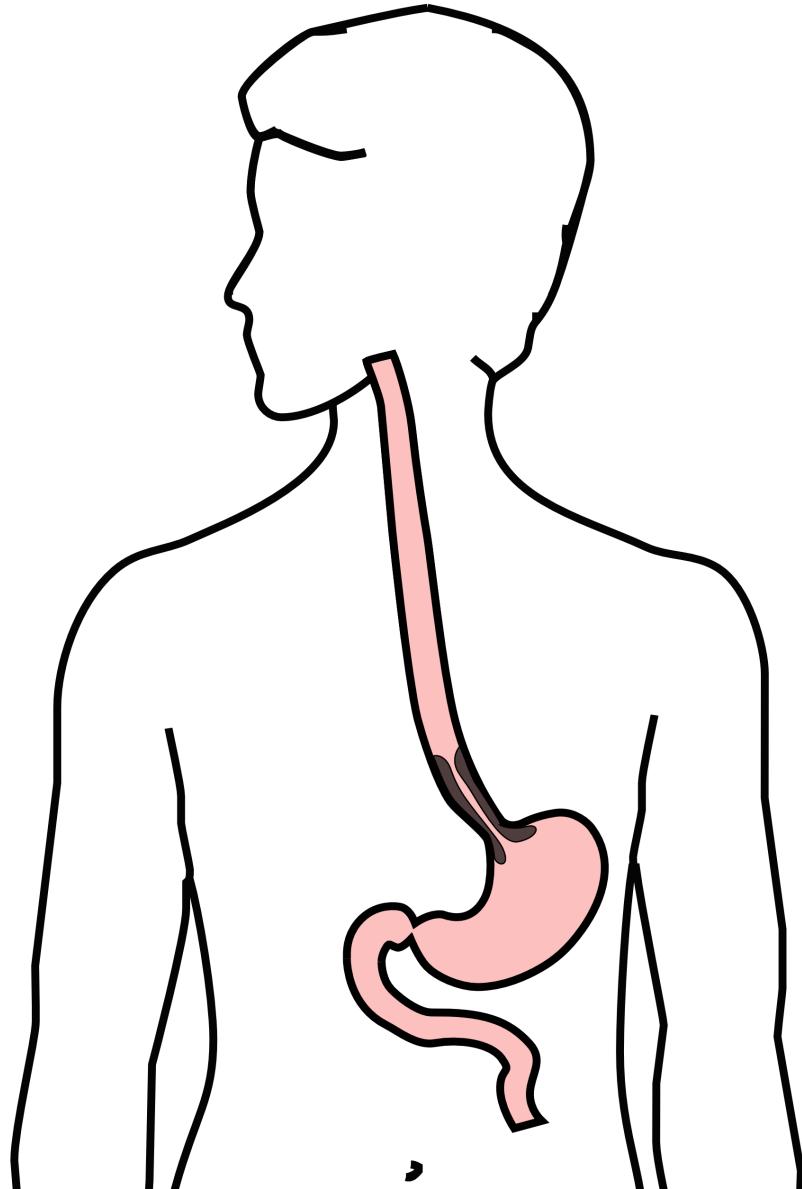


# **Robot-assisted Esophagectomy**

## **2 Stage Ivor Lewis Esophagectomy**

### Abdominal Phase

- Mobilize stomach
- Divide Left Gastric
- Celiac lymph node dissection
- Create conduit
- Transpose conduit → chest



