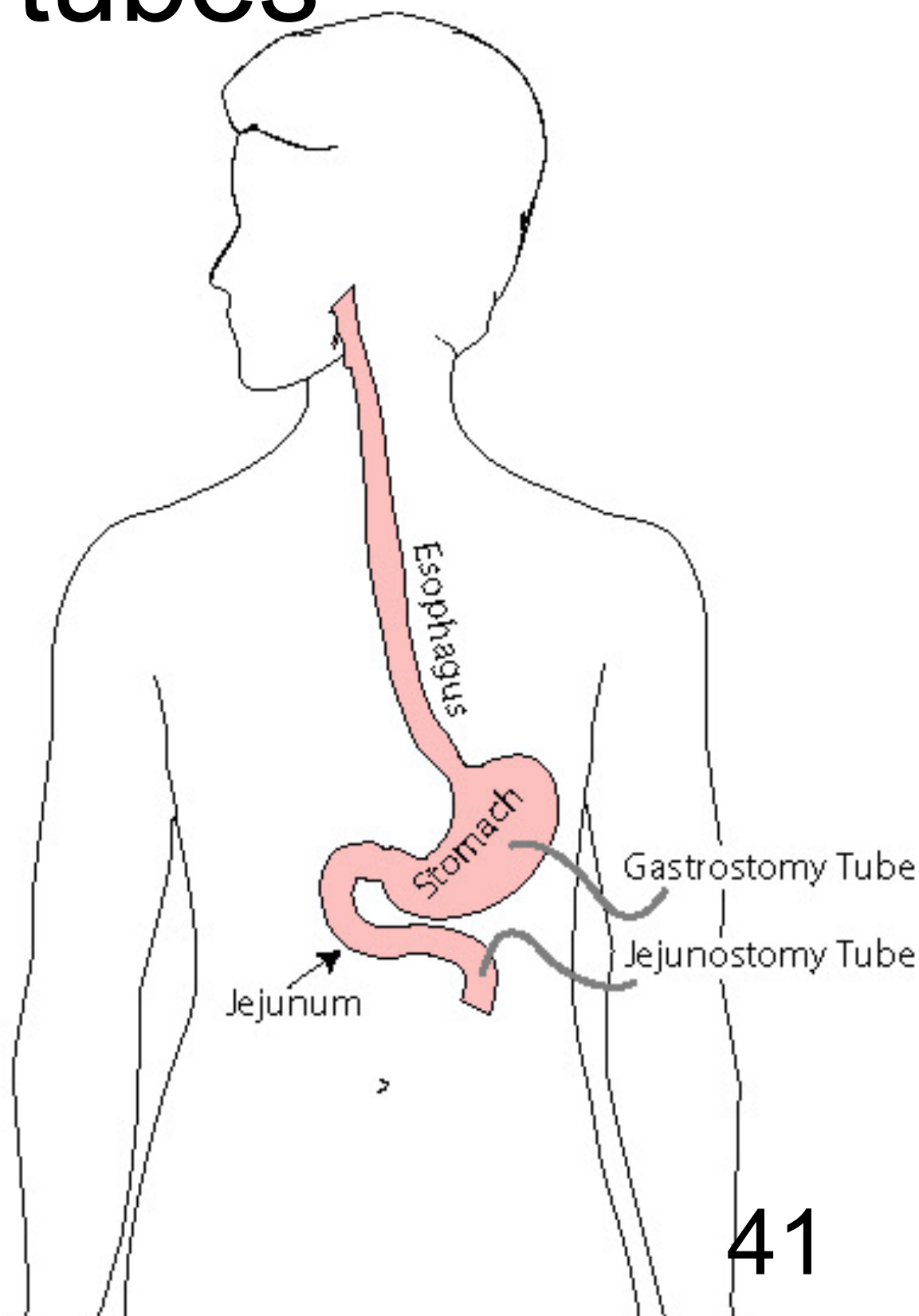
May taste better if kept in the refrigerator

Feeding tubes

Gastrostomy tube

- Placed into stomach

- Can frequently be removed after chemo + radiation has been completed



Feeding Tubes

Gastrostomy Tube

Placed in stomach

Bolus feedings can be done with a syringe for several ‘meals’ per day

Requires precise placement if surgery is planned to remove the tumor in the esophagus

Jejunostomy Tube

Placed in small intestines

Feedings require several hours to administer (12-16 hours) with a pump (usually given overnight)

