NEW YORK SOCIETY FOR GASTROENTEROLOGY & ENDOSCOPY
48th Annual
NEW YORK COURSE
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NYSGE
New York Society for Gastroenterology and Endoscopy

POEMS - When are they indicated, & How are they performed?

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Director of Advanced Endoscopic Resection

Weill Cornell Medicine

Disclosures

Boston scientific, consulting

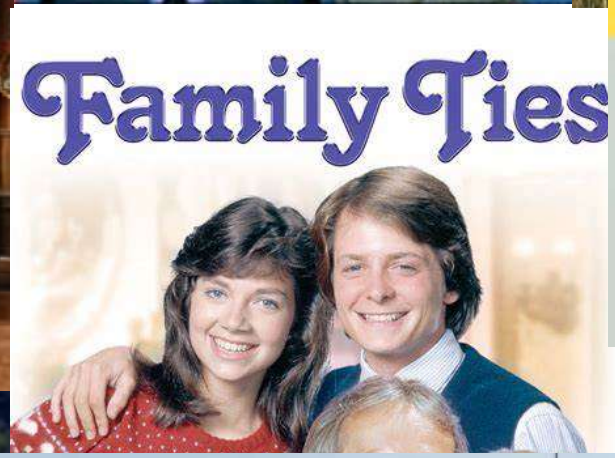
Conmed, consulting

Eli Lilly, consulting


The Waltons

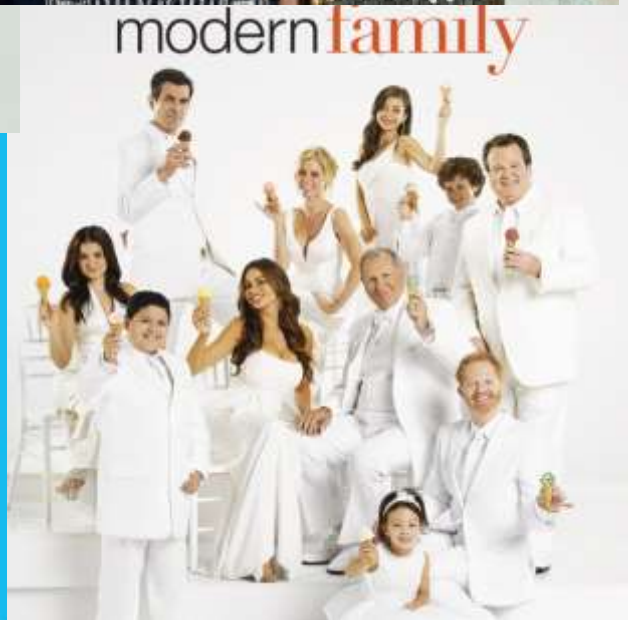

The Brady Bunch


Little House on the Prairie


Family Ties


FAMILY MATTERS

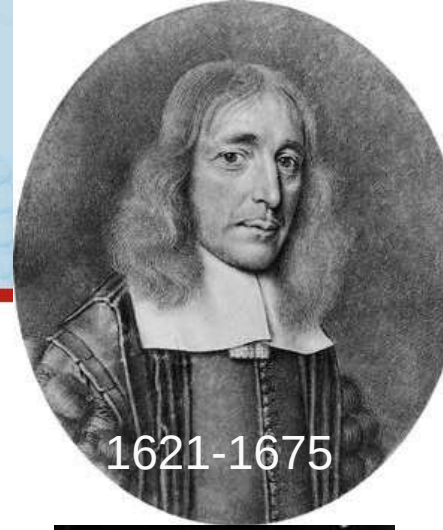

3RD ROCK
FROM THE SUN
SEASON 3


modern family

POEM Family

Z or C-POEM	(Zenker's)
E-POEM	(Achalasia)
G-POEM	(Gastroparesis)
B-POEM	(Biliary Sphincterotomy)
P-POEM	(Pancreatic Sphincterotomy)
S-POEM	(Sleeve gastrectomy)
D-POEM?	(Diverticular disease)
PREM	(Hirschsprung's disease)

Achalasia - history



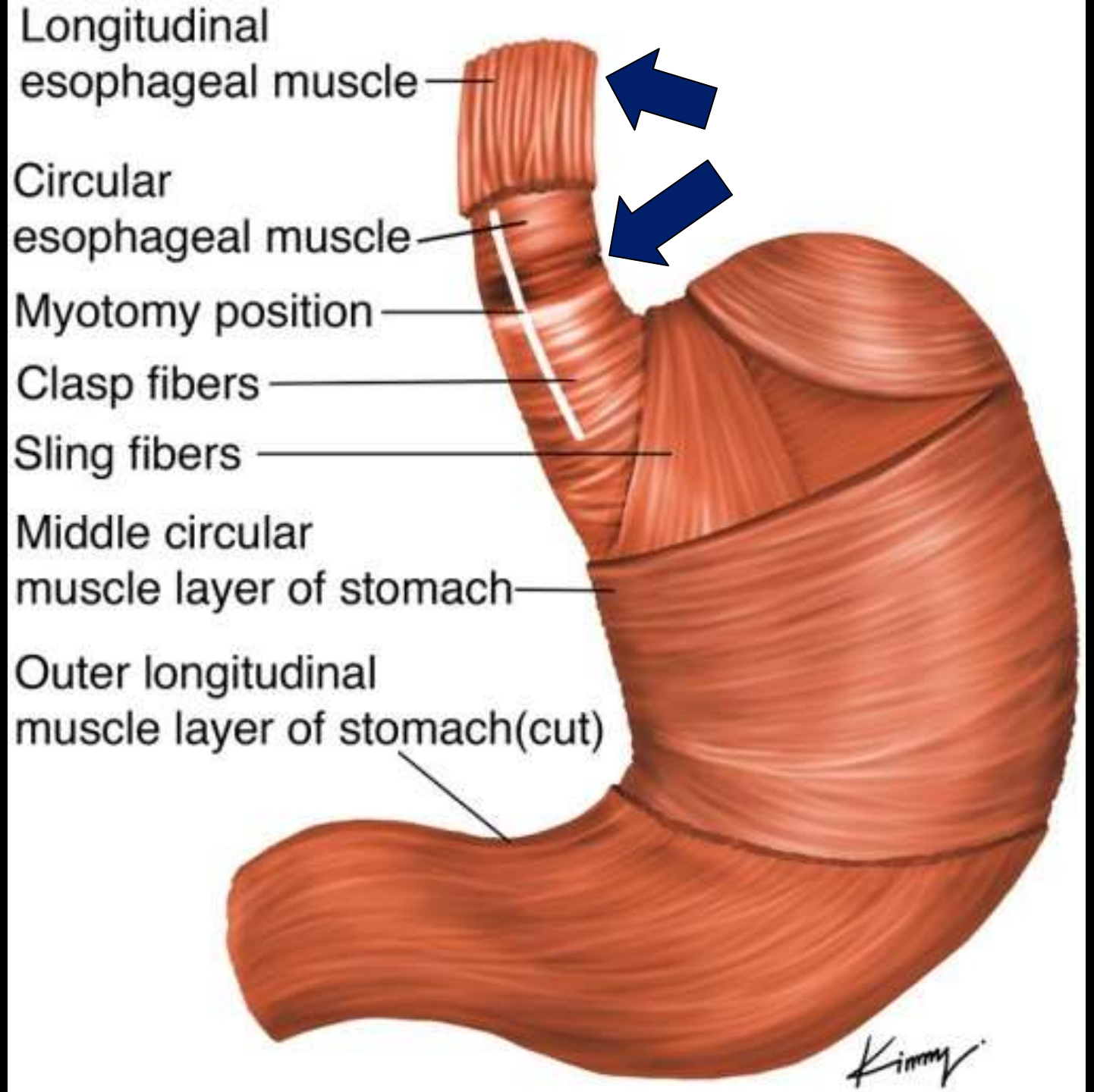
- *Gr: a (*no*) – chalasis* (slackening, relaxation)
- Sir Thomas Willis 1672 described ‘cardiospasm’ – dilated w whalebone
- Ernst Heller first esophagomyotomy 1913
- FC Lendrum changed name to achalasia 1937
  [Arch Int Med1937;59:474-451]
- First LHM 1991
  [Shimi S et al Laparoscopic cardiomyotomy for achalasia. J R Coll Surg Edinb 1991;36: 152-4]

