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COVID-19: Overcoming Operational Challenges of the New Normal

July 27, 2020
8-9:30

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DEADLINE: AUGUST 1, 2020

How to Receive CME and MOC Points

LIVE VIRTUAL GRAND ROUNDS WEBINAR
ACG will send a link to a CME & MOC evaluation to all attendees on the live webinar.

ABIM Board Certified physicians need to complete their MOC activities by December 31, 2020 in order for the MOC points to count toward any MOC requirements that are due by the end of the year. No MOC credit may be awarded after March 1, 2021 for this activity.

ACG will submit MOC points on the first of each month. Please allow 3-5 business days for your MOC credit to appear on your ABIM account.

MOC QUESTION
If you plan to claim MOC Points for this activity, you will be asked to: Please list specific changes you will make in your practice as a result of the information you received from this activity.

Include specific strategies or changes that you plan to implement. THESE ANSWERS WILL BE REVIEWED.
Disclosures:

Moderator:
Baharak Moshiree, MD, FACG
*Medtronic: Grant Funding*

Speaker:
John E. Pandolfino, MD, MSCI, FACG
*Medtronic: Consultant/Speaker/Licensing*
*Agreement: FLIP Panometry*
*Diversatek: Consultant/Grant*
*Crospen: Stock Options*

Off-Label Use: Neuromodulation and their use in a specific esophageal disorder with a functional component.

“High-Resolution Manometry: Thinking beyond the Chicago Classification”

John E. Pandolfino, MD, MSCI, FACG
Hans Popper Professor of Medicine
Feinberg School of Medicine, Northwestern University
Chief, Division of Gastroenterology and Hepatology
Northwestern Medicine
Northwestern Memorial Hospital
High-Resolution Manometry

Content Outline:
1. Discuss the protocol beyond the 10 supine swallows required for high-level manometry diagnosis.
2. Discuss pitfalls with the current classification diagnoses.
3. Introduce provocative maneuvers.

Objectives:
1. To learn how to perform and analyze esophageal motor function using high resolution manometry.
2. To understand how to use manometry to alter management of patients with esophageal complaints.

The Chicago Classification

Bridging conventional manometry and high-resolution manometry

The core of the Chicago Classification is the recognition of EPT patterns and new metrics based on EPT landmarks to better define clinically relevant phenotypes.

- Improved and more accurate metrics
  - IRP
  - Integrity
  - Distal Contractile Integral
  - Distal Latency
  - Pressurization
- Provided a universal language and was associated with higher intra- and inter-observer agreement.
HRM: Chicago Classification Patterns

**Normal**  
**EGJOO**  
**Distal Esophageal Spasm**  
**Absent Contractility**

---

**Chicago Classification 3.0**

**Disorders of EGJ Outflow Obstruction**
- IRP ≥ upper limit of normal AND 100% failed peristalsis or spasm
- IRP ≥ upper limit of normal AND sufficient evidence of peristalsis such that criteria for type III achalasia are not met

**Major Disorders of Peristalsis**
- Entities not seen in normal controls
- IRP is normal AND reduced distal latency (DL) OR DCI > 8,000 mmHg·cm·s
- IRP is normal AND 100% failed peristalsis

**Minor Disorders of Peristalsis**
- Impaired bolus clearance
- IRP is normal AND > 50% of swallows are ineffective based on DCI values or large breaks

**Normal Esophageal Motor Function**
- IRP is normal AND ≥ 50% of swallows are effective without criteria for spasm or jackhammer

---

**Achalasia**
- Type I: 100% failed peristalsis (no PEP)
- Type II: 100% failed peristalsis (+ PEP)
- Type III: >20% premature contractions

**EGJ Outflow Obstruction**
- Incompletely expressed achalasia
- Mechanical obstruction

**Distal esophageal spasm (DES)**
- ≥ 20% premature contractions (DL<4.5s)
- Jackhammer esophagus
- ≥ 20% of swallows with DCI >8,000 mmHg·cm·s and normal DL

**Absent Contractility**
- No scoreable contraction by DCI and DL criteria (should consider achalasia with borderline IRP and/or bolus pressurization)
- IRP is normal AND > 50% of swallows are ineffective based on DCI values or large breaks

**Rapid contraction and Hypertensive peristalsis are not considered distinct clinical-pathological entities in CC v3.0**
Line Plots (pressure vs time) of Conventional and High Resolution Manometry

