Getting Unstuck: Positioning of Esophageal Motility Testing in Patients with Esophageal Motility Disorders

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Case Study

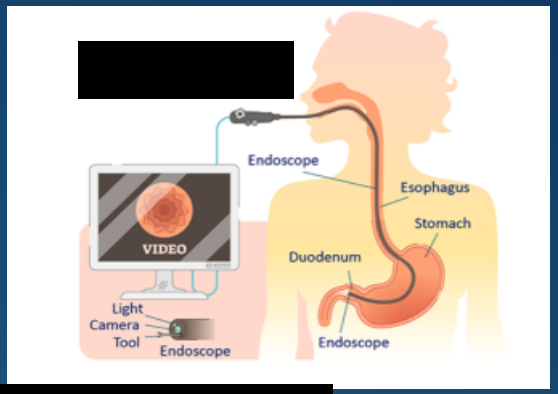
A 55-year-old man with a 1 year history of progressive dysphagia and regurgitation is evaluated in your clinic.

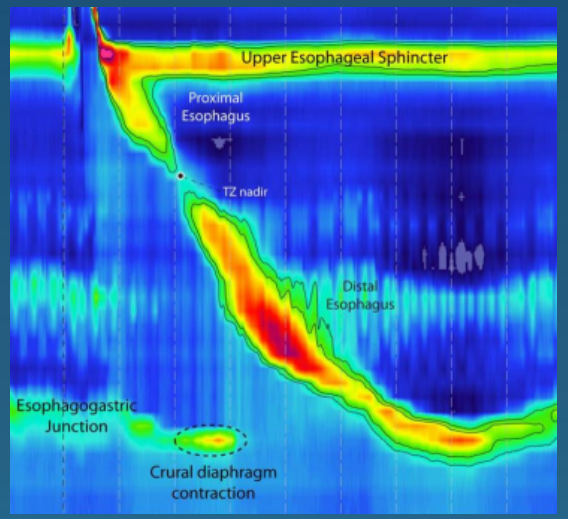
- Also reports intermittent chest discomfort and a 10 lb. weight loss.
- Physical exam is benign
- PMH: Hypertension
- Meds: Hydrochlorothiazide
- Cardiac evaluation is negative.

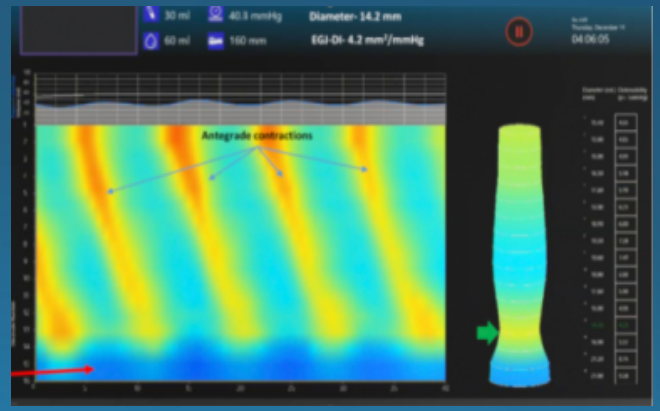
Diagnosing Esophageal Motor Disorders

- Clinical history, questionnaires
- Endoscopy
- High-resolution manometry
- Barium esophagram
- FLIP panometry

Score	Weight loss (kg)	Dysphagia	Retrosternal pain	Regurgitation
0	None	None	None	None
1	<5	Occasional	Occasional	Occasional
2	5–10	Daily	Daily	Daily
3	>10	Each meal	Each meal	Each meal



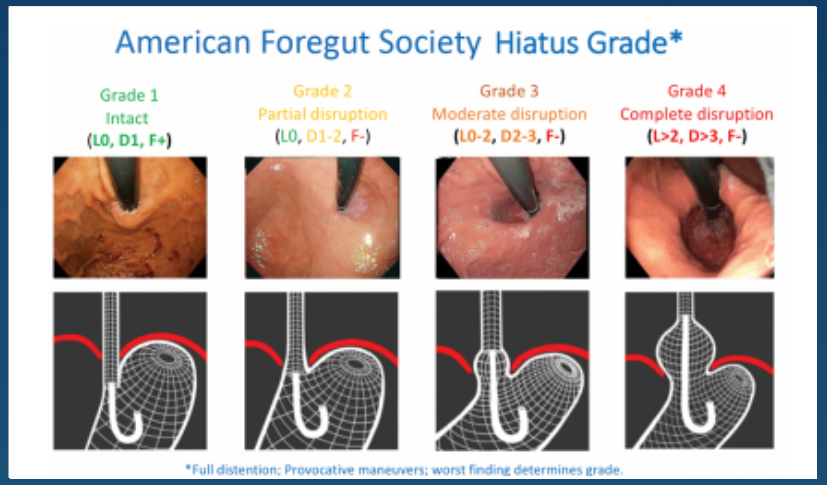


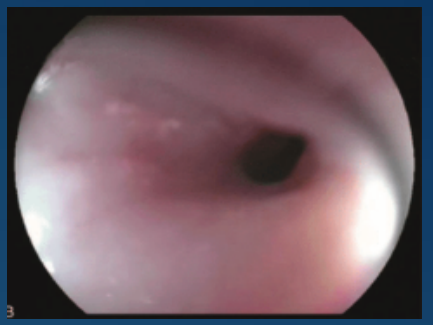


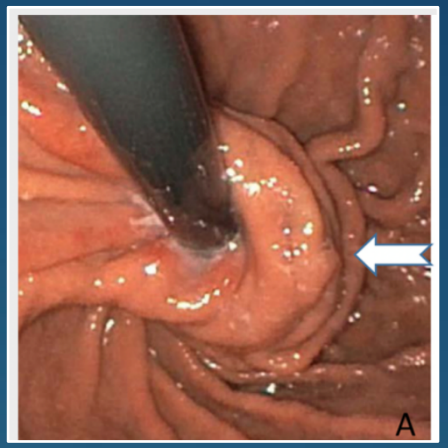
**No one test explains all of esophageal physiology!*

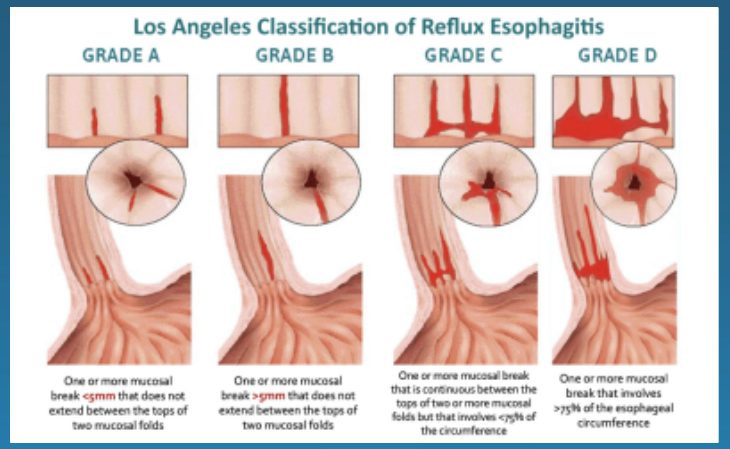
Endoscopy

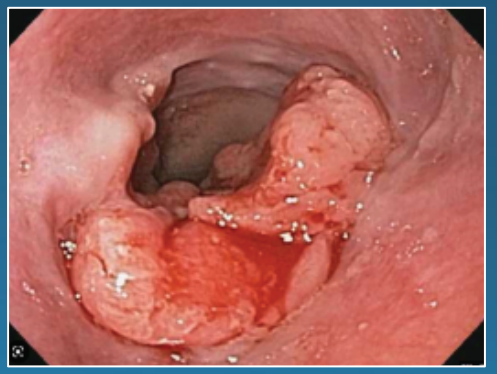
- Hiatal Hernia
- Stricture
- Esophagitis (Reflux/EoE)
- Post-surgical abnormalities
- Cancer
- Infiltrative disease