Epidemiology

- Mean incidence:
  - 0.3-1.63/100,000 adults per year
  - 0.18/100,000 in children <16y per year
- Mean prevalence 10/100,000
- Equal frequency in men/women all races
- Incidence increases with age
  - Mean age at diagnosis = 50y
- Mean incidence in adults >80y = 17/100,000

Boeckxstaens et al. *Lancet* 383.9911 (2014):83-93

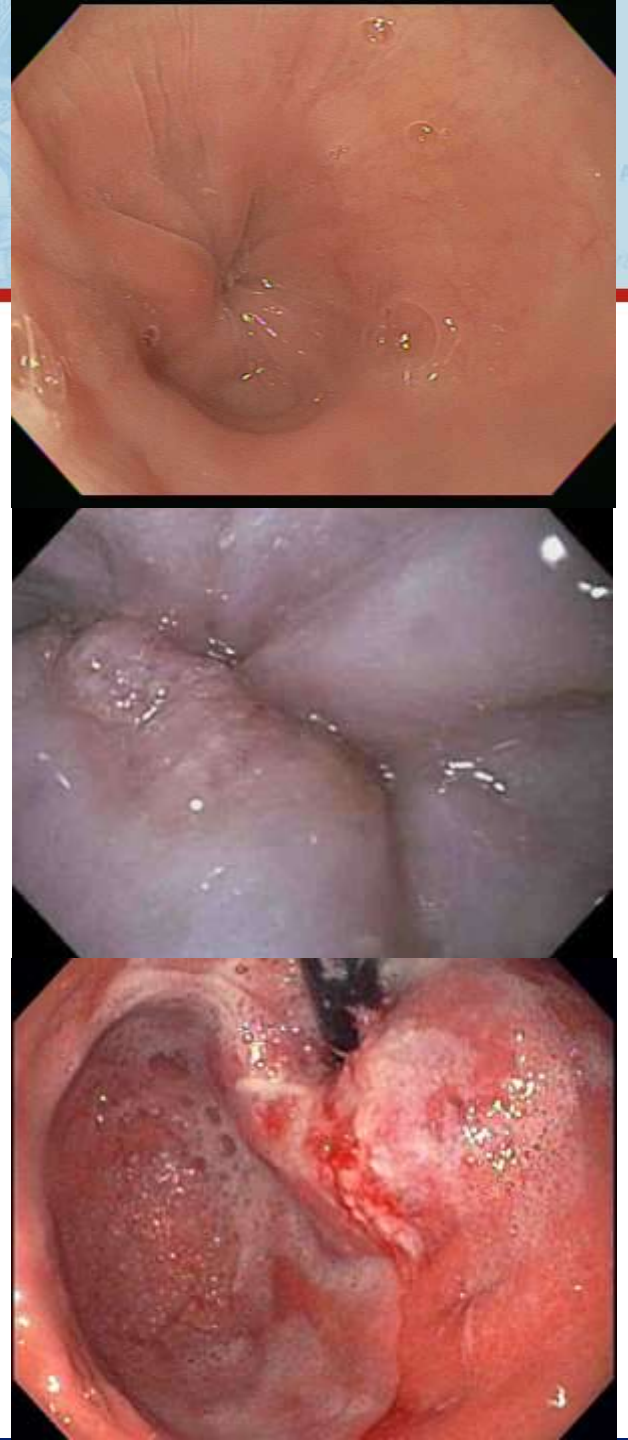
Singapore - 600 cases?

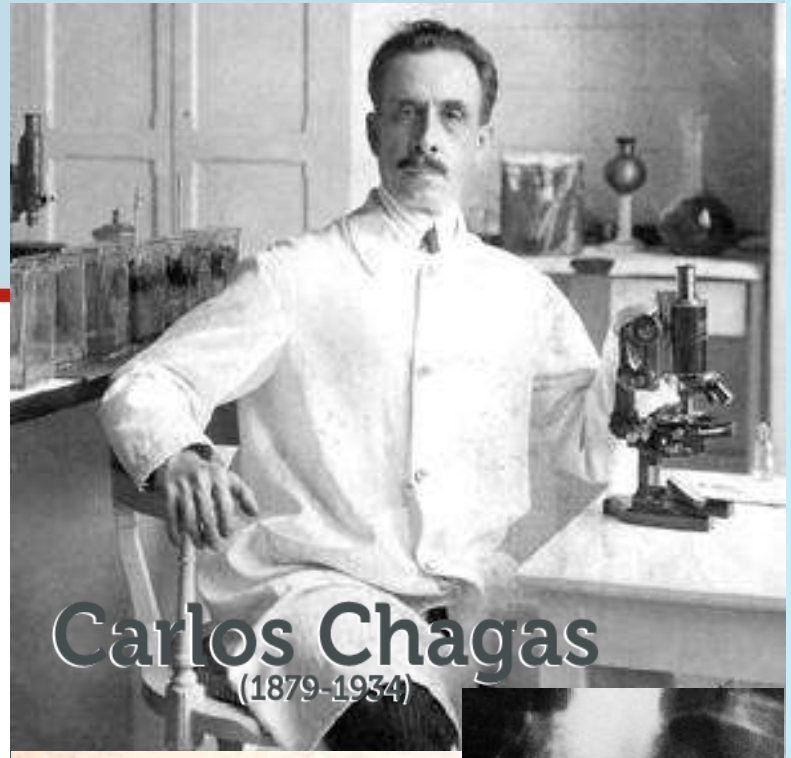

Longitudinal esophageal muscle
Circular esophageal muscle
Myotomy position
Clasp fibers
Sling fibers
Middle circular muscle layer of stomach
Outer longitudinal muscle layer of stomach(cut)

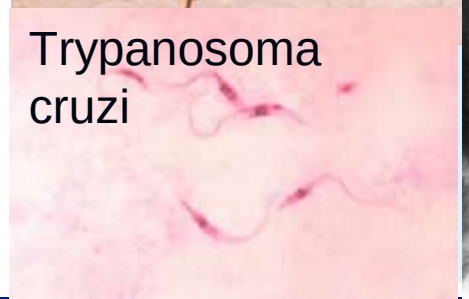
Etiology

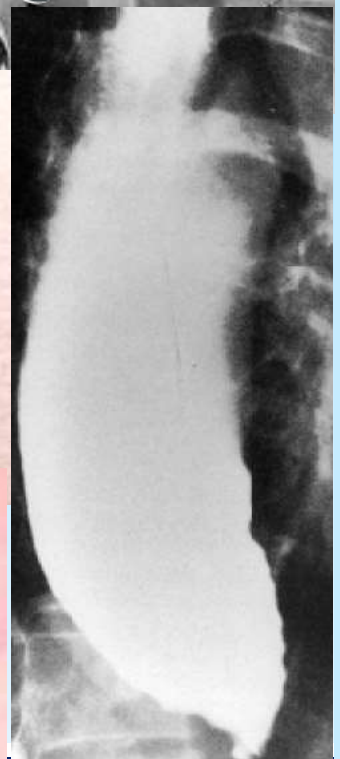
- **Idiopathic (most common)**
- Pseudoachalasia (2-4%)
  - Neoplastic infiltration
- Chagas disease
  - T. Cruzi infection
- Allgrove syndrome

(Achalasia-Addisonianism-Alacrima)