HRM Plotted in Esophageal Pressure Topography

Catheter Configuration

1st
2nd
3rd
4th
LES

UES

Proximal trough
Middle trough
Distal trough

CDP

EGJ relaxation

Clouse Plots

American College of Gastroenterology
The Chicago Classification

Standard Protocol
- Baseline recording/basal EGJ pressure
- 10 supine, 5-ml liquid swallows
  - Basis for Chicago Classification of esophageal motility diagnoses

Supplementary maneuvers
- Upright swallows
- Multiple rapid swallows (2ml liquid x 5 q2-3 seconds)
- Viscous swallows
- Solid swallows
- 200 ml free drink
- Test meal +/- post-prandial monitoring

Chicago Classification 3.0 Protocol
- Place catheter and document placement with at least 3 deep breaths
- Attempt to reposition can use endoscopic placement if needed
- Good placement
- No PIP- Never entered abdomen
- No PIP- Coiled

American College of Gastroenterology
Virtual Grand Rounds

Chicago Classification 3.0 Protocol - ? 4.0

Place catheter and document placement with at least 3 deep breaths

Generates the classic CC 3.0 Diagnosis

10 supine swallows

No

Attempt to reposition
Can use endoscopic placement if needed

5 upright swallows

Can help with False (+) IRP
Vascular/contact artifact

2-3 MRS

May unmask subtle obstruction

2 solid swallows

Rapid Drink Challenge

Primary regurgitation and belching
- achalasia ruled out

Post-prandial meal

Integrated relaxation pressure (IRP)

The biggest problem with the Chicago Classification

• Measures IBP driving the EGJ open [when it is open] or the LESP [when it is closed].

• Mean of the 4 seconds (contiguous or non-contiguous) of maximal deglutitive relaxation in the 10s following UES relaxation; referenced to gastric pressure

American College of Gastroenterology
Integrated relaxation pressure (IRP)

The biggest problem with the Chicago Classification

• Measures IBP driving the EGJ open [when it is open] or the LESP [when it is closed].

• Mean of the 4 seconds (contiguous or non-contiguous) of maximal deglutitive relaxation in the 10s following UES relaxation; referenced to gastric pressure

Achalasia Subtypes:
Contractile and Pressure Profiles
Achalasia Type I - normal IRP
Achalasia Type III
### Symptoms of dysphagia ± chest pain and bland regurgitation

**GERD symptoms- not responding to PPI therapy**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Obstruction/Eosophagitis</td>
<td>Treat appropriately</td>
</tr>
<tr>
<td>Upper Endoscopy</td>
<td>Normal</td>
</tr>
<tr>
<td>High Resolution Manometry</td>
<td>TBE and FLIP may be helpful in patients unable to tolerate HRM</td>
</tr>
<tr>
<td>Achalasia I or II</td>
<td></td>
</tr>
<tr>
<td>Definitive Therapy:</td>
<td>- Pneumatic Dilatation [30/35/40 mm]</td>
</tr>
<tr>
<td></td>
<td>- May start with 35 mm in young males</td>
</tr>
<tr>
<td></td>
<td>- Routine gastrografin is not needed</td>
</tr>
<tr>
<td></td>
<td>- Repeat in 2-4 weeks if no response</td>
</tr>
<tr>
<td></td>
<td>- Lap Heller Myotomy</td>
</tr>
<tr>
<td></td>
<td>- Recommend Dor or Toupet fundoplication</td>
</tr>
<tr>
<td></td>
<td>- POEM</td>
</tr>
<tr>
<td></td>
<td>- Standard myotomy length</td>
</tr>
<tr>
<td></td>
<td>- All patients discharged with PPI therapy</td>
</tr>
<tr>
<td></td>
<td>Patients unfit for definitive therapy:</td>
</tr>
<tr>
<td></td>
<td>- BoTox</td>
</tr>
<tr>
<td></td>
<td>- Smooth muscle relaxants</td>
</tr>
<tr>
<td>Achalasia III</td>
<td></td>
</tr>
<tr>
<td>Definitive Therapy</td>
<td>- Tailored myotomy via POEM or tailored Heller myotomy</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Inconclusive Diagnosis</td>
<td>EGJOO or absent contractility</td>
</tr>
<tr>
<td></td>
<td>Confirmatory testing with TBE and/or FLIP to confirm diagnosis before offering definitive therapy</td>
</tr>
</tbody>
</table>

### EGJOO: Epidemiology and Natural History

- **Intact Peristalsis**
- **Weaker Peristalsis**
- **Type II Achalasia**
EGJOO: Relevance

• EGJOO - natural history
  - Many patients may improve and the factors that predict symptom persistence was predicted by maximum distal contractile integral (DCI) and IRP in both EGJOO and HE (P<.05).

