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Non-Congenital, Non-Traumatic Diaphragmatic Hernia: Does It Exist?

Sophia L Fu, MD

Long Island College Hospital,
Brooklyn, NY

September 1. 2011

History

- 60 yo female c/o mid-epigastric pain x2 years with worsening dysphagia x6mo with occasional vomiting and 20lb wt loss,
- No history of trauma
- PMH: asthma, arthritis, CAD
- PSH/ FHx: L salpingectomy for ectopic pregnancy
- SocHx: 25ppy smoker

Physical Examination

- AVSS
- Gen: in NAD
- Cv: nl S1 S2, RRR, no m/r/g
- Chest: CTAB/L
- Abd: soft, nontender, nondistended, +BS
- Rectal: no masses, guiac neg
- Ext: no edema

Laboratory work-up

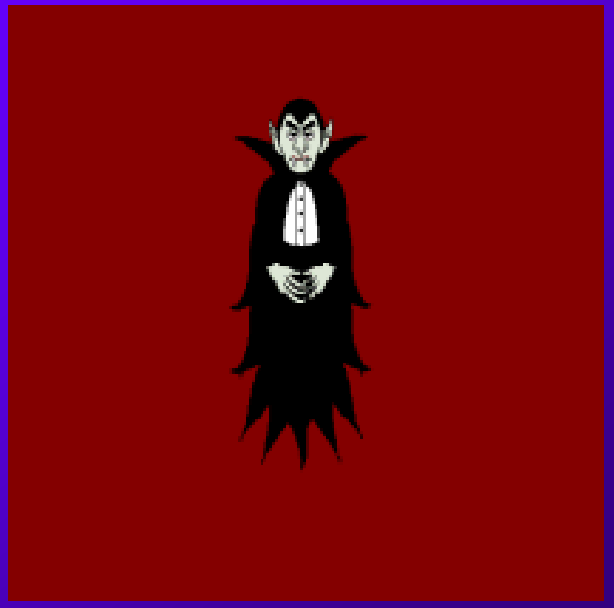
9.2	12.5	151
	38.2	

			8.9
139	107	22	50
3.7	23	1.09	

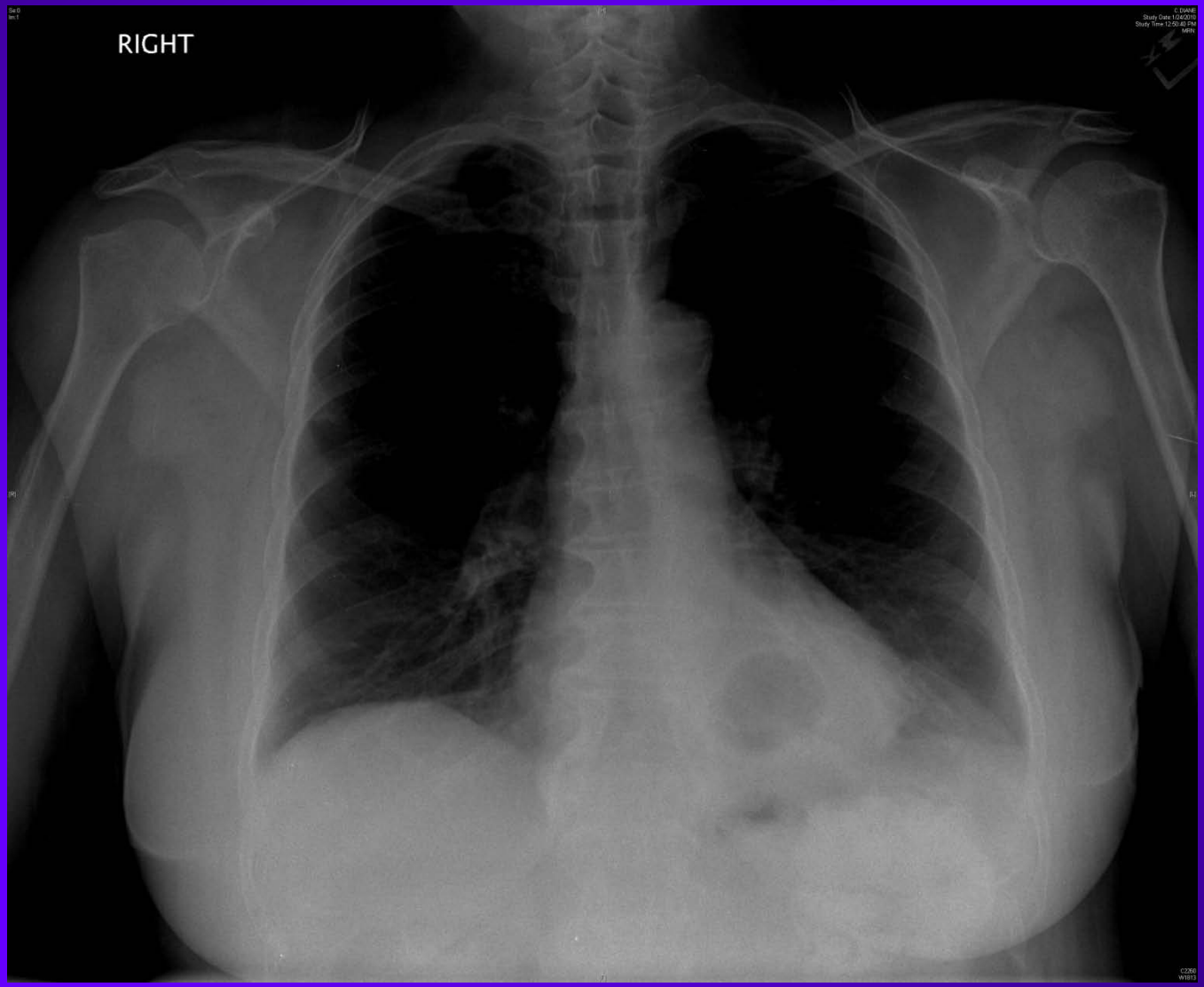
6.6	25	60
4.0	23	0.4

PT 10.6

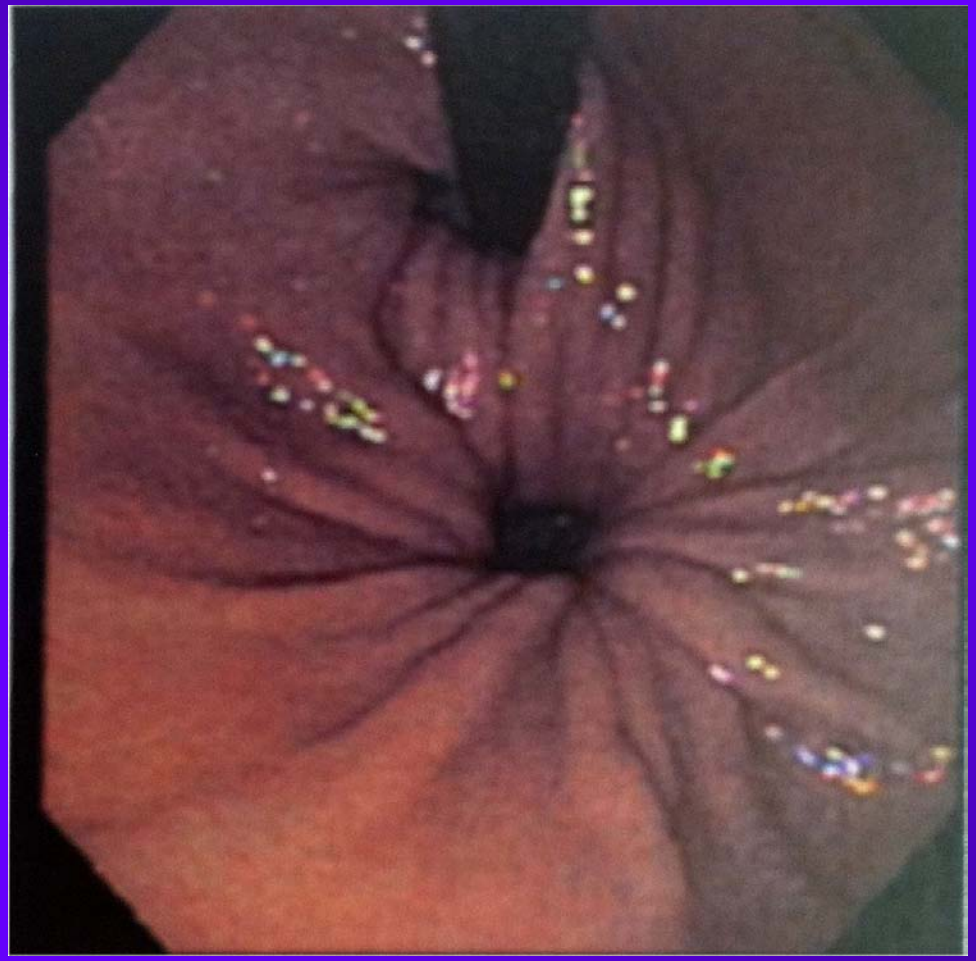
INR 0.9



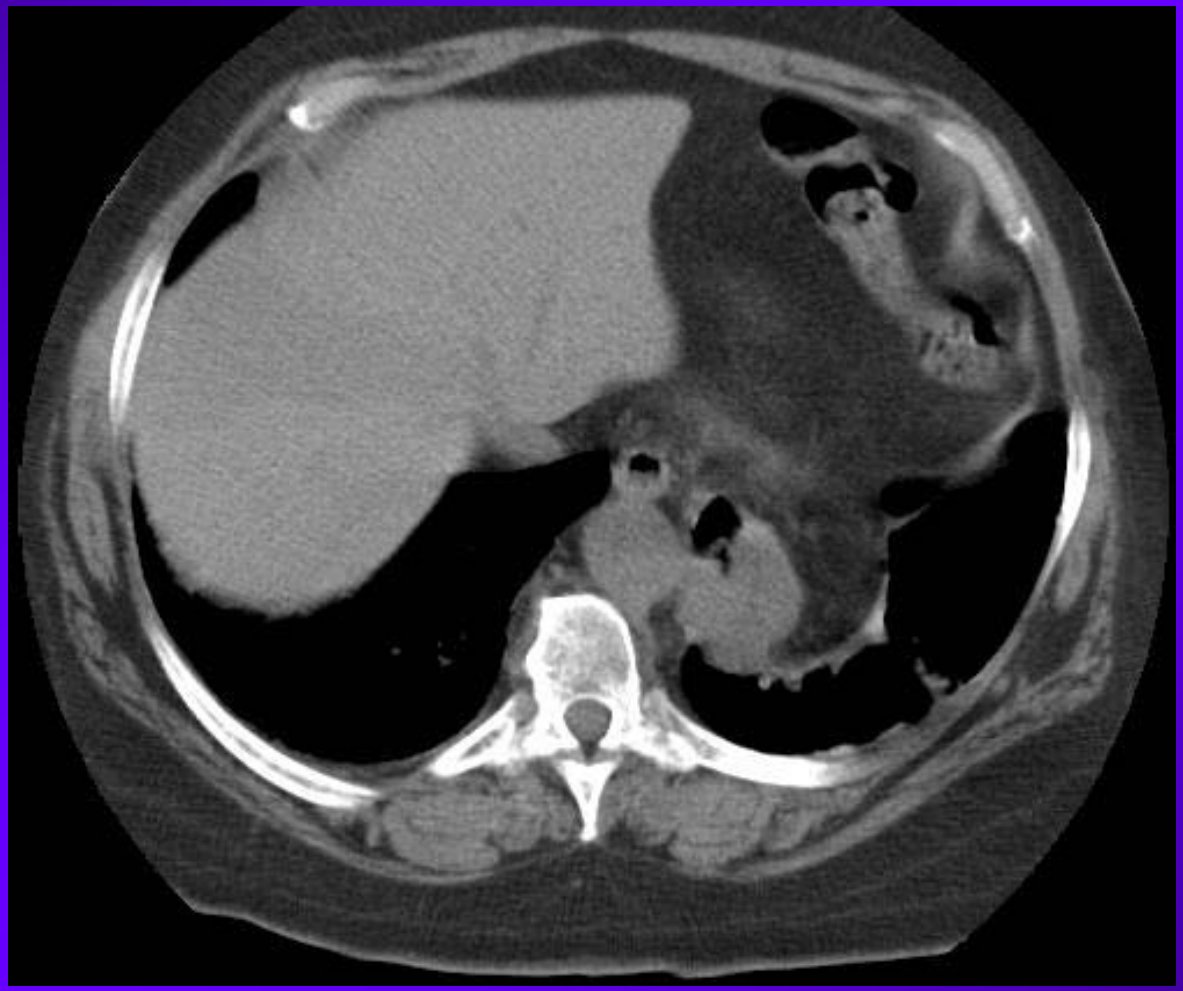
Chest X-ray



EGD



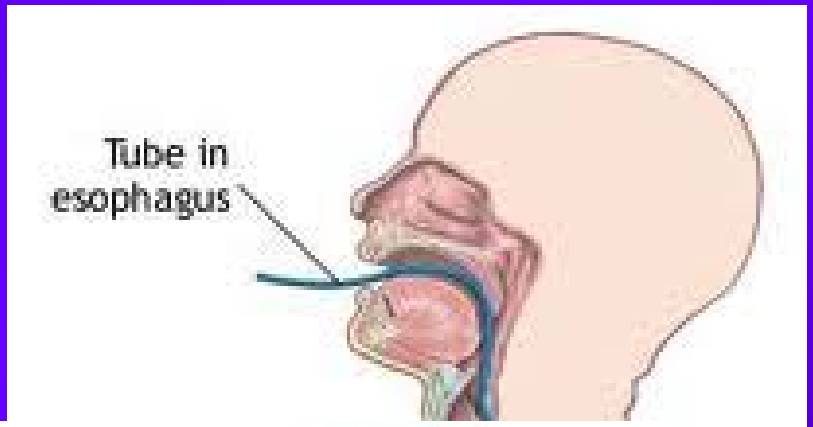
CT Abdomen



Impression – Hiatal Hernia

Other work-up

- 24 Hour pH monitoring
  - Low DeMeester score



- Cardiology clearance
  - EKG – nsr@80bpm
  - Stress test - wnl

Surgical Intervention

- Laparoscopy
- Reduced the stomach from the chest
- Separate diaphragmatic hernia
- Repair hernia defect & posterior crus

