Paraesophageal Hiatal Hernias: Is This Hernia Different From All Other Hernias? Why, and How to Repair.

Marc Bessler, M.D., F.A.C.S.
Professor of Clinical Surgery
Columbia University Medical Center

Hiatal Hernia

- Widening of the space between the diaphragmatic crura
- Weakening of the phrenoesophageal membrane
- Protrusion of the stomach into the thoracic cavity
History of Paraesophageal Hernias

- Ake Akerlund first used the term “hiatus hernia” in 1926 and described 3 subtypes
- Allison (1951) association of HH with GERD
- Belsey (1961) Smaller hernias (type I) result in reflux
  Massive hernias (type II) asymptomatic
- Sporadic reports of incarceration 1950’s
Type 1 Sliding HH

- EG Junction above/proximal to stomach
- 95% of HH's
- 60% have GERD
- Can progress to type 3 or 4

Type 2 Pure Para-Esophageal

- EG Junction below diaphragm
- Isolated herniation of stomach
- Usually antero-left lateral
- Rare
Type 3 Mixed Para-Sliding

HH

- EG junction above diaphragm
- Fundus above EG junction
- Most common type of PEH

Type 3 Mixed Sliding/Paraesophageal
Type 3

Endoscope

Hernia
Type 4 Giant/Complex HH

Type 4 with Colon in Chest
Type 4

Symptoms

- “Most PEH are asymptomatic”
- Early satiety / Bloating 50%
- Nausea or vomiting
- Dysphagia – 45%
- Post prandial chest pain
- Reflux - 60%
- Exertional dyspnea – 30%
Complications of Paraesophageal Hiatal Hernia

- Most paraesophageal hernias occur as a progression of sliding hernia and reflux can resolve as a result.
- Chronic Anemia
  - Cameron’s ulcers
- Aspiration
- Hoarseness
- Volvulus
- Strangulation/Perforation
Mesoaxial Volvulus

Borchardt's Triad

- Epigastric or chest pain
- Inability to vomit
- Failure to pass a nasogastric tube

- Incarceration/Strangulation
- Emergent Evaluation
Surgical Dogma

- The presence of PEH is indication for repair
- Of twenty-nine patients with paraesophageal hernia, incarceration and strangulation occurred in ten or 30.4 per cent
- In four patients in whom a nasogastric tube could not be passed making immediate operation mandatory, the mortality was 50 per cent
- This experience suggests that paraesophageal hernia should be corrected unless the patient is not a candidate for surgery

Risk of Death from PEH

- Acute complications 1.1% per year
- Those with acute complications had 5% mortality
- Overall low yearly mortality
Indications for Surgery

- Many patients with paraesophageal hernias are elderly
- Risk of incarceration vs. Risk of surgery
- All patients with symptoms of recurrent painful episodes
- Chronic anemia
- Severe symptoms

Components of Repair

- Complete reduction of stomach
  - Excision of the hernia sac
- Mediastinal esophageal mobilization
  - Axial tension - Collis gastroplasty
- Crural repair
  - Lateral tension - crural relaxing incision
  - Reinforcement
- Fundoplication
Controversies

- Open vs Laparoscopic Approach
- Reduce/Excise Sac
  - Most or all now in agreement
- Need for Collis Gastroplasty
- Mesh reinforcement

First Laparoscopic Case Report

- Sac excision was not part of the operation
Open vs Laparoscopic


• Complications 0% to 14% in Lap and 5.3% and 25% in open series.

• The median mortality rate in the laparoscopic reports was 0.3% (range, 0% to 5.4%) and 1.7% (range, 0% to 3.7%) after open repair.

• In addition, the median hospital stay after laparoscopic repair was shorter

Open vs Laparoscopic


• University Health System Consortium database

• Laparoscopic (n = 2069) or Open (n = 657) PEH repair between 2007-10

• Laparoscopic repair 81%
• Shorter hospital stay 3.7 vs 8.3 days, (P < 0.01),
• ICU 13% vs 35%, (P < 0.01),
• Complications 2.7% vs 8.4%, (P < 0.01),
• 30-day readmissions 1.4% vs 3.4%, (P < 0.01)
• Cost $15,227 vs $24,263, (P < 0.01).
• Mortality 0.4 % versus 0% for open repair.