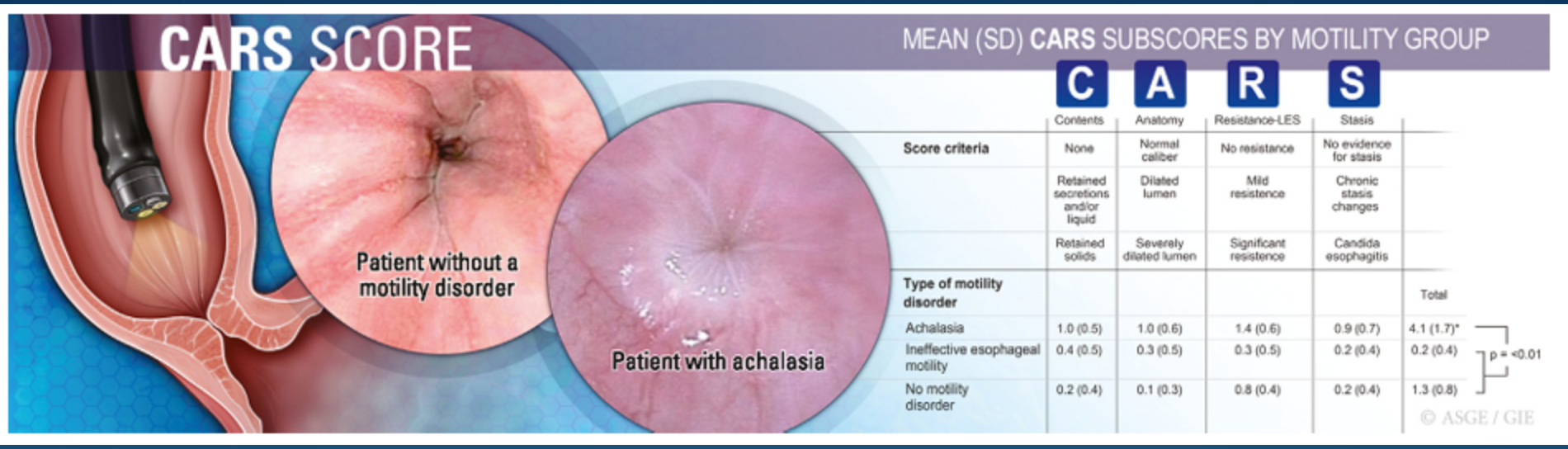








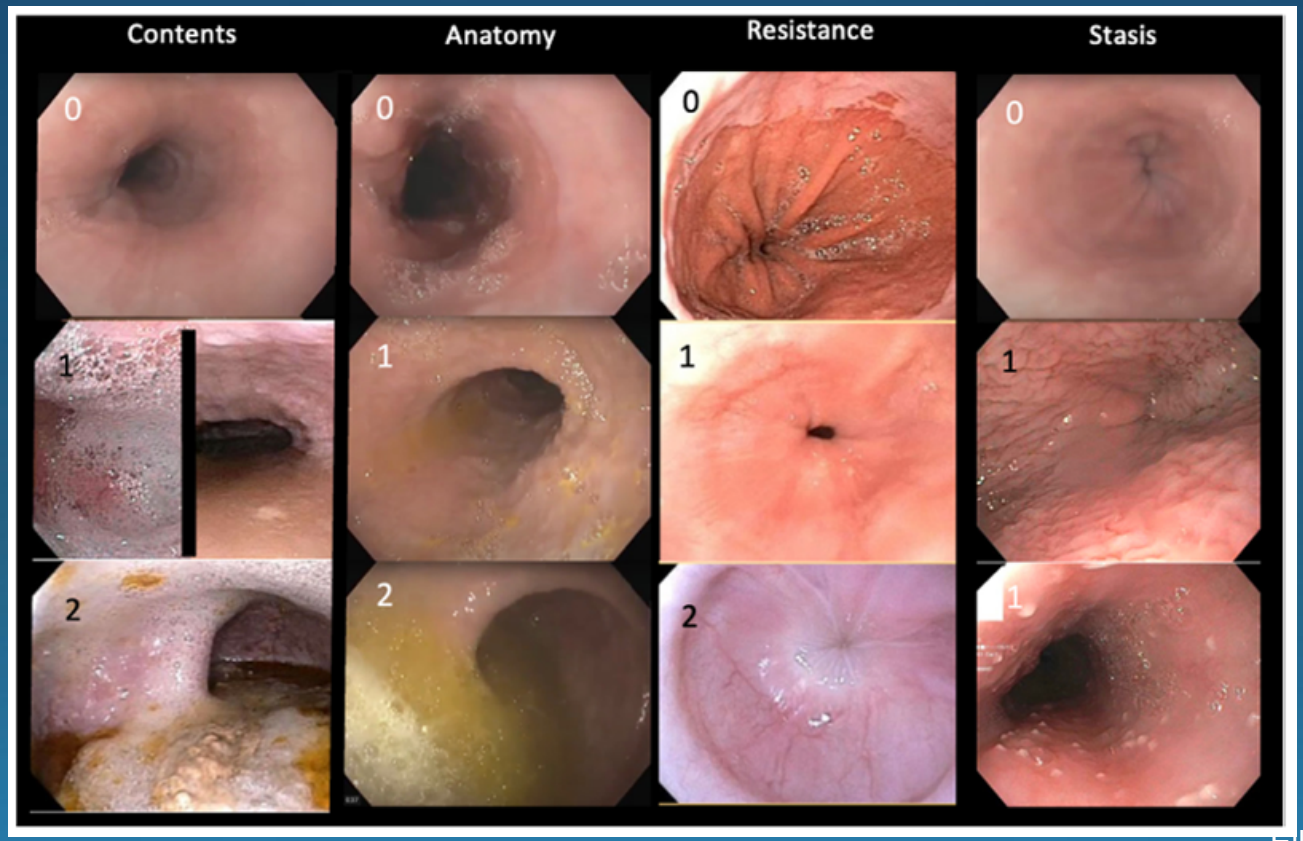




MEAN (SD) **CARS** SUBSCORES BY MOTILITY GROUP

	C Contents	A Anatomy	R Resistance-LES	S Stasis	
Score criteria	None	Normal caliber	No resistance	No evidence for stasis	
	Retained secretions and/or liquid	Dilated lumen	Mild resistence	Chronic stasis changes	
	Retained solids	Severely dilated lumen	Significant resistence	Candida esophagitis	
Type of motility disorder					Total
Achalasia	1.0 (0.5)	1.0 (0.6)	1.4 (0.6)	0.9 (0.7)	4.1 (1.7)*
Ineffective esophageal motility	0.4 (0.5)	0.3 (0.5)	0.3 (0.5)	0.2 (0.4)	0.2 (0.4)
No motility disorder	0.2 (0.4)	0.1 (0.3)	0.8 (0.4)	0.2 (0.4)	1.3 (0.8)

