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HIATAL HERNIA REPAIR

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Morbidity and Mortality

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Case Presentation

- 60 yo M with c/o vague abdominal pain, left abdominal pulling x 1 year
- Diagnosed with Type III hiatal hernia on CT Abdomen
- PMH: HTN
- PSH: umbilical hernia repair
- Meds: atenolol, norvasc, diovan, HCTZ
- NKDA
- Plan: elective laparoscopic repair

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OR - Laparoscopy

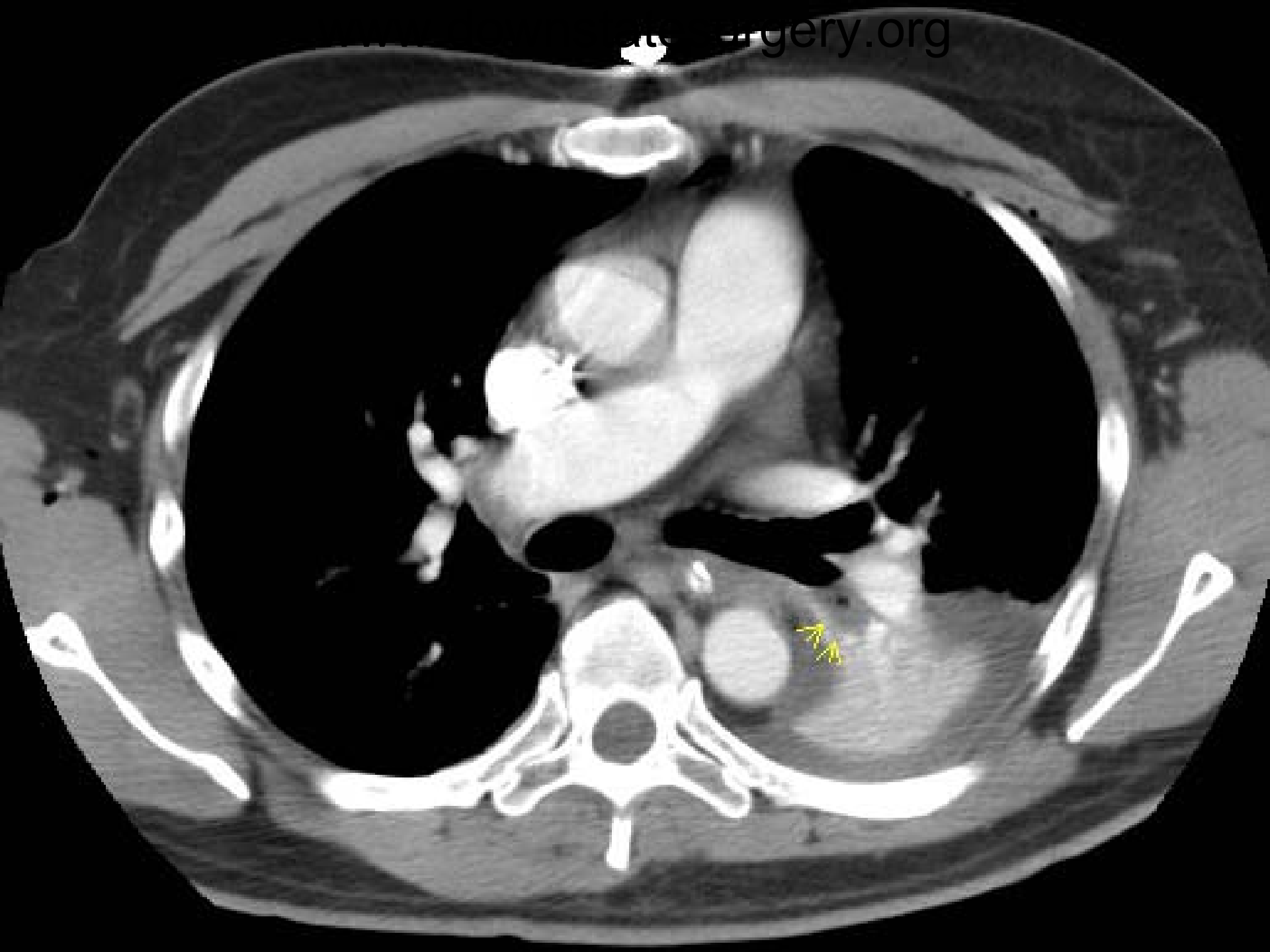
- Large hiatal hernia containing stomach and omentum
- Contents reduced
- Dissection of the sac with Harmonic scalpel
- Primary repair of hiatal defect
- Distal esophageal perforation with 50 Fr bougie during Nissen fundoplication

OR - Open

- 3.5 cm intra-abdominal distal esophageal perforation
- Primary repair with interrupted 3-0 vicryl
- Nissen fundoplication
- Omentopexy
- JP over repair
- Pt left OR intubated to SICU

POD 1

- Extubated in AM
- TPN started, OOB to chair
- In PM desaturation to 79%
- CTA
 - acute PE involving right main pulmonary artery
 - fluid collection at the left lung base
14 x 8 cm
- Heparin drip