Total OR time: 4:35

- Operating time 3:35
- EBL 30 mL

Intra-op Video

Post-op Course

- POD#1-3 – Extubated in OR, admitted to floor
- POD#3 – started on diet
- POD#5 – D/C home

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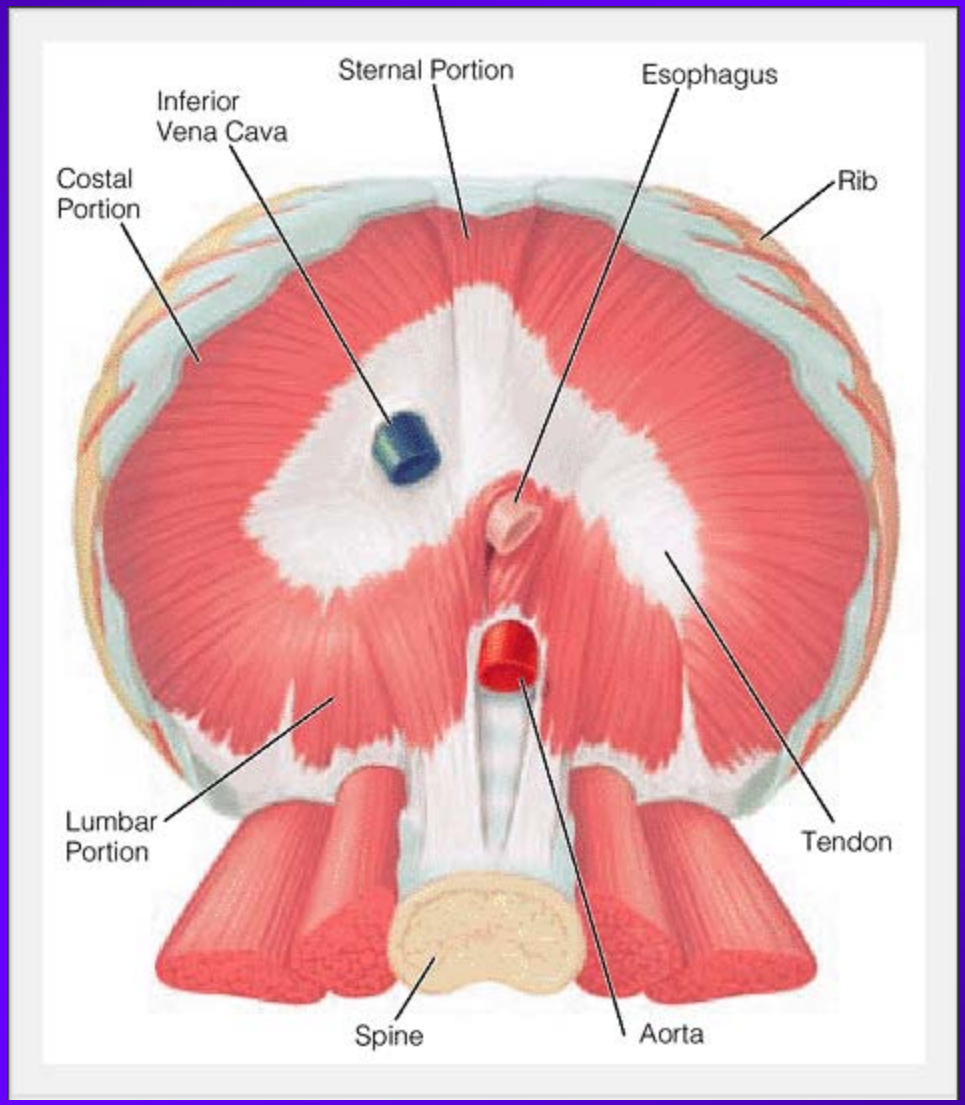
Diaphragmatic Hernia

Diaphragmatic Anatomy



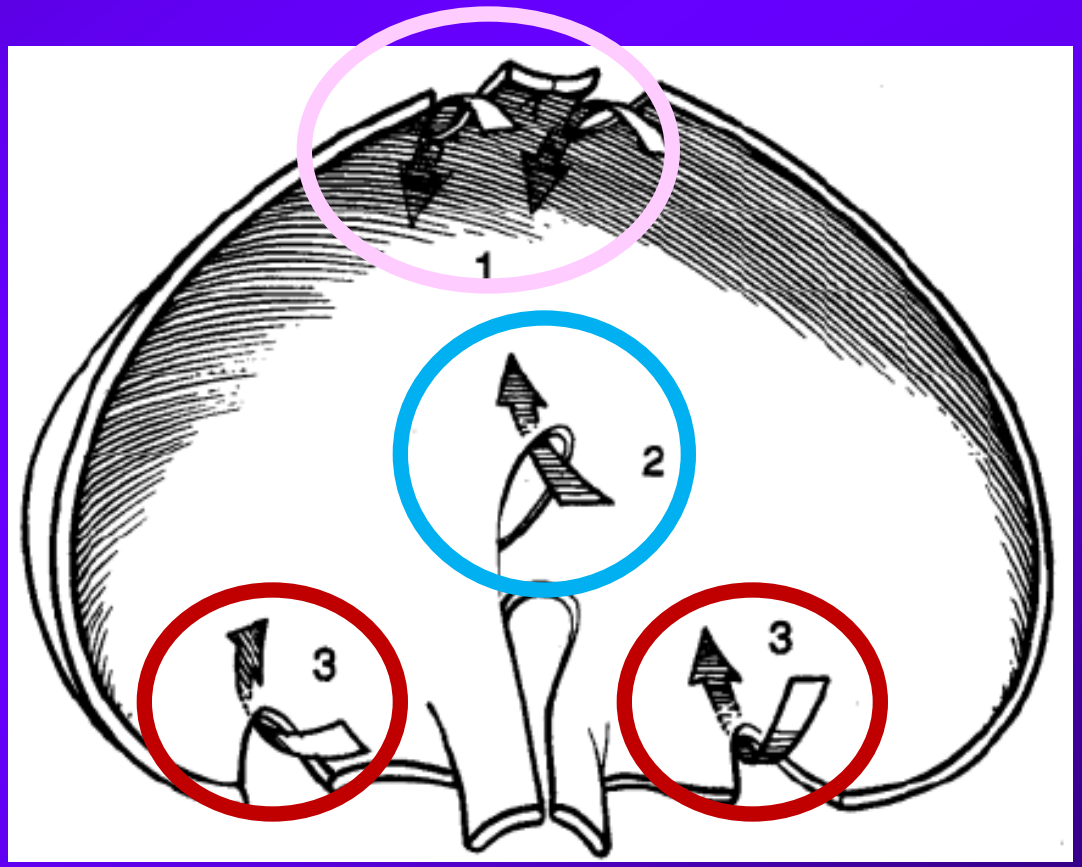
Hiatal Hernia Pathophysiology

- Protrusion of abdominal cavity beyond walls through muscular opening in diaphragm