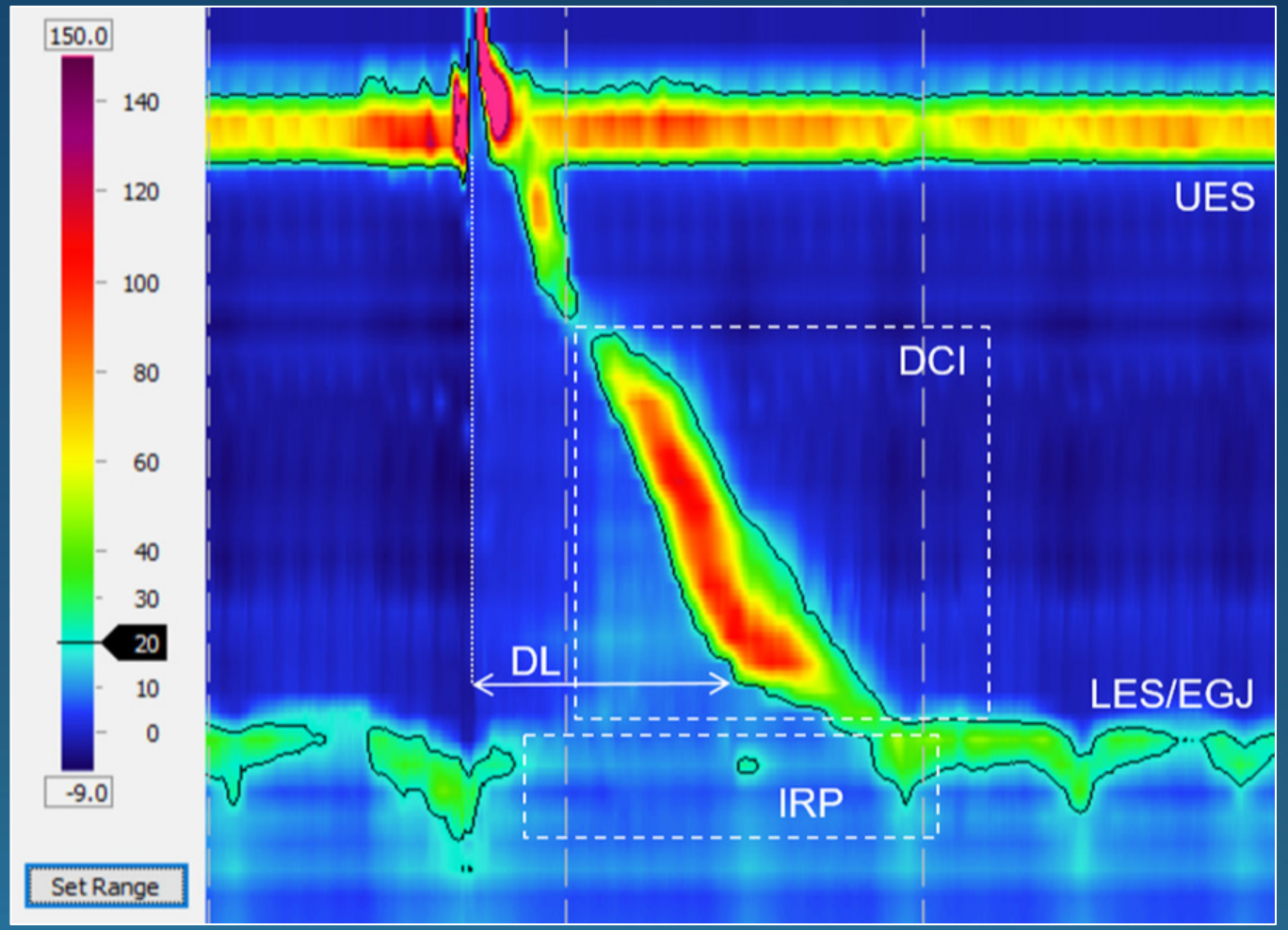
p = <0.01

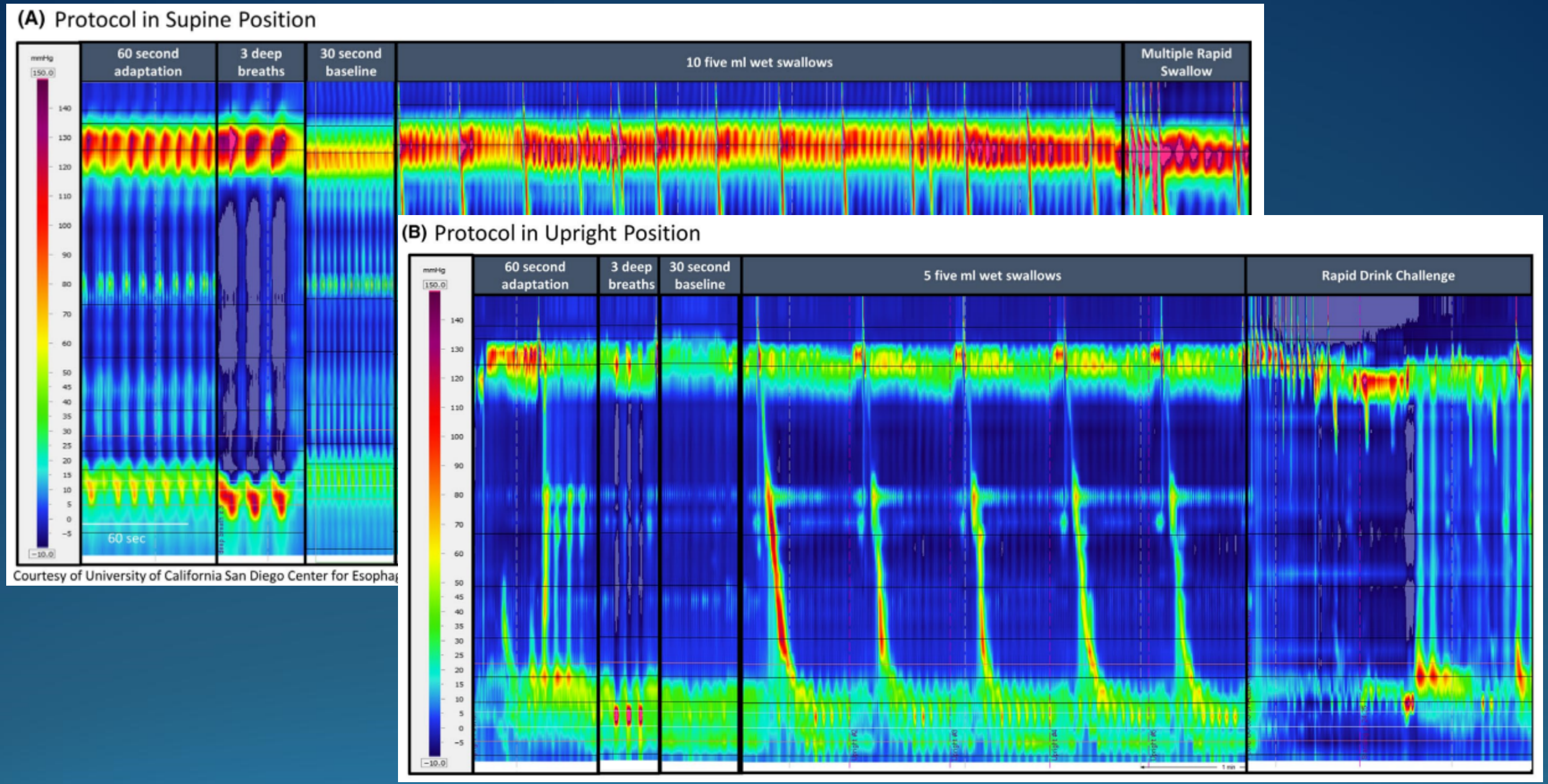


Ellison A, et al. *Gastrointestinal Endosc* 2024.

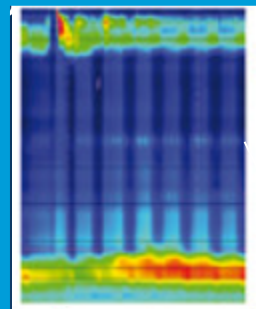
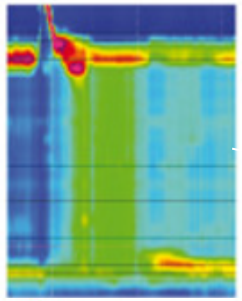
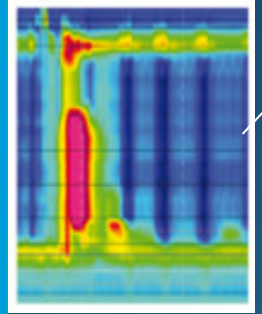
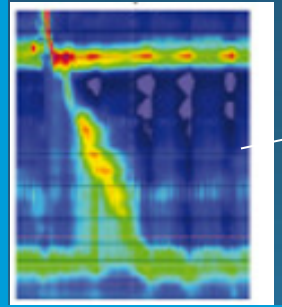
High-Resolution Manometry

- Pressure-time graphs
- Catheter-based, requires patient participation
- Evaluation of EGJ (IRP) and esophageal body (DCI/DL)





Yadlapati R, et al. *Neurogastroenterol Motil* 2020.

