

Postoperative Complications after Esophagectomy

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- **Systemic complications**

- Pulmonary

- : pneumonia, bronchospasm, ARDS, pulmonary embolism
COPD exacerbation

- Cardiac

- : A-fib, MI

- **Procedure-specific complications**

- Conduit complications

- : anastomotic leak, conduit ischemia, anastomotic stricture

- RLN injury

- Chylothorax

- **Functional disorders**

- dysphagia, delayed gastric emptying, reflux, dumping syndrome

- **Hiatal hernia**

Esophageal Cancer Surgery

- Extensive and Aggressive surgical procedures

- **Pneumonia**

- **Age**

- **Conduit complication**

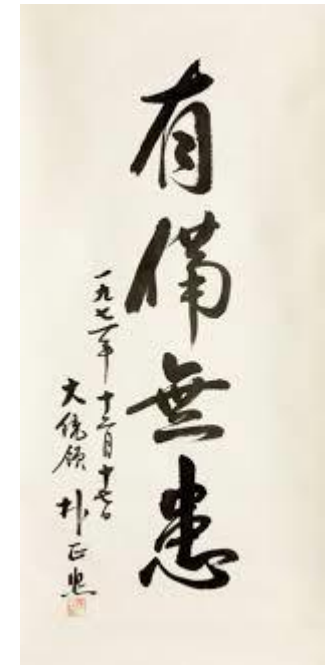
- Mortality risk 

Risk Factors for Complications

- Increasing age
- Compromised pulmonary function (COPD)
- Malnutrition
- Renal or Hepatic dysfunction
- Emergency operation
- Comorbid illness (DM, CAD, LC, obese)

“An ounce of prevention is worth a pound of cure”
- Benjamin Franklin

- proper patient selection
- preparation
- selection of esophagectomy type
- conduct of the operation
- intraoperative anesthesia management
- meticulous postoperative care