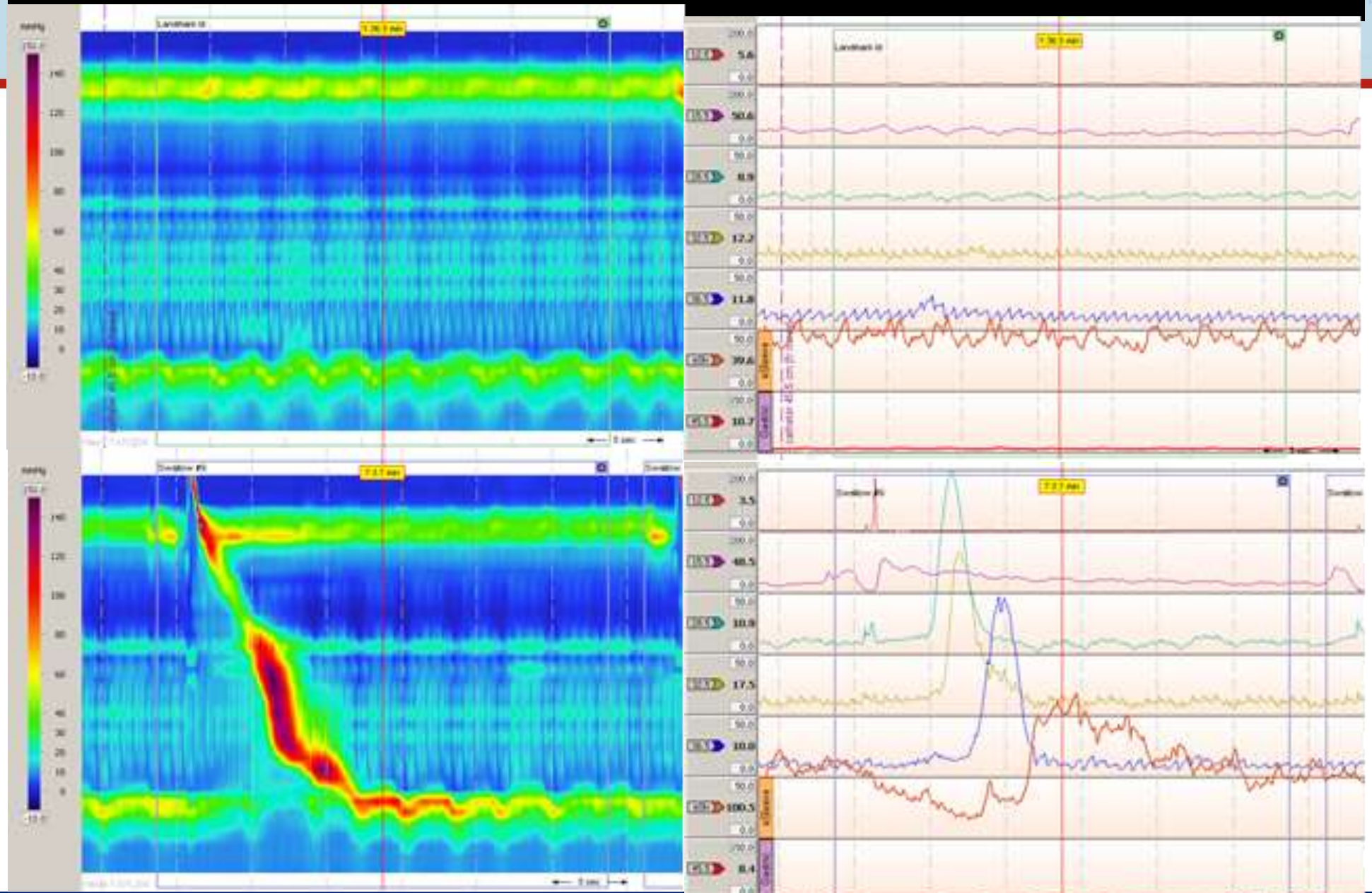


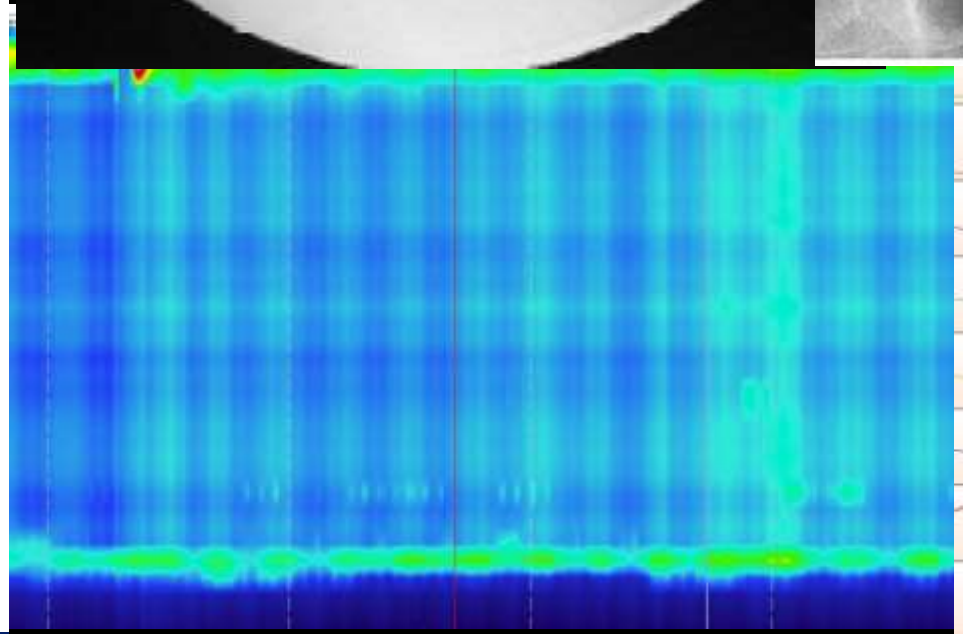


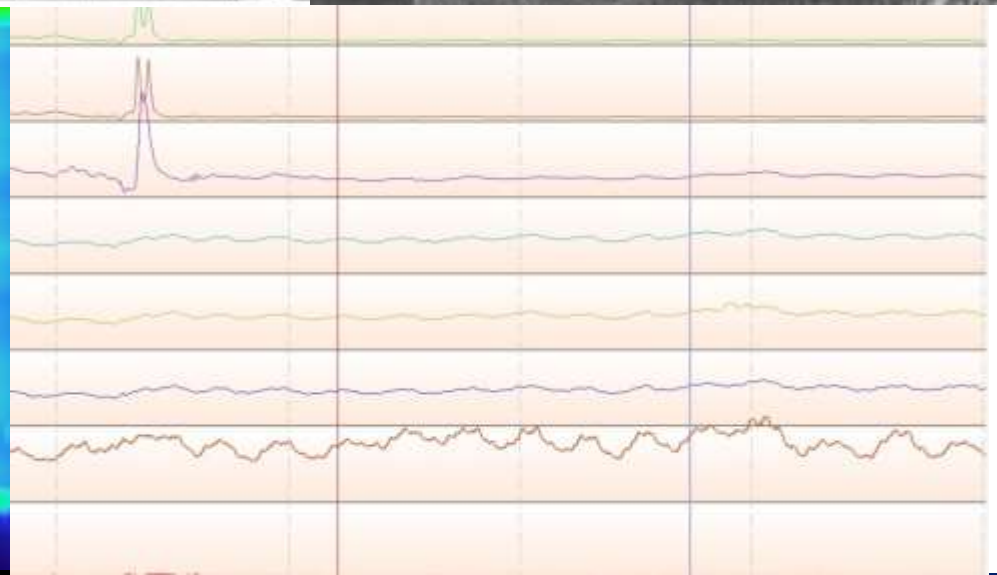


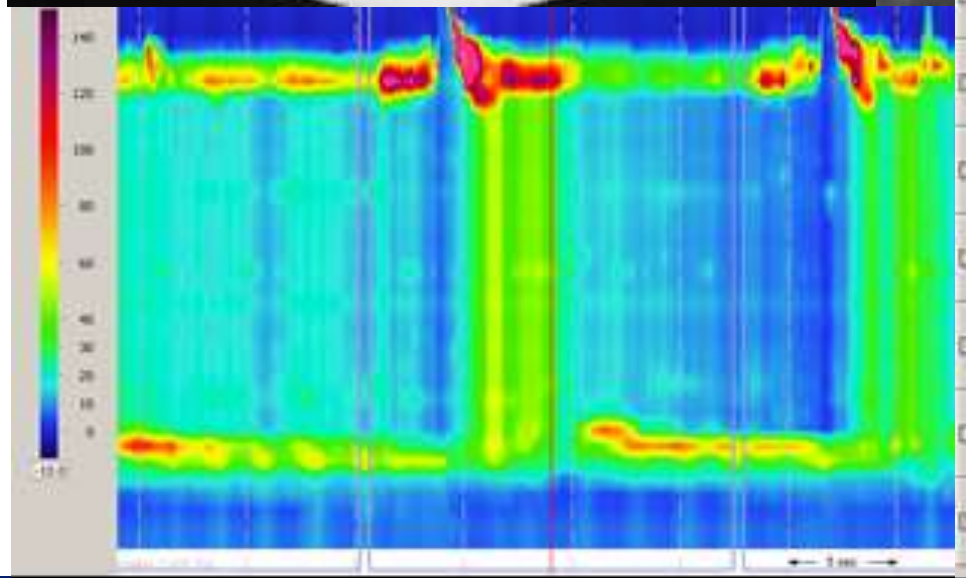
Chagas Disease (1909)