Disorders of EGJ Outflow

- Achalasia I
- Achalasia II
- Achalasia III
- EGJOO*†

Step 1: Perform 10 wet swallows (Primary position)

Abnormal median IRP

Yes → 100% Absent Peristalsis All swallows are either failed or premature◊

- Yes → 100% Failed Peristalsis without PEP → Achalasia I
- Yes → 100% Failed Peristalsis with PEP in ≥20% swallows → Achalasia II
- Yes → ≥20% swallows with premature contractions. Failed peristalsis ± PEP may be present → Achalasia III

No → Step 2: (if not done) Wet swallows in secondary position + MRS/RDC

Elevated LES IRP persists in varying positions + elevated IBP/PEP‡

- No → No evidence of EGJ outflow obstruction
- Yes → Abnormal TBE or FLIP
  - Yes → EGJOO*†
  - No → No evidence of EGJ outflow obstruction

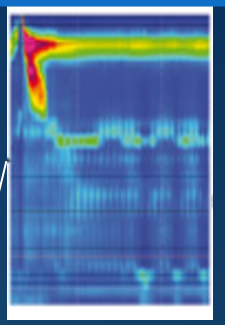
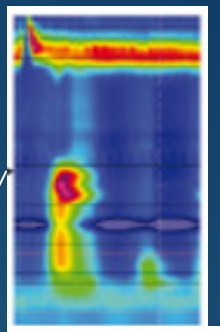
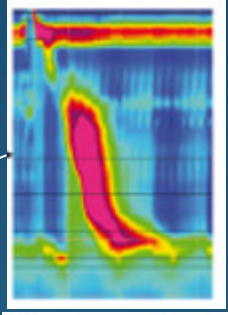
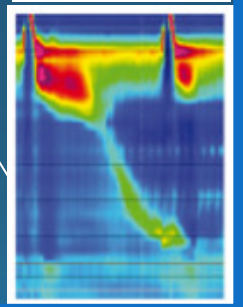
No evidence of EGJ outflow obstruction → ≥20% swallows with premature contractions

No → Step 2: Wet swallows in secondary position + MRS/RDC

Elevated LES IRP in varying positions ± elevated IBP/PEP

- Yes → 100% Absent Peristalsis All swallows are either failed or premature◊
- No → 100% Failed Peristalsis
  - Yes → Absent Contractility
  - No → ≥20% swallows with premature contractions
    - Yes → Distal Esophageal Spasm*
    - No → ≥20% swallows with hypercontractility
      - Yes → Hypercontractile Esophagus*
      - No → >70% ineffective or ≥50% failed swallows
        - Yes → Ineffective Esophageal Motility
        - No → No evidence of disorder of peristalsis → *Consider meal challenges based on symptom¥*

Disorders of Peristalsis

Yadlapati R, et al. *Neurogastroenterol Motil* 2020.
Patel DA, et al. *Gastroenterology* 2022.

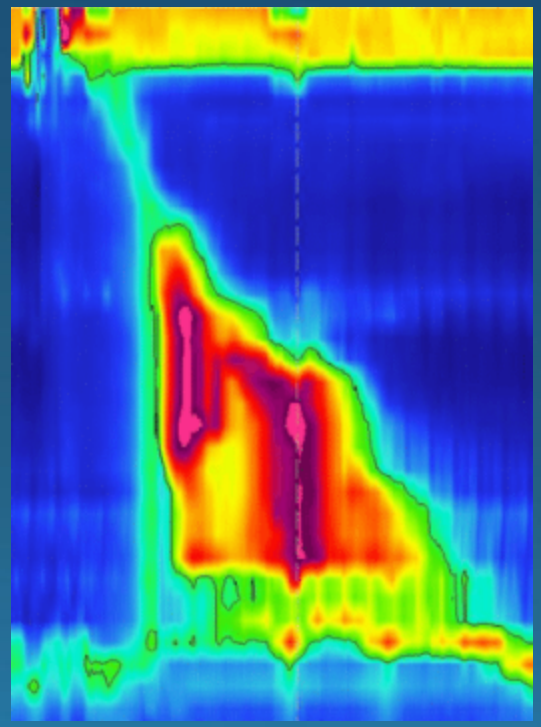
Case Study

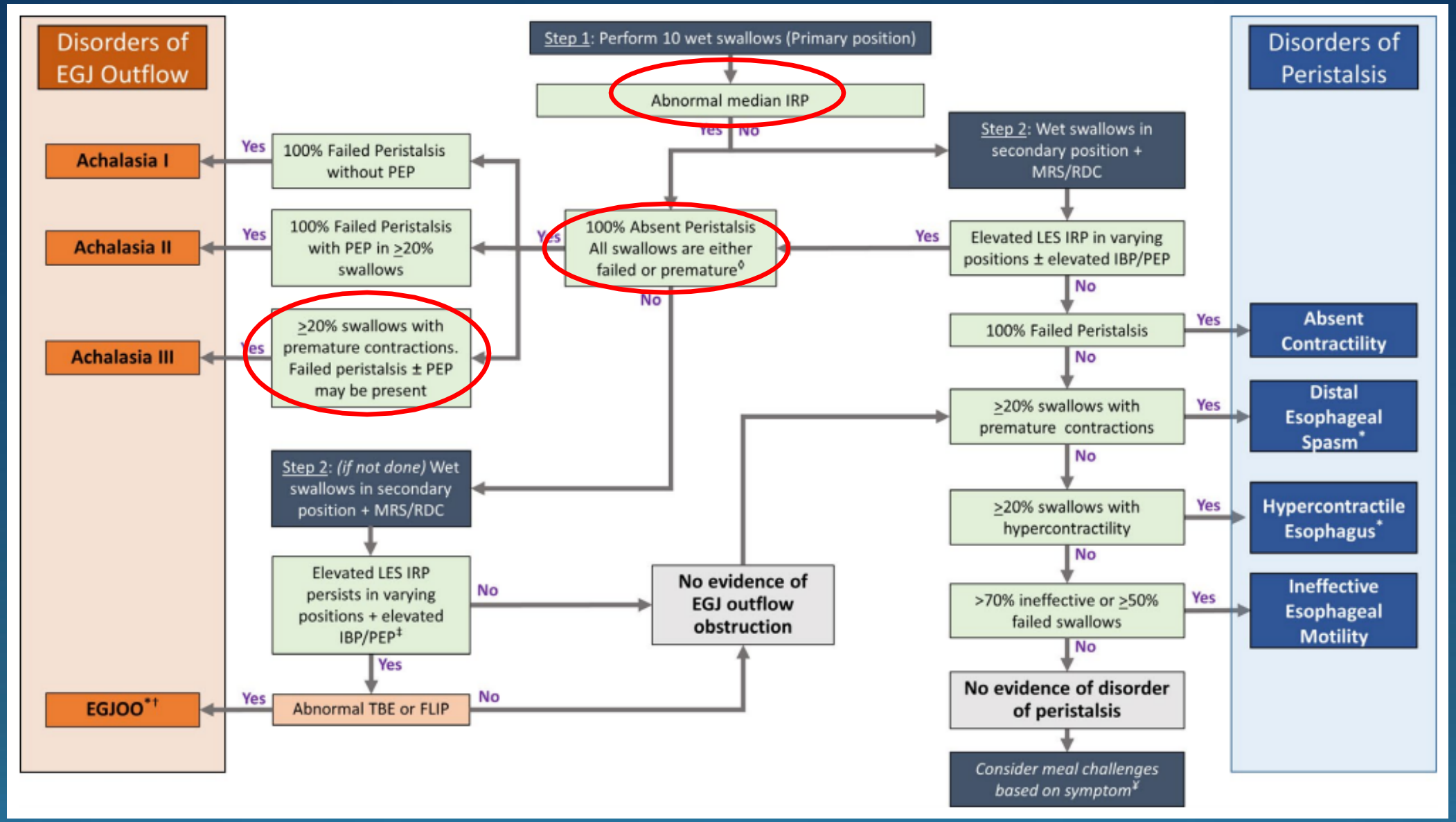
Endoscopy

- Spastic esophageal contractions during the exam and a puckering at the EGJ
- Biopsies from the proximal and distal esophagus normal