### **Minimally-invasive Ivor Lewis Esophagectomy**

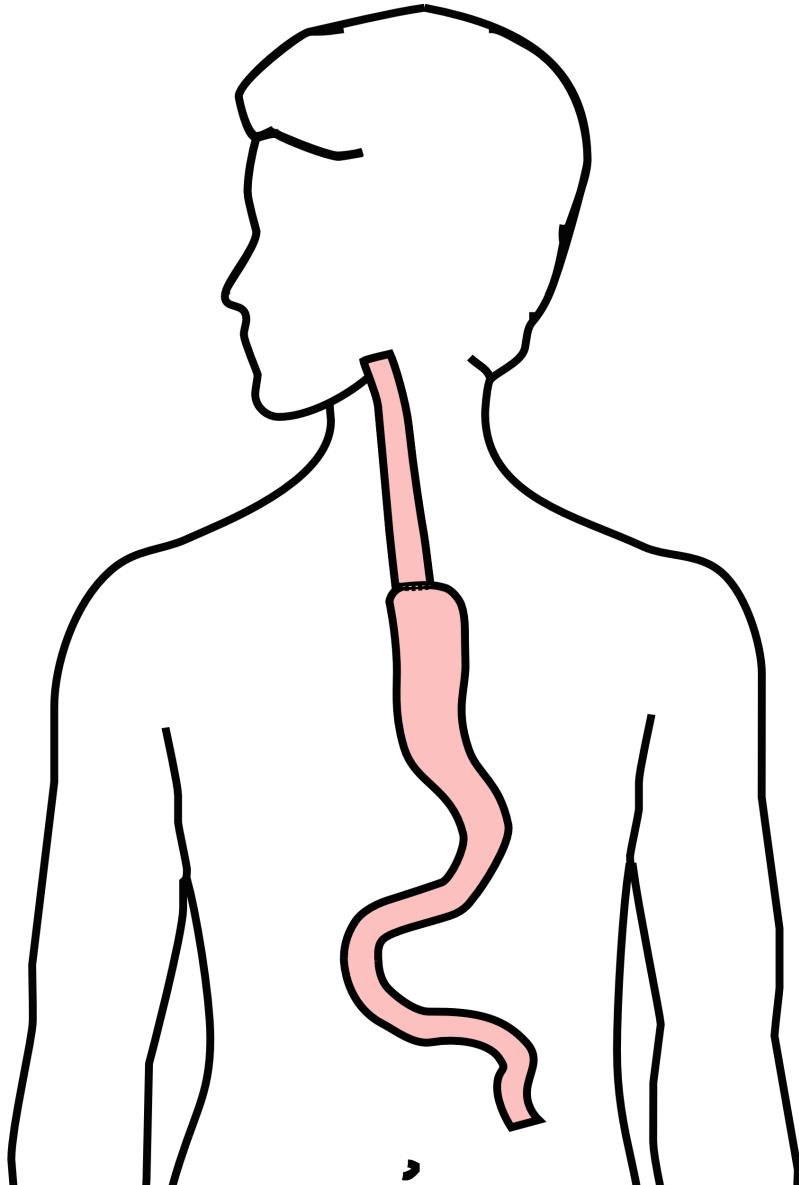
#### Abdominal Phase

- Mobilize stomach
- Divide Left Gastric
- Create conduit (intracorporeal)

- Suture conduit to GE junction

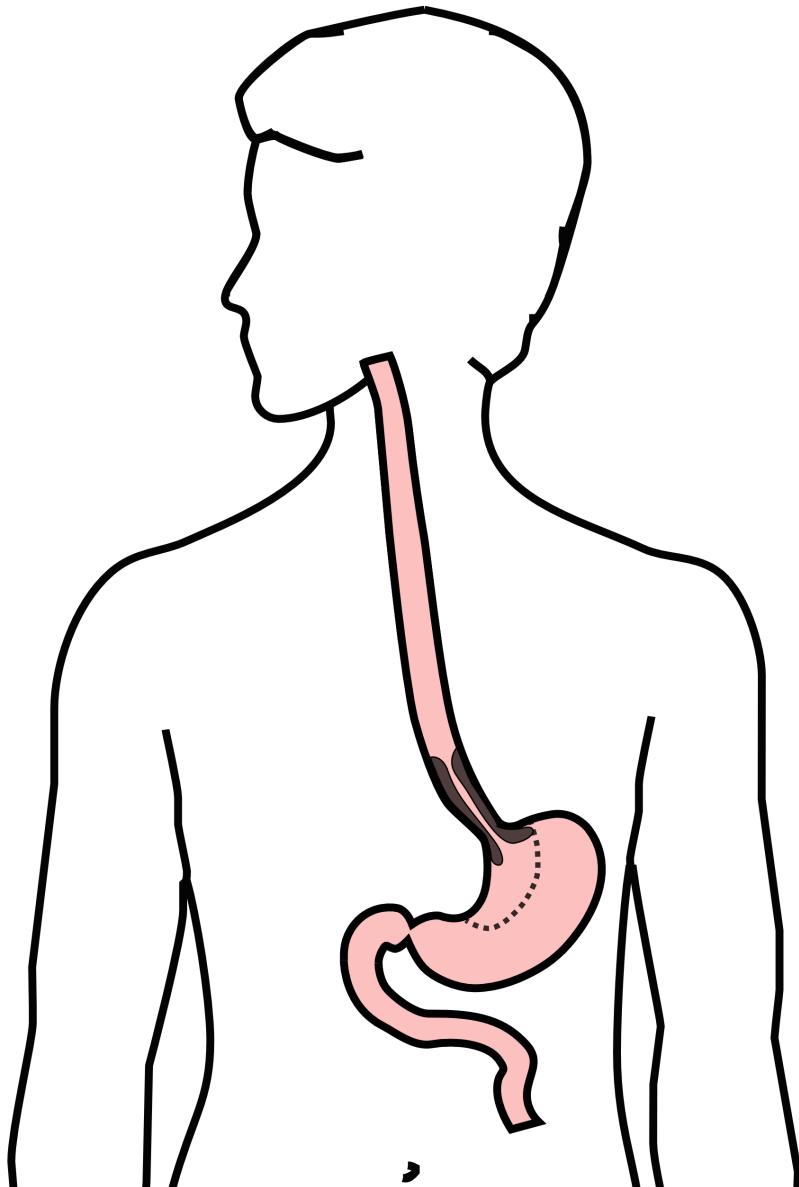
Chest Phase

- Extract specimen through mini-thoracotomy
- Construct anastomosis



## **Minimally-invasive Ivor Lewis Esophagectomy - Conduit**

- Intracorporeal conduit construction
- Limitations on stretch of stomach
- Limited ability to identify cardia/lesser curve tumors