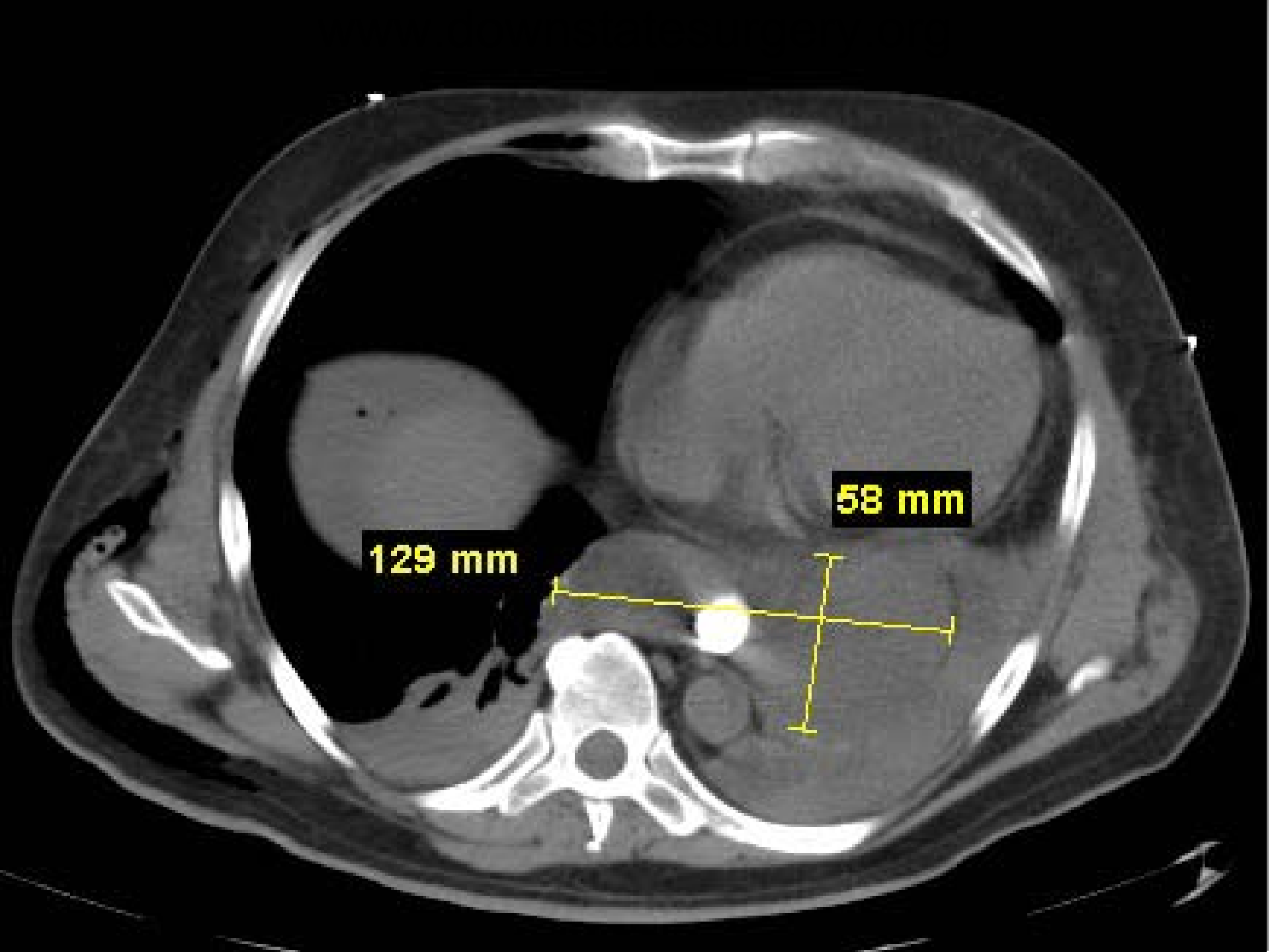


POD 2-7

- Respiratory failure -> intubated
- Daily fevers to 101.7, WBC 14
- Cultures – NGTD
- IV Abx
- Wounds clean, dry, intact
- Abdomen soft, ND
- JP – white fibrinous output

POD 8

- Tm 103, WBC 35
- Esophagram & CT w/contrast
 - prominent extravasation at GE junction
 - Abdominal & pelvic ascites
 - 13 x 6 cm fluid collection in the site of prior hernia
 - LLL atelectasis



129 mm

58 mm

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OR

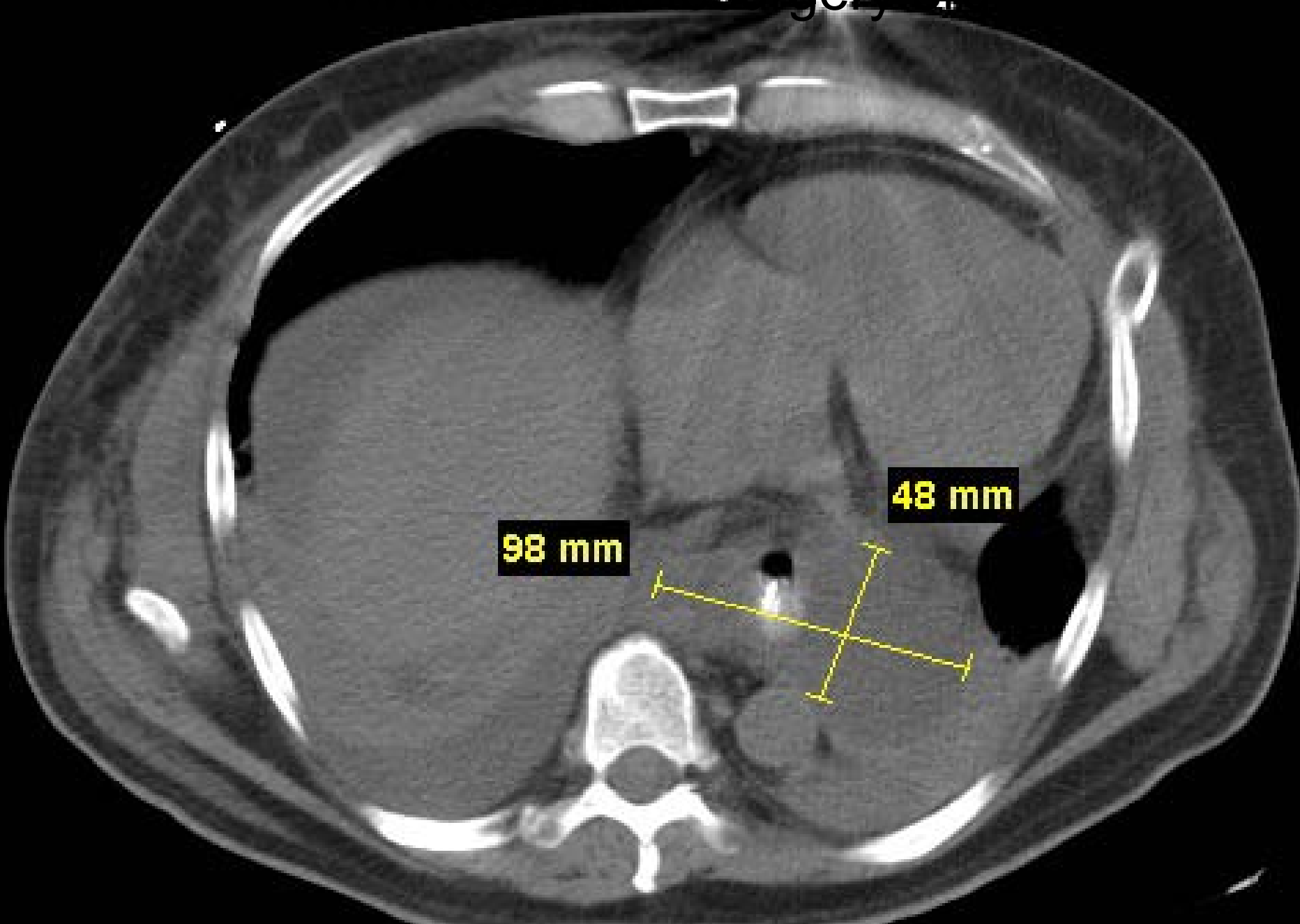
- Ex-lap
- Multiple intra-abdominal collections
- Splenic capsule tear during mobilization requiring transfusion
- Multiple adhesions, unable to find tear
- Drains: 2 sumps & 2 pediatric chest tubes
- J-tube placement
- Permacol mesh and 2 subq JPs