Esophageal Manometry

- Median IRP 29 mmHg
- Mean DCI 5500 mmHg·s·cm
- DL < 4.5s on 50% of swallows




Disorders of EGJ Outflow
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Abnormal median IRP
Yes
No
Step 2: Wet swallows in secondary position + MRS/RDC
Achalasia I
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100% Failed Peristalsis without PEP
Achalasia II
Yes
100% Failed Peristalsis with PEP in ≥20% swallows
Yes
100% Absent Peristalsis All swallows are either failed or premature◊
Yes
Elevated LES IRP in varying positions ± elevated IBP/PEP
No
Achalasia III
Yes
≥20% swallows with premature contractions. Failed peristalsis ± PEP may be present
No
100% Failed Peristalsis
Yes
Absent Contractility
No
Step 2: (if not done) Wet swallows in secondary position + MRS/RDC
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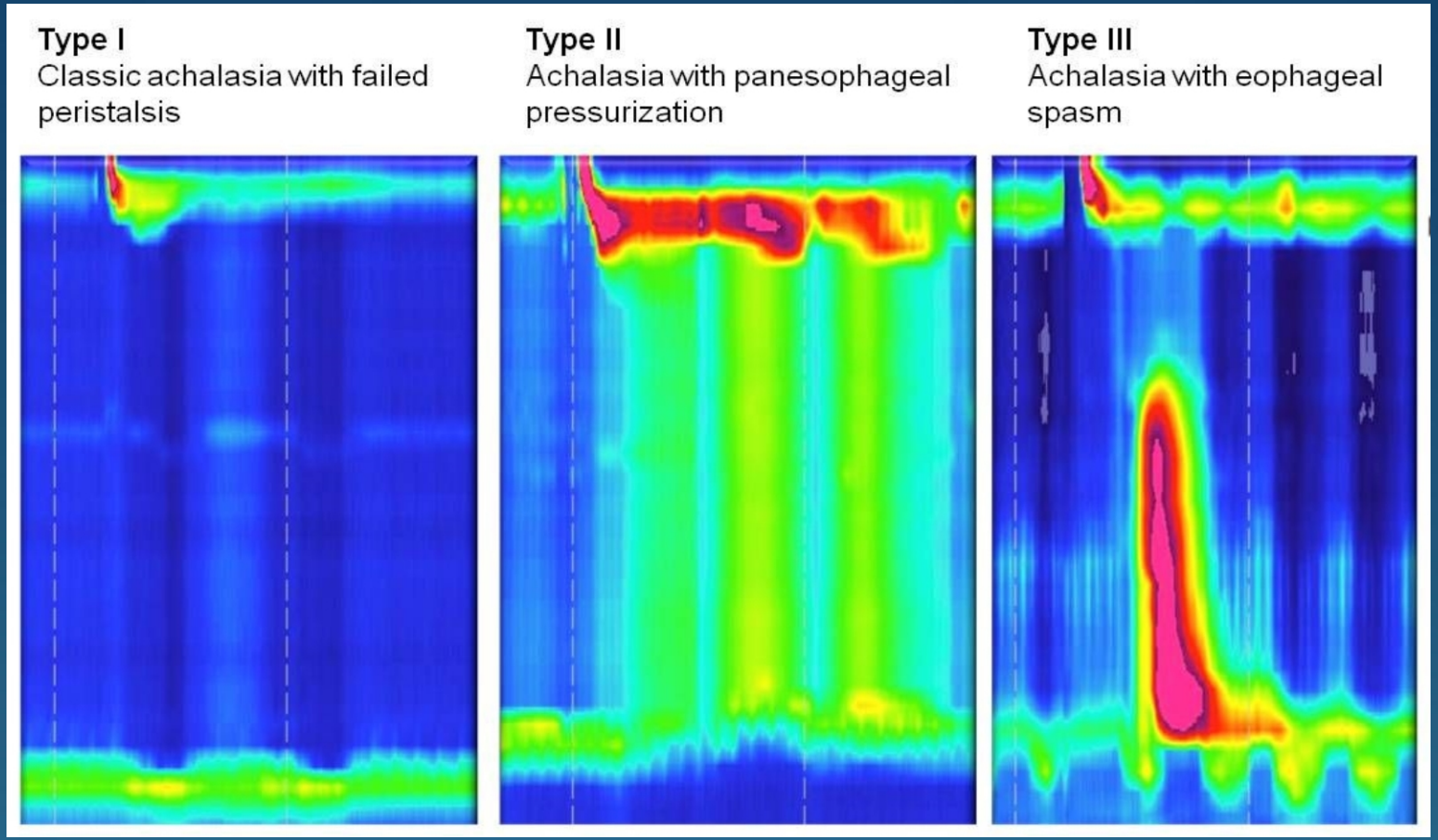
Consider meal challenges based on symptom¥
Disorders of Peristalsis

Achalasia Subtypes



100% failed swallows (all DCI's <100)

Panesophageal pressurization on ≥ 20% swallows

DL < 4.5 sec on ≥ 20% swallows

Symptoms of dysphagia ± chest pain and bland regurgitation
GERD symptoms not responsive to PPI therapy

Upper Endoscopy

- Mechanical Obstruction/Esophagitis: Treat appropriately
- Normal
- Esophageal dilatation, EGJ resistance, Retained food, Diverticulum

High Resolution Manometry, Timed Barium Esophagram
(FLIP may be helpful in patients unable to tolerate HRM)

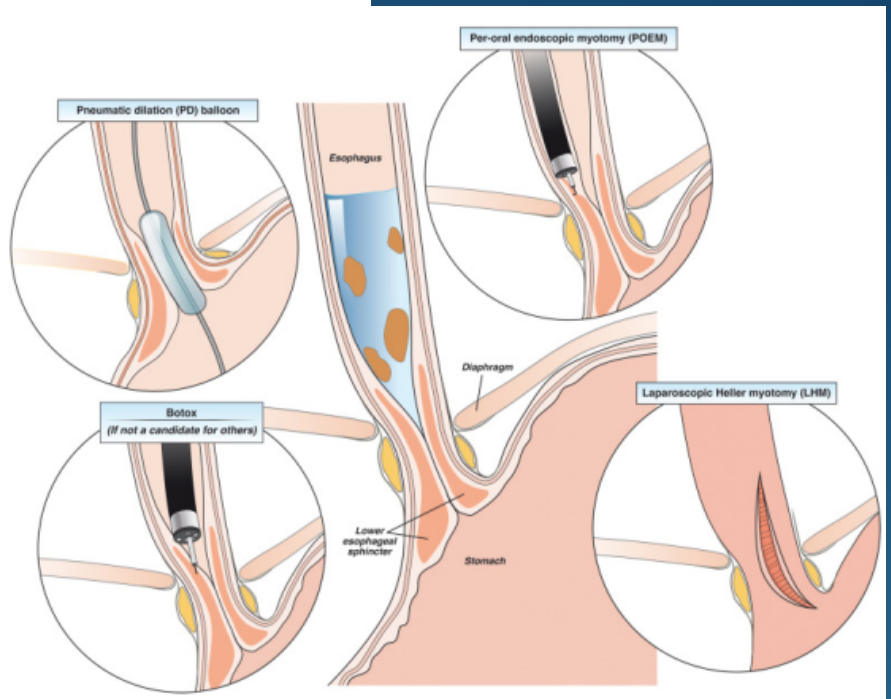
Type I or II Achalasia

Definitive Therapy:
- Pneumatic Dilation [30/35/40 mm]
  - May start with 35 mm in young males
  - Routine gastrograffin is not needed
  - Repeat in 2-4 weeks if no response
- Laparoscopic Heller Myotomy
  - Recommend Dor or Toupet fundoplication
- POEM
  - Standard myotomy length
  - All patients discharged with PPI therapy

Type III Achalasia

Definitive Therapy
- Tailored myotomy via POEM or tailored Heller myotomy

Patients unfit for definitive therapy:
- Botulinum toxin
- Smooth muscle relaxants



Vaezi M, et al. *Am J Gastroenterology* 2020.
Patel DA, et al. *Gastroenterology* 2022.