- Enlargement of esophageal hiatus due to developmental defects
- Increased abdominal thoracic pressure gradient
- Altered collagen metabolism
- Depletion of elastic fibers in phrenoesophageal membrane w/aging

Diaphragmatic Hernias

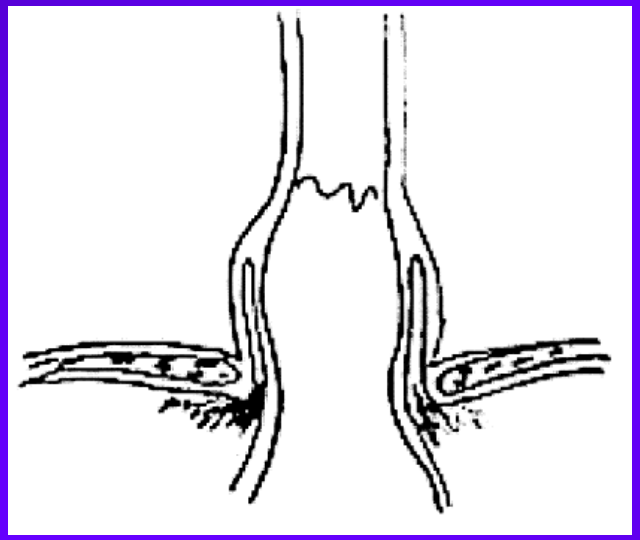
- 1 – Sternocostal foramina of Morgagni (anterior)*
- 2 – Esophageal Hiatus
  - Hiatal Hernia
  - Paraesophageal Hernia
- 3 – Lumbocostal foramina of Bochdalek (posterolateral)*



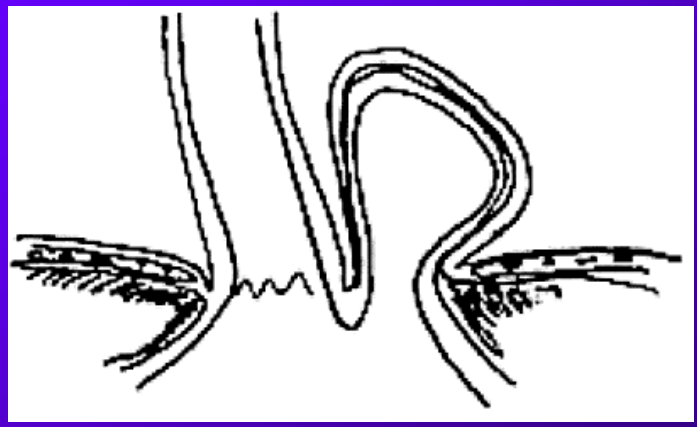
* Congenital

Hiatal Hernia Classification

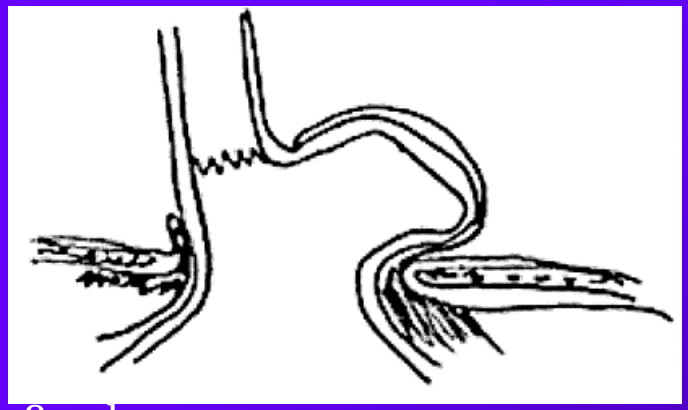
- Type I*
  - "Sliding" hiatal hernia
  - GEJ in chest



- Type II
  - "True" paraesophageal hernia
  - Gastric fundus herniates alongside esophagus



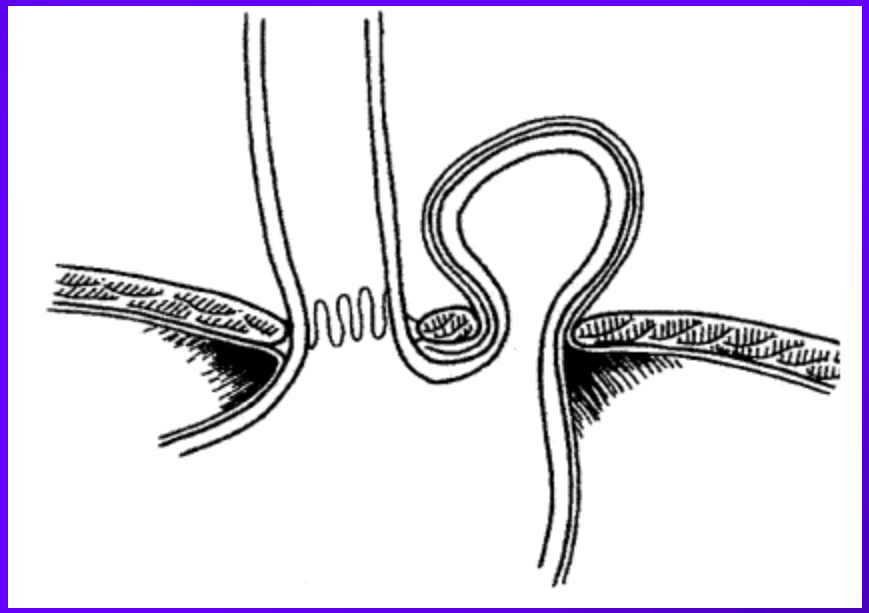
- Type III*
  - Type I & II



- Type IV
  - Entire stomach & other contents

Parahiatal Hernia

- Stomach herniates through a defect in the diaphragm adjacent to the esophageal hiatus



Symptomatology of Hiatal Hernia

Type I

- Asymptomatic
- Incidental finding on UGI or EGD
- GERD

Type II (&III)

- CXR w/air-fluid level
- Epigastric pain
- Postprandial fullness
- Chest discomfort
- Dysphagia
- Abdominal bloating
- Respiratory problems