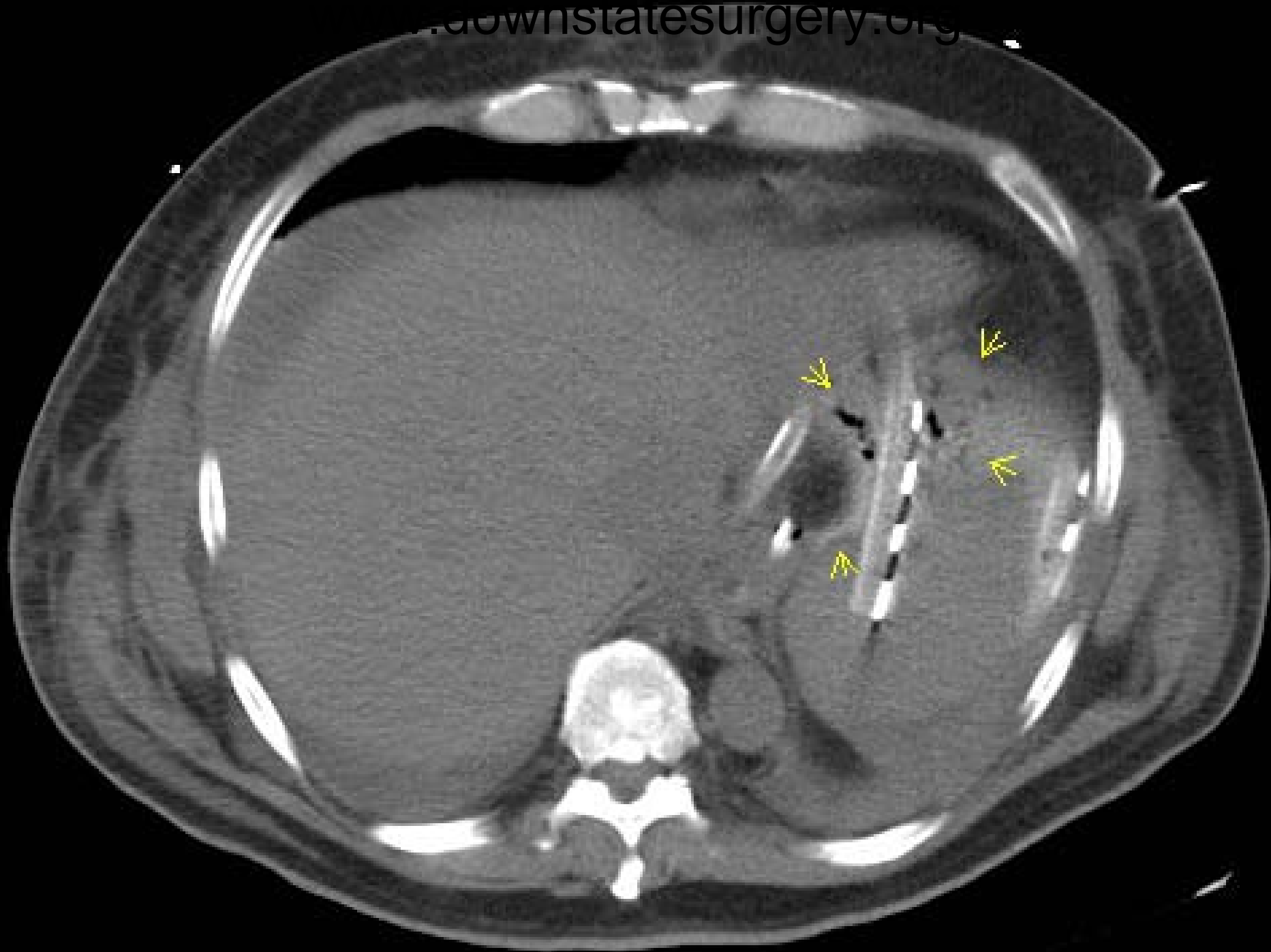
POD 10-16

- Unable to wean off the vent
- L chest tube – serosanguinous fluid
- Tube feeds
- Continued fevers up to 102
- WBC decreased to 15-20
- Pt on broad spectrum IV Abx

POD 17

- CT Chest/Abd/Pelvis
 - Indeterminate findings for leak
 - Decrease in ascites and left subphrenic collection
 - Residual hernia sac decrease in size to 10 x 5 cm





POD 18-33

- POD 18 – bronchoscopy, BAL of LLL, percutaneous tracheostomy
 - edematous airway, large mucus plug in LUL bronchus
- POD 24 – CT Chest/Abd/Pelvis
 - no leak, decrease in size of left subphrenic collection
- Continued fevers up to POD 33

- Clears, trach collar, all drains out
- POD 48 – UGIS: outpouching of distal esophagus w/o extravasation
- POD 56 - CT Chest/Abd/Pelvis – neg
- Abx stopped, soft diet, decanulated
- Transferred to rehab (prealbumin 20)