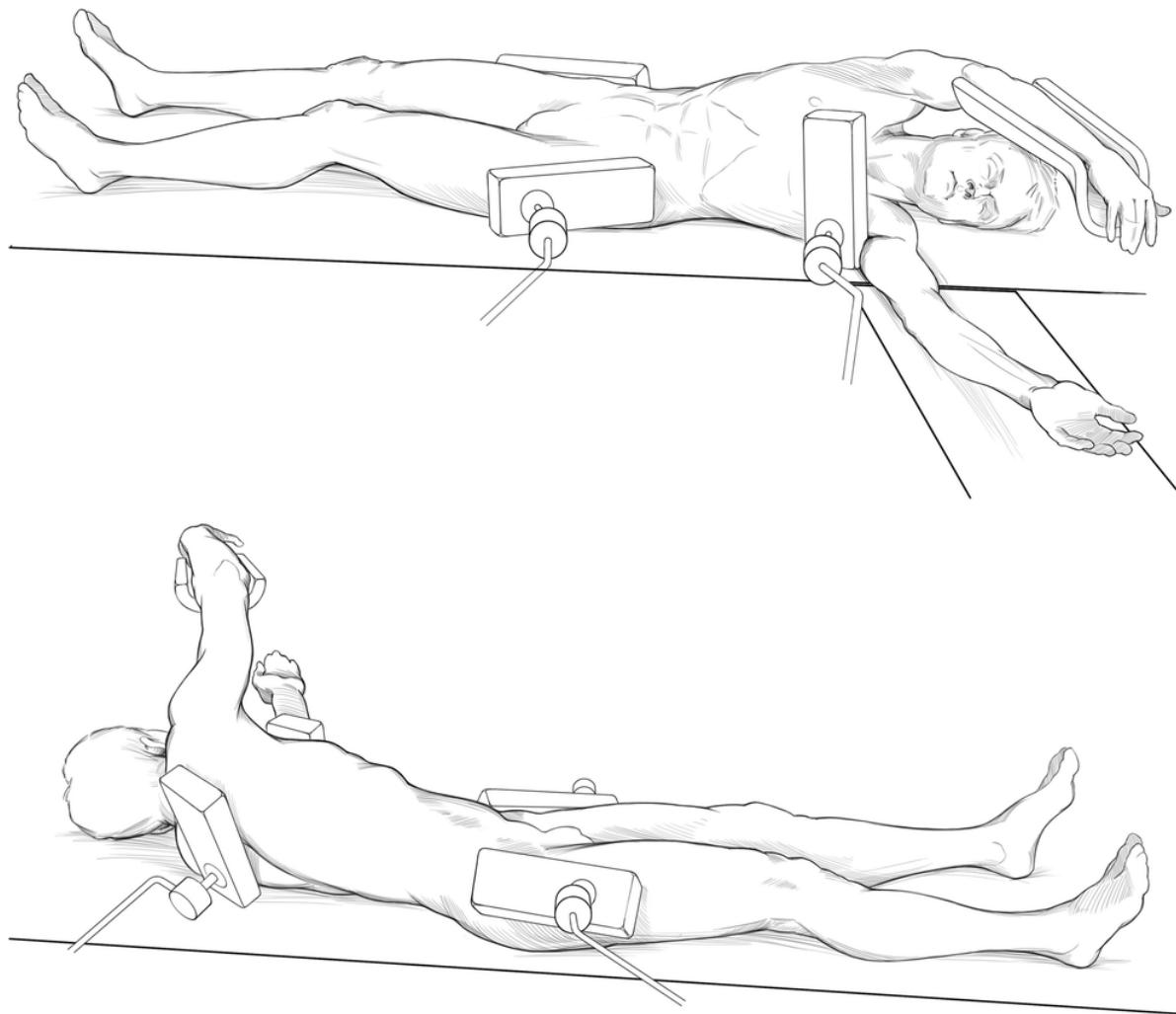
## One Stage Esophagectomy “corkscrew”

Allows simultaneous access to abdomen and chest in one prep

- Abdomen I: Mobilize stomach → Dissect hiatus
- Chest I: Dissect esophagus → Divide esophagus
- Abdomen II: Extract specimen → Construct conduit → Transpose conduit
- Chest II: Anastomosis (circular stapler)

Extracorporeal construction of conduit:

- Less risk of positive distal margin
- Longer conduit ( $\uparrow$ stretch during construction)