Clinical Presentation of Hiatal Hernia

Acute

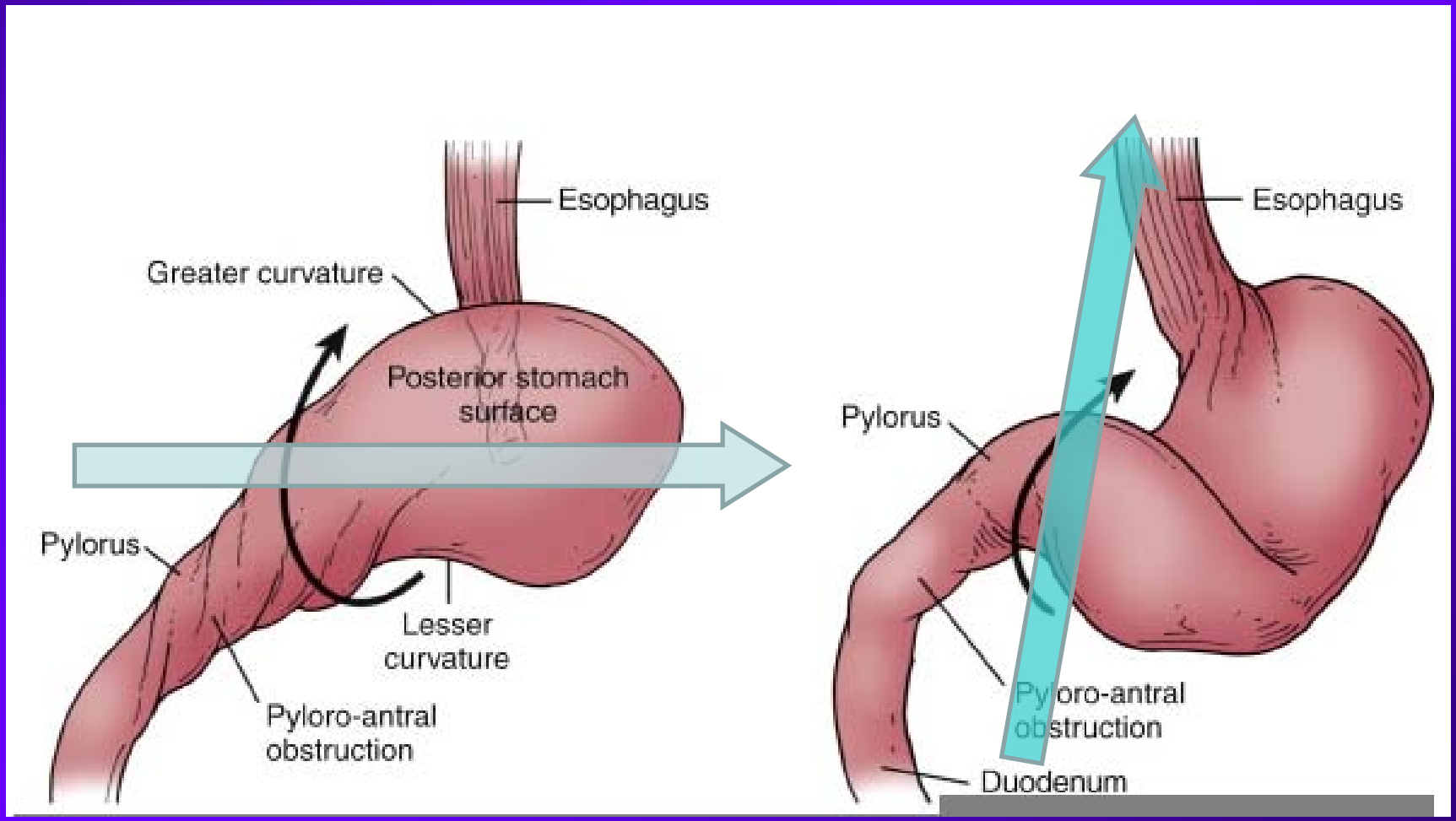
- Complete obstruction or strangulation of stomach
- Mimics myocardial infarction
- May have perforation of stomach
- Borchardt's triad
  - Chest pain
  - Retching w/inability to vomit
  - Inability to pass NGT

Chronic

- Anemia from GI blood loss
- 1/3 of Type II hernias
- Gastric cardia
- Linear ulcerations
- 92% resolve after surgery

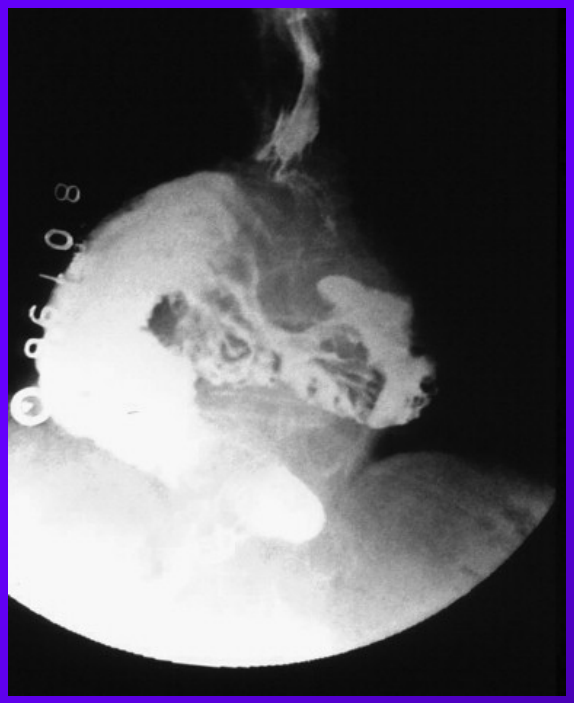
Gastric Volvulus

Organoaxial **Mesenteroaxial**



Evaluation

- Mostly Asymptomatic
  - CXR – retrocardiac air-fluid level
  - UGI series – illustrates anatomy
  - EGD – assess amt of herniation
  - Motility
  - 24-hr pH or gastric-emptying studies
  - CT scan



Management

- Symptomatic
  - Surgery
- Asymptomatic
  - "Watchful waiting"
    - Episodes of incarceration & strangulation are rare >60y

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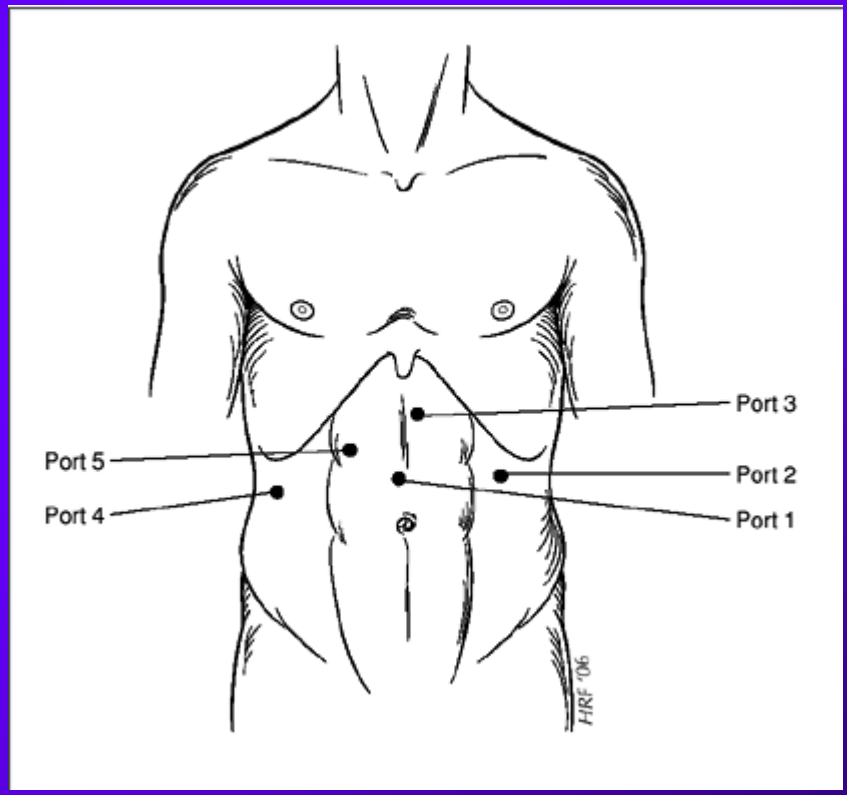
Surgery