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Questions



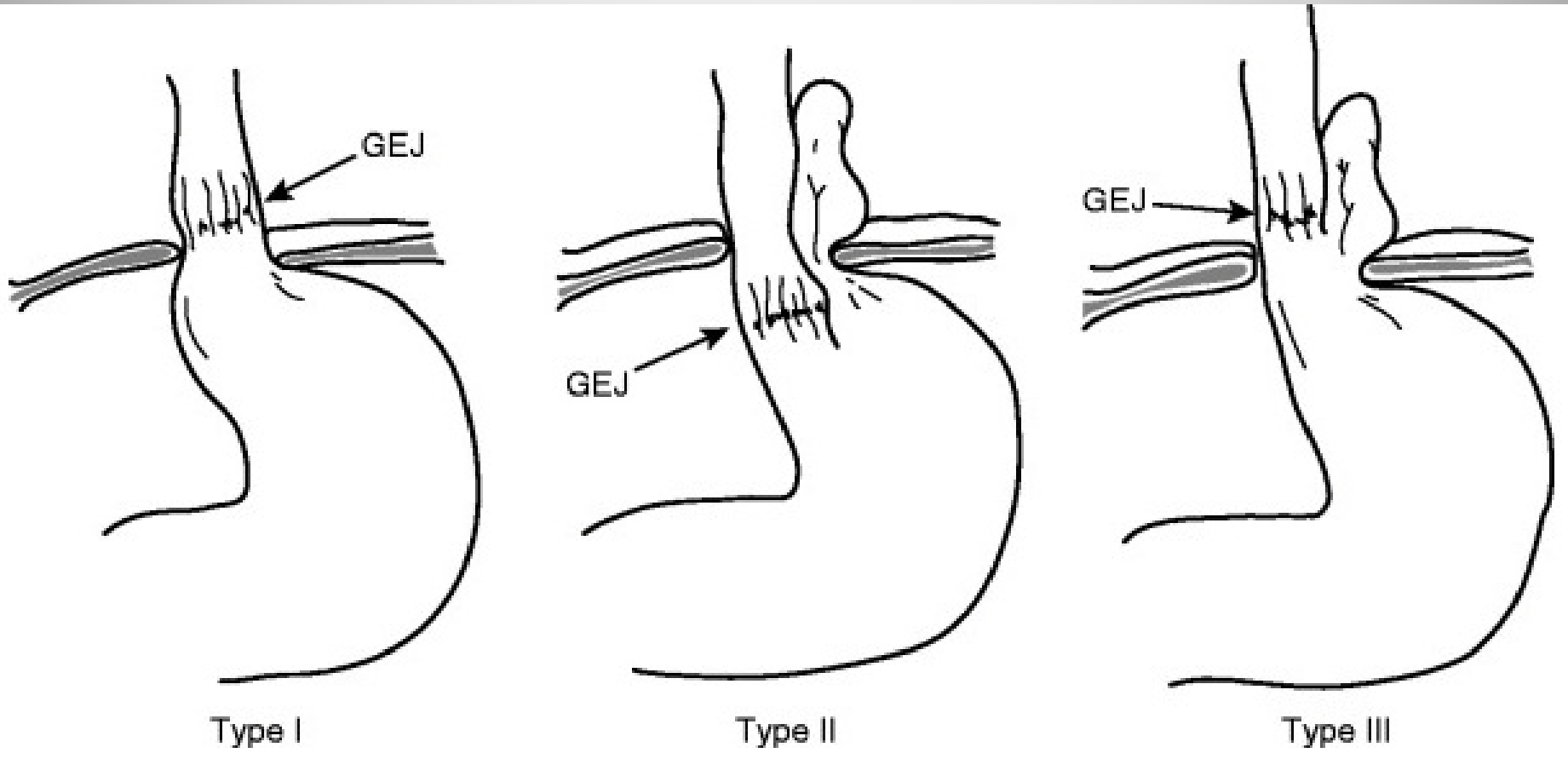
Hiatal Hernia

- Etiology unknown
- Pathophysiology - attenuation of the phrenoesophageal membrane
- Acquired weakness of tissue as a result of aging or excess strain on the diaphragm
- More common in
 - older individuals
 - obese
 - patients with delayed gastric emptying

Classification of Hiatal Hernias

Hernia Type	Location of GE Junction	Hernia Contents
I (Sliding) – most common	Intrathoracic	Gastric cardia ± fundus
II (True paraesophageal) – very rare	Intraabdominal	Gastric fundus ± body
III (Combination of I and II)	Intrathoracic	Gastric fundus and body
IV	Intrathoracic	Gastric fundus, body and other abdominal organs (e.g. colon)

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Hiatal Hernia Types



Symptoms and Presentation

- Most type I and III hiatal hernias are diagnosed incidentally (UGIS or EGD)
- Type II hernias often found on CXR (air-fluid level in the chest)
- Symptoms
 - Type I: GERD
 - Type II/III: - epigastric pain, postprandial fullness in the chest, dysphagia, respiratory problems

Acute Symptoms

- Due to complete obstruction/strangulation of the stomach within the chest
- Type II hernias are at increased risk
- Borchart's triad is indicative of an incarcerated hernia
 - chest pain
 - retching with inability to vomit
 - inability to pass NG tube

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Pre-op Evaluation

- EGD - to assess distal esophagus and stomach for concomitant pathology
- Studies difficult to acquire and interpret for most type II and III hernias
 - motility studies
 - 24hr pH monitoring
 - gastric emptying studies
- CT Chest and Abdomen is not necessary for straightforward cases

Management

- Hiatal hernia is a mechanical abnormality - there is no non-operative treatment
- Presence of a sliding hiatal hernia alone does not mandate intervention
- Symptomatic patients with a type I hernia may be best served with an operative repair

Management

- Traditional recommendation
 - all patients with type II or III hernias should undergo surgical repair regardless of symptoms
 - based on a report in 1967 documenting a mortality rate of 30% (6/21) in patients with paraesophageal hernia

Management

- More recent recommendation
 - elective repair in symptomatic and only select asymptomatic patients
 - based on series of 23 patients with a paraesophageal hernia followed for a median of 78 months
 - no life-threatening complications
 - symptoms remained unchanged in 83% of these patients

Operative Objectives

- Return the herniated content to its anatomic position below the diaphragm
- Resect hernia sac
- Establish adequate esophageal length
- Return GEJ to an intra-abdominal position
- Repair hernia defect
- Prevent recurrence while minimizing associated morbidity

Operative Technique

- Laparoscopic
 - Transabdominal (currently most common approach)
 - Transthoracic
- Open
 - Transabdominal
 - Transthoracic

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Antireflux Procedure

- Most sliding-type hernias are repaired on the basis of symptoms
- Most patients with type II hernias do not have reflux symptoms
- Many patients with type II hernias give a history of GERD symptoms that spontaneously abated
- 30% of patients without GERD preoperatively will have GERD unmasked after hiatal hernia repair