EGJOO: Chicago 3.0 → 4.0

Manometry findings

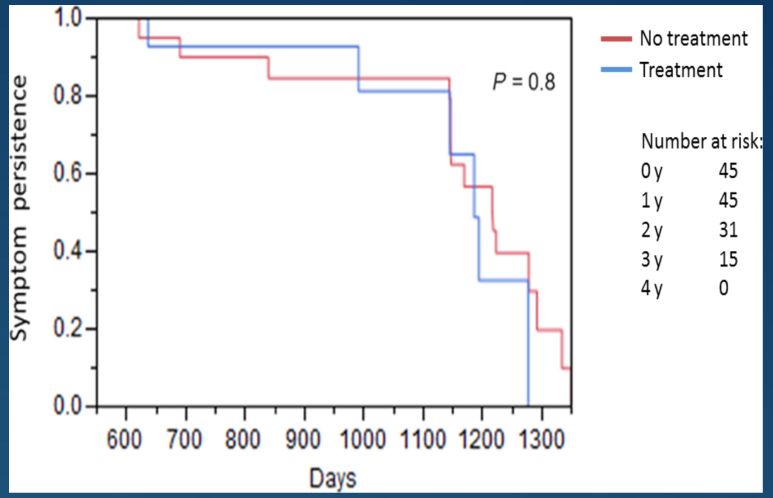
- Abnormal median IRP (supine and upright)
- ≥20% elevated intrabolus pressure (supine)
- Evidence of peristalsis
- Supportive: provocative maneuvers

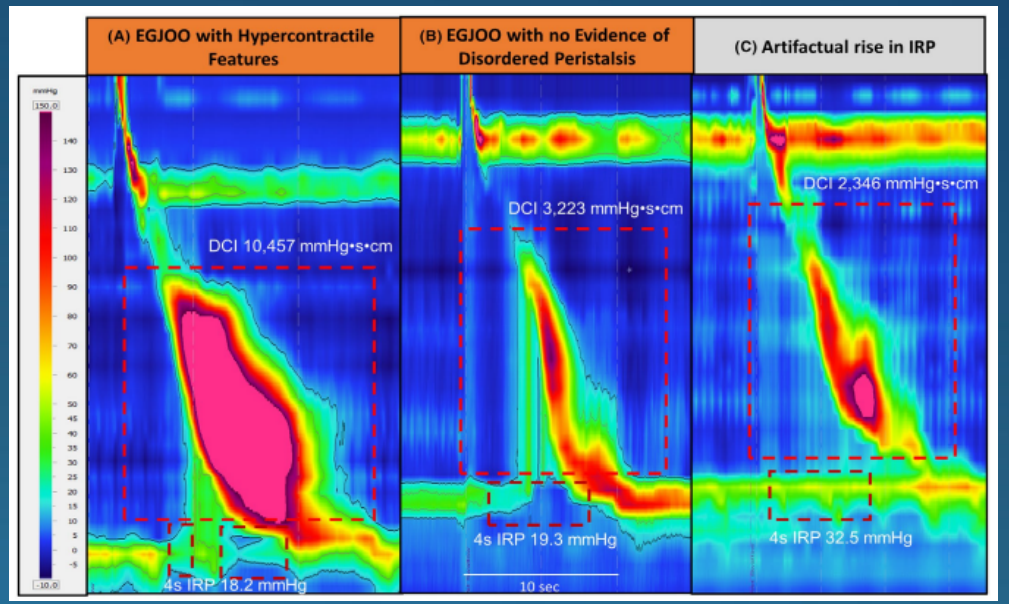
"Clinically relevant" symptoms

- Dysphagia
- Non-cardiac chest pain

Supportive investigation

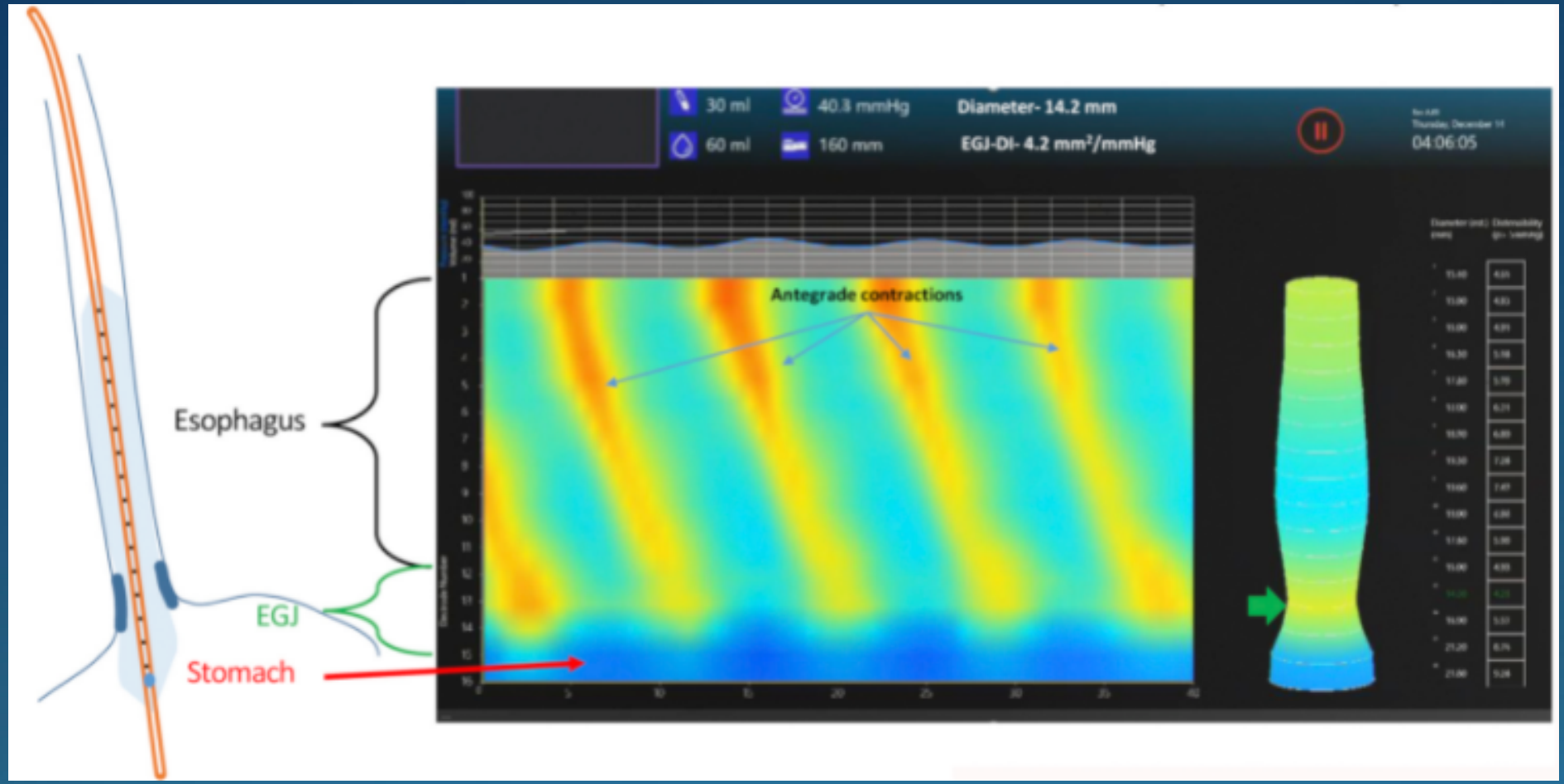
- TBE, preferably with tablet, OR
- FLIP





Schupack D, et al. *Neurogastroenterol Motil* 2017.
Yadlapati R, et al. *Neurogastroenterol Motil* 2020.