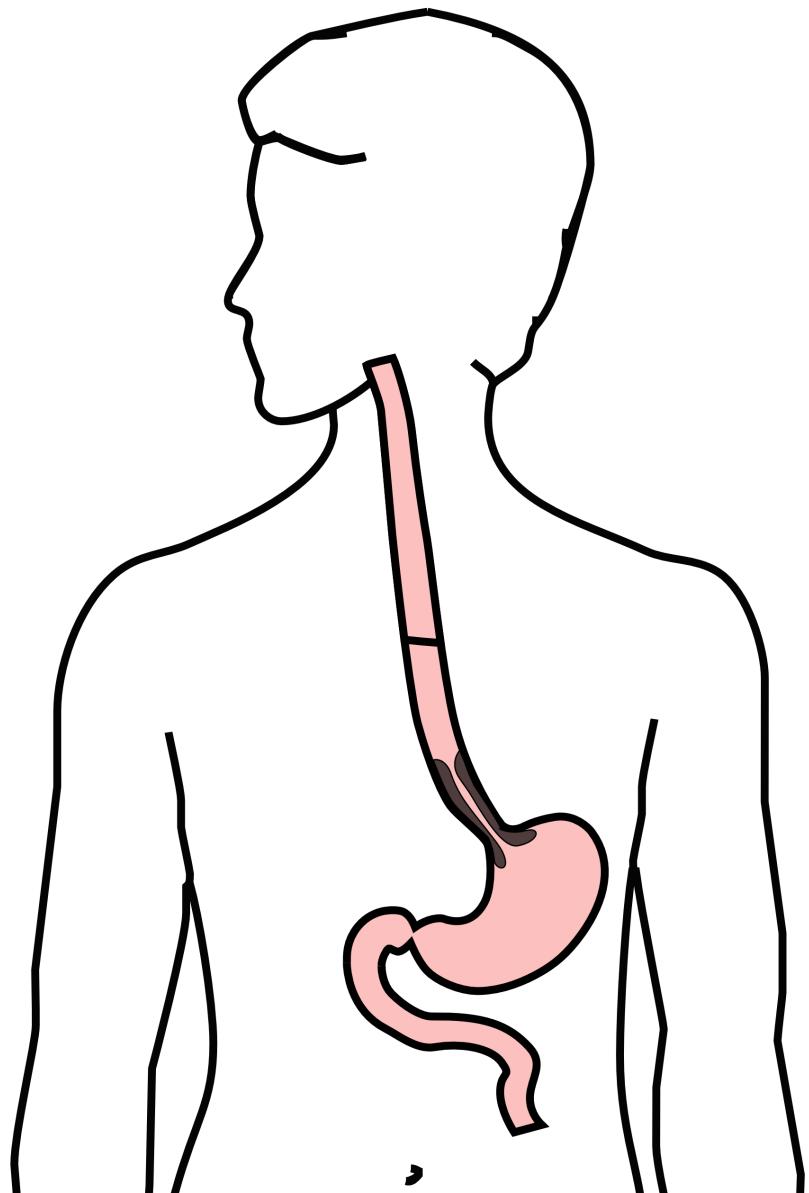


## **Abdominal Phase I**

- Stomach mobilized
- Left gastric artery divided
- Hiatus dissected
- Transhiatal drains placed in left and right pleurae