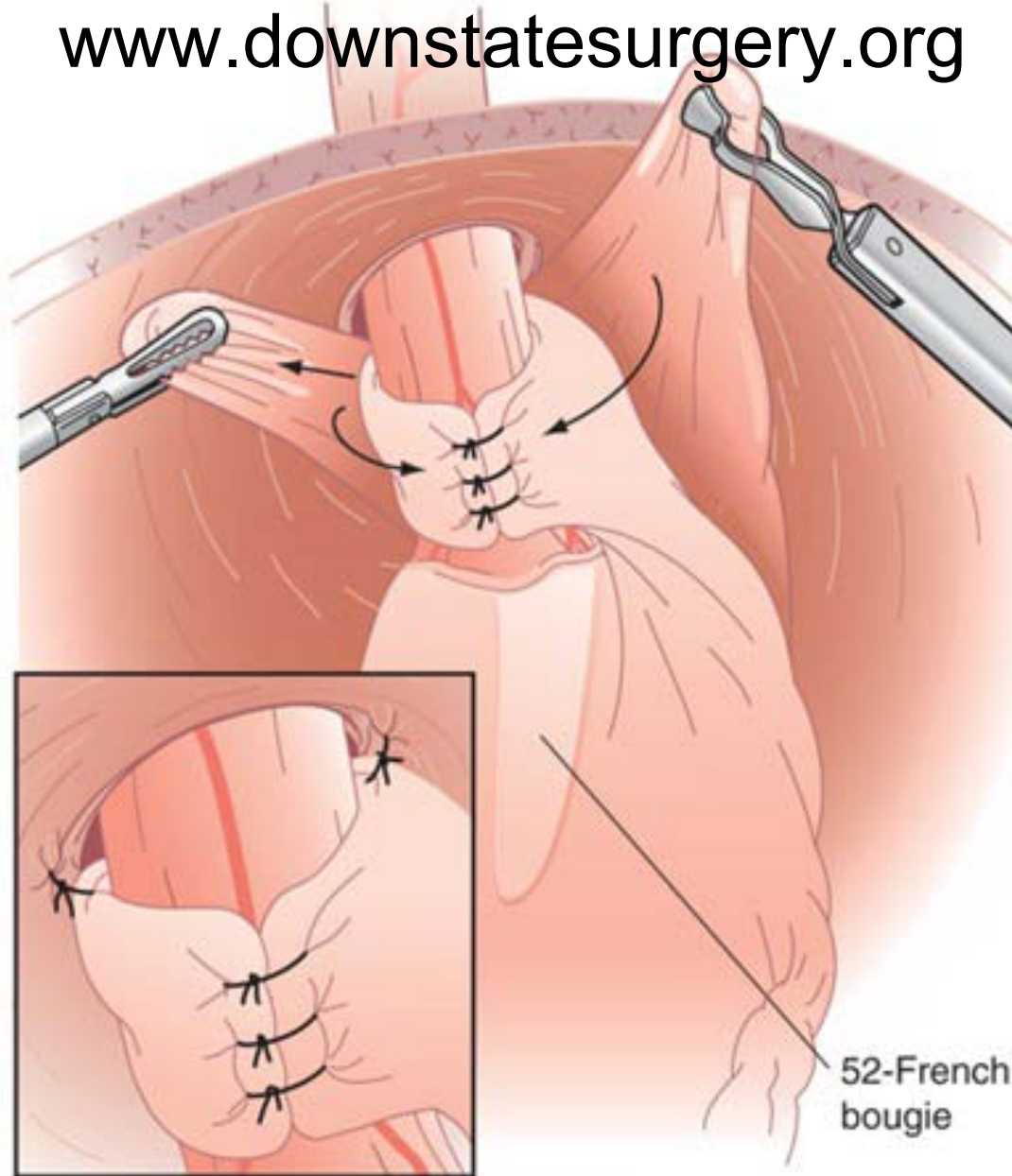


Figure 42-12 The wrap is fashioned with fundus over a length of 2.5 to 3 cm. The bougie is placed after the first suture of wrap is secured to ensure a so-called floppy fundoplication. The wrap is secured to the diaphragm with right and left coronal sutures (inset).

Complications of Hiatal Herniorrhaphy

- Intra-op complications
 - Perforation (esophagus, stomach)
 - Pneumothorax
 - Vagus nerve injury
 - Hemorrhage (splenic laceration, short gastric vessels)

Complications of Hiatal Herniorrhaphy

- Post-op complications
 - Perforation (stricture, suture placement)
 - Dysphagia (mechanical vs. edema)
 - Early anatomic recurrence
 - Cardiac tamponade
 - Chylothorax
 - Pleural effusion

Acute Esophageal Perforation

- Can occur when
 - esophagoscopy is performed during an antireflux operation
 - distal esophageal stricture is disrupted during intraoperative dilatation
- If recognized intraoperatively
 - should be repaired immediately
 - reinforced with
 - fundoplication (distal esophagus)
 - pedicled anterior mediastinal fat
 - pedicled intercostal muscle (onlay patch)

Acute Esophageal Perforation

- If involved tissues are not amenable to repair (e.g. reflux stricture)
 - transthoracic esophagectomy with cervical esophagogastric anastomosis
 - Thal fundic patch esophagoplasty
 - uses gastric fundus as a “patch”
 - relies on healing of the opened, inflamed distal esophagus
 - high incidence of suture line disruption and mechanical complications

Delayed Esophageal Perforation

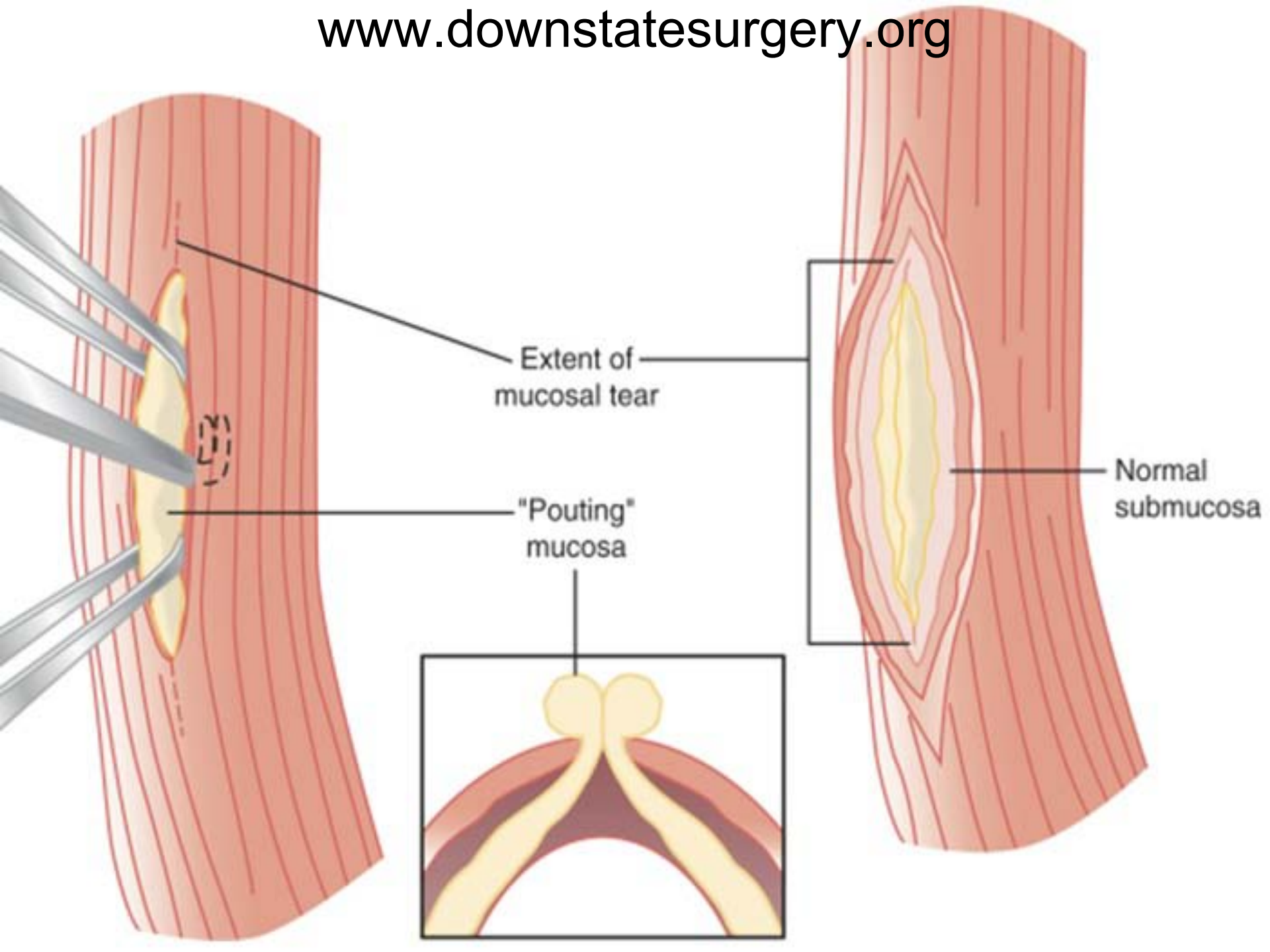
- May occur when esophageal sutures placed too deeply result in local mural necrosis
- 1st week post-op: fever, chest pain, or respiratory distress -> contrast study
- If perforation is diagnosed -> reoperation
- Site of perforation is identified intraop (may insufflate air through NGT)
- Leak from fundoplication suture may be closed and reinforced with omentum

