Minimally Invasive Therapies for Achalasia

Siva Raja MD, PhD
What is Achalasia?

- Achalasia (a- and -chalasia "no relaxation") is a failure of smooth muscle fibers (at the end of the esophagus) to relax, which can cause a sphincter to remain closed...

Wikipedia, 2014
What is Achalasia?

- Achalasia – *failure to relax*
  - Lower esophageal sphincter (LES) has impaired relaxation and dysregulation of esophageal peristalsis
- Sir Thomas Willis 17th century treated starving patient with a sponge-tipped whale bone
- Rare – annual incidence 1/100,000
Traditional manometry
MANOMETRY CATHETER EVOLUTION 1960-2010

A. Traditional manometry:
   5 pressure sites, 5-cm apart

B. Impedance manometry:
   5 pressure sites, 5-cm apart,
   4 impedance sites, 5-cm apart

High Resolution
   • 36 circumferential pressure sites, 1-cm apart
   • 0 Impedance sites
   • 4.4 mm diameter
Conventional manometry

High Resolution Manometry
Free selection mode
Topographic display
Hypotensive Peristalsis: Assess Bolus Transit?

Mild

Severe

Normal
DIFFUSE ESOPHAGEAL SPASM

Normal peristalsis > 30 mmHg  Simultaneous >30 mmHg
THREE TYPE OF ACHALASIA

Type 1

Type 2

Type 3

CCF © 2009
Motility Disorders
Disorders of EGJ Relaxation

Achalasia
- Type I  Classic
- Type II  Esophageal compression
- Type III  Spastic

Functional Obstruction
- Normal propagation (CFV)
- Intrabolus pressure > 15 mmHg
- ≥ 30% of swallows compartmentalized

Evolution of Achalasia

Manometry:
- Aperistalsis
- Incomplete LESR
- Low AMP Contractions

Histology:
- Myenteric Inflammation
- Ganglion Cell Number
- Myenteric Fibrosis

Early (Vigorous)
Late (Classic)
Goals of Therapy

Palliation

Symptom relief

Esophageal emptying
Timed Barium Esophagram

- 250 ml low density barium
- Upright
- Drink the volume they can tolerate without regurgitation (recorded for future testing) in 30-60 seconds
- Left posterior oblique position
- 3 on 1 spot films (35 cm x 35 cm) at 1, 2 and 5 minutes

De Olivera JAM et al. AJR 1997;169:473
Therapy

• Medical
  - Calcium channel blockers, nitrates

• Interventional
  - Botox
  - Pneumatic Dilation

• Surgical
  - Heller Myotomy
  - Per Oral Endoscopic Myotomy
Medical Therapy
Medical Therapy

- Calcium channel blockers
  - nifedipine 10 – 20 mg sublingual before meals compared to PD in 30 patients over mean 21 months provided good or excellent response in 77% and 75%, respectively
  - LES pressure reduced by 28%

- Oral nitrates
  - isosorbide dinitrate 5 mg sublingual before meals
  - May be more potent than nifedipine

Coccia Gut 1991;32:604-6
Gelfond Gastroenterology 1982:83:963-9
Interventional Therapy
Botulinum Toxin (BT)

- Inhibitor of acetylcholine release from neurons promoting LES contraction
- 80 u injected into LES with sclerotherapy needle
  - 20 units / cc into 4 quadrants
  - High safety profile - mild chest pain
  - BT retreatment possible after BT, PD, myotomy
  - Negative predictors – age <55 or LESP >50 mmHg

Pasricha Ann Intern Med 1994;121:590-1
Storr BMC Gastroenterol 2002;Aug 13;2:19
Neubrand Endoscopy 2002;34:519-23
Pneumatic Dilation (PD)
Pneumatic Dilation (PD)

- Per-oral balloon disruption of the LES
  - High pressure 5 – 12 psi to obliterate waist
  - Large diameter 30, 35 and 40 mm
  - Repeated sessions 1 day – 3 weeks apart with size progression

- Negative predictors
  - Age <40 years
  - Higher LES pressures after treatment
  - Pretreatment chest pain

Hulselmans Clin Gastro Hepatol 2010:8:30-5
Eckart Gut 2004;53:629-33
Pneumatic Dilation (PD)

- Perforation 3 – 7%
- Severe chest pain 15%
- Fever
- Intramural hematoma
- Bleeding
- GERD 15%
Surgical Therapy
Robotic Heller
Narration
Best Operation

- Heller/Dor is obstructive decreasing the adequacy of myotomy
- Heller/Dor does not adversely effect esophageal emptying as assessed by TBE
- Heller/Dor decreases reflux (?Normal)
**pH – Longest Episodes**

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<thead>
<tr>
<th></th>
<th>Upright</th>
<th>Supine</th>
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<tbody>
<tr>
<td>No Dor</td>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
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<tr>
<td>Dor</td>
<td><img src="image3.png" alt="Graph" /></td>
<td><img src="image4.png" alt="Graph" /></td>
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- **P = 0.17** for Upright
- **P = 0.004** for Supine
Clinical Experiences of Per-Oral Endoscopic Myotomy POEM

<table>
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<th>Details of the Cases</th>
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<tr>
<td><strong>Sex</strong></td>
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<td><strong>Age</strong></td>
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<td><strong>History</strong></td>
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<td><strong>Type</strong></td>
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After proper injection of normal saline, small incision as an entry is made.
POEM – Myotomy

Cutting only inner circular muscles with triangle knife.
POEM – Myotomy complete

Cutting through the narrow segment of EGJ.
POEM – Clipping
LES pressure
55.2mmHg → 23.5mmHg

Subjective Symptom Score
10 → mean 1.3

Mean Hospital Stay After The Procedure
4.9 days (3-8 days)
When minimally invasive therapies fail, there is maximally invasive therapy.