Bolus feedings not possible

Placed *after* esophagectomy

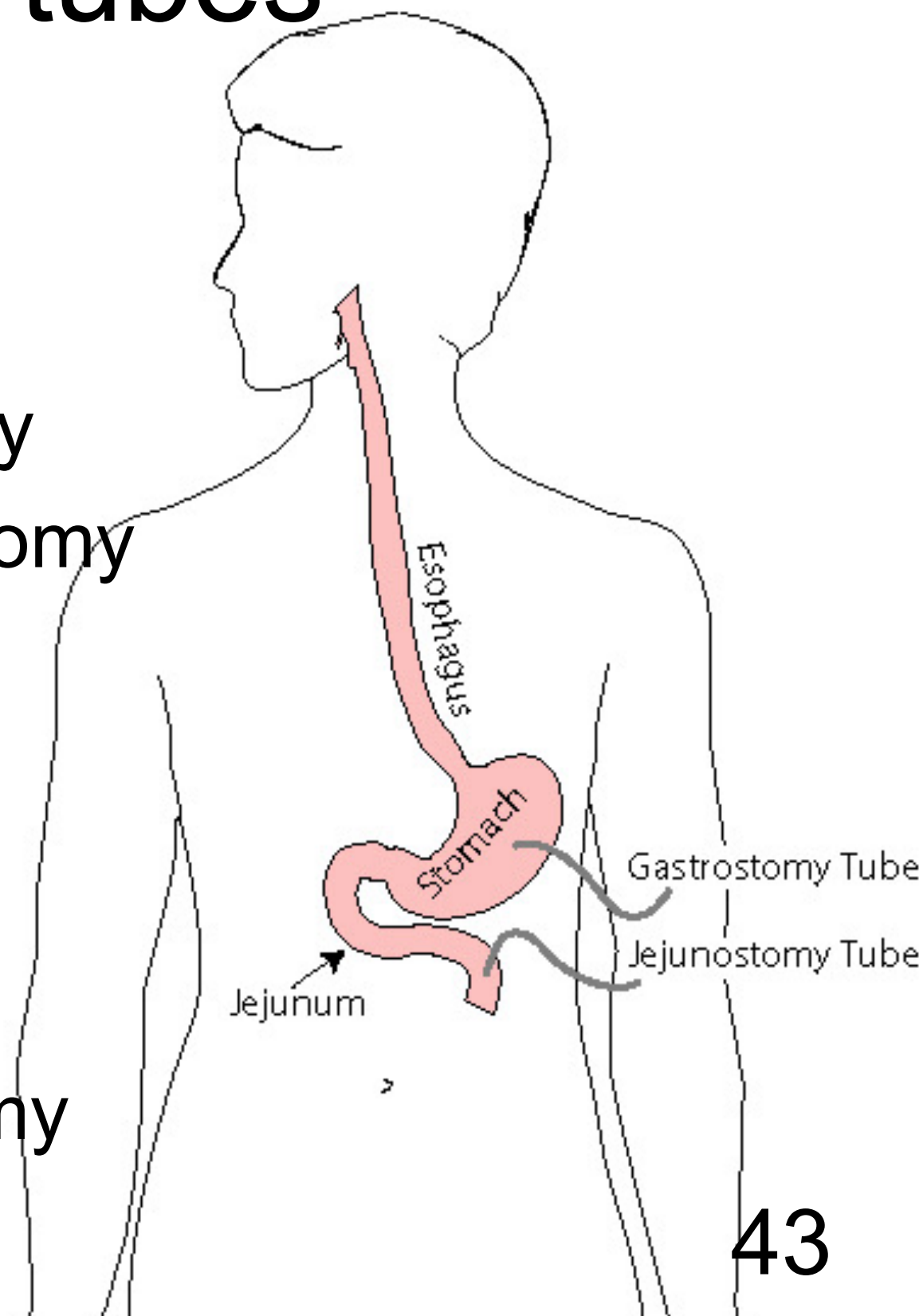
Feeding tubes

Gastrostomy tube

- More convenient
- Bolus feedings during day
- Used *before* esophagectomy

Jejunostomy tube

- Requires a pump
- Feeding overnight
- No bolus feedings
- Used *after* esophagectomy



Feeding Jejunostomy

Jejunostomy – Placed in small intestine

- Leaves stomach undisturbed (ideal for patients who will undergo esophagectomy
- Pump feedings (12-16 hours – overnight)
- Laparoscopic placement (in OR)
- Overnight hospital stay

https://www.youtube.com/watch?v=jjPP4zENP9g

“Your Feeding Jejunostomy”