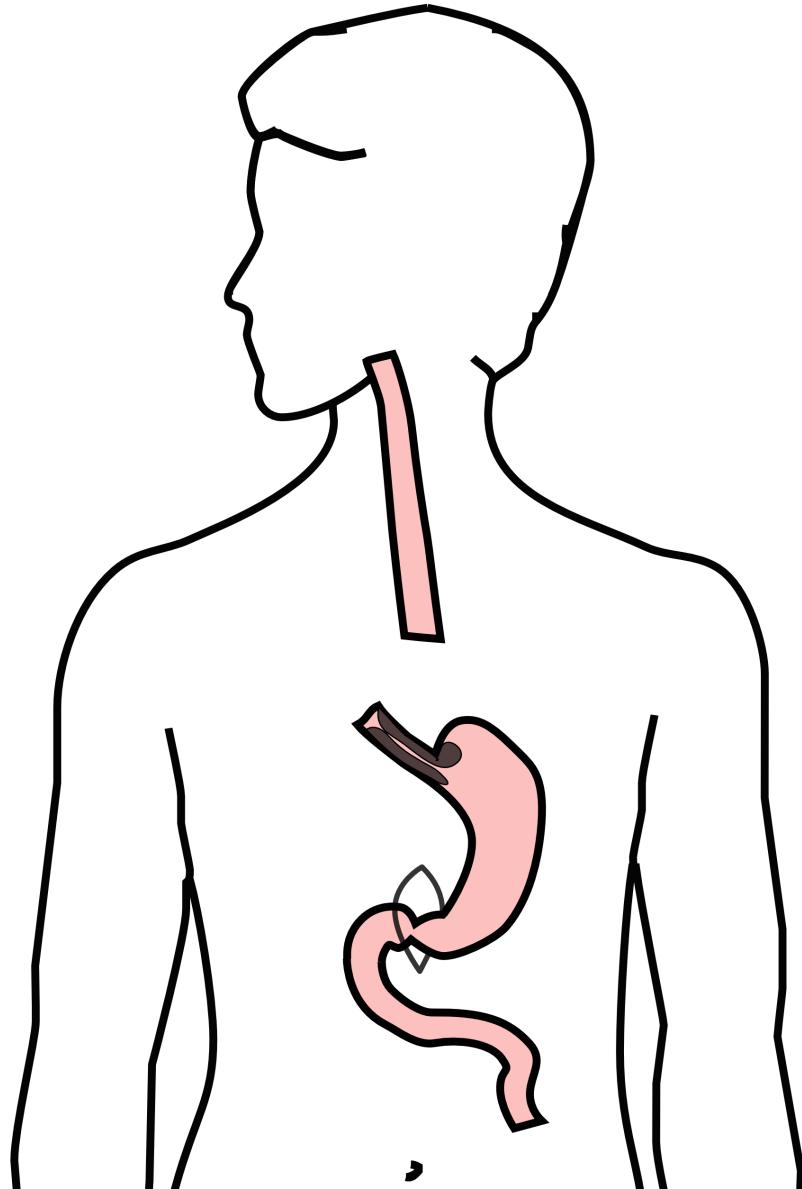
## **Chest Phase I**

- Esophagus dissected from hiatus → cephalad
- Esophagus divided



### **Abdominal Phase II**

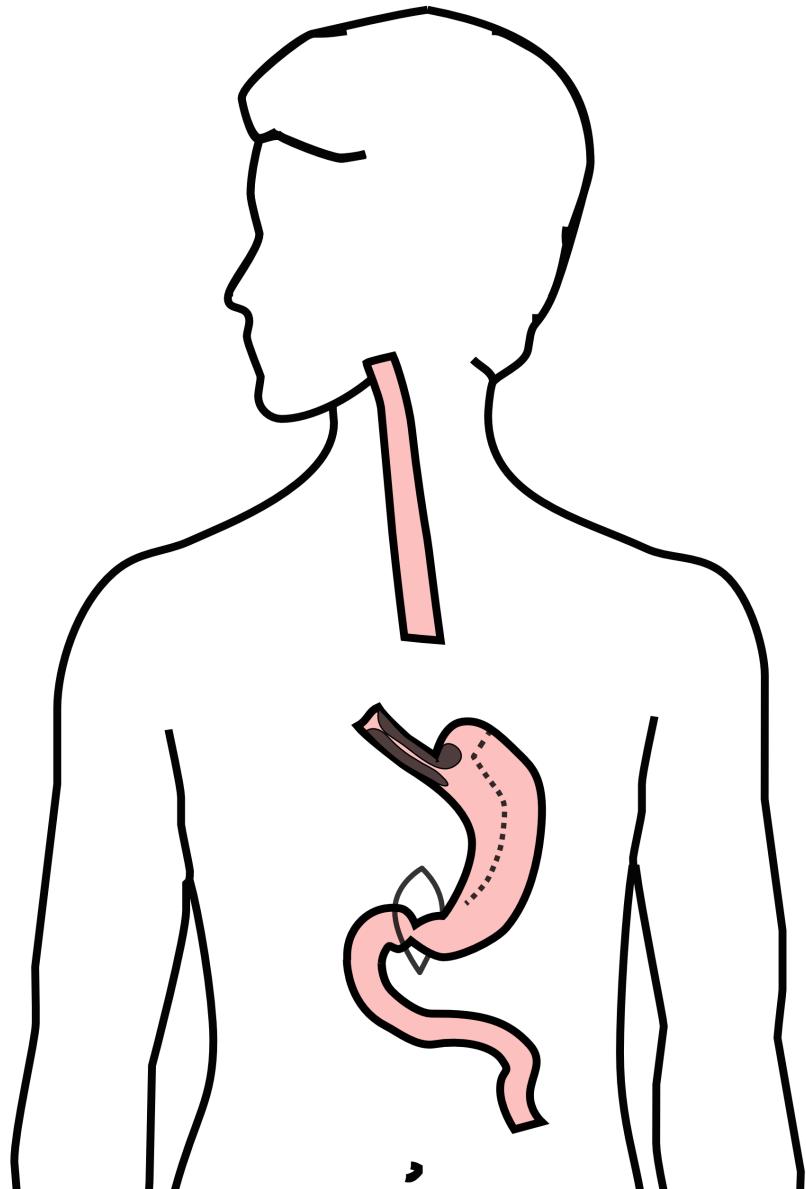
- Esophagus extracted
- Extracorporeal construction of conduit
- Pyloromyotomy
- Conduit constructed



### **Abdominal Phase II**

- Esophagus extracted
- Extracorporeal construction of conduit
- Pyloromyotomy
- Conduit constructed
  - Place stomach on stretch