• In patients presenting with obstruction or gangrene, utilization of laparoscopic repair was 57%
Laparoscopic repair of PEH

- 20 studies reviewed, safety & durability
- 1415 patients attempted repair
- Mean age 65
- 94% antireflux operation
- 5% operative complications
- 10 studies follow up performed (mean 16 months)
- Anatomic recurrence 26.9%

Recurrence Rates Following Open Repair

<table>
<thead>
<tr>
<th>Author</th>
<th>n</th>
<th>Gastroplasty</th>
<th>Recurrence</th>
<th>Reoperation</th>
<th>F/U</th>
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<tbody>
<tr>
<td>Altorki</td>
<td>47</td>
<td>0</td>
<td>1 (2%)</td>
<td>2%</td>
<td>Pt Contact</td>
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<tr>
<td>Pearson</td>
<td>94</td>
<td>80%</td>
<td>2 (2%)</td>
<td>2%</td>
<td>Interview/UGI</td>
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<tr>
<td>Allen</td>
<td>124</td>
<td>66%</td>
<td>1 (1%)</td>
<td>1%</td>
<td>Chart, interview, questionnaire</td>
</tr>
<tr>
<td>Ellis</td>
<td>119</td>
<td>0</td>
<td>13 (11%)</td>
<td>8%</td>
<td>Chart, interview, questionnaire</td>
</tr>
</tbody>
</table>
### Laparoscopic Repair: Objective Followup Reveals High Recurrence Rate

Bremner, J Am Coll Surg, 2000

**Video Esophagram Recurrence Rates**

<table>
<thead>
<tr>
<th>Method</th>
<th>Recurrence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open*</td>
<td>3/20 (15%)</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>9/24 (42%)</td>
</tr>
</tbody>
</table>

*2 transabdominal, 1 thoracic

\[ P < 0.001 \]

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### Sac Excision

![Image of Sac Excision Procedure]
No routinely accepted technique/definition for determining short esophagus


11.8% Short esophagus with PEH

Others have shown over 20%
The short esophagus: Intraoperative assessment of esophageal length

Sandro Mattioli et al. Division of Esophageal and Pulmonary Surgery Villa Maria Cecilia e San Pier Damiano Hospitals, University of Bologna, Bologna, Italy

• observational prospective study from September 10, 2004, to October 31, 2006, was performed at 8 centers

• measured intraoperatively before and after esophageal mediastinal dissection; a distance of 1.5 cm was arbitrarily determined to categorize cases as long (>1.5 cm) or short (≤1.5 cm).

• True short esophagus is present in about 20% of patients undergoing routine antireflux surgery. Radiology, severity, and duration of symptoms are predictors of true foreshortening.

Laparoscopic repair of PHH

• Prospective series 01/1995 to 06/2005

• Impact of age on repair

• 171 patients: 72% women

• Mean age 65

• Mean follow up 25 months

• Recurrence 26% ("adequate follow up")
Antireflux surgery for Barrett's esophagus: comparative results of the Nissen and Collis-Nissen operations

L.-Q. Chen, P. Ferraro, J. Martin, A. C. Duranceau
Department of Surgery, Division of Thoracic Surgery, Centre Hospitalier de l'Université de Montréal, Quebec, Canada

- 33 Nissen fundoplication.
- 51 Collis-Nissen operation
- Postoperative reflux symptoms were more frequent in the Nissen group (52%) when compared to the Collis group (7%, P < 0.001). These symptoms correlated with the 24-h pH recordings revealing an increased acid exposure in the Nissen group (3.4%) as opposed to 1% in the Collis group (P = 0.003).

Historical background of the wedge Collis gastroplasty

J.K. Champion M.D., F.A.C.S.
video presentation at Society of Gastrointestinal Endoscopic Surgeons in 2000

Stapled-wedge Collis gastroplasty for the shortened esophagus

Wedge Collis Gastroplasty
Completed Gastroplasty

Wedge Gastroplasty
Wedge Gastroplasty Results

- Hunter, Oregon
  - 16 patients

- Houghton, Paiolero, Mayo
  - 63pts, 47 wedge gastroplasty
  - 2% recurrence

- Maddaus et al.
  - 61 patients wedge gastroplasty, 20% after previous failed repair
  - 4% recurrence

Collis Outcomes


- 795 Lap PEH repairs, Collis, n = 454; fundoplication alone, n = 341.