Feeding Jejunostomy Video QR Code for YouTube

Jejunostomy Feedings 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*

Feeding Gastrostomy

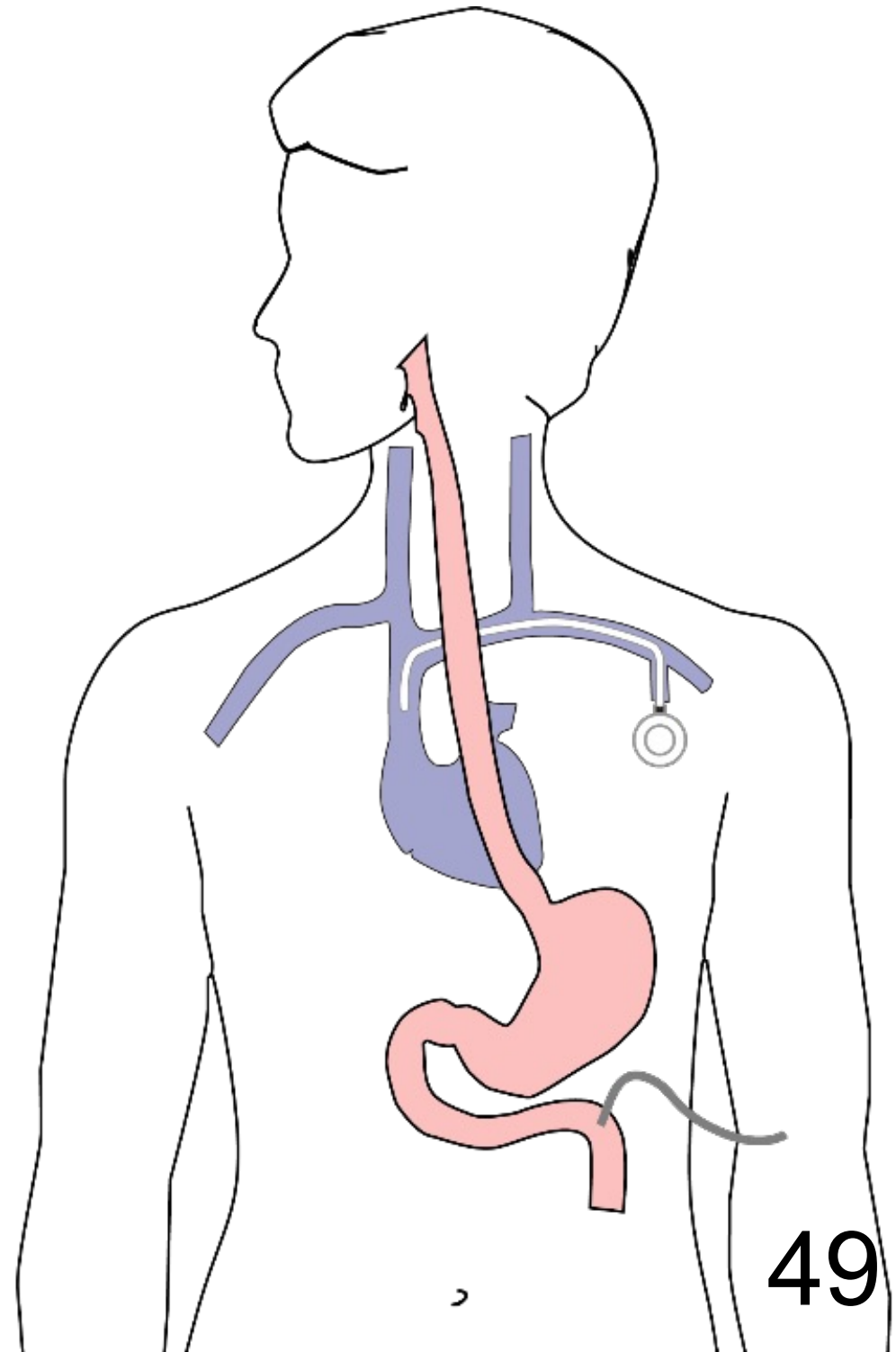
Gastrostomy – Placed in stomach

- Convenient bolus feedings with syringe *OR* gravity bag
- Placed in operating room *OR* in endoscopy
- Generally done as an outpatient

Gastrostomy Tube
QR Code for YouTube

Central Venous Port Feeding tube

- Placed at same time in operating room
- General anesthesia
- Home care nursing to assist with tube feeds
- Jejunostomy- overnight
- Gastrostomy - outpatient



Muscle Loss in Cancer Therapy

Muscle loss is a particular problem in the patient with cancer:

- Chemotherapy
- Radiation
- Difficulty eating and weight loss

All these factors can make muscle loss worse.

Rebuilding Muscle Loss prior to Surgery

Muscle strength is extremely important in recovery from surgery:

- Walking (prevents blood clots in legs)
- Deep breathing and coughing (prevents pneumonia)

Extremely important to rebuild muscle loss before surgery

Exercise and Cancer Therapy

Exercise prior to cancer surgery can reduce the risk of complications by almost half.

Need 30 minutes per day 6 days per week

- Vigorous: Working hard enough that conversation is difficult
- Exercise bike is inexpensive and doesn't require favorable weather
- Important to start immediately

Nurse Navigators

- Expedite scheduling for appointments, tests, surgeries or therapies
- Make delivery of care more efficient by working with your team of doctors
- Help you find appropriate resources during and after treatment
- Ensure that important needs such as access to cancer counselors, nutritionists and local support agencies are met
- Explore and assist with work-related or financial concerns you may have regarding treatment

LCI Cancer Support

Individual and group counseling

Support groups for patients and caregivers

Financial counseling

Assistance from patient resource navigators

Pastoral care

Psychiatric assessment/referral

Social work needs assessment/referral

Integrative Oncology

‘A holistic way to promote wellness while reducing cancer's impact and maximizing quality of life’

Physicians trained in integrative oncology work to address the physical, emotional and spiritual needs of patients and their family members throughout treatment.