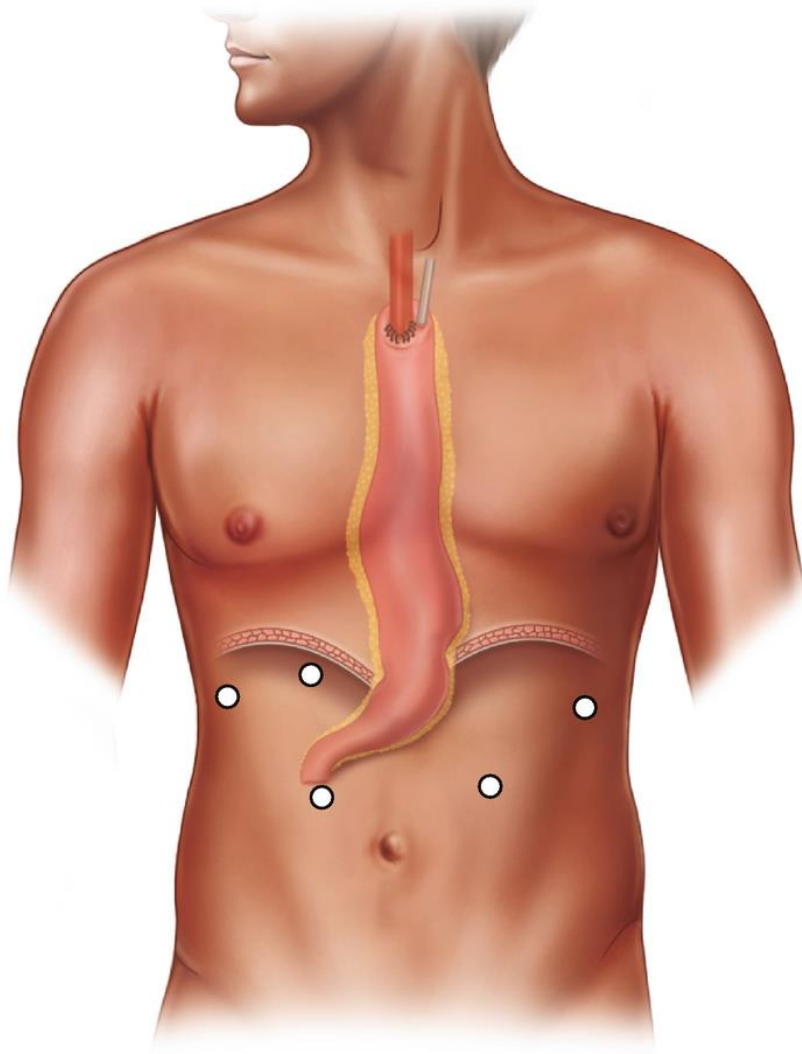
Pulmonary Complications

- m/c (16 to 67%)
 - **Pneumonia** Bronchospasm, ARDS, acute exacerbation of COPD, pulmonary embolism
 - Two thirds of mortality related to esophageal cancer surgery
 - Pneumonia is an independent risk factor for postoperative mortality
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- Preoperative respiratory rehabilitation
 - Postoperative lung care
 - Proper perioperative oral hygiene
 - Adequate pain management
 - Minimally Invasive Esophagectomy (VATS/ RAMIE)



Aspiration

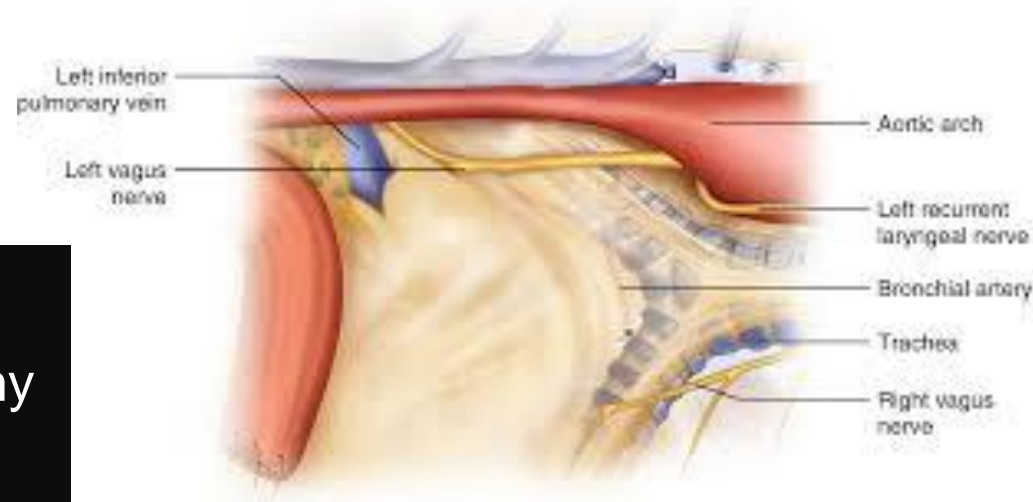
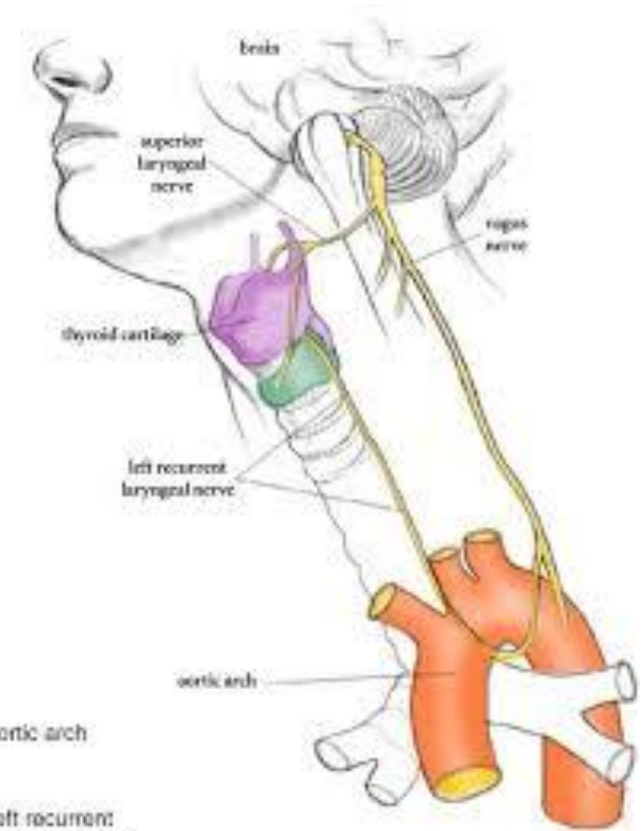
Aspiration



