High Resolution Manometry: A new perspective on esophageal motility disorders

Chris Andrews
& Bill Paterson
**CDDW/CASL Meeting Session:**

**CanMEDS Roles Covered in this Session:**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Medical Expert</strong></td>
<td>(as <em>Medical Experts</em>, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes in their provision of patient-centered care. <em>Medical Expert</em> is the central physician Role in the CanMEDS framework.)</td>
</tr>
<tr>
<td><strong>Communicator</strong></td>
<td>(as Communicators, physicians effectively facilitate the doctor-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.)</td>
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<tr>
<td><strong>Collaborator</strong></td>
<td>(as <em>Collaborators</em>, physicians effectively work within a healthcare team to achieve optimal patient care.)</td>
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<td><strong>Manager</strong></td>
<td>(as <em>Managers</em>, physicians are integral participants in healthcare organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the healthcare system.)</td>
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<tr>
<td><strong>Health Advocate</strong></td>
<td>(as <em>Health Advocates</em>, physicians responsibly use their expertise and influence to advance the health and well-being of individual patients, communities, and populations.)</td>
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<tr>
<td><strong>Scholar</strong></td>
<td>(as <em>Scholars</em>, physicians demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application and translation of medical knowledge.)</td>
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<tr>
<td><strong>Professional</strong></td>
<td>(as <em>Professionals</em>, physicians are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behaviour.)</td>
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Financial Interest Disclosure
(over the past 24 months)

No relevant financial relationships with any commercial interests
## Disclosures – Christopher Andrews, MD

<table>
<thead>
<tr>
<th>Commercial Interest</th>
<th>Nature of Relevant Financial Relationship</th>
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<tbody>
<tr>
<td>Janssen</td>
<td>Consultant, Honoraria Recipient, Advisory Board, Speakers’ Bureau</td>
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<tr>
<td>Forest Labs/Actavis</td>
<td>Honoraria Recipient, Advisory Board</td>
</tr>
<tr>
<td>Takeda</td>
<td>Advisory Board</td>
</tr>
<tr>
<td>Pendopharm</td>
<td>Honoraria Recipient, Advisory Board</td>
</tr>
<tr>
<td>EatLittle, Inc</td>
<td>Board Member, Intellectual Property Holder</td>
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Objectives

At the end of this session participants should be able to:

• Describe the advantages of high resolution esophageal manometry over traditional manometry.
• Recognize major esophageal motor abnormalities as characterized by high resolution manometry according to the latest guidelines.
• Identify different achalasia subtypes based on high resolution manometry and use this to optimize treatment.
Traditional Esophageal Manometry
High Resolution Manometry
Esophageal Peristalsis by HRM and Impedance
Esophageal Pressure Activity: HRM vs Line Tracings
HRM Is More Accurate

Fox M R, and Bredenoord A J Gut 2008;57:405-423
## Advantages of High Resolution Manometry (HRM)

<table>
<thead>
<tr>
<th></th>
<th>Conventional manometry</th>
<th>High-resolution manometry</th>
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<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>Inexpensive</td>
<td>Expensive</td>
</tr>
<tr>
<td><strong>Execution</strong></td>
<td>More time consuming</td>
<td>Faster</td>
</tr>
<tr>
<td><strong>Interpretation</strong></td>
<td>Requires experience</td>
<td>Relatively easy</td>
</tr>
<tr>
<td><strong>Measuring LES function</strong></td>
<td>Limited</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Measuring UES function</strong></td>
<td>No</td>
<td>Yes</td>
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</table>
Distal contractile integral (DCI)

• Old – Mean contraction amplitude
  – average contraction amplitude at 3cm and 7cm above the LES should be between 30 and 180 mmHg

• New – DCI
  – quantifies the amplitude, duration and length of the distal esophageal contraction (< 5000 mmHg s cm)
**Integrated residual pressure (IRP)**

- **Old – LES residual pressure**
  - Lowest pressure reached by LES during a swallow

- **New – IRP**
  - Mean of the 4 seconds of maximal relaxation of LES during 10 second window from UES relaxation
Examples of impaired EG junction relaxation
The Chicago Classification v3.0
Hierarchical analysis

1. IRP ≥ ULN and 100% failed peristalsis or spasm
   - Yes → Achalasia
     - Type I: No contractility
     - Type II: ≥20% PEP
     - Type III: ≥20% spasm (DL<4.5s)
   - No → Disorders with EGJ outflow obstruction

2. IRP ≥ ULN and not Type I-III achalasia
   - Yes → EGJ outflow obstruction
     - Incompletely expressed achalasia
     - Mechanical obstruction
   - No → Major disorders of peristalsis
     - Entities not seen in normal subjects

3. IRP normal and Short DL or high DCI or 100% failed peristalsis
   - Yes → DES
     - ≥20% premature (DL<4.5s)
     - Jackhammer esophagus
     - Absent contractility
     - No scorable contraction
     - Consider achalasia
   - No → Ineffective motility (IEM)
     - ≥50% ineffective swallows
     - Fragmented peristalsis
     - ≥50% fragmented swallows and not ineffective

4. IRP normal and ≥50% ineffective swallows
   - Yes → Fragmented peristalsis
   - No → Normal

5. IRP normal and > 50% effective swallows
Esophageal pressure Topography
Jackhammer Esophagus
Case presentation

• 48 yo man presents with 2 year Hx of slowly progressive esophageal dysphagia.
  • Mainly to solids, but liquids also get stuck, especially if he drinks too quickly
  • Also reports an intermittent burning discomfort in chest that has not improved with PPI therapy
  • Often regurgitates up thick mucous with bits of old food when he goes to bed
Investigations
Esophageal motility study
What treatment would you recommend?

- Isordil
- BoTox
- Pneumatic dilation
- Laparoscopic Heller myotomy
- POEM
What treatment would you recommend if he was 72 and his manometry looks like this?
Achalasia subtypes – Are they clinically relevant?
Outcomes of Treatment for Achalasia Depend on Manometric Subtype
- Wout et al. Gastro 2013 -

<table>
<thead>
<tr>
<th>Subtype</th>
<th># patients</th>
<th>Overall (%)</th>
<th>PD (%)</th>
<th>LHM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>44</td>
<td>81</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>II</td>
<td>114</td>
<td>96*</td>
<td>100**</td>
<td>93</td>
</tr>
<tr>
<td>III</td>
<td>18</td>
<td>66</td>
<td>40</td>
<td>86#</td>
</tr>
</tbody>
</table>

* p < 0.01 vs Type I and p < 0.001 vs Type II; ** p < 0.05 vs LHM
  # p = 0.12 vs PD