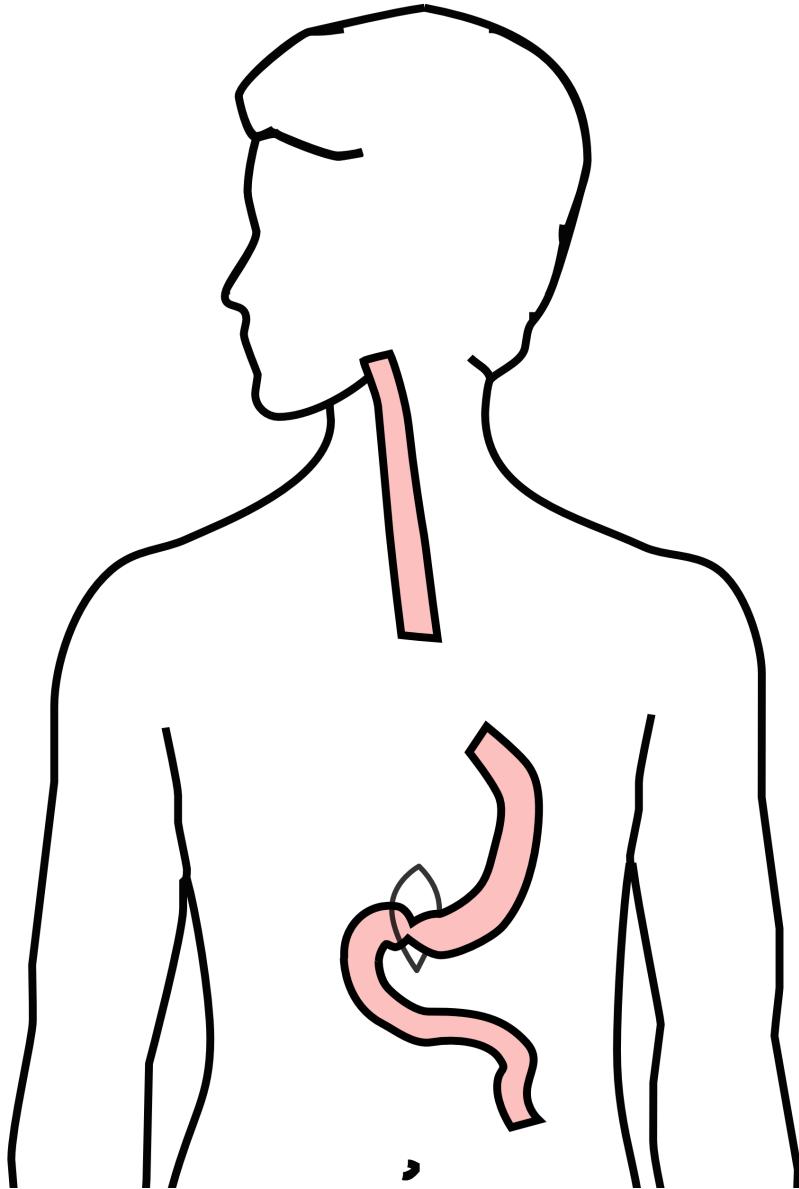
- Palpate GE junction/lesser curvature



## Abdominal Phase II

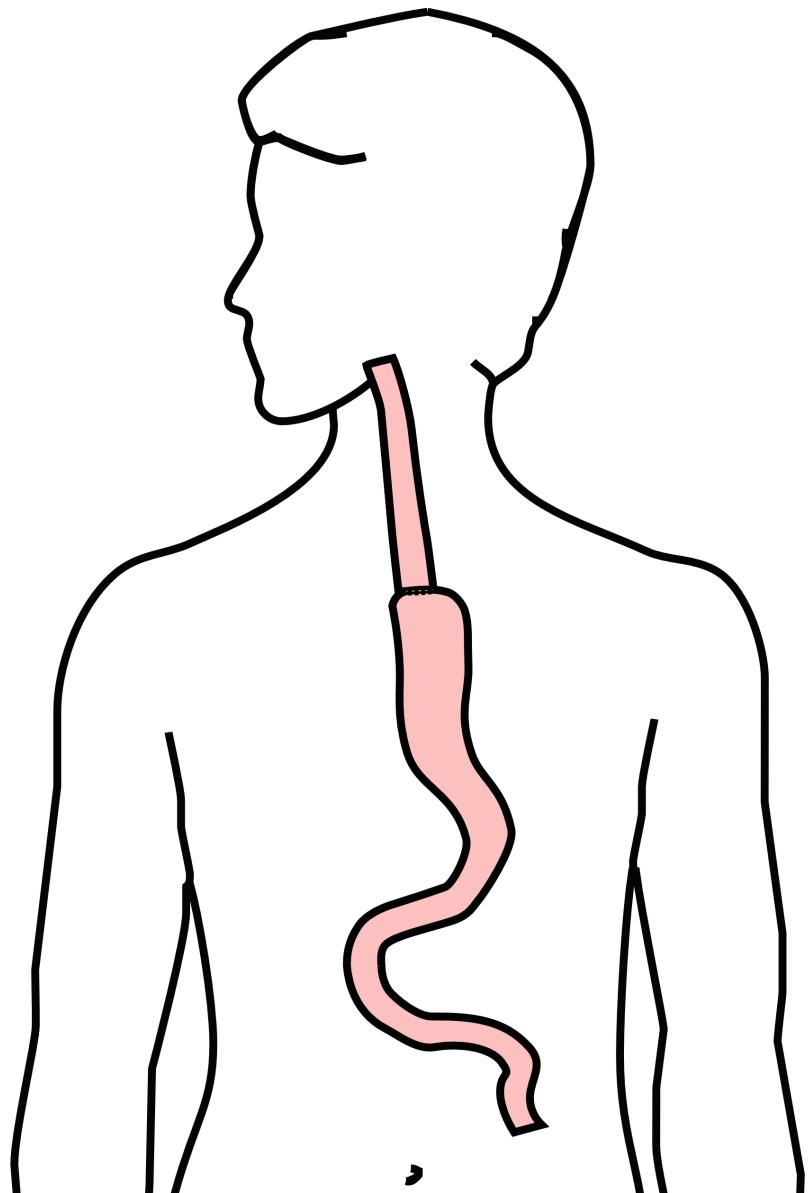
- Extracorporeal construction of conduit
- Pyloromyotomy
- Conduit constructed