![Graph showing symptom persistence over time with and without treatment.](image)


EGJOO: Relevance

• **EGJOO - not always achalasia in evolution**
  - Can be an artifact - Fake
    - **Too reliant on IRP**
  - Can be mechanical obstruction or an anatomical issue
    - **Missed on EGD**

**Need supportive evidence**

- **HRIM**
  - elevated upright IRP and IBP, abnormal motility, paradoxical response to CCK
- **FLIP**
  - EGJ-DI < 2.0, absent contractility or RRCs
- **TBE**
  - Barium tablet/retention
Upright Integrated Relaxation Pressure Facilitates Characterization of EGJOO: Triggs et al 2019

Validation of RDC with normative ranges:
Ang et al 2017

Metrics
- RDC-IRP: ≥ 12 mmHg with achalasia, ≥ 8 mmHg for EGJOO
- 6/199 (IEM/NL)- positive with ≥ 8mmHg
- 3/34 (aperistalsis)- positive with ≥ 12mmHg
- 22/23 (EGJOO-upright > 15 mmHg)- positive with ≥ 8mmHg

- 10/209 (IEM/NIls)– failure of deglutitive inhibition
- 11/17 (Jackhammer/Spasm) – failure of deglutitive inhibition
Validation of Standard test meal in Healthy Controls with Dysphagia Patients: Ang et al 2017

Approach to Dysphagia, Chest Pain, Food Impaction

EGD- No FLIP access

- Esophagitis LA B or higher, stricture, EoE or other mechanical obstruction
  - yes
  - no
  - Hiatus hernia > 3 cm
  - yes
  - no
  - HRIM using stepwise assessment and provocative testing to assess EGJOO
  - yes
  - no
  - 10 Supine swallows/10 Upright swallows

IRP elevated = Normal or Borderline Peristalsis

- Abnormal MRS [IRP > 8 mmHg], RDC [IRP > 12 mmHg] and Test Meal-200 gms Rice [IRP > 25mmHg]
  - yes
  - no
  - Positive Retention of barium and Tablet
    - Positive Retention of Tablet/no barium
    - Negative Retention of barium and Tablet
  - TRD with tablet

Type I, II and III Achalasia
- Treat appropriately based on subtype
  - Achalasia TX BOTOX® (onabotulinumtoxinA) / PD
  - Repeat EGD with stepwise Dilation
  - Treat appropriately using antisecretory therapy and dilation therapy as needed.
  - Perform biopsies to assess EoE if suggestive and ? tumor
  - May require surgery
  - will need preop w/u motility and potentially reflux testing

- Likely artefact- treat conservatively
CC 3.0 Diagnosis of EGJOO in a Patient with Dysphagia, Chest Pain, Food Impaction

IRP ≥ upper limit of normal AND sufficient evidence of peristalsis such that criteria for type III achalasia are not met
Presumed – NEGATIVE EGD - NO previous surgery or hernia

Evolving Achalasia
Sub-threshold PEP, compartmentalized IBP and evidence of poor emptying

• Usually will not resolve with position change.
• MRS, RDC and STM – typically positive

Confirmatory Testing:
• TBE – negative for barium and positive for tablet retention.
• EGJ-O on FLIP < 3.0, no fixed obstruction +/- abnormal response to volumetric contraction.

Definitive Therapy:
• Pneumatic Dilation [30/35/40 mm]
• May attempt TTS before
• POEM
• BOTOX® (onabotulinumtoxinA) if unfit for surgery and/or there are contraindications

Mechanical Obstruction
Sub-threshold PEP, compartmentalized IBP and evidence of poor emptying

• Usually will not resolve with position change.
• MRS, RDC and STM – typically positive

Confirmatory Testing:
• TBE – negative for barium and positive for tablet retention.
• EGJ-O on FLIP < 3.0 and fixed obstruction may suggest mechanical obstruction.

Definitive Therapy:
• TTS Balloon or Savary Dilation
• BOTOX® (onabotulinumtoxinA) if no response to dilation

Artifact
All IBP and evidence of poor emptying is typically related to IEM and not elevated IBP

Resolves with position change
• MRS, RDC and STM – Negative

Confirmatory Testing not needed.

Therapy:
• Behavioral Therapy or neuromodulator
• Consider u/s for GERD

Virtual Grand Rounds

Distal latency and Distal Contractile Integral

• Deglutitive inhibition of esophageal contraction
• Contractile Vigor
Distal Esophageal Spasm
Defining Relevant Phenotypes

Rapid Premature Contraction
Premature Contraction
Rapid Contraction

Jackhammer Esophagus
Evolution and Treatment

A: Jackhammer standard swallow- no pain
B: Jackhammer- Normal protocol swallow + sildenafil
C: Jackhammer-Spasm during chest pain event
D: Jackhammer-Absent Contractility After POEM
Hypercontractile Esophagus: 
Heterogeneous Patterns

A) Nutcracker: A single-peak jackhammer swallow with normalized POSP-CI (composite DCI=15237 mmHg-cm-s), the POSP-CI/PREP-CI ratio was 1.56.