1. RLN injury
2. Anastomotic stricture
3. Hiatus narrowing
4. Pylorus narrowing
5. Regurgitation

RLN injury

- Hoarseness, dyspnea, aspiration pneumonia
- Laryngoscopy, swallowing evaluation, Voice
- Vocal cord injection



1. Three-Field esophagectomy
2. Cervical anastomosis
3. Transhiatal esophagectomy

Cardiac Complication

- **A-fib (first warning sign)**
 - up to 20%
 - significantly higher rates of pulmonary complication, anastomotic leaks, and mortality rates
- **MI**
 - significantly implication for the health of the conduit

Conduit complications

- Viable conduit needs to be
 - well-vascularized
 - adequately mobilized (reduced tension)
 - not long (ischemic portion resected)
 - treated gently
- The anastomosis needs to be
 - sufficiently wide
 - closed securely

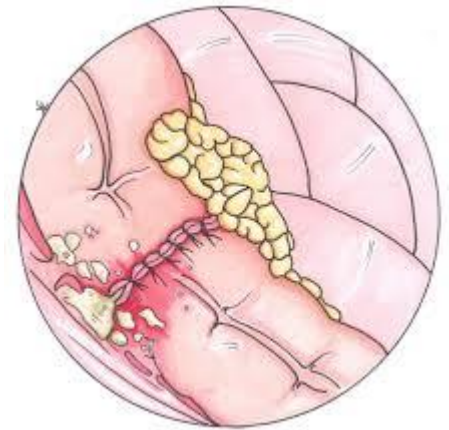
1. Anastomotic leak

2. Conduit ischemia

3. Anastomotic stricture

1. Anastomotic Leak

- Incidence – 5 to 40 %
- Factors that influence the incidence of anastomotic leak include:
 - anastomotic technique (hand sewn vs stapled vs hybrid)
 - **location of anastomosis (neck vs chest)**
 - type of conduit (stomach vs colon vs small bowel)
 - location of the conduit (orthotopic vs heterotopic)
 - **conduit ischemia**
 - **neoadjuvant therapy**
 - **comorbid conditions (HF, HTN, renal insufficiency)**
 - Etc. (surgeon's experience,,,,)



1. Anastomotic Leak

Table 1. Esophagogastric Anastomotic Leak Classification^a

Grade	Leak Classification	Definition	Treatment
I	Radiologic	<ul style="list-style-type: none">• No clinical signs or symptoms• Purely radiologic diagnosis	<ul style="list-style-type: none">• No change in management
II	Clinical minor	<ul style="list-style-type: none">• Minor clinical signs (eg, cervical wound inflammation or drainage)• Radiographically contained intrathoracic leak• Fever, leukocytosis	<ul style="list-style-type: none">• Delay oral intake• Antibiotics• Wound drainage• CT-guided drain placement
III	Clinical major	<ul style="list-style-type: none">• Significant anastomotic disruption requiring surgical revision• Minor anastomotic disruption with systemic sepsis	<ul style="list-style-type: none">• Esophageal stent placement• Surgical debridement• Anastomotic revision
IV	Conduit necrosis	<ul style="list-style-type: none">• Conduit necrosis necessitating esophageal diversion	<ul style="list-style-type: none">• Conduit resection with esophageal diversion

1. Anastomotic Leak

- Incidence : Cervical anastomosis > thoracic anastomosis
 - No difference in mortality
 - The morbidity of pleural and mediastinal soilage is theoretically higher than for cervical leaks
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- ✓ Cervical anastomotic leaks – drainage of the neck wound with subsequent wet-to-dry dressing changes
 - ✓ Thoracic anastomotic leaks – more likely to require re-exploration
endoscopic stenting / endoluminal VAC
(in selected circumstances)



