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

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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

Diaphragmatic Hernia

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PT 10.6
INR 0.9
Chest X-ray
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
Diaphragmatic Hernia

Post-op Course

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

"The bad news is, someone just stole our surgical instruments. The good news is, I still have my Swiss army knife."
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
Diaphragmatic Hernia

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)
Diaphragmatic Hernia

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 with nonabsorbable suture
- Large defect closed with prosthetic patch
Bochdalek Repair

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
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.

Mesh Repair

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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