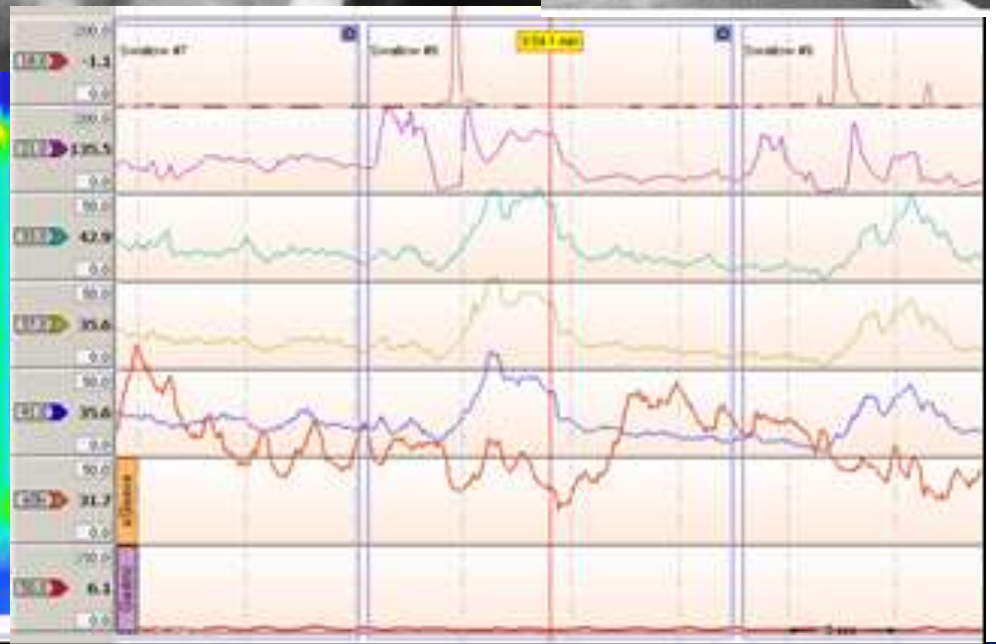
Normal HRM

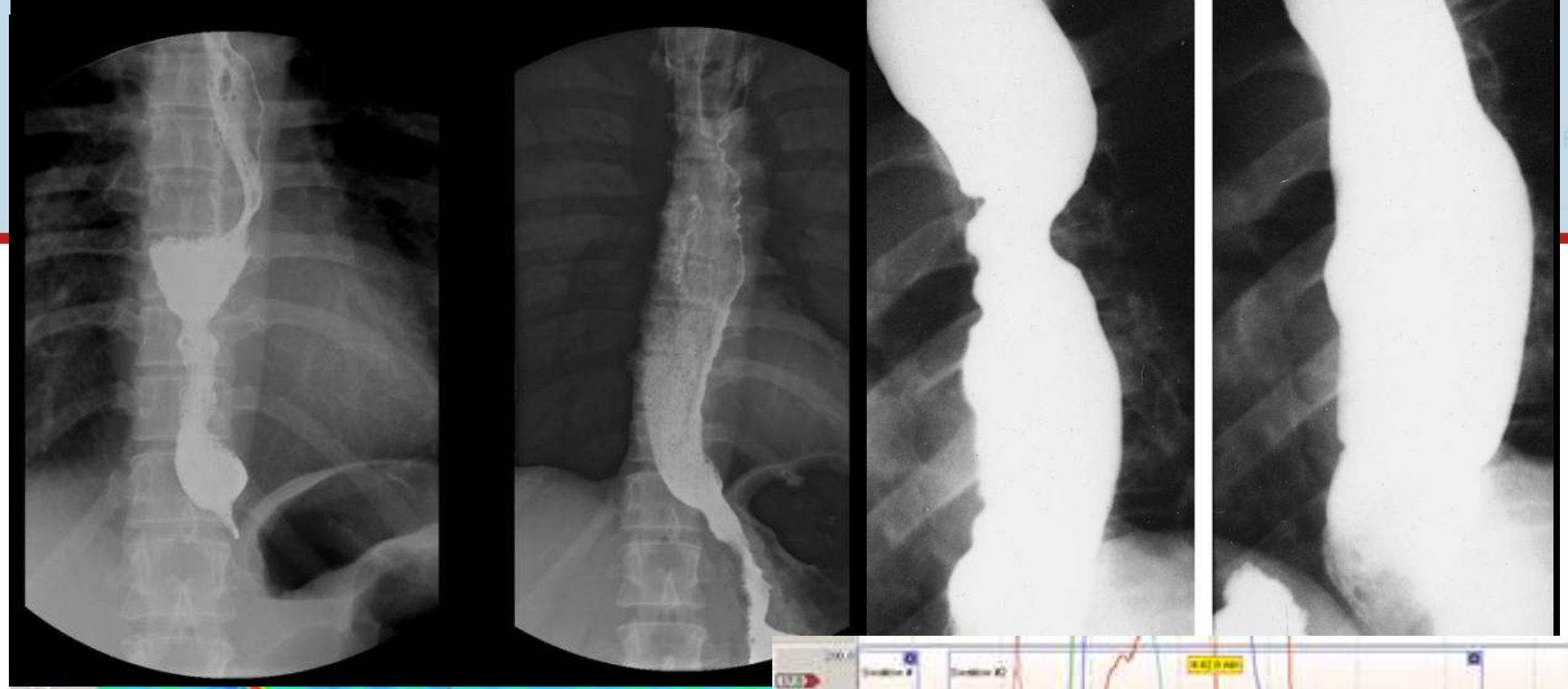


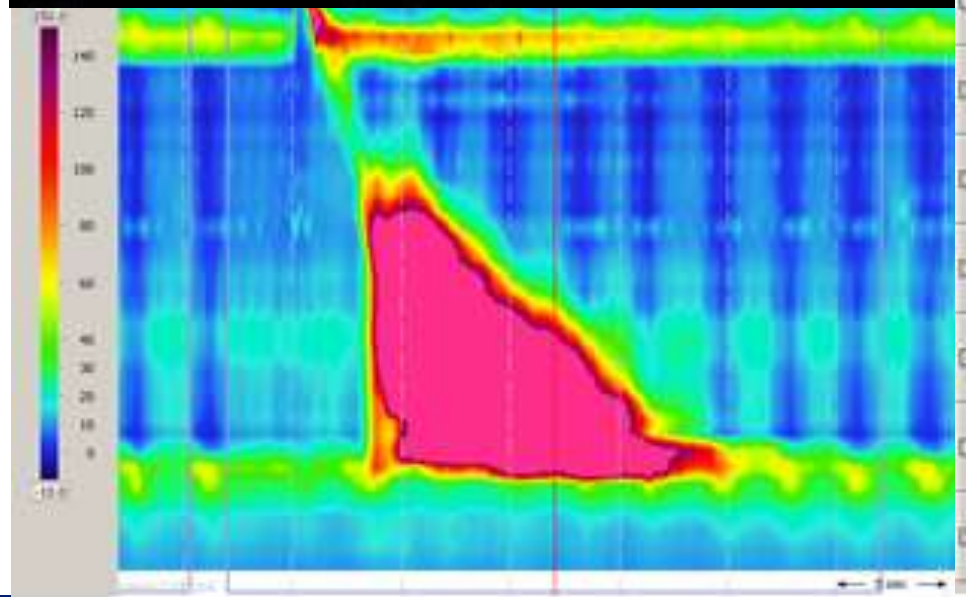












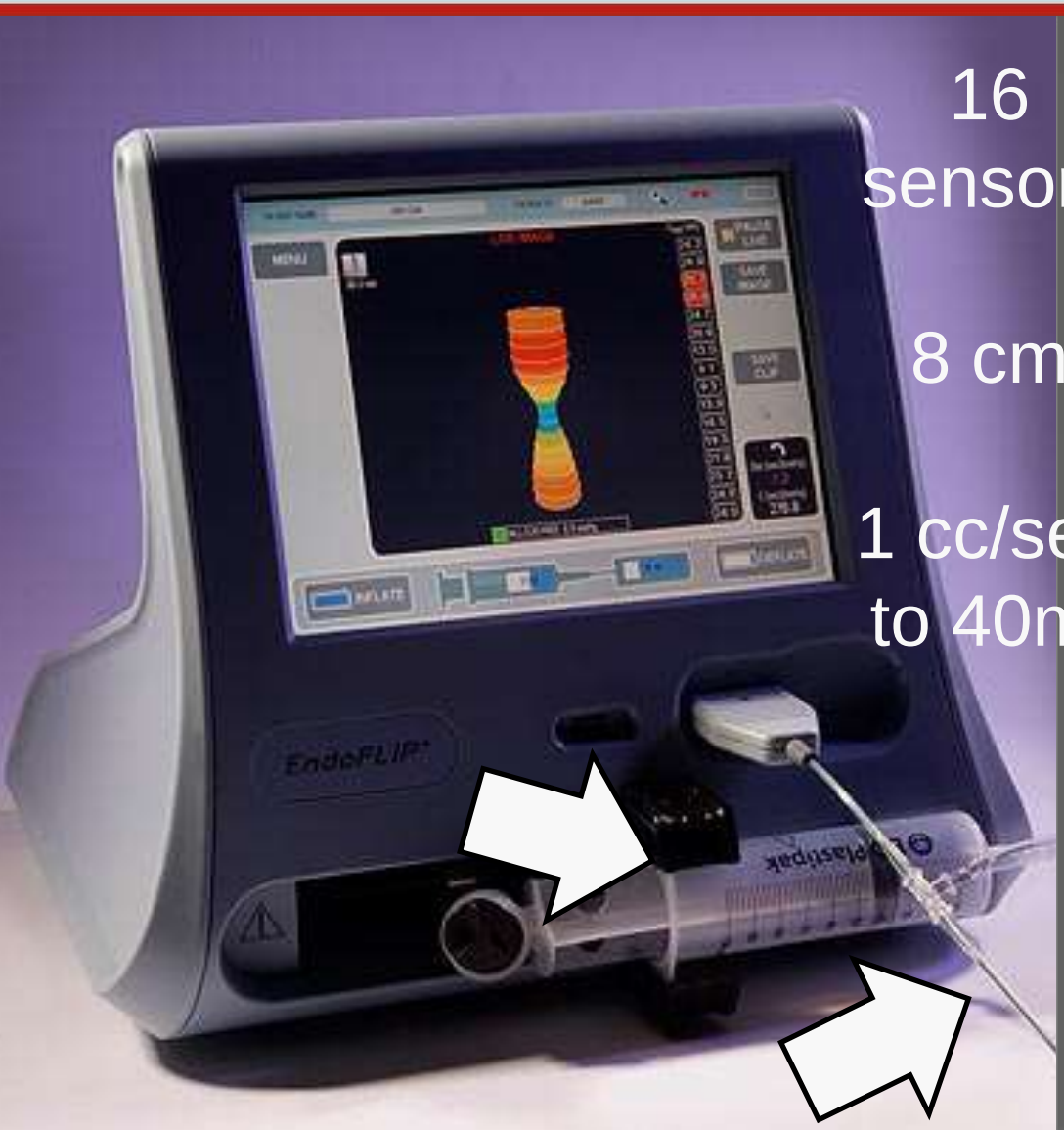
Eckardt Dysphagia Score (1997)

Score	Symptom			
	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

Treatment: How do we evaluate success in treating Achalasia?