B) Jackhammer: A multiple-peak jackhammer swallow with prolonged POSP-CI (composite DCI=16502 mmHg-cm-s), the POSP-CI/PREP-CI ratio was 2.93.

Approach to patient with: 
Jackhammer or Spasm

Step 1: Assess the severity of the motility disturbance
- Number of abnormal swallows
- Pattern-repetitive peaks/ abnormal morphology
- High DCI
- Evidence of EGJOO
- Abnormal MRS

Step 2: Assess context in terms of presentation and anatomy
- GERD versus Dysphagia
- Hiatus hernia
- Endoscopic evidence of obstruction
- Opioid use

Step 3: Consider further diagnostics
- GERD dominant- BID PPI trial- Reflux testing
- Dysphagia
  - [IRP- NL]- Esophagram with barium Tablet
  - [IRP- Inc]- FLIP- 322
  - Dilation
- EUS with deep muscle biopsy
## Approach to patient with: Jackhammer or Spasm

**Step 4: Medical Management**
- Levsin
- CCB/ Nitrates
- Viagra
- BoTox
- TCA- if considering functional overlap

**Step 5: POEM**
- LAST RESORT- NEED TO HAVE OBSTRUCTION

---

### Ineffective Esophageal Motility

**Assessing Integrity and Contractile Vigor**

- **Absent Peristalsis**
  - DCI = 7 mmHg·s·cm
- **Absent/Failed Peristalsis**
  - DCI = 34 mmHg·s·cm
- **Weak Peristalsis - IEM**
  - DCI = 326 mmHg·s·cm
- **Fragmented - TZ Defect**
  - DCI = 1121 mmHg·s·cm

---

### Quantifying Bolus retention beyond IBH

#### Esophageal Impedance Integral

![Graphs showing normal swallow, retrograde escape, and failed emptying]

- Before emptying: $Z_1$, $Z_2$
- During emptying: $Z_1$, $Z_2$
- Complete Emptying: $Z_1$, $Z_2$
- Before emptying: $Z_1$, $Z_2$
- Emptying: $Z_1$, $Z_2$
- Bolus Retained: $Z_1$, $Z_2$

### Neuromodulation and Behavioral Intervention

**MEDS- NOT FDA APPROVED**

#### Table. Antidepressants With the Best Evidence to Support Their Use in a Specific Esophageal Disorder With a Functional Component

<table>
<thead>
<tr>
<th>Esophageal disorder</th>
<th>Medication Class</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional chest pain</td>
<td>Imipramine TCA</td>
<td>25–50 mg$^a$</td>
</tr>
<tr>
<td></td>
<td>Sertraline SSRI</td>
<td>50–200 mg$^a$</td>
</tr>
<tr>
<td></td>
<td>Venlafaxine SNRI</td>
<td>75 mg</td>
</tr>
<tr>
<td>Hypersensitive esophagus</td>
<td>Citalopram SSRI</td>
<td>20 mg</td>
</tr>
<tr>
<td>Refractory GERD</td>
<td>Fluoxetine SSRI</td>
<td>20 mg</td>
</tr>
<tr>
<td>Globus</td>
<td>Amitriptyline TCA</td>
<td>25 mg</td>
</tr>
</tbody>
</table>

$^a$GERD, gastroesophageal reflux disease; SNRI, serotonin-norepinephrine reuptake inhibitors.

*Escalating dose.

**Editorial: CGH 2014: Maradey-Romero & Fass**
Approach to patient with: Regurgitation

Refractory Regurgitation may be reflux:
But it may also be:

1. Achalasia
   • Most common presentation of achalasia is GER.
2. Rumination
   • Should be at the top of your differential.
3. Belching disorder
   • Patients have a hard time describing.
Supragastric Belching

Air reflux

No LES relaxation

**Summary**

**The Chicago Classification is not perfect.**

- Achalasia classification is good and there are some subtle issues.
- EGJOO should never be diagnosed with manometry alone as most are normal.
- Jackhammer is a heterogeneous disorder and should be further phenotyped as most are not a primary motor abnormality.
- Weak peristalsis is a borderline motor disorder but should not be forgotten.
- There are other patterns of motility occurring between and after swallows that may be important.
Questions?

Moderator:
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