1. Anastomotic Leak

- **Basic principle** of anastomotic leak management
 - 1. Blood flow to the esophageal conduit is **vulnerable to hypotension**
 - : adequate hemodynamic monitoring / euvolemia / avoidance of vasopressors
 - 2. Adequately **drainage**
 - : wound opening or percutaneous drainage
 - CT for extraluminal collection
 - 3. **NG tube, NPO**
 - 4. **Systemic antibiotics** (empirically, antifungal therapy)

2. Conduit Ischemia

- Incidence – 9%
- The presence of comorbid illness increased the risk of conduit ischemia
- Similar on gastric pull up and colon interposition
- Diagnostic tool – Endoscopy (best)
- Take-down of the gastric pull-up, resection of the necrotic bowel, cervical esophageal diversion, and placement of a feeding jejunostomy

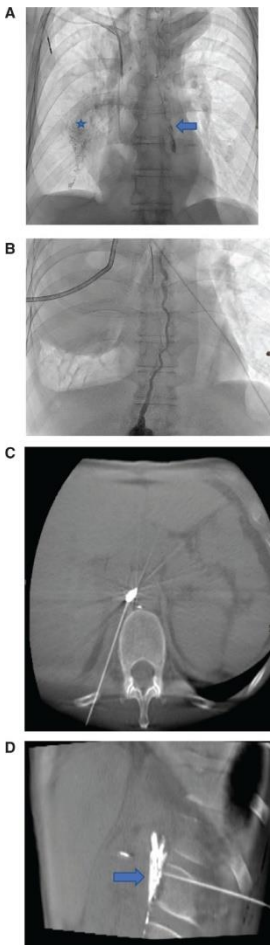
3. Anastomotic Stricture

- Incidence – 9~40%
- Due to conduit ischemia or recurrent disease at the anastomotic site
- Dysphagia, odynophagia, aspiration, inadequate dietary intake, and malnutrition
- Diagnostic tool – Endoscopy (best)
- Often closely linked to conduit malperfusion/ischemia or surgical technique

+ anastomotic leak

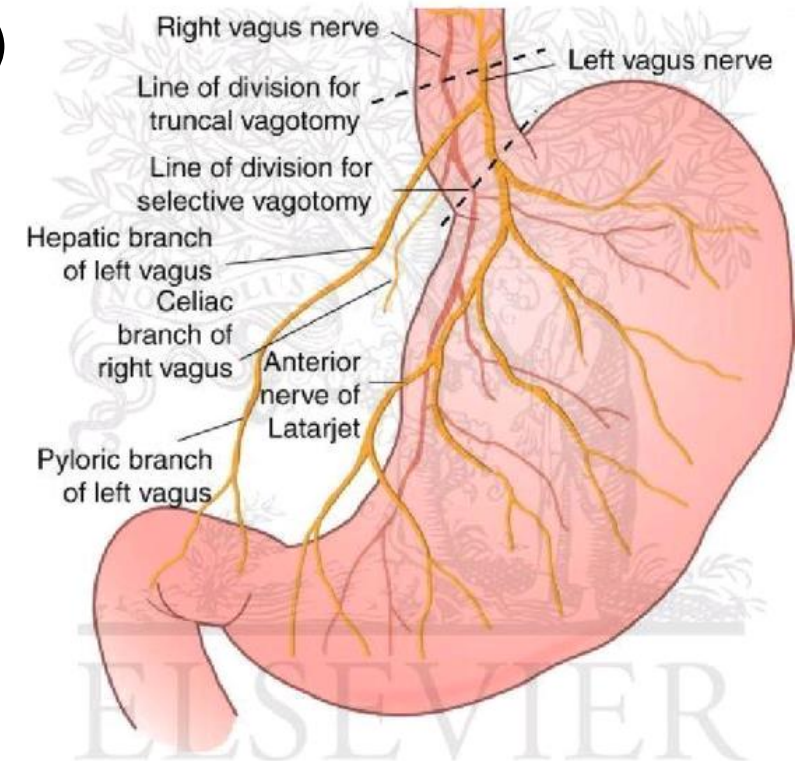
Chylothorax

- Incidence : 0 – 8%
- Prophylactic ligation of the thoracic duct is controversial
- Elimination of enteral nutrition, parenteral nutritional support (TPN)
- Close observation of chest tube output
- Octreotide and fluid resuscitation
- Surgical intervention : > 10mL/kg over 5 days