- Eckardt Score<3 after therapy
- Decrease in LES pressure (>50%)
- Improvement in esophageal emptying
  - Timed Barium Esophagram
- EndoFLIP (Endoluminal Functional Lumen Imaging Probe) increased GEJ diameter and cross-sectional area/distensibility

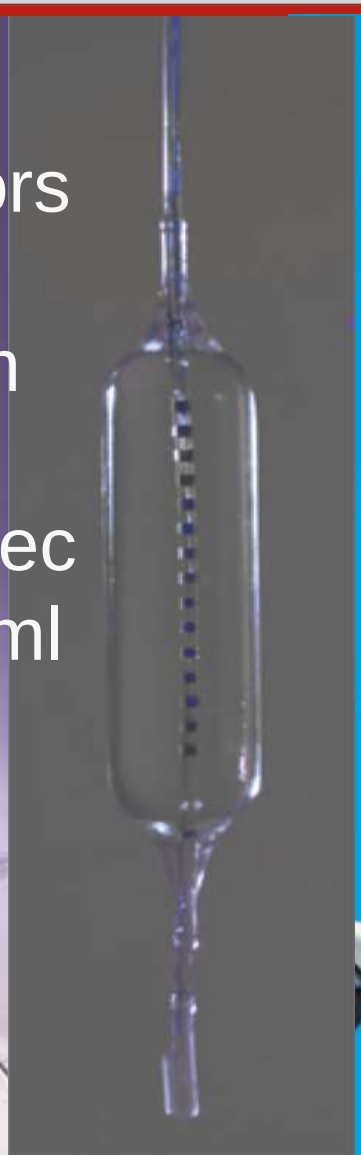
GEJ Distensibility Measurement
Endoscopic Functional Lumen Image Probe (EndoFLIP®)