- Reduce side effects of cancer treatment
- Review use of vitamins and supplements
- Develop a plan to reduce cancer risk factors
- Ask questions regarding alternative or complementary care
- Improve health and wellness

Next Steps

Stop smoking

- No nicotine patch within 3 weeks of surgery

Optimize nutrition

- Goal is to avoid further weight loss
- May need a feeding tube prior to surgery

Exercise

- Vigorous exercise 30min/day, 6 days per week

Sign up for MyAtriumHealth my.atriumhealth.org

- Secure patient portal (desktop or phone)

Prior to Surgery

Preoperative therapy (if needed):

- Chemotherapy (Medical Oncologist)
- Radiation Therapy (Radiation Oncologist)
- Re-staging scans (PET) 4 weeks after chemo/radiation

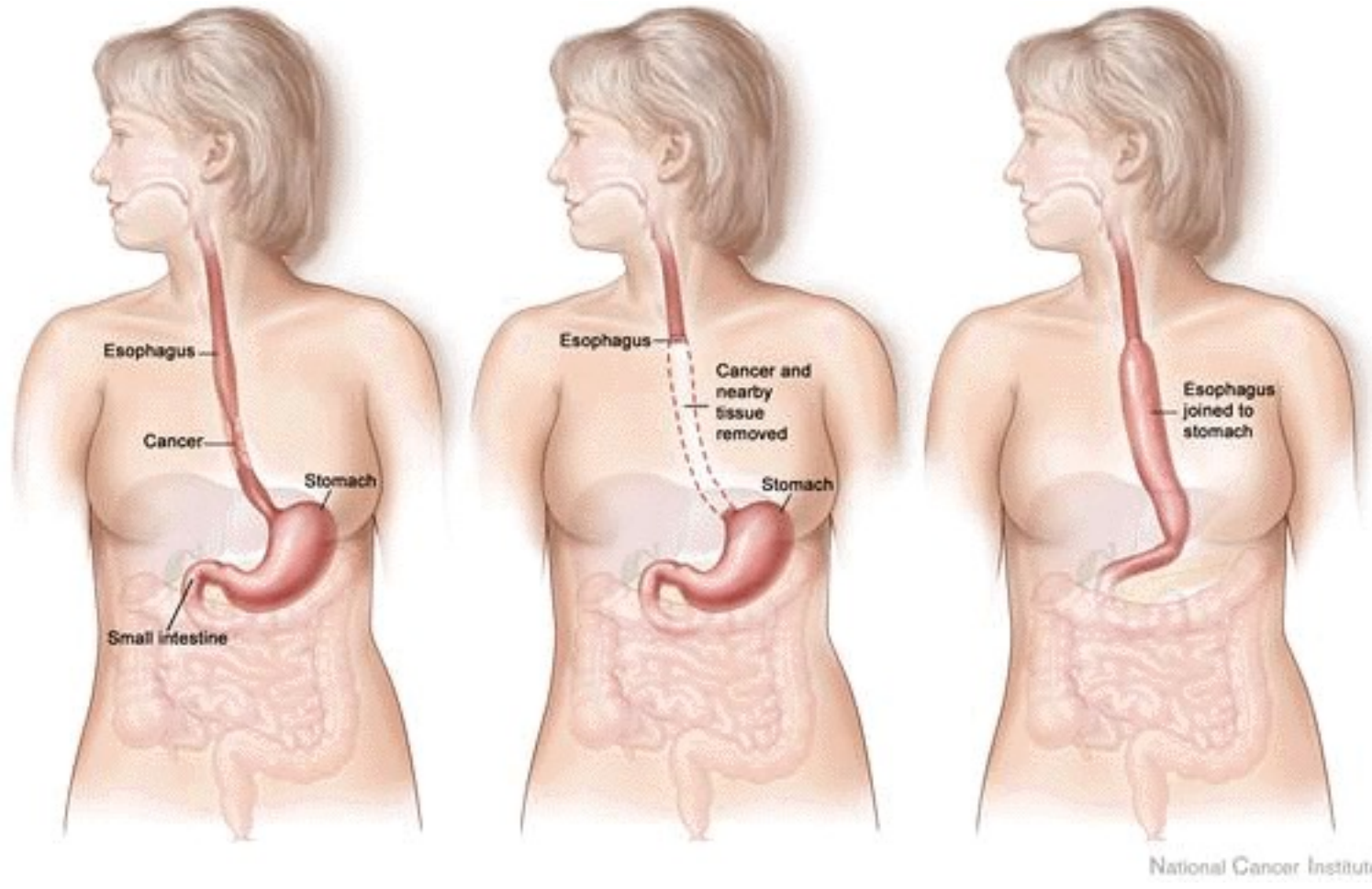
Lung Function Tests (PFTs)

Cardiology evaluation (if needed):