- Conduit transposed into chest (hand-assisted)



### Chest Phase II

Anastomosis completed - 25mm Circular stapler



### **Robotic Esophagectomy Training**

- Society for Surgical Oncology Course (Hawkins)
- Case observation at UT Southwestern - Netu Sarkaria (w/Mike Roach)
- ORSI Cadaver Course - Richard van Hillesberger (w/Mike Roach)

## **Hybrid Robotic/VATS Esophagectomy**

Abdominal Phase Supine - Robotic

- Mobilize stomach
- Celiac lymph node dissection
- Conduit constructed with linear stapler
- Conduit sutured to GE junction

### **Conduit transposed to Chest**

Conduit Sutured to GE junction



Chest Phase Semi-lateral - VATS

- Mobilize and divide esophagus
- Transpose conduit into chest (traction)
- Extract specimen between ribs
- Circular stapled anastomosis (OrVil 25mm)

### **Robotic Esophagectomy Experience 2021-2024**

- 5 cases 2018 co-surgery with Jeff Hagen/Mike Roach
  - Tri-incisional (McKeown):
    - \* 1 leak + stricture + RLN palsy
    - \* 1 RLN palsy

## **Hybrid Robotic/VATS Experience 2025**

- 14 cases May - October (5 planned Nov-Jan)
  - Surgical Oncology Block (Friday Room 45): 4
  - Open Robot Time: 10

## **Hybrid Robotic/VATS Experience**

14 cases

- Anatomotic leaks in 2 (14%)
- Delayed gastric emptying in 3
  - Treated with postop pyloric dilation and Botox
  - Somewhat longer length of stay
- Adequate lymph node harvest
- Increased operative time (but improving)

## **Hybrid Robotic/VATS Problems**

Midline abdominal extraction incision required in one patient with large GE junction tumor which could not be extracted between ribs

Difficulty with transposition of conduit into chest via traction

## **Hybrid Robotic/VATS Modifications**

Reduction in width of conduit

Widening of hiatus

Prep abdomen into chest phase to allow two-field visualizaiton of transposition

Pyloric drainage procedure

## **Next Steps**

Thoracic robotic phase w/Mike Roach January 2026 (block time)

Move from 25mm OrVil stapler to 27mm CEEA stapler

No plans for linear stapled or hand-sewn anastomosis

## **Goals**

100 robotic esophagectomy cases by January 2029

Recruit replacement GI surgeon by 2028

Robust clinical research platform

## **January 2029**

- Outpatient clinical evaluation and care
- Assist in OR 1-3 days/week
- No night/weekend call
- No primary surgical responsibility
- Option for some remote work from Durham

## **Clinical Research**

Anastomotic leak remains the Achilles heel of esophagectomy

Vascular evaluation of conduit is critical to understanding and preventing leaks

Need a technology for evaluating conduit perfusion

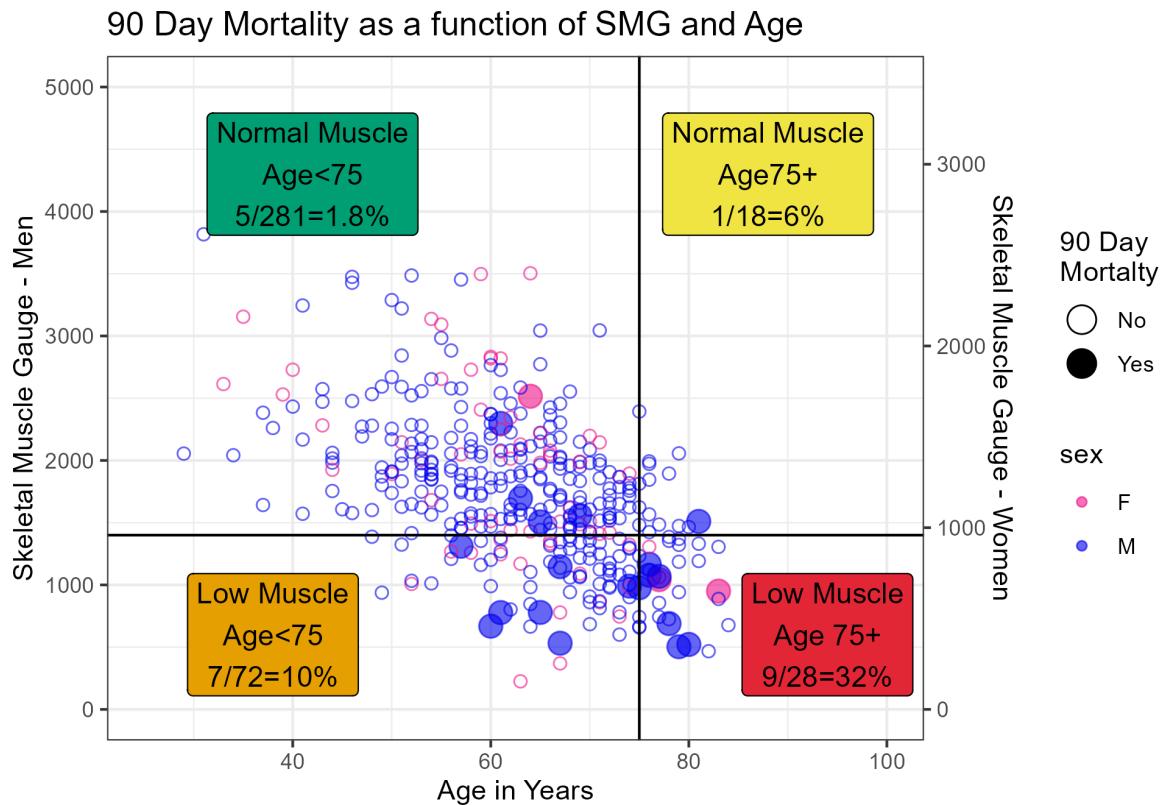
- Reproducible by different surgical teams (across Advocate)
- Quantitation of perfusion
- Mapping of perfusion (relative to final location of anastomosis)