16
sensors

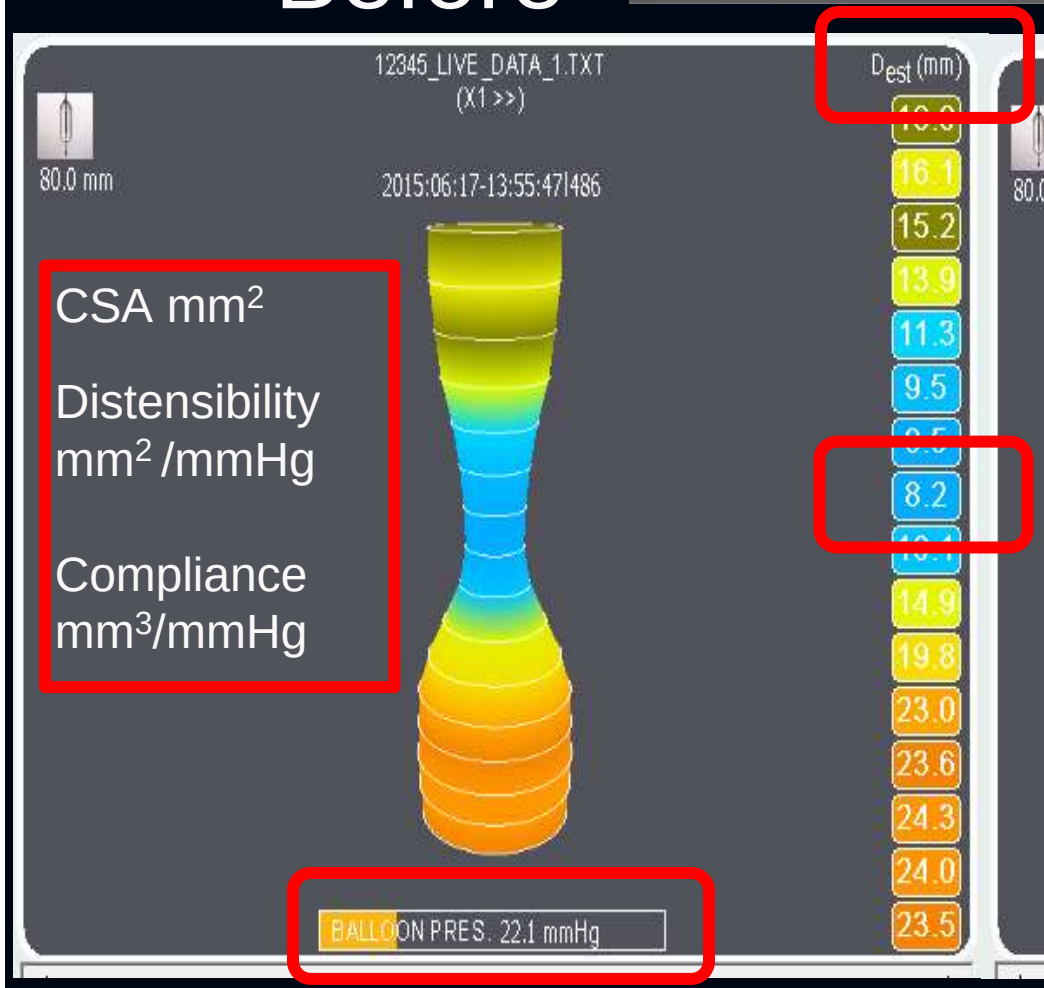
8 cm

1 cc/sec
to 40ml



EndoFLIP before and after POEM

Before



CSA mm^2

Distensibility mm^2 /mmHg

Compliance mm^3/mmHg

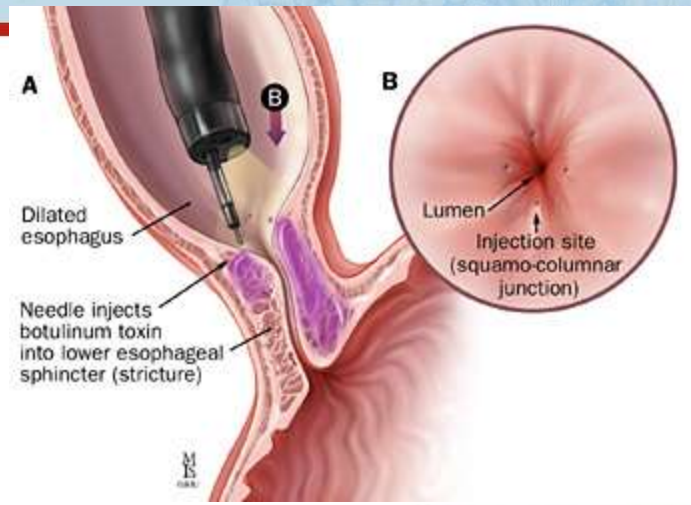
After

Options for Palliation

- Medical: nitrates, Ca++ channel blockers
- Botox injection (BTI)
- Pneumatic balloon dilation (PD)
- Heller myotomy (HM) ± fundoplication
- Esophagectomy
- PerOral Endoscopic Myotomy (POEM)

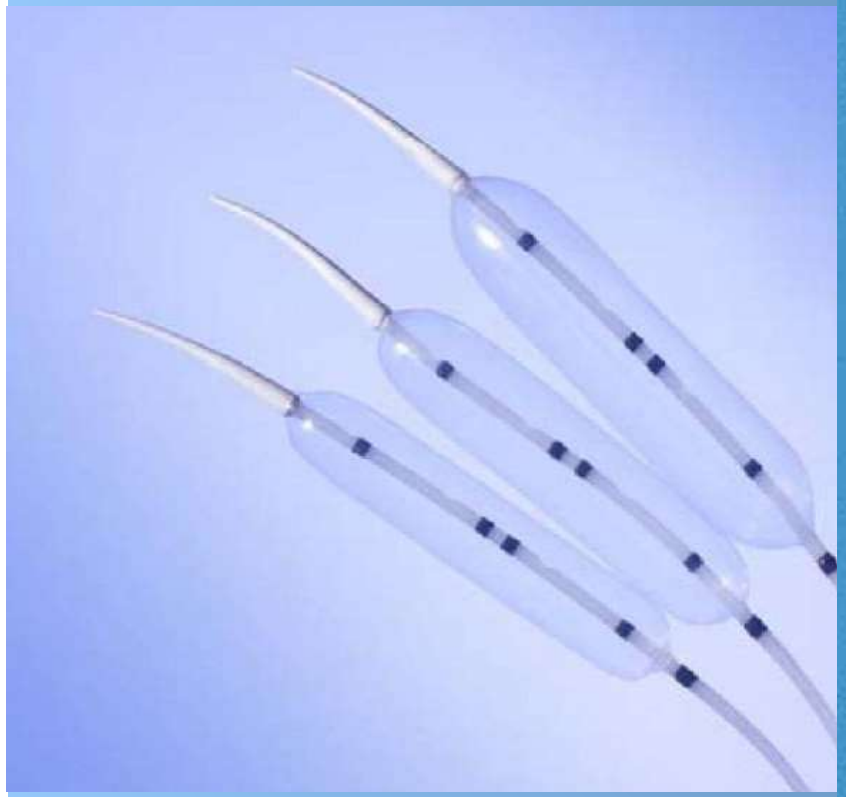
Botulinum Toxin Injection (BTI)

- Simple
- Repeat less effective
- 75% effective initially
- 75% fail at one year
- Less effective than balloon
- Increases difficulty myotom
- Rescue treatment



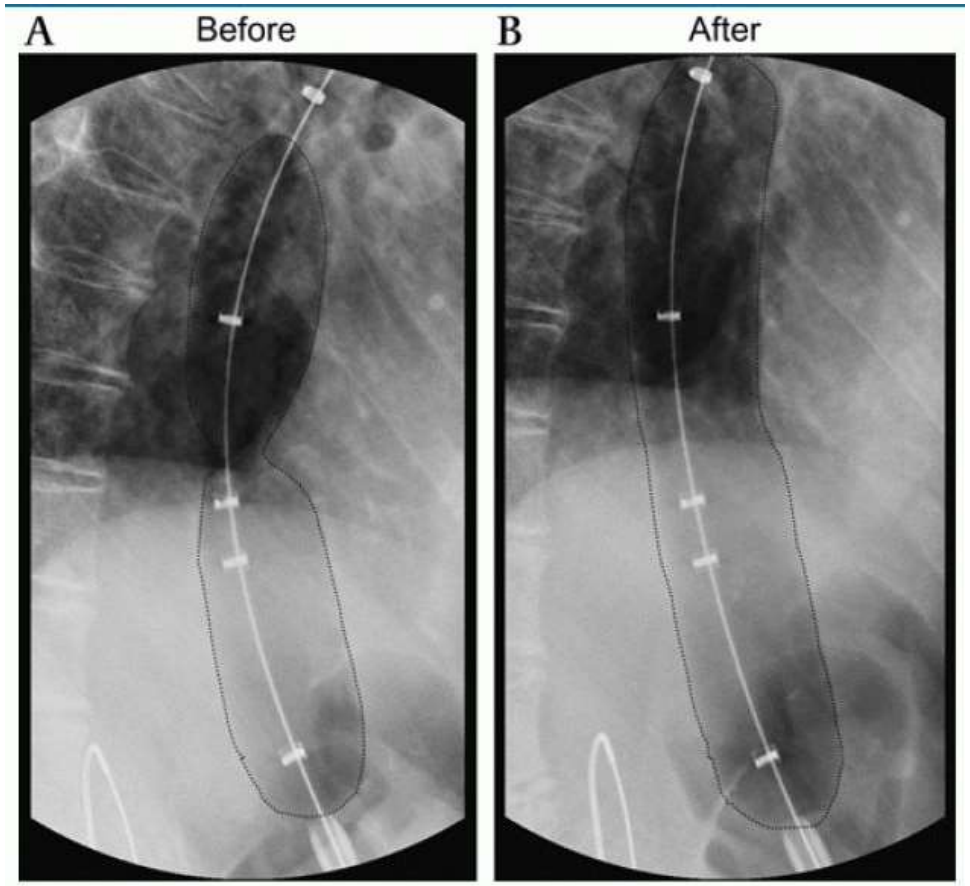
Pneumatic Balloon Dilation (PD)