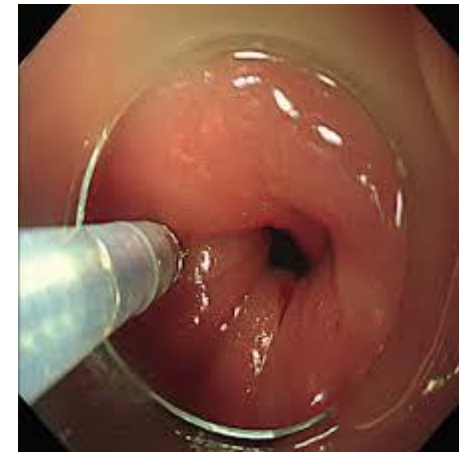
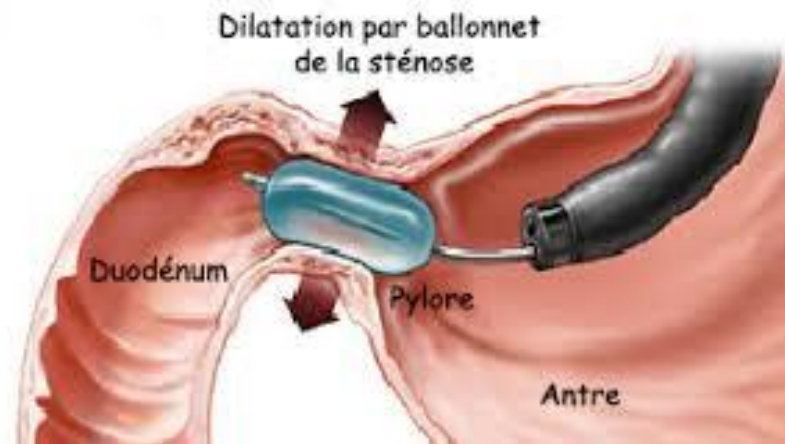
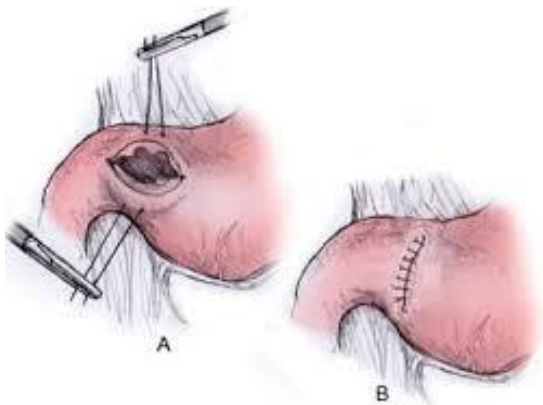
Functional Disorders

- Dysphagia – up to 65% (m/c: anastomotic stricture – ischemia/recurrence)
- **Delayed gastric emptying** (m/c: truncal vagotomy)
- **Reflux**
- Dumping syndrome (early dumping)
 - increased frequency, decreased size of meals