- Echocardiogram
- Stress Test

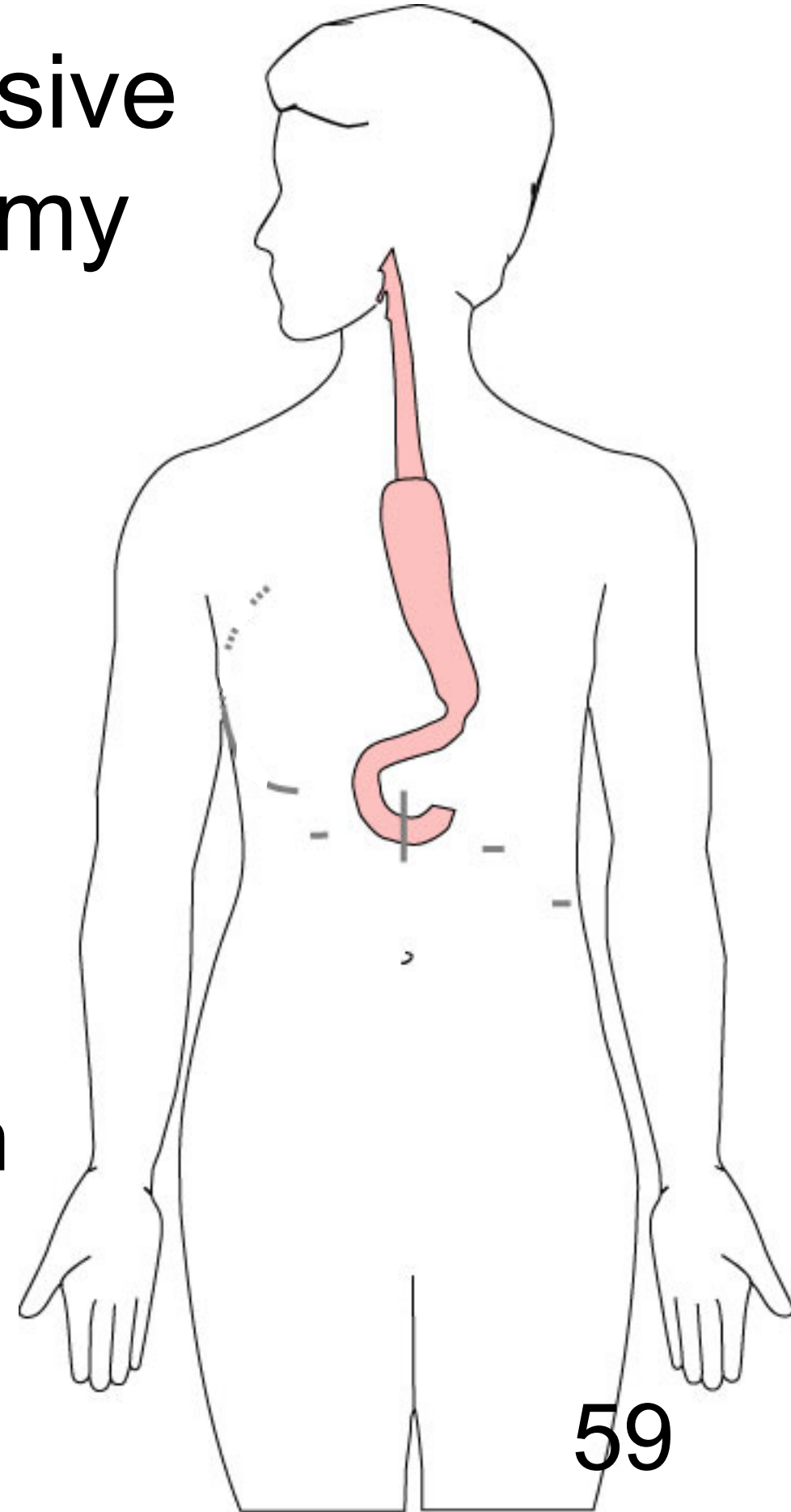
Esophagectomy

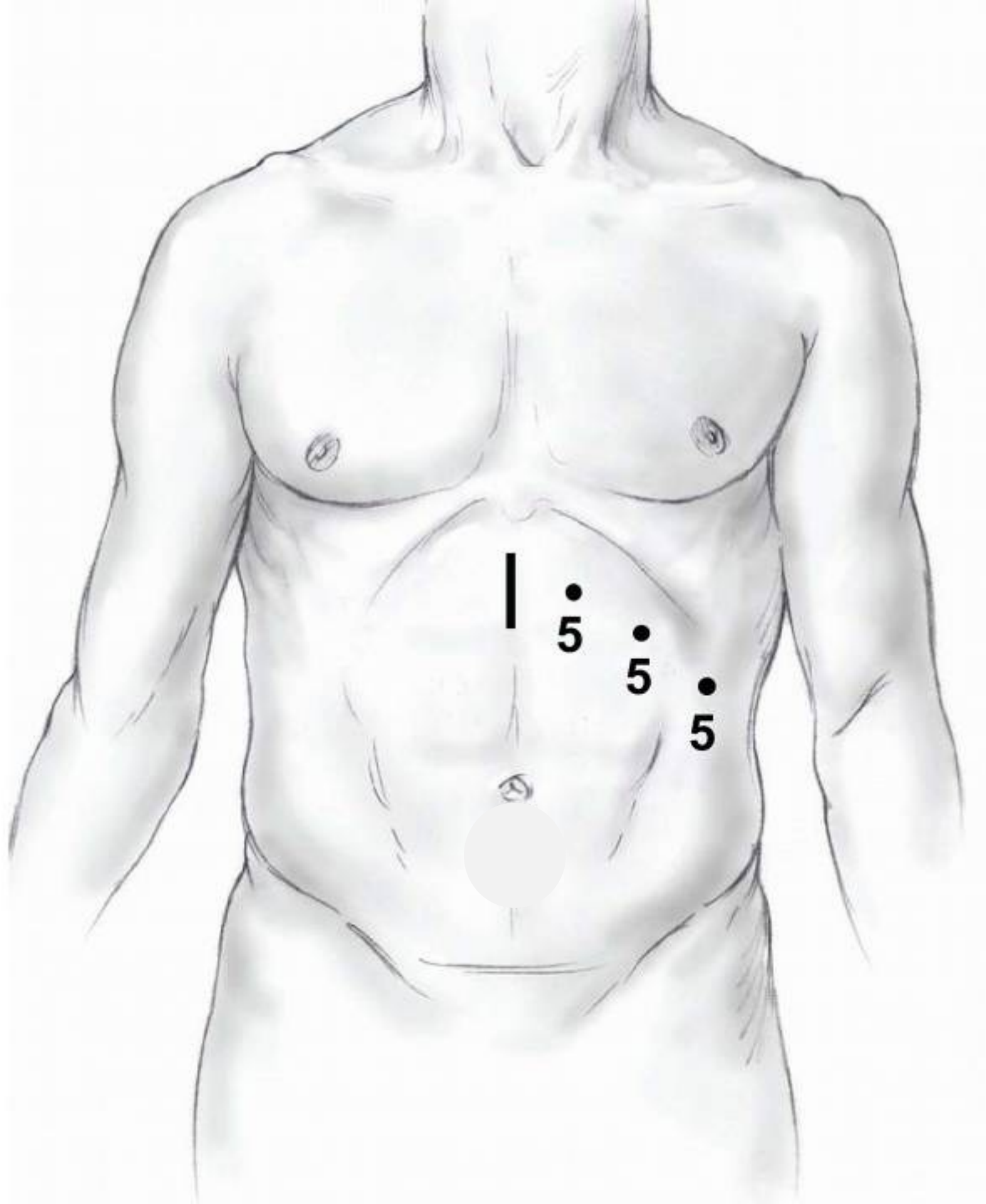
- Esophagus removed
- Stomach brough into chest as a replacement
- Connection eithe in chest or in neck



Minimally-invasive Esophagectomy