Goals of Operative Management

- Correction of Esophageal Hiatal Hernia
  - Return herniated content to anatomically correct position below diaphragm
  - Resect hernia sac
  - Establish adequate esophageal length & return GEJ to inta-abdominal position
  - Repair hernia defect – restore lower esophageal sphincter
  - Prevent recurrence while minimizing morbidity

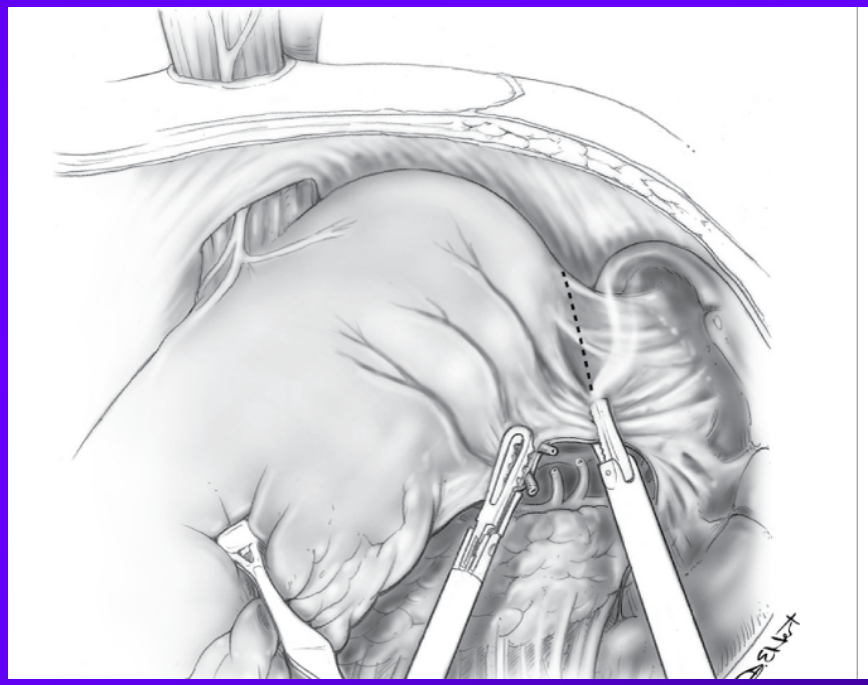
Positioning

- Low lithotomy
- Steep trendelenberg
- Hands tucked
- 5 ports
  - 15cm from xiphoid left midline (10mm port)
  - Liver retractor (5mm)
  - RUQ @ costal margin (5mm)
  - 10cm Left subcostal (10mm)
  - Left flank (5mm)



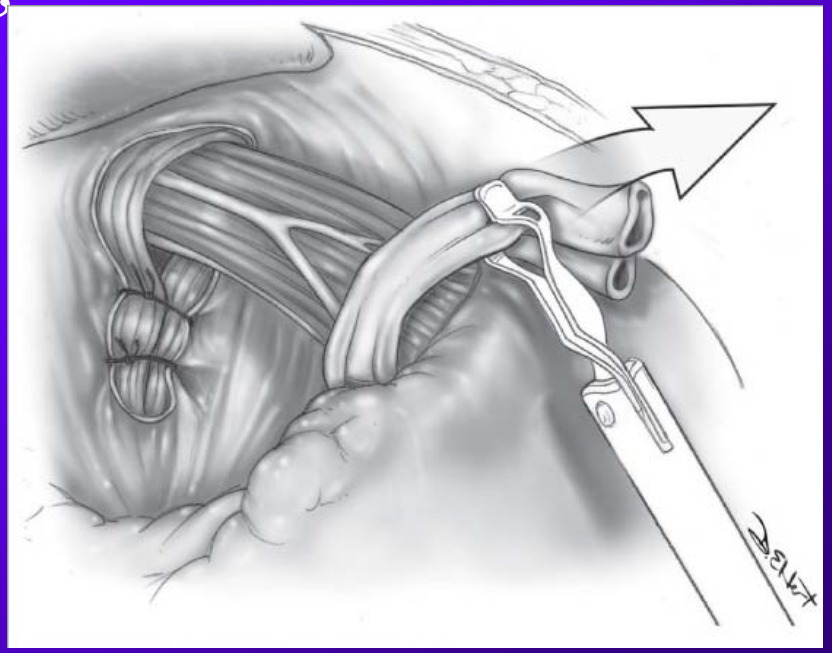
Dissection

- Reduce hernia contents
- Divide short gastrics
- Dissect sac off of L. crus
- Identify esophagus & vagus
- Use 52 Fr Bougie
- Open hepatogastric ligament
- Dissect sac off of R. crus
- Mediastinal dissection until 3cm intraabdominal esophagus w/o tension
- Resect sac



Crural Repair

- Close crura post to esophagus
- At decussation of R. & L. crura
- Interrupted 2-0 nonabsorbable sutures
- 50 Fr bougie: assess tightness, prevent postop dysphagia

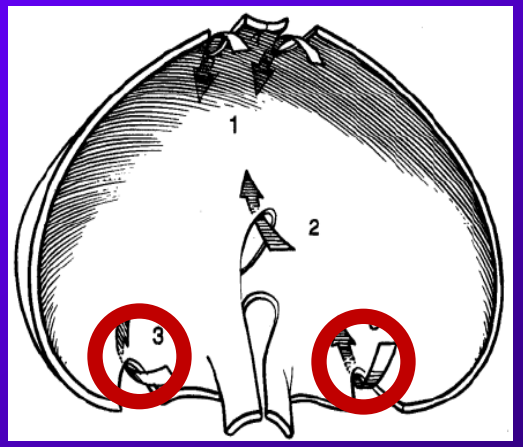


Nissen Fundoplication

- Pull fundus through retroesophageal window
- Mirror image of the ant. & post. Fundus
- Ant & post fundus should meet at the 9 o'clock position
- The divided vessels along the greater curvature should lie in apposition to the left crus
- Sutured fundoplication should lie on the right side
- 3-4 sutures for 2.5-3cm fundoplication