30, 35, 40 mm

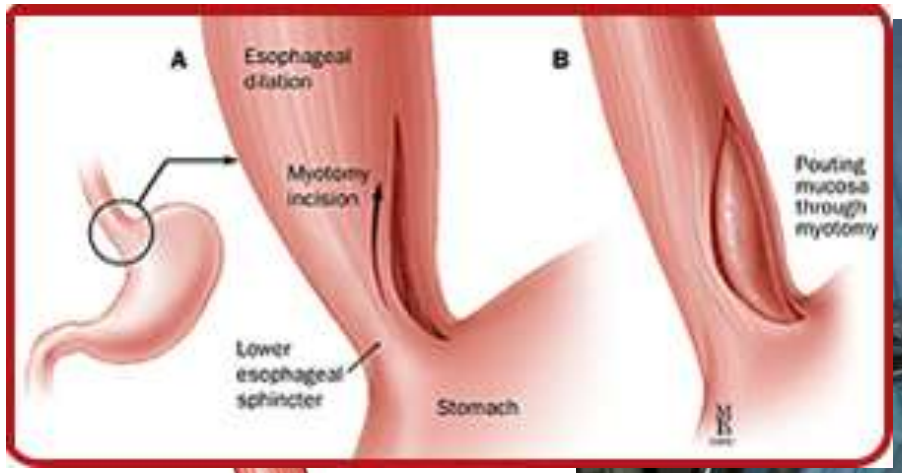


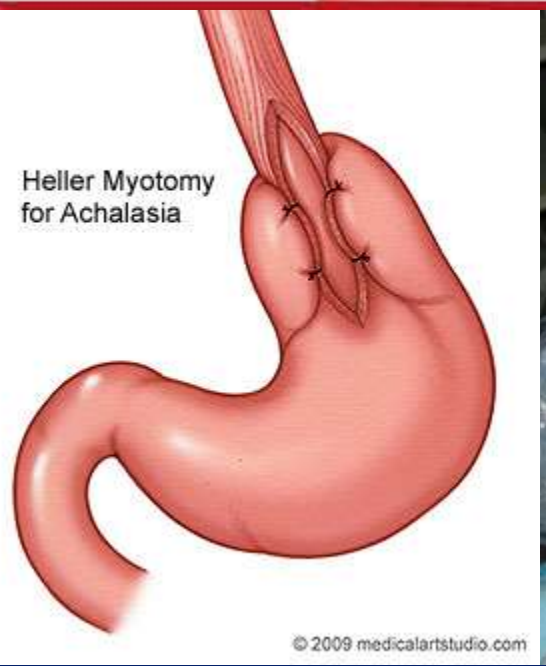
Pneumatic Balloon Dilation (PBD)

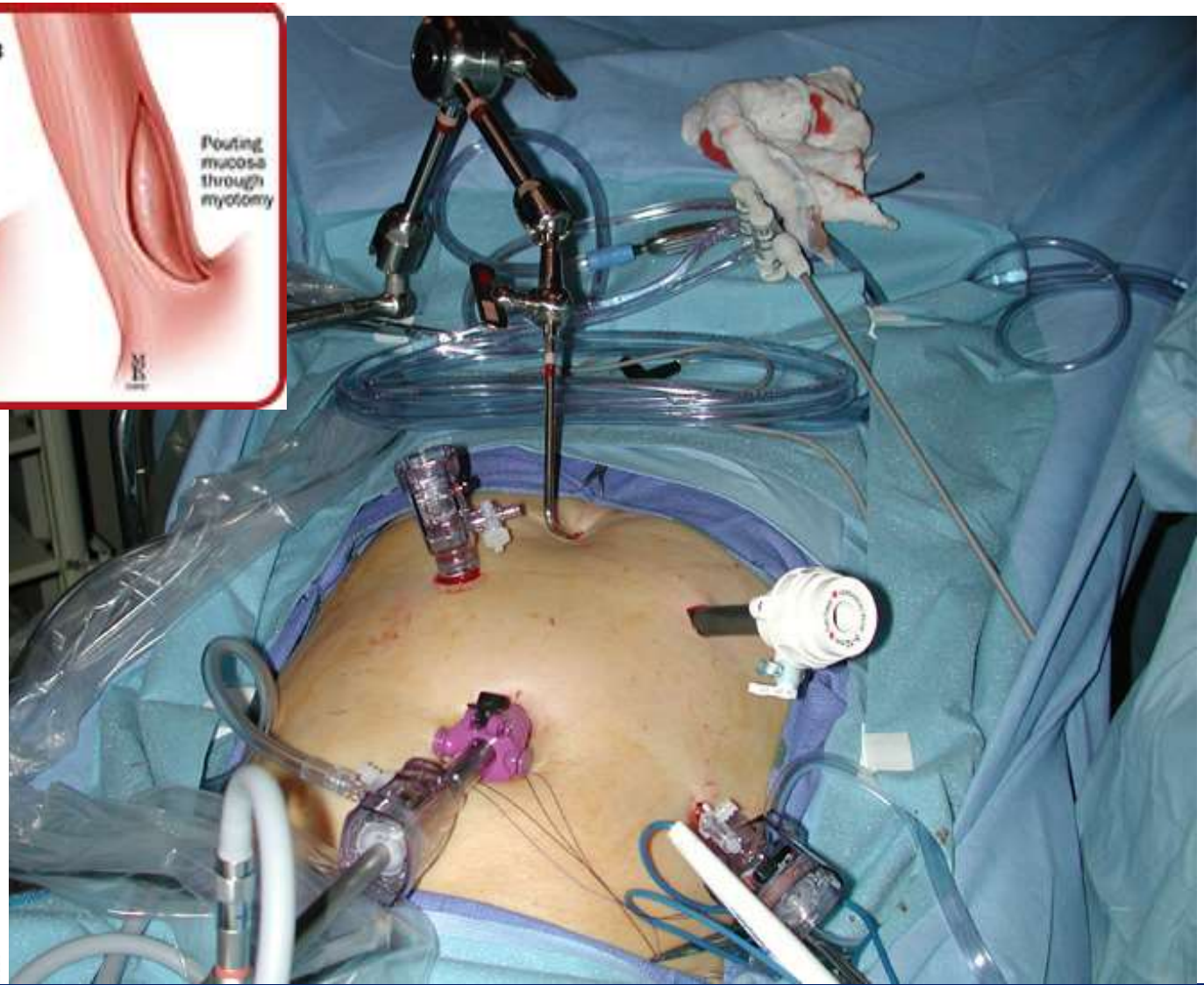
- Relief of dysphagia
  ≡ surgery
- ≤ 2% perforation
- Relapse > surgery
- Can be repeated
- OP procedure
- Salvage therapy



Laparoscopic Heller Myotomy







Heller Myotomy

Campos et al (UCSF) Ann Surg 2009; 249:45-57

Endoscopic and Surgical Treatments for Achalasia: a systematic review and meta-analysis

105 articles 7855 patients

	Symptom Relief	Repeat Therapy
BTI	68%	47%
PD	41%	25%
HM + FP	90%	0

PerOral Endoscopic Myotomy ‘POEM’

1) Submucosal tunneling

2) Submucosal tunneling beyond GE junction

3) Dividing circular muscle bundles

4) Complete division of inner circular muscle bundles

5) Closure of mucosal entry

Endoscopy 2010; 42:265-71

SPECIAL ARTICLE

Per-oral endoscopic myotomy, 1000 cases later: pearls, pitfalls, and practical considerations

Robert Bechara, MD,[1,2] Manabu Onimaru, MD, PhD,[1] Haru Ikeda, MD,[1] Haruhiro Inoue, MD, PhD[1]

Tokyo, Japan; Kingston, Ontario, Canada

Background and Aims: Eight years have passed since the introduction of the per-oral endoscopy myotomy (POEM) procedure. POEM was initially received as an investigational procedure, but since the revelation of promising safety and efficacy data, it is becoming the preferred treatment for achalasia. With the recent completion of our 1000th POEM procedure, we share our experience and knowledge through the discussion of clinical pearls, pitfalls, and practical considerations.