- Collis patients had significantly larger GPEH (p = 0.027) and fewer comorbidities (p = 0.002).

- Radiographic recurrences were similar (p = 0.353).

- Symptom improvement was significant for both (p < 0.001), although Collis was associated with better pain resolution (p < 0.001) and less gas bloat (p = 0.003).

- Quality of life was good to excellent in 88% (90% Collis versus 86% fundoplication alone, p = 0.17).
Antireflux surgery for Barrett's esophagus: comparative results of the Nissen and Collis-Nissen operations

Repair failure were either the endoscopic/histologic evidence of mucosal erosion/ulcer/stricture on the latest follow-up, or radiologic/endoscopic evidence of a displaced/disrupted/tight fundoplication, irrespective of the presence of reflux symptoms.

What about Mesh

- All other hernias routinely repaired with mesh
- 50-90% reduction in recurrence rates

However

- Concerns with erosion or stenosis
- Complex problems can result
When Mesh Goes Bad!

- 26 pts presented for re-op
- 15 dysphagia, 3 erosion
- 56% synthetic mesh others biologic
- Almost 50% had resection

Mesh complications after prosthetic reinforcement of hiatal closure: a 28-case series

Rudolf J. Stadlhuber1, Amr El Sherif1, Sumeet K. Mittal1, Robert J. Fitzgibbons Jr1, L. Michael Brunt2, John G. Hunter3, Tom R. DeMeester4, Lee L. Swanstrom5, C. Daniel Smith6 and Charles J. Filipi1

- 28 cases
- 8 polypropylene
- 12 PTFE
- 7 Biologic
- 15/21 synthetic had erosion
- Only 1/7 biologic
- 9 required resection
- 5 on tube feeds

![Biological mesh chart](chart.png)
# Biologic Grafts

<table>
<thead>
<tr>
<th>Graft</th>
<th>Animal</th>
<th>Tissue</th>
<th>Crosslinked</th>
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<tbody>
<tr>
<td>Biodesign®</td>
<td>Porcine</td>
<td>Submucosa</td>
<td></td>
</tr>
<tr>
<td>Strattice®</td>
<td>Porcine</td>
<td>Dermis</td>
<td></td>
</tr>
<tr>
<td>Xenmatrix®</td>
<td>Porcine</td>
<td>Dermis</td>
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<tr>
<td>Surgimend®</td>
<td>Bovine</td>
<td>Dermis</td>
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<tr>
<td>Permacol®</td>
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<tr>
<td>Veritas®</td>
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<td>Pericardium</td>
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</table>
Hiatal Closure
Technical Points

Is mesh safe, effective, or necessary in paraesophageal hernia repair?

Biologic Prosthesis to Prevent Recurrence after Laparoscopic Paraesophageal Hernia Repair: Long-term Follow-up from a Multi-center Prospective Randomized Trial

Brant K Oelschlager, MD, FACS, Carlos A Pellegrini, MD, FACS, John G Hunter, MD, FACS, Michael L Brunt, MD, FACS, Nathaniel J Seper, MD, FACS, Brett C Sheppard, MD, FACS, Nayak L Polissar, PhD, Moni B Neradilek, MS, Lee M Misumori, MD, Charles A Rohrmann, MD, Lee L Swanstrom, MD, FACS

- 108 patients
- Primary vs. SIS mesh
- Recurrence @ 6 months: 24% vs. 9%
- Recurrence, symptoms, and QOL @ 5 years: no difference
New Mesh Configurations

So Why is PEH Different

- Axial tension in addition to radial tension that is usual with hernias
- Negative pressure on thoracic side
- Hollow viscus must cross through defect
- Functional concerns / Dysphagia
- Little room for mesh overlap
  - IVC, Liver
- Closest analogy is parastomal hernia
Summary

- PEH repair is technically challenging
- High recurrence rates
- Patient selection
- Axial and Radial tension
- Appropriate use of lengthening, relaxing and mesh techniques
- Still in evolution