- Abdominal laparoscopy
  - Stomach formed into tube
- Right thoracoscopy
  - Stomach connected to esophagus in chest
- Minimally-invasive techniques mean less pain and faster recovery

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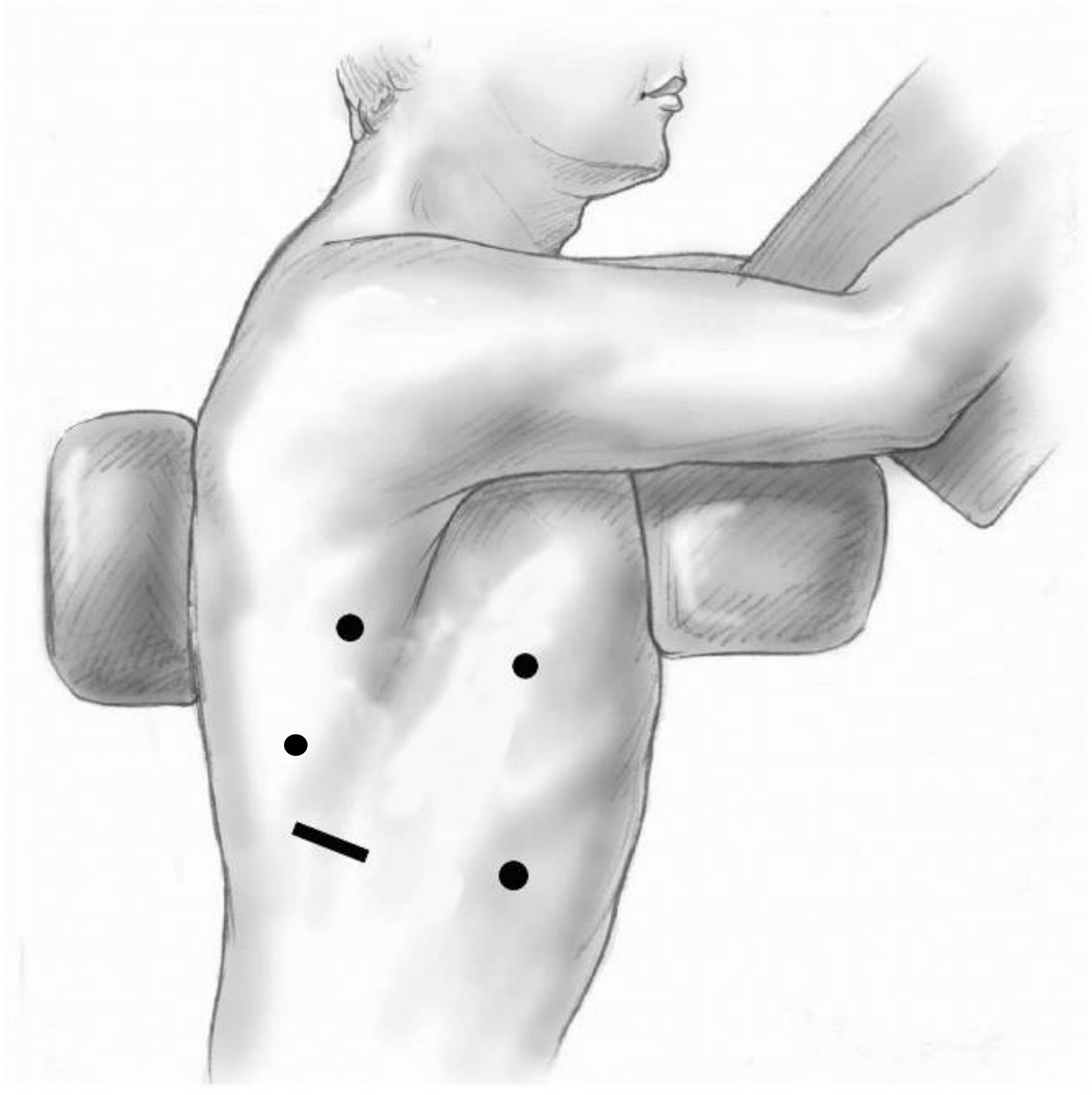