Functional Lumen Imaging Probe (FLIP)

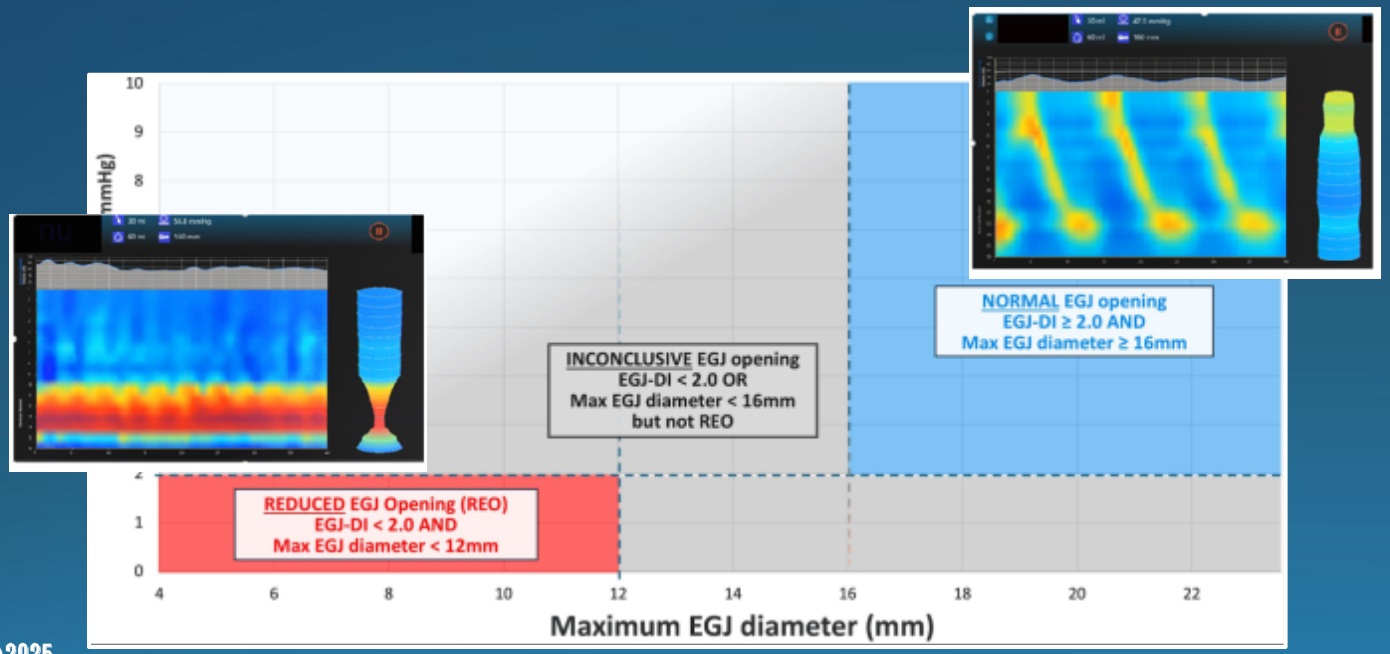


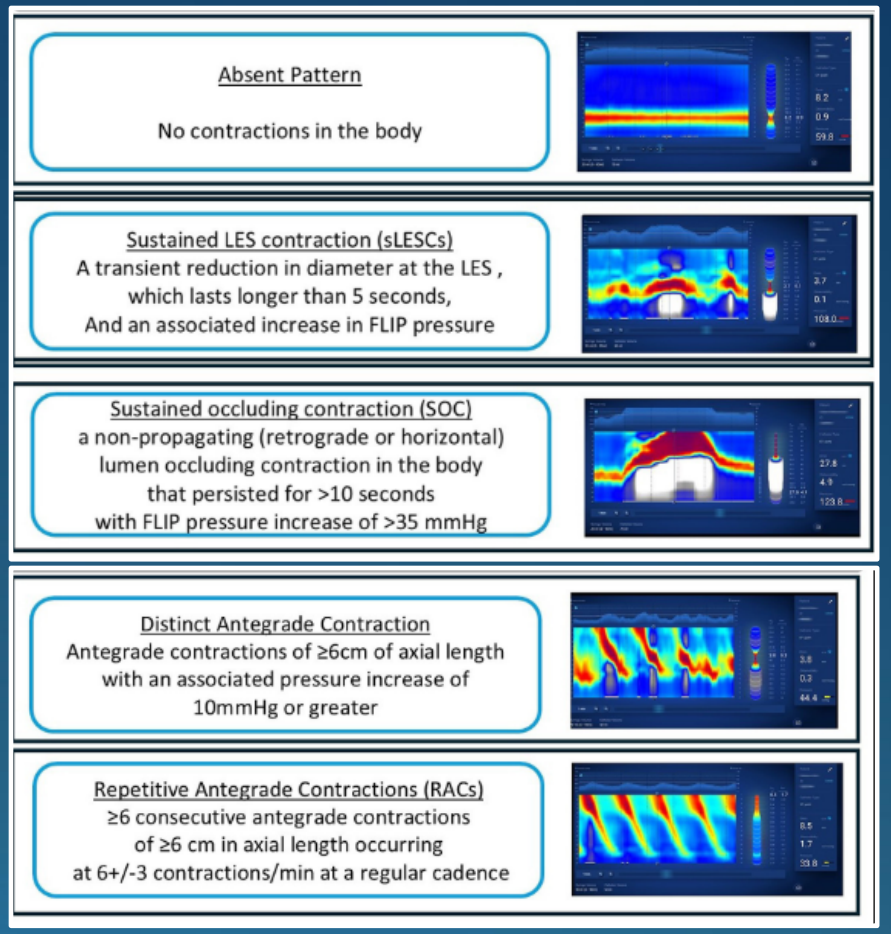
- EGJ opening
- EGJ-DI
- Maximum EGJ Diameter
- Contractile response

Donnan EN, et al. *Gastroenterol Clin N Am* 2020.

A Standardized Approach to Performing and Interpreting Functional Lumen Imaging Probe Panometry for Esophageal Motility Disorders: The Dallas Consensus

Dustin A. Carlson [1], John E. Pandolfino [1], Rena Yadlapati [2], Marcelo F. Vela [3], Stuart J. Spechler [4], Felice H. Schnoll-Sussman [5], Kristle Lynch [6], Adriana Lazarescu [7], Abraham Khan [8], Philip Katz [5], Anand S. Jain [9], C. Prakash Gyawali [10], Milli Gupta [11], Jose M. Garza [12], Ronnie Fass [13], John O. Clarke [14], Reena V. Chokshi [15], Joan Chen [16], Karthik Ravi [17], Walter W. Chan [18 19]...Vani J.A. Konda [4]