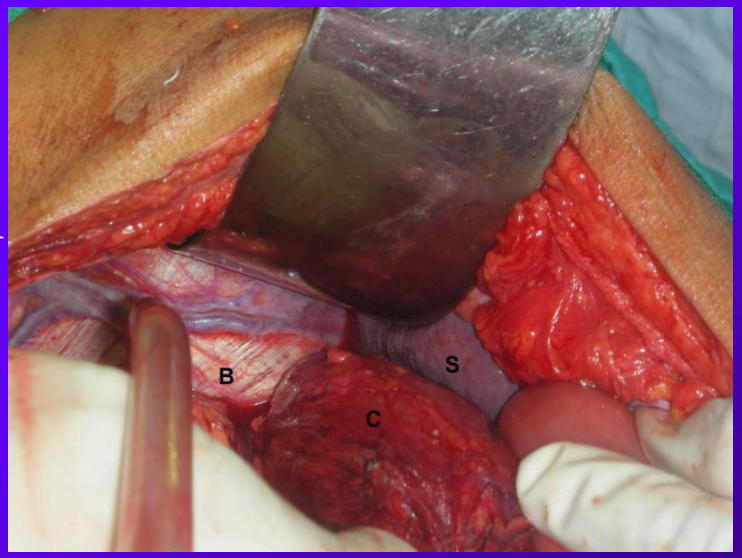
Bochdalek Hernia

- Most common form of CDH (1:2500 live births)
  - 2:1 male predominance
- Most common surgical emergency in neonates
- Maldevelopment of pleuroperitoneal folds
- -or- absent migration of diaphragmatic musculature
- Presenting symptoms
  - Severe respiratory distress
  - Scaphoid abdomen



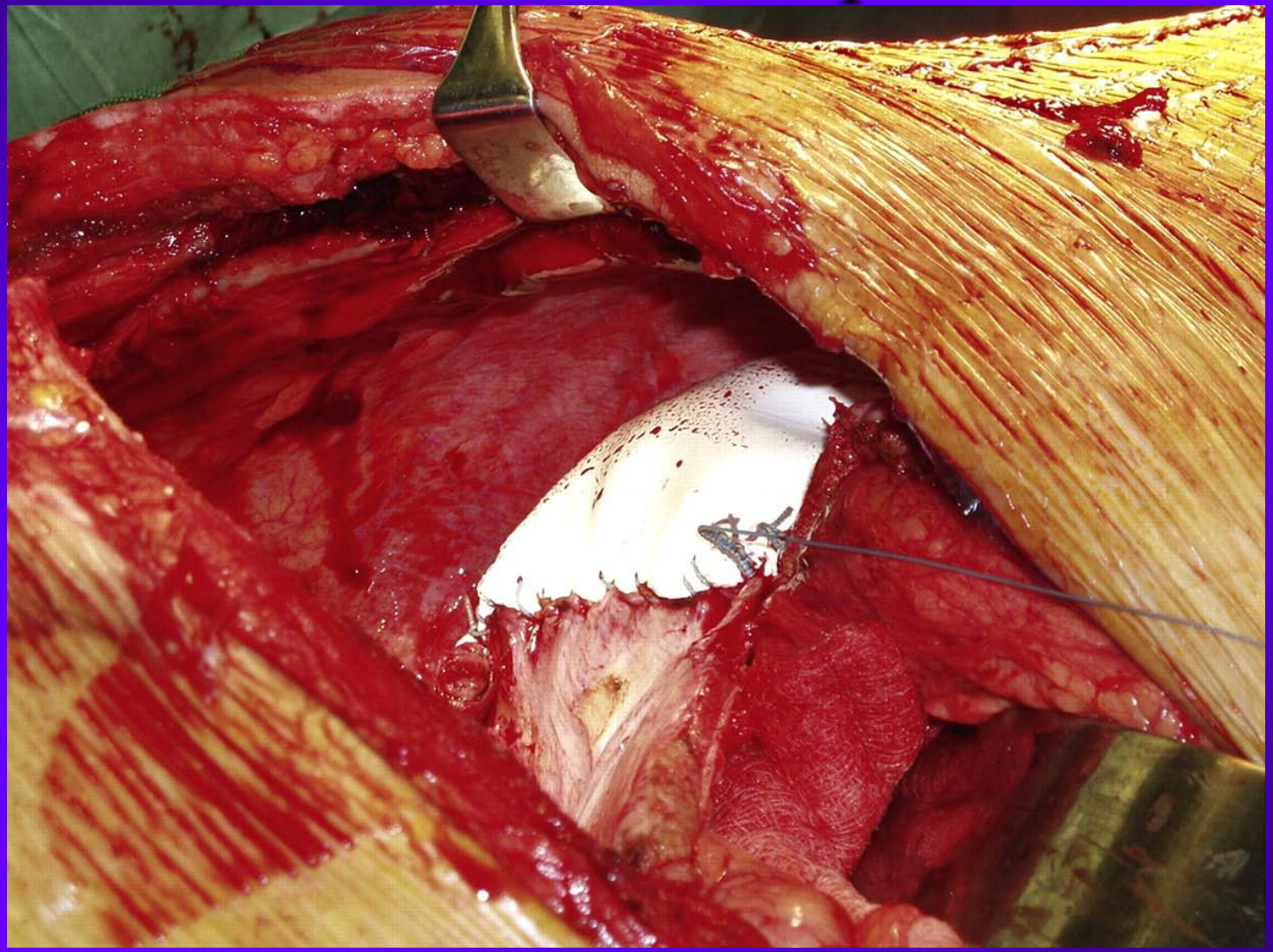
Bochdalek Hernia

- Diagnosis by ultrasound in prenatal period
- Surgery immediately after birth
- Left-side hernias
  - Transabdominal subcostal approach
- Right-side hernias
  - Transthoracic approach



- Closure of defects w/nonabsorbable suture
- Large defect closed with prosthetic patch

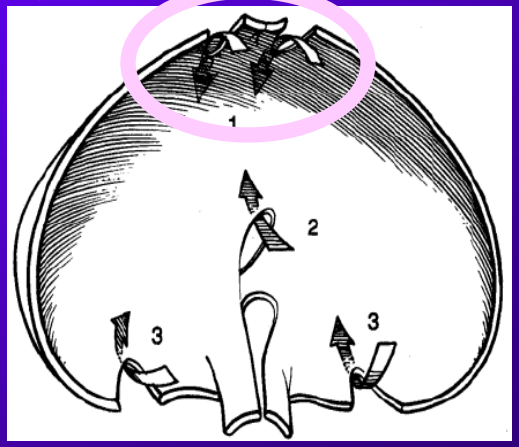
Bochdalek Repair



Harrington DK et al. *J Thorac Cardiovasc Surg*. 2008.