Risks - Anesthesia

Risks related to anesthesia

- Heart attack (5%) — Beta blockers
- Irregular heart rhythm (15%) — Beta blockers
- Pneumonia (15%) — Pain control
- Blood clots in legs (<5%) — Blood thinners and pneumatic stockings
- Pulmonary embolism (2%)

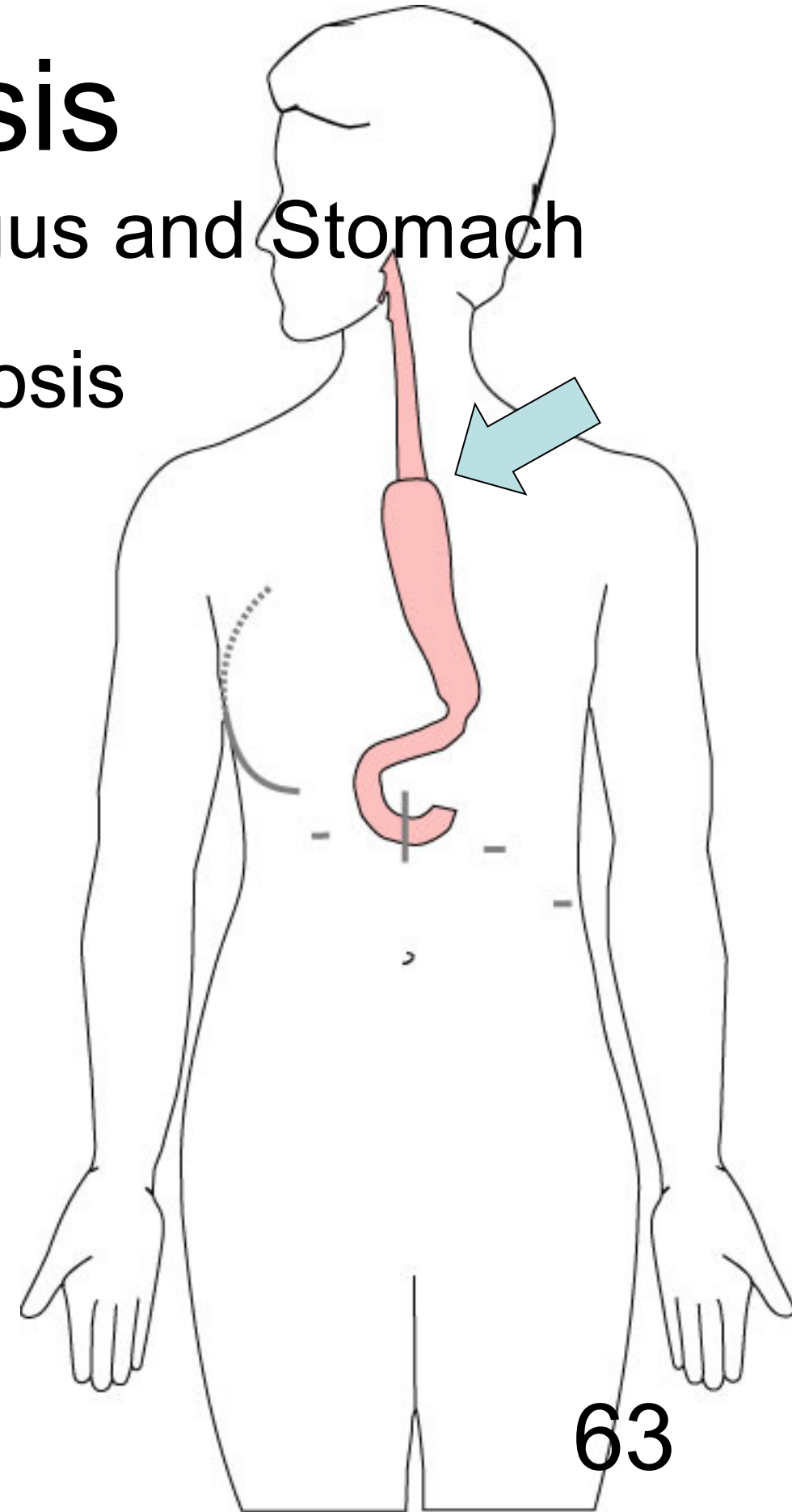
Anastomosis

Connection between Esophagus and Stomach

Potential Problem with Anastomosis

- Leak at anastomosis
  (risk 5-8%) Stop Smoking

- Stricture (narrowing)
  at anastomosis
  May require dilation
  (risk 15%) Stop Smoking



Risks - Surgery

Risks related to surgery

- Bleeding
- Infection
- Mortality (average 5% at 90 days after surgery)
  - High risk patients: 10% mortality at 90 days (8%)
  - Low risk patients: 2% mortality at 90 days (70%)

450+ Esophagectomy operations at Carolinas Medical Center by Dr Salo since 2007

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 may be cancelled if you take even a sip of cream or milk the morning of surgery.

Waiting room 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 removed

ICU Stay
1 or 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)
- Feeding jejunostomy (stays in for ± 8 weeks)

ICU

Catheter in bladder removed → check to 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 tube

Feeding Jejunostomy

Jejunostomy – Placed in small intestine

- Leaves stomach undisturbed (ideal for patients who will undergo esophagectomy
- Pump feedings (12-16 hours – overnight)
- Laparoscopic placement (in OR)
- Overnight hospital stay

https://www.youtube.com/watch?v=jjPP4zENP9g

“Your Feeding Jejunostomy”

Feeding Jejunostomy Video QR Code for YouTube

Ward
6Tower

Tube feeds – will start continuous, then convert to night-time only (6pm to 10am)

Water administered through the feeding tube during the day (usually 8oz 4x per day)

Diabetic patients may need insulin at 6pm and Midnight

Jejunostomy Feedings 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*

Ward Activity

Up in chair most of the day

Walking in halls with help from nurse/physical therapist

Goals:

1. Improve lung function (reduce need for supplemental oxygen)
2. Prevent muscle weakness (particularly ‘core’ muscles needed for walking)

Ward
Swallowing Evaluation

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

If Upper GI OK → NG tube removed
(tube in nose)

Modified barium swallow after NG tube out

If OK → start water by mouth

1 ounce per hour

Ward Discharge

Goal: ready to leave day #6 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 in some