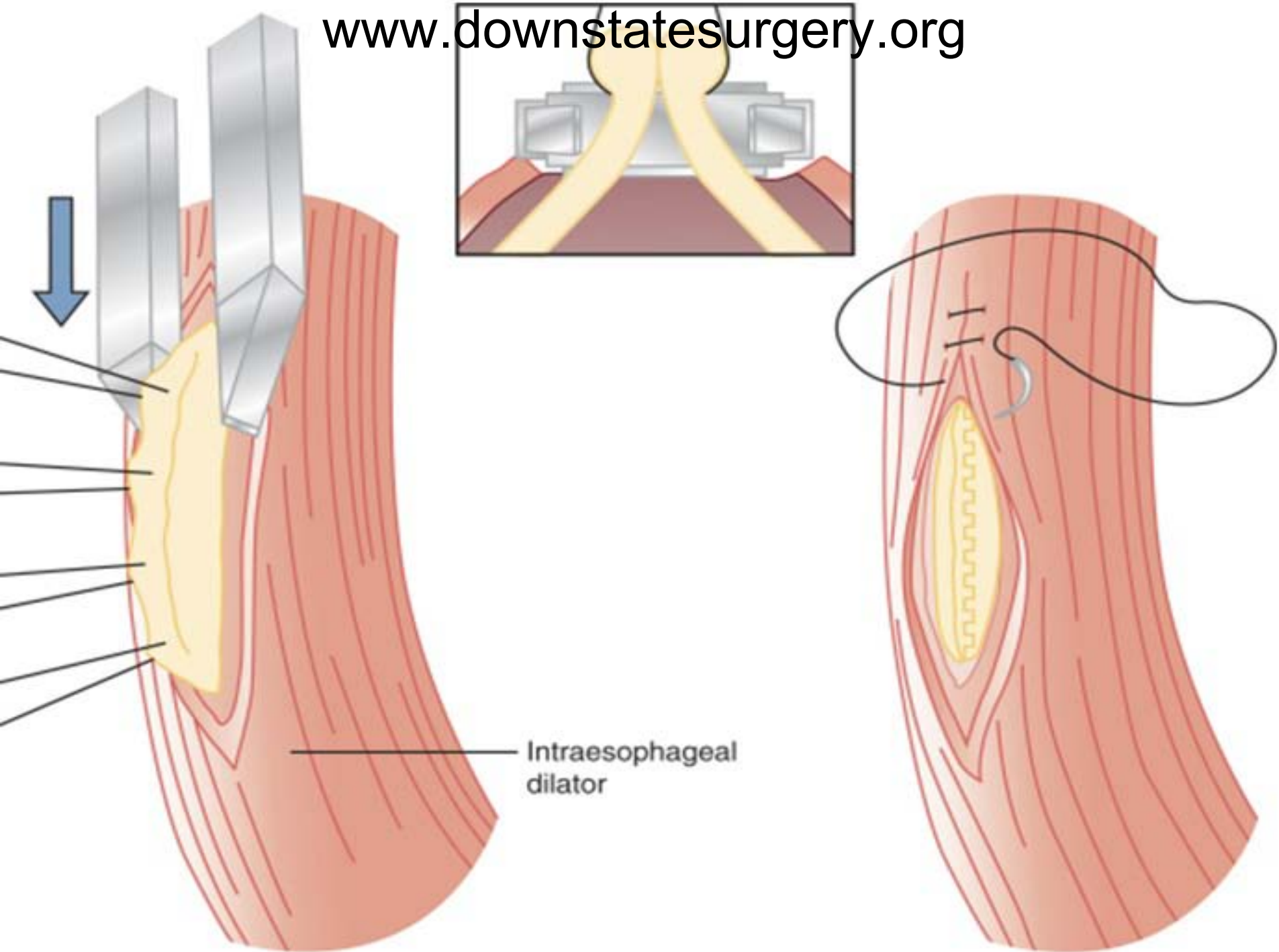
Delayed Esophageal Perforation

- If leak is in the chest -> transthoracic approach
 - closure reinforced with a pedicled anterior mediastinal fat, intercostal muscle or pleura
- Jejunostomy feeding tube should be placed
- Chest tube should be left near the thoracic esophageal repair
- Drain should be placed near transabdominally repaired fundoplication

Esophageal Perforation Repair

- Dissection of muscle to expose mucosal tear
- Reapproximation of mucosa and submucosa
- Reapproximation of the muscle
- Optional limited esophagomyotomy 180 degrees opposite the site of injury
- Reinforcement with a parietal pleura, pedicled intercostal muscle flap, omentum, pericardium, visceral pleura or diaphragm





Evolving Options in the Management of Esophageal Perforation

Brinster CJ, Singhal S, Lee L, et al

- Literature review of case series (559 patients) between 1990 and 2003 - 59% iatrogenic
- Surgical options
 - Primary or reinforced primary closure
 - Esophageal resection
 - Drainage alone
 - T-tube drainage
 - Exclusion and diversion
- Nonoperative management

Evolving Options in the Management of Esophageal Perforation

Brinster CJ, Singhal S, Lee L, et al

- Mortality Rates
 - Operative Management (322 pts)
 - Primary repair - 12%
 - Esophageal resection - 17%
 - Exclusion and diversion - 24%
 - Drainage alone - 37%
 - Nonoperative Management (152 pts) – 18%

Water-Soluble or Barium Contrast Esophagography,
Chest X-Ray, Computed Tomography

Contained
Perforation

Uncontained
Perforation

Broad-Spectrum Antibiotics
Parenteral Nutrition

No Improvement
<24 hr

Cervical

Thoracic

Abdominal

DRAINAGE

Evaluation of Perforation

Surgical Repair Tolerable

Surgical Repair Intolerable

Malignancy

PRIMARY REPAIR

CONTROLLED
FISTULA

EXCLUSION AND
DIVERSION

RESECTION

Complete Esophageal Diversion: A Simplified, Easily Reversible Technique

Koniaris LG, Spector SA, Staveley-O'Carroll KF

- Propose simplified technique for complete esophageal diversion
- Report of 5 patients w/4 years follow-up
- No leak, no stricture
- Complete esophageal diversion may result in leak or late stricture after reconstruction
- Standard loop esophagostomies do not provide complete diversion

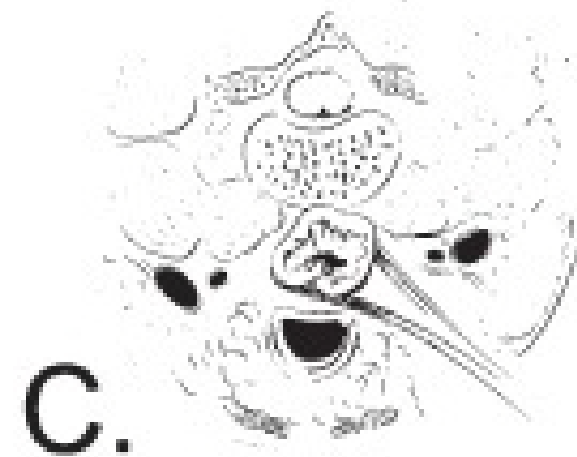
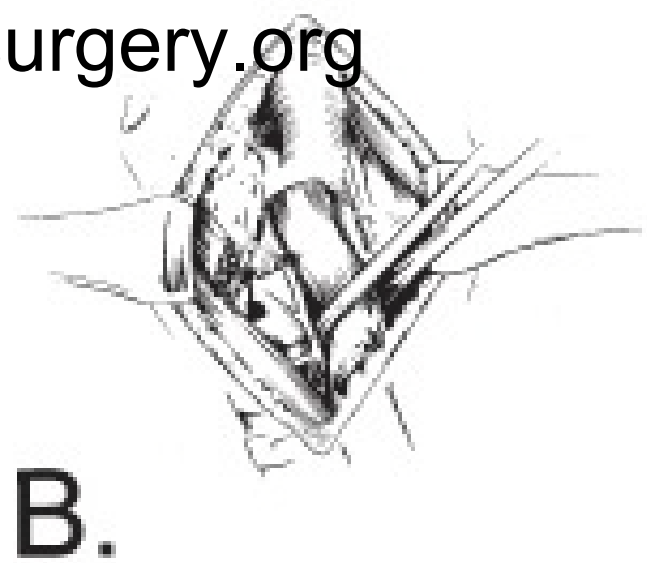