Conduit perfusion will serve as an intermediate endpoint in research to prevent leaks

## **Collaboration with Winston-Salem**

- Machine-learning evaluation of PET in gastric cancer
- Body composition analysis in esophagectomy

## Body Composition and Mortality after Esophagectomy



## Body Composition and Surgical Decision-making

Retrospective Review of Adenocarcinoma of the Esophagus

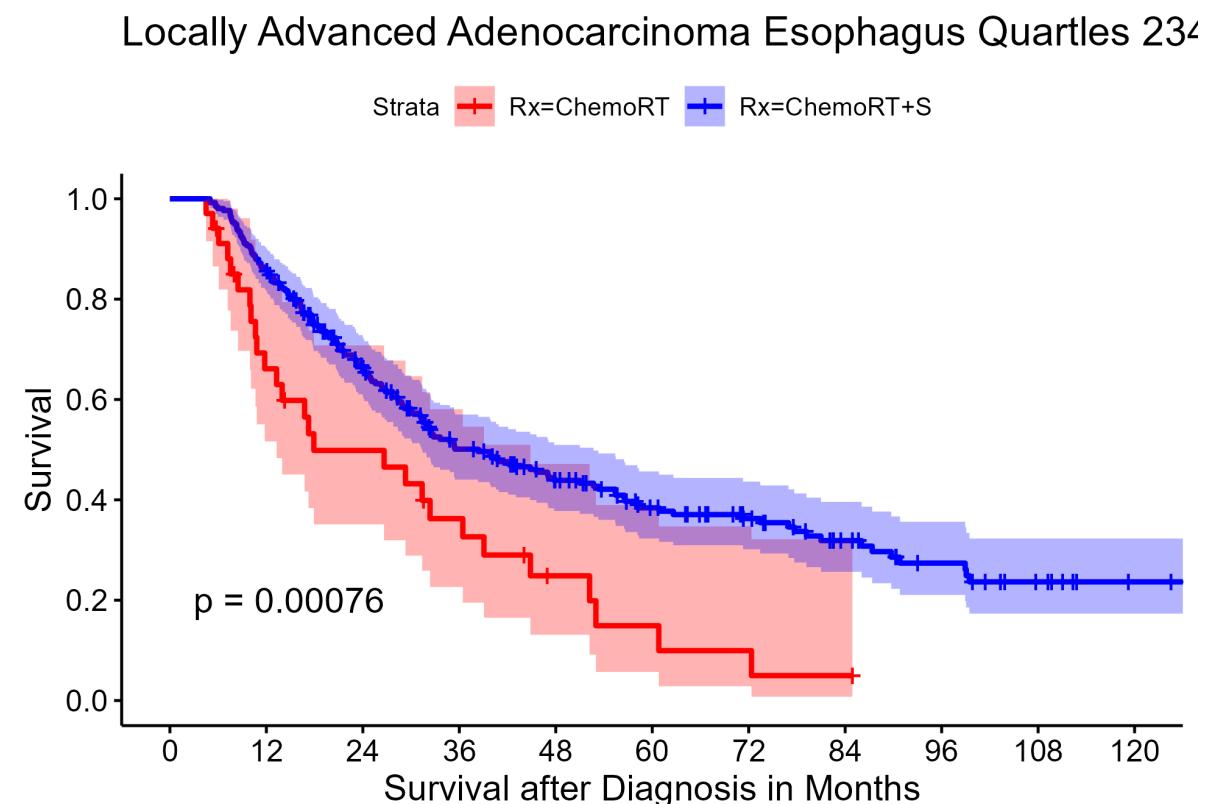
Patients stratified by risk of perioperative mortality

- Age
- Body Composition

Two Risk Cohorts:

- High Risk (Highest risk quartile)
- Low Risk (Bottom 3 quartiles)

## Low Risk of Perioperative Mortality



## High Risk of Perioperative Mortality

### Locally Advanced Adenocarcinoma Esophagus Quartile 1