- Water through tube 8oz four times per day
- Home care nursing (feeding tube teaching)
- Home infusion (tube feeding supplies)

Medicines at Home
Pain Control

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

Gabapentin 300mg 3 times/day

- Gabapentin works best if it is 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

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 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

Metroprolol – 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 Plan 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 4-5 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 protein intake by mouth increases, tube feeds can be reduced
- Important that protein intake be spread out during the day (20gm/meal)
- Three meals + 2-3 high-protein snacks

Nutrition After Esophagectomy

Protein → wound healing and muscle

- Average woman needs 60 grams/day
- Average man needs 75 grams/day
- Spread out during the day (20gm/meal)

Carbohydrates → energy

- Sugary liquids can cause ‘dumping’

Fats → help food taste good

- High fat foods may not be digested well

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

Typical Day at Home after Surgery

Time	Activities
8am	Morning Medicines (by mouth or into feeding tube)
10am	Stop Jejunostomy feedings, flush tube, disconnect
	Breakfast
	Walk
10am	Snack – Protein shake or high-protein snack
Noon	Lunch
	Nap
2pm	Snack – Protein shake or high-protein snack
	Walk
4pm	Dinner
6pm	Start Jejunostomy tube feedings. (Insulin if needed)
MN	(Insulin if needed)

30 Degree 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. This 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

After Surgery

Wean off medicines added after surgery

- (pain medicines, beta blockers, Reglan)

Immunotherapy to prevent recurrence

- Patients with residual disease (in the pathology specimen) found at the time of esophagectomy (after chemo + radiation) are candidates for immune therapy (nivolumab or Optivo) for a year after surgery

Survivorship

Survivorship Visit

- Cancer surveillance (CT scan + EGD)
- Survivorship plan for healthy living
- Nutrition Monitoring
  - Iron, Vitamin D, Vitamin B12

Team Members

Primary Care Physician
Gastroenterologist
Medical Oncologist (chemotherapy)
Radiation Oncologist (radiation therapy)
Surgeons – Jonathan Salo MD
– Jeffrey Hagen MD
– Michael Roach MD
Dietician – Liz Koch RD
Nurses – Brandon Galloway & Mychal LaCombe
Schedulers – Stacey Singleton & Tony Bethea