Figure 1. Steps of esophageal diversion. (A) A lateral incision is made anterior to the sternocleidomastoid. (B, C) Esophagus is encircled with a Penrose drain with attention given to avoid inadvertent incorporation of the recurrent laryngeal nerve.

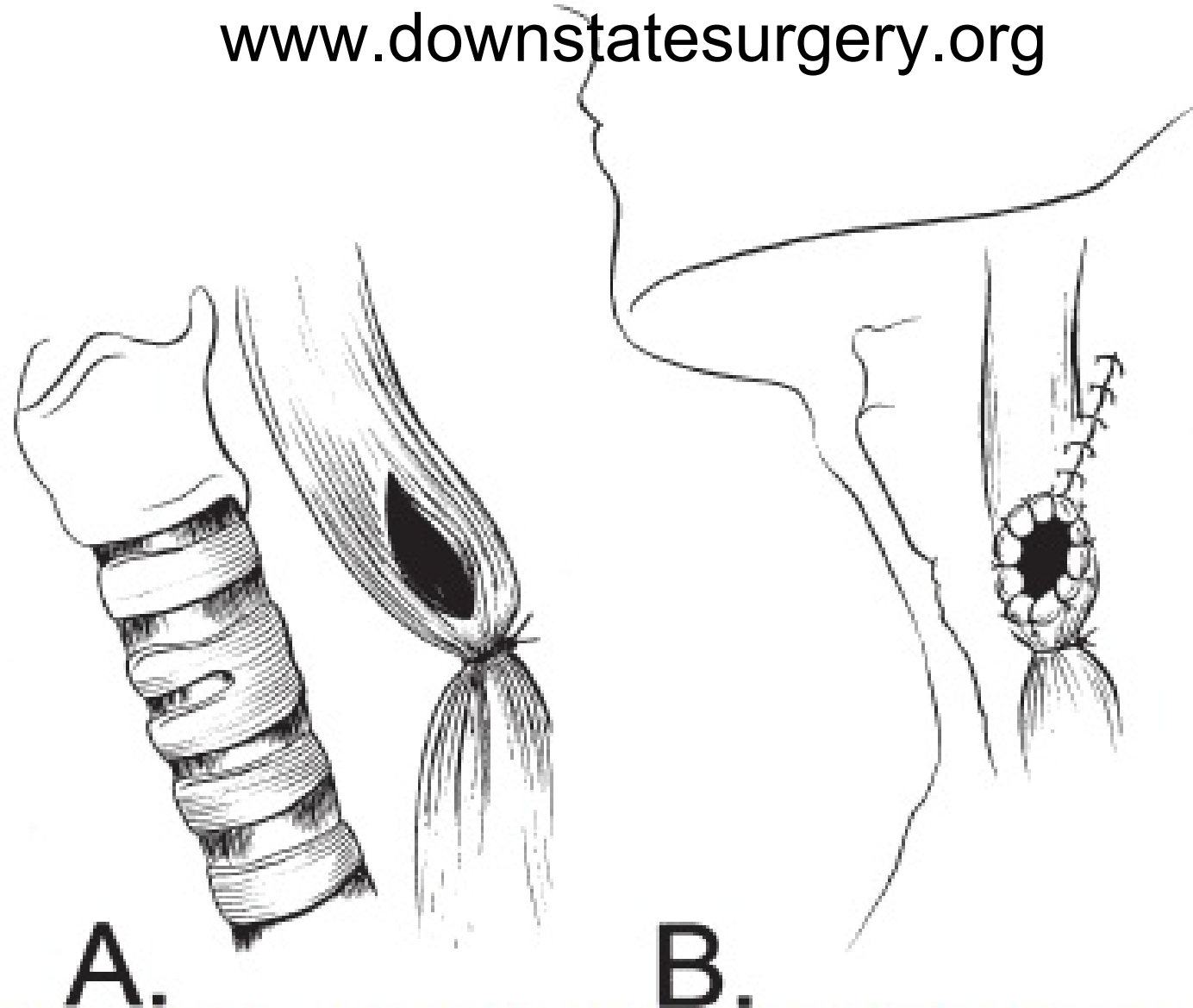


Figure 2. (A) Ligation of the distal esophagus with formation of a longitudinal cervical esophagus incision. (B) Matured cervical esophagostomy. Esophageal ostomy is incorporated into the inferior edge of the cervical neck incision.