Morgagni Hernia

- Maldevelopment of embryologic septum transversum
- Failed fusion of sternal & costal fibrotendinous elements
- Age of Dx > in Bochdalek
- Hernia contents: omentum, TC, stomach, liver, SB
- Asymptomatic
- CXR – mass @R cardiophrenic ∠



Morgagni Hernia

- Subcostal, paramedian or midline incision
- Reduce hernia sac, just posterior to xiphoid & post sternal border
- Herniated contents restored
- Hernia sac resected & closed
- Defect repaired with prosthetic patch
- Thoracic approach follows same principles

Morgagni Hernia Repair

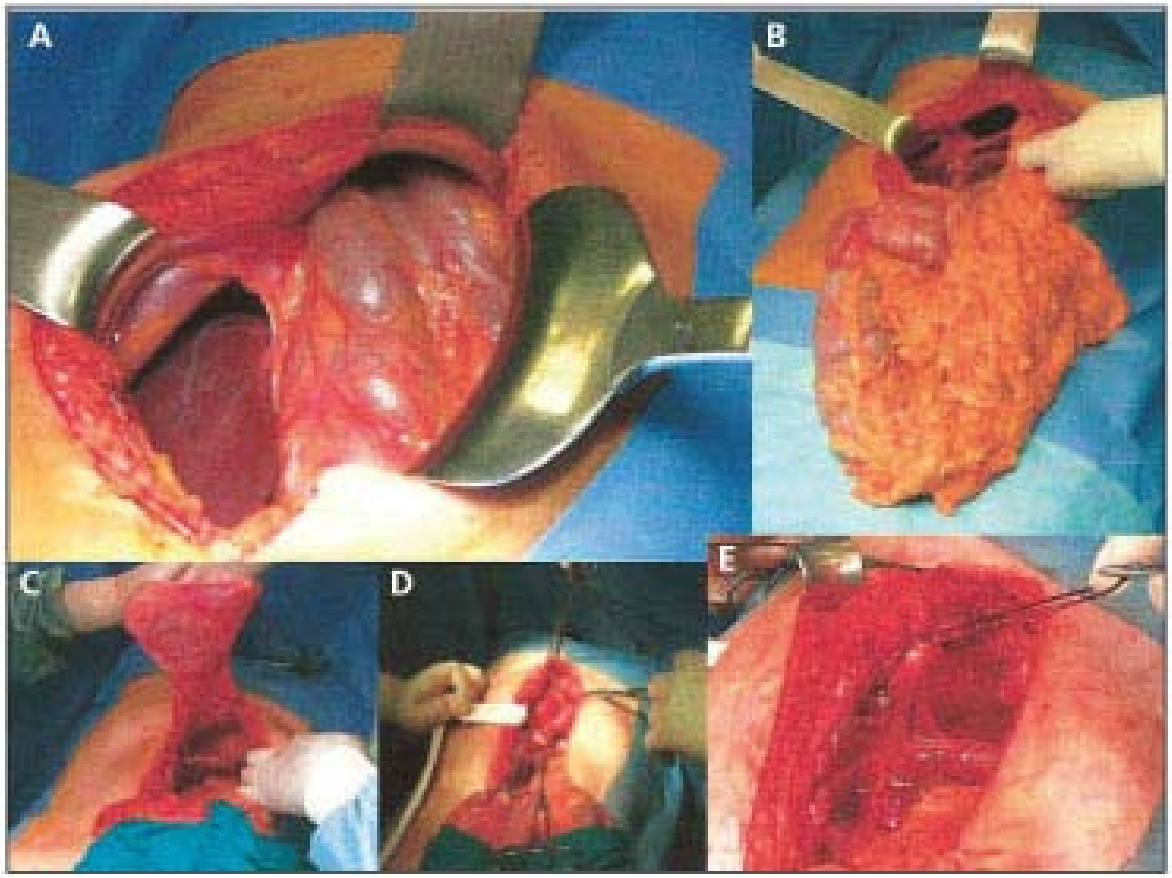


Fig. 2. Mosaic of images where it appreciates the successive surgical steps. A. Laparotomy. B. Reduction of herniary content. C. Identification of herniary sac. D. Checking indemnity of pleura. E. Primary closing of herniary default.

Aguilar LT et al. *Rev Esp de Enf Dig.*. 2009.

Mesh Repair

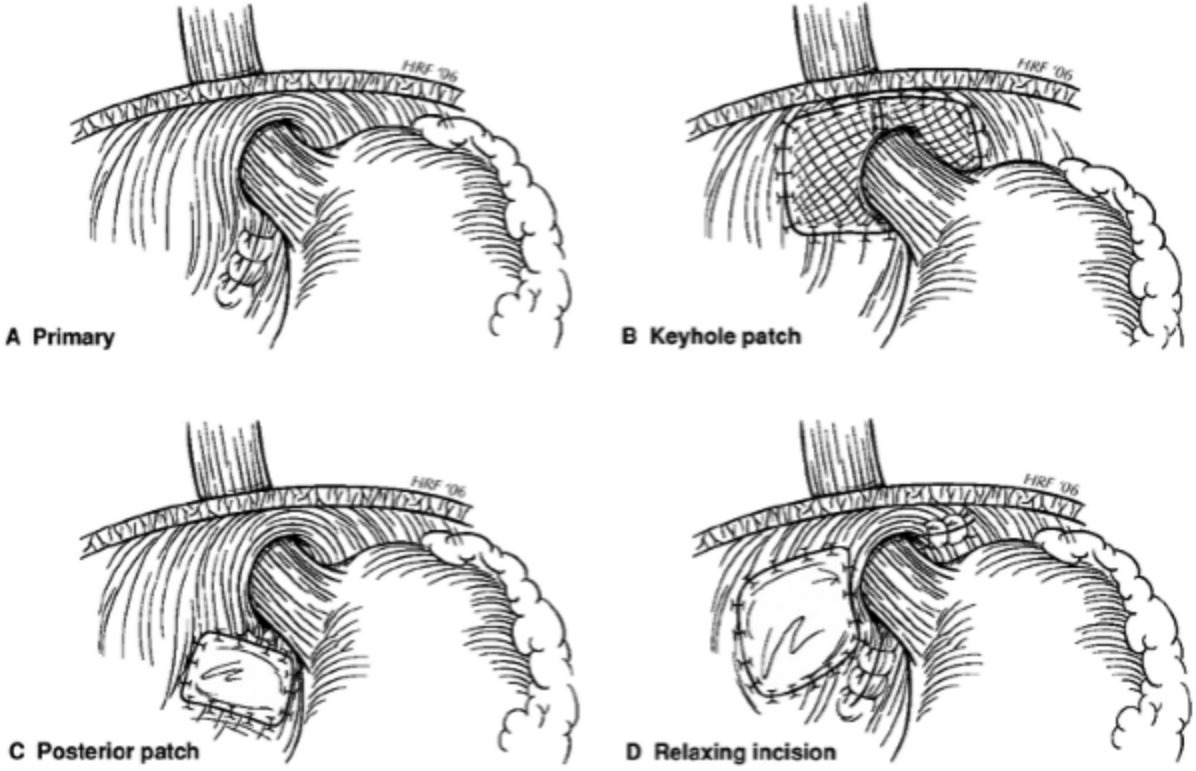


Fig. 8. Crural closure. **A:** Primary. **B:** Keyhole patch. **C:** Posterior patch. **D:** Relaxing incision.

Hiatal Hernia Repair with mesh: a survey of SAGES members

- **261 responses: 5486 hiatal hernia repairs**
- 77% vs 23% (laparoscopic vs open)
- Most common indication for mesh: increased size hiatal defect
- Types of mesh used:
- Biomaterial (28%); PTFE (25%); polypropylene (21%)
- Failure rate (3%), stricture rate (0.2%), erosion rate (0.3%)

- ∴ Recurrence rate was less in mesh use but no one mesh was superior

Frantzides CT et al. *Surgical Endo*, 2011

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