FLIP Panometry Motility Classification – version 2.0

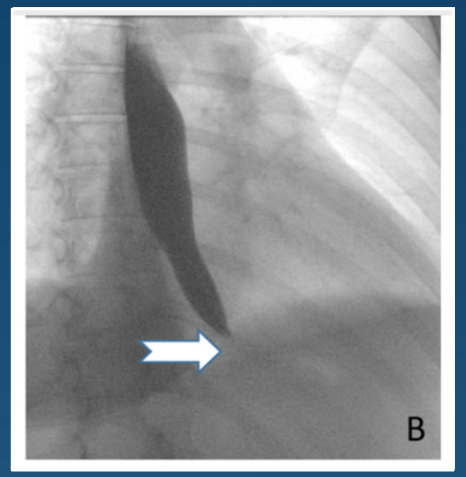
The Dallas Consensus

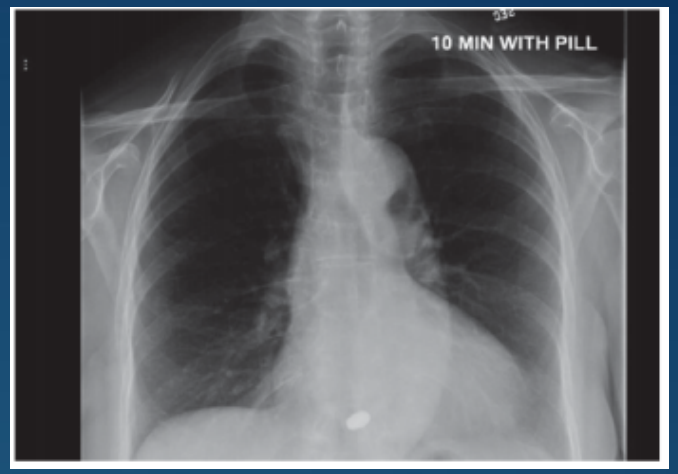
Contractile Response (CR)	Esophagogastric Junction (EGJ) Opening: Normal (NEO)	Esophagogastric Junction (EGJ) Opening: *Inconclusive*	Esophagogastric Junction (EGJ) Opening: Reduced (REO)
Spastic	Possible Spasm	Possible Obstruction **further classify by CR pattern*	Spastic Obstruction
Disordered	Possible Spasm	Possible Obstruction **further classify by CR pattern*	Spastic Obstruction
Normal	Normal	Possible Obstruction **further classify by CR pattern*	Obstruction with Normal Contractility
Diminished	Hypocontractility	Possible Obstruction **further classify by CR pattern*	Non-spastic Obstruction
Absent	Hypocontractility	Possible Obstruction **further classify by CR pattern*	Non-spastic Obstruction

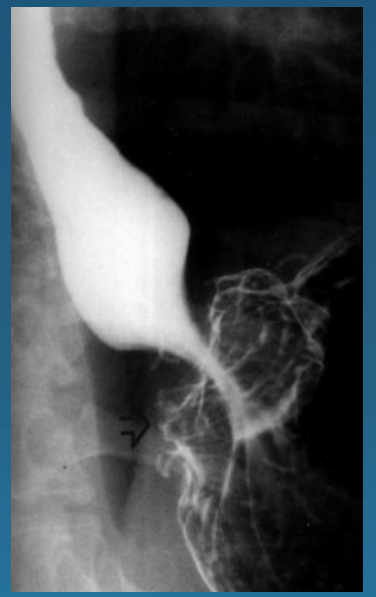
Gastroenterology

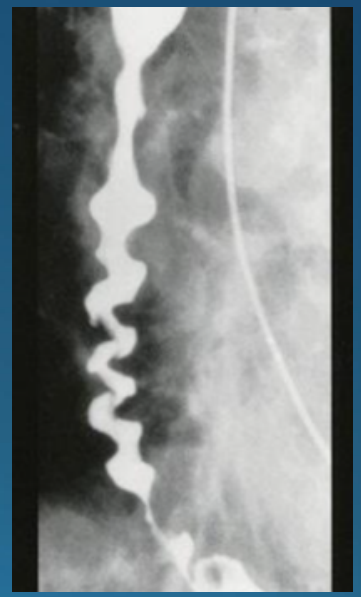
Esophagram

- Standard v. timed protocols
- Barium tablet
- Variable interpretation
- Contractility cannot be accurately assessed





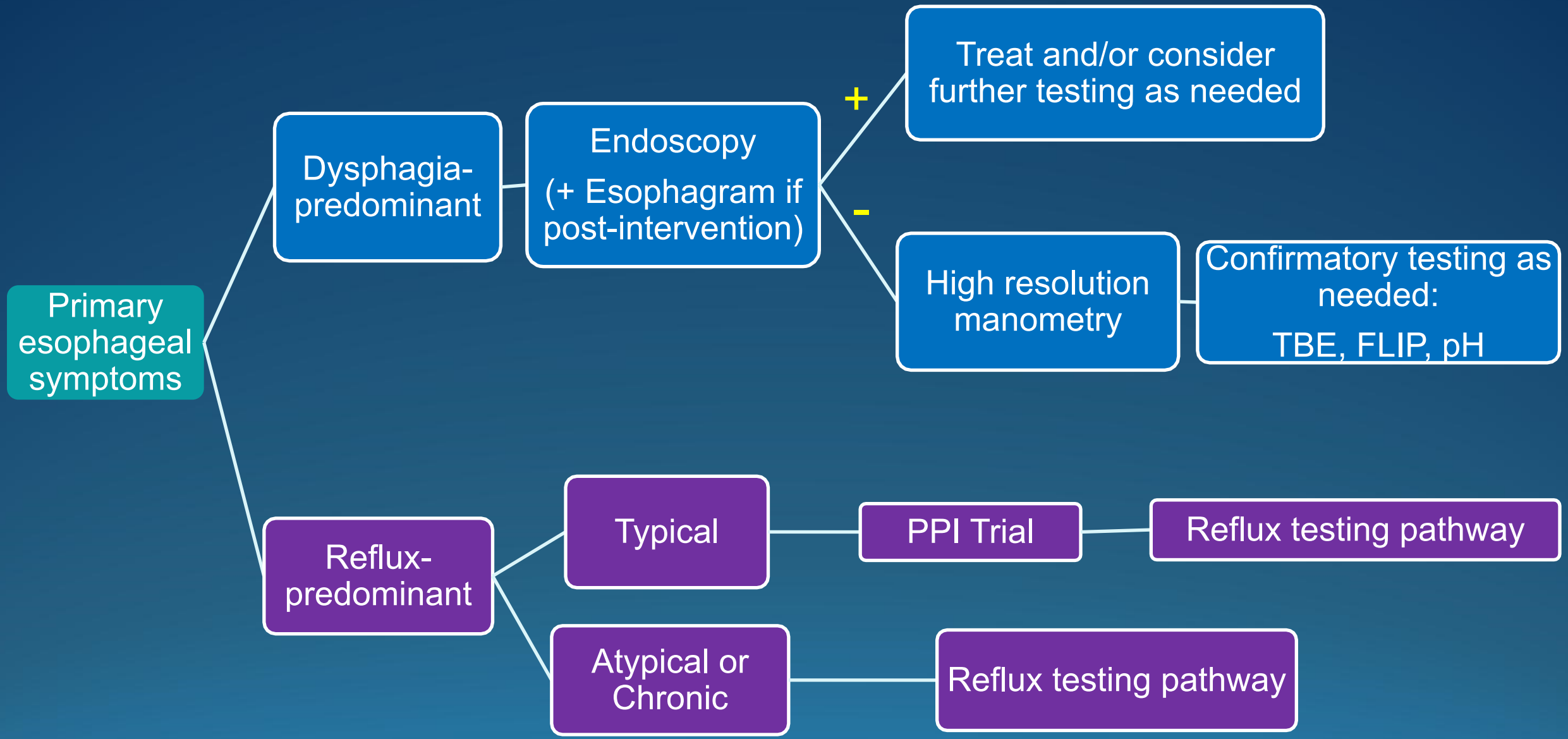




Case Outcome

- Patient underwent a tailored endoscopic myotomy
- Continues to do well, with PPI currently used as needed

General Algorithm



Take Home Points

- No one test assesses all of esophageal physiology!
- Start with the primary symptoms, then move to endoscopy for patients with dysphagia.
- Follow the CC v4 algorithm to make a *manometric* diagnosis; clinical diagnoses may require complementary testing.
- FLIP panometry allows for confirmation of outflow obstruction and can rule out achalasia if normal.
- Timed barium esophagram is an adjunct tool used primarily for confirmation of outflow obstruction.