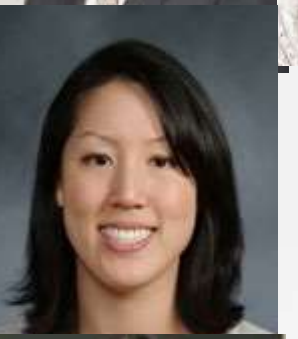
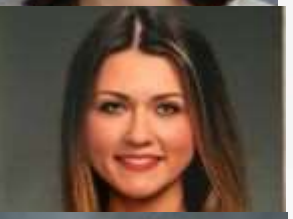
Methods: The various aspects of the procedure and conditions that warrant special attention are discussed from our perspective, with a focus on areas in which there is currently limited evidence.

Results: The key points on patient position, submucosal tunneling, myotomy, closure, intraprocedural bleeding, and advanced sigmoid achalasia are presented.

Conclusions: The dissemination of this information serves as a foundation for new POEM operators and as a catalyst for more-experienced operators to further refine and advance their POEM skills and stimulate international discourse and collaboration. (Gastrointest Endosc 2016;84:330-8.)

POEM – Essentials



- Anesthesia
- Technique
- Endoscope
- CO_2
- Cap
- Knife
- Coagulator
- Generator
- Closure

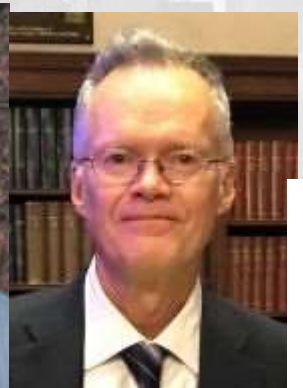






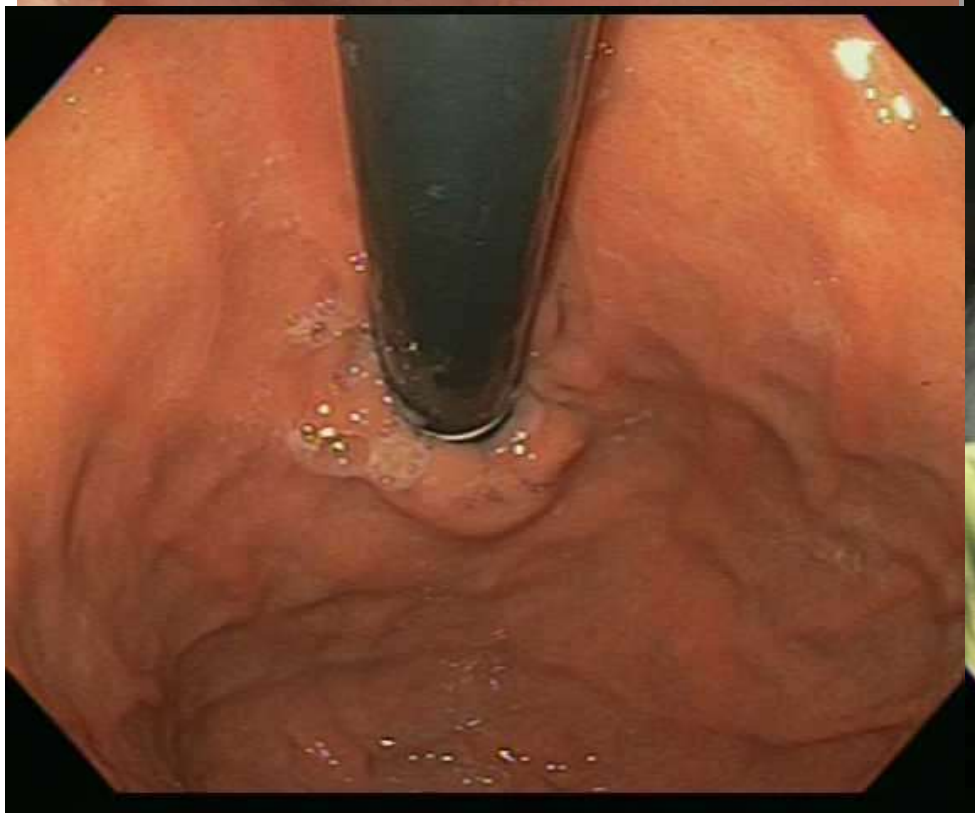


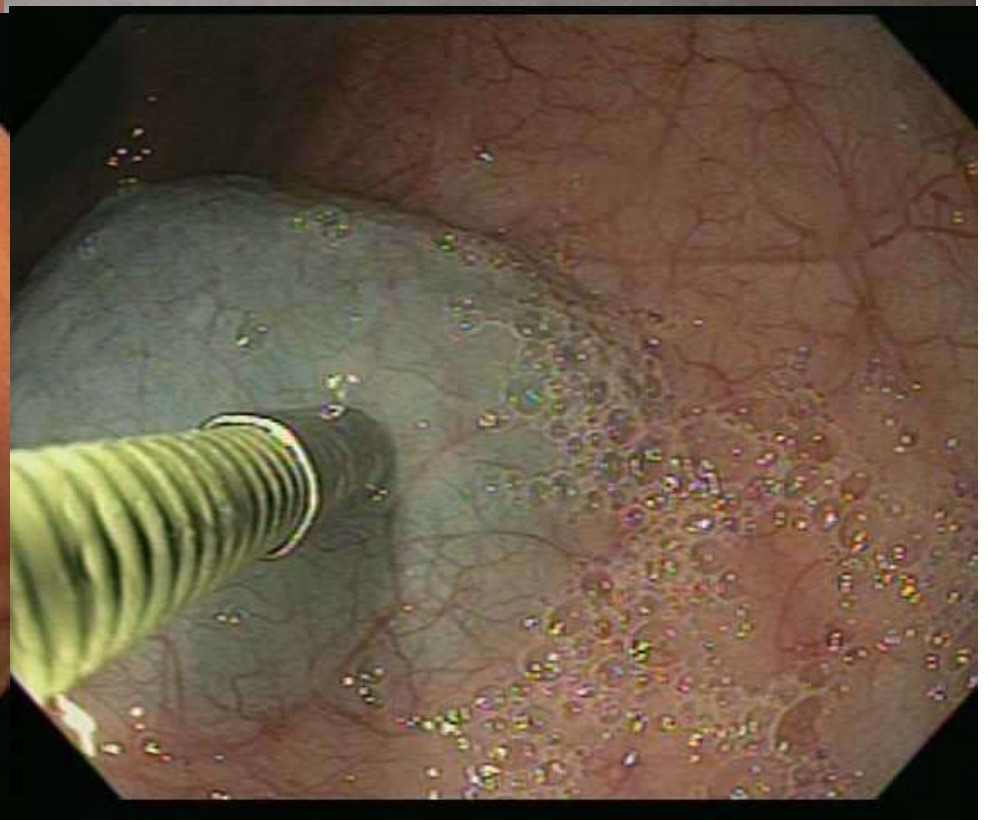





Cornell Medicine

PO





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