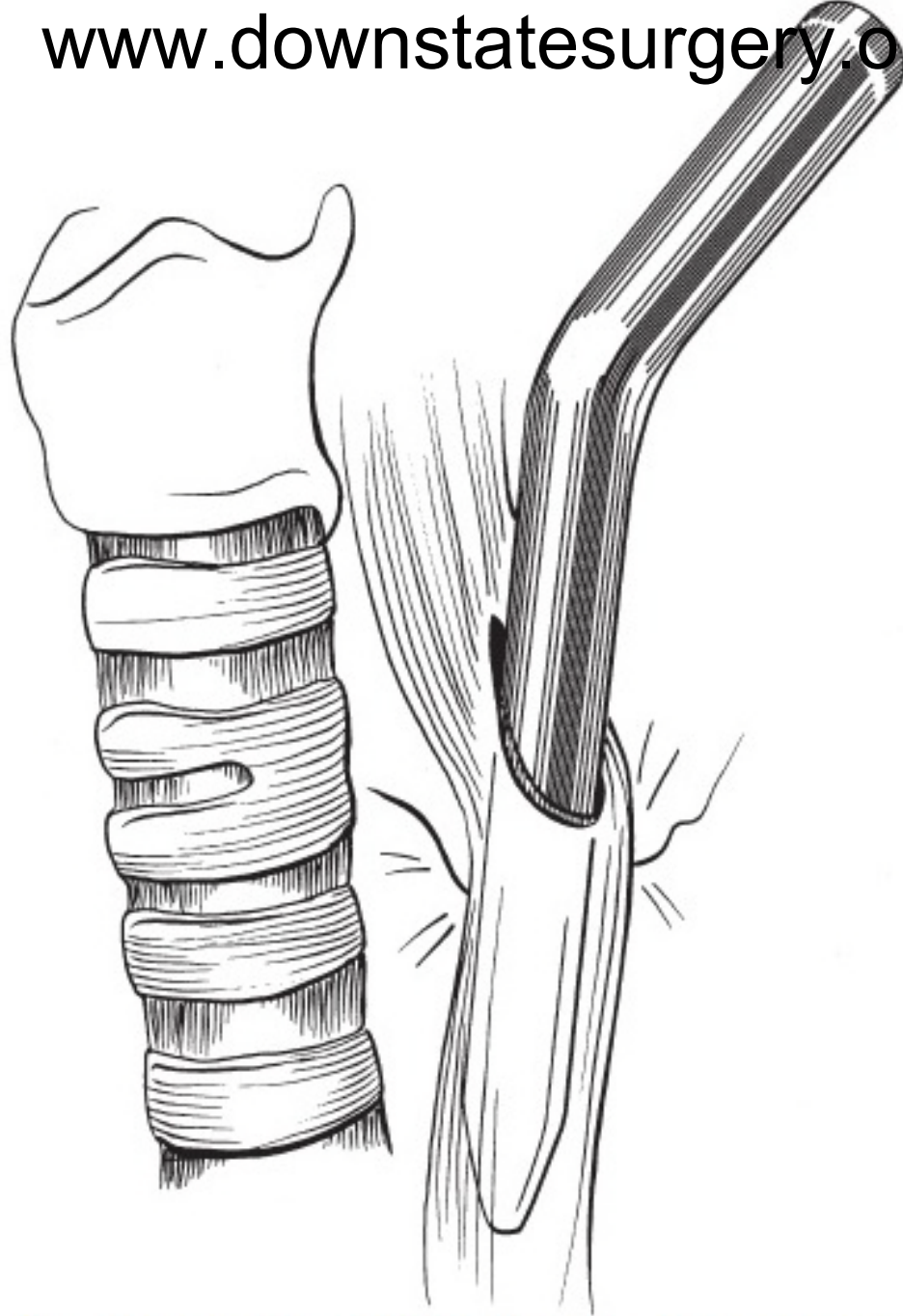


Figure 3. Transverse closure of longitudinal esophageal incision.

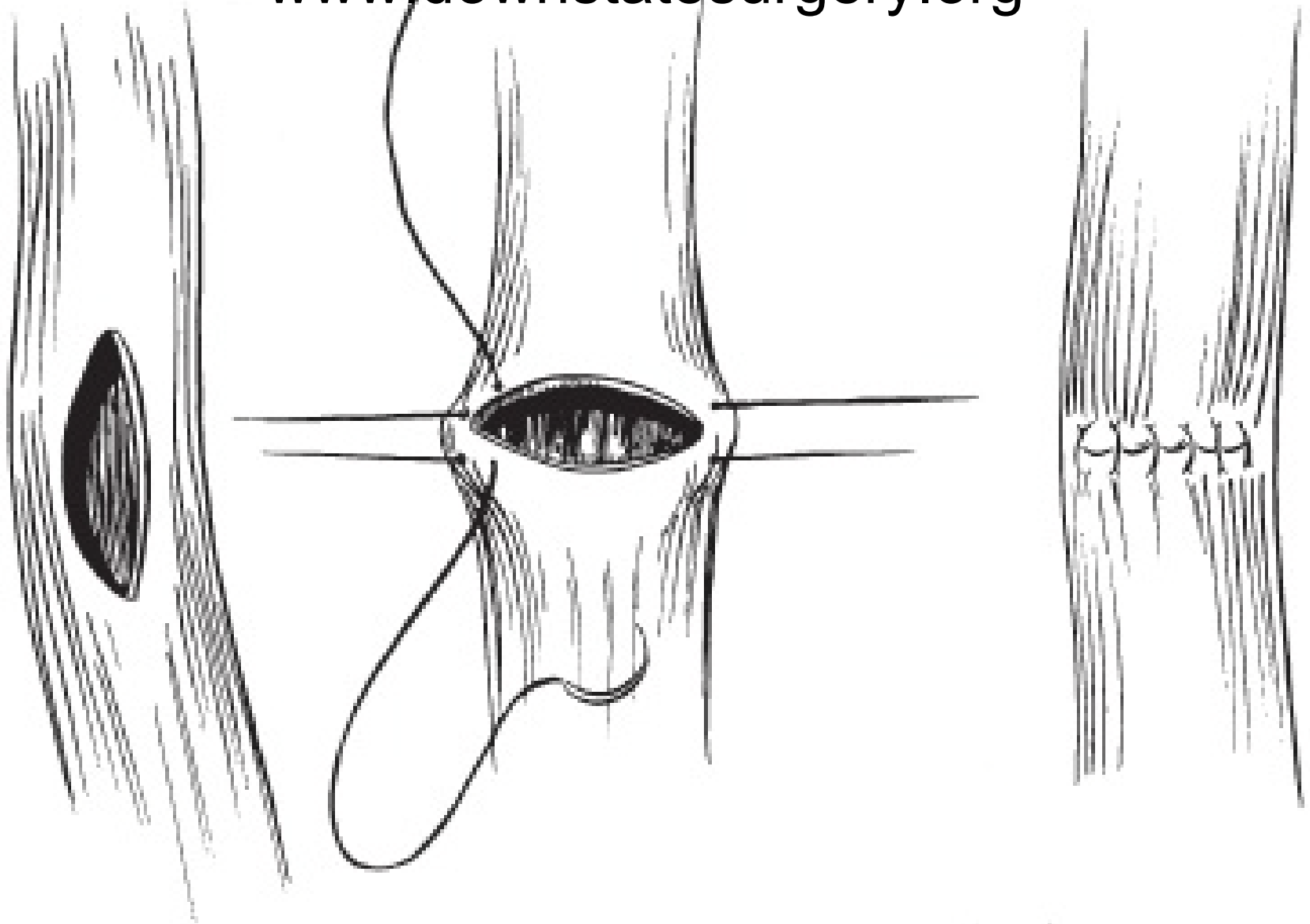


Figure 4. Placement of a Hagar dilator into the mobilized esophagus, with reestablishment of esophageal continuity.

Postoperative esophageal leak management with the Polyflex esophageal stent.

Freeman RK, Ascoti AJ, Wozniak TC

- 21 patients with post-op esophageal leak treated with 27 stents
 - Esophagectomy (5)
 - Esophageal perforation repair (5)
 - Surgical antireflux procedure (4)
 - Endoscopic antireflux procedure (2)
 - Esophageal diverticulectomy (3)
 - Esophageal myotomy (2)
- Mean interval between surgical intervention and stent placement was 12 ± 8 days

Postoperative esophageal leak management with the Polyflex esophageal stent.

Freeman RK, Ascoti AJ, Wozniak TC

- Occlusion of the leak (20), death (1)
- 95% of stents removed without residual leak (mean 51 ± 43 days)
- Stent migration (24%) requiring
 - repositioning (3)
 - replacement (4)
- Stricture requiring endoscopic dilatation (1)
- Dehiscence of repair requiring esophageal diversion (1)