Delayed Gastric Emptying

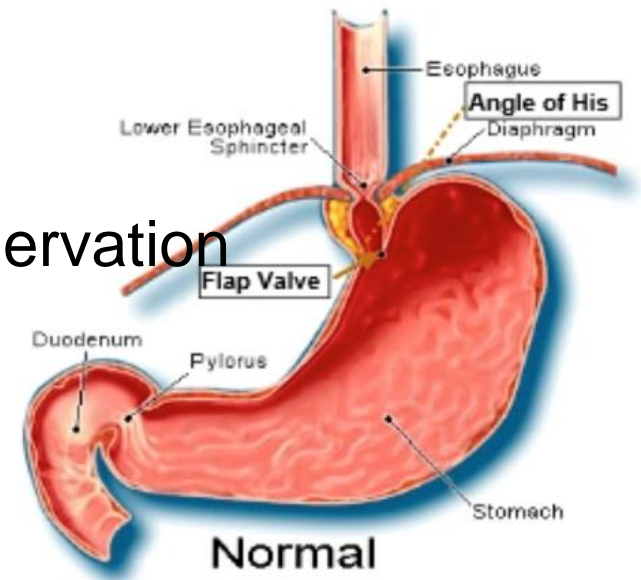
- One of the major causes of severe aspiration pneumonia
- Gastric outlet procedures (pyloromyotomy or pyloroplasty)
- s/e: dumping, duodenal reflux (biliary reflux) – Endoscopic balloon dilatation
Botox injection



Reflux

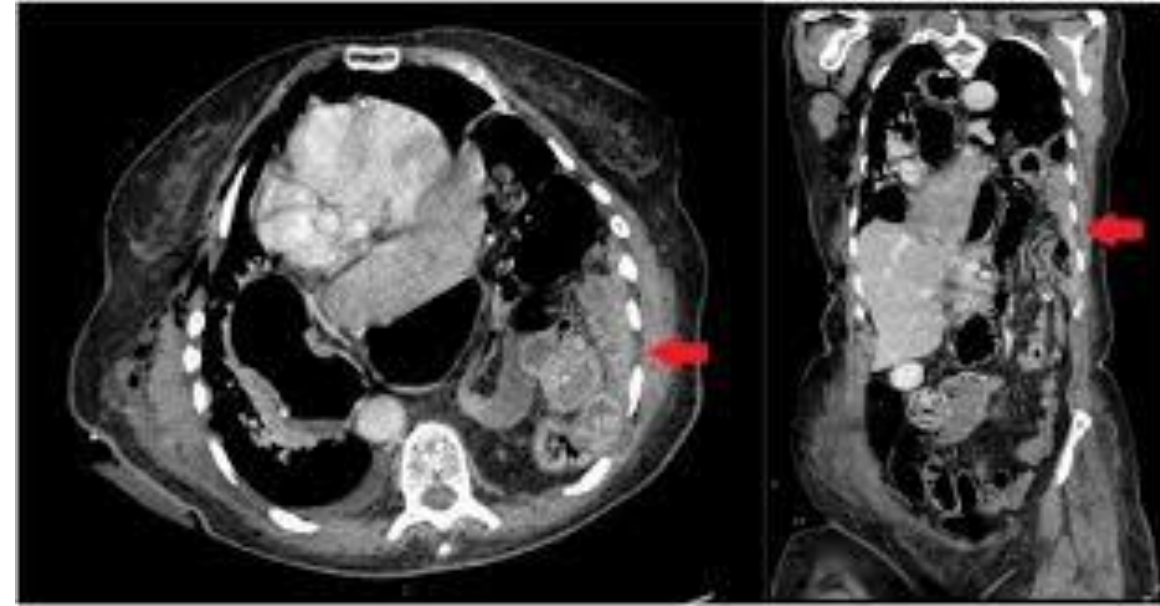
- Loss of anti-reflux mechanism (LES, angle of His, diaphragmatic sling)
- Direct anastomosis with no sphincter-like mechanism to prevent reflux
- Positive intra-abdominal pressure, negative intrathoracic pressure
- Impaired conduit motility
- Impaired esophageal remnant motility, possibly related to denervation

PPI + Motility agents



Diaphragmatic Hernia

- Uncommon but challenging problem
- More often after MIE or RAMIE
- Nausea, vomiting, progressive chest pain, and unexplained weight loss
- Reduction of hernia contents
- Primary repair of the hernia defect
- Avoiding injury to the vasculature of the esophageal conduit
- The abdominal approach is preferred





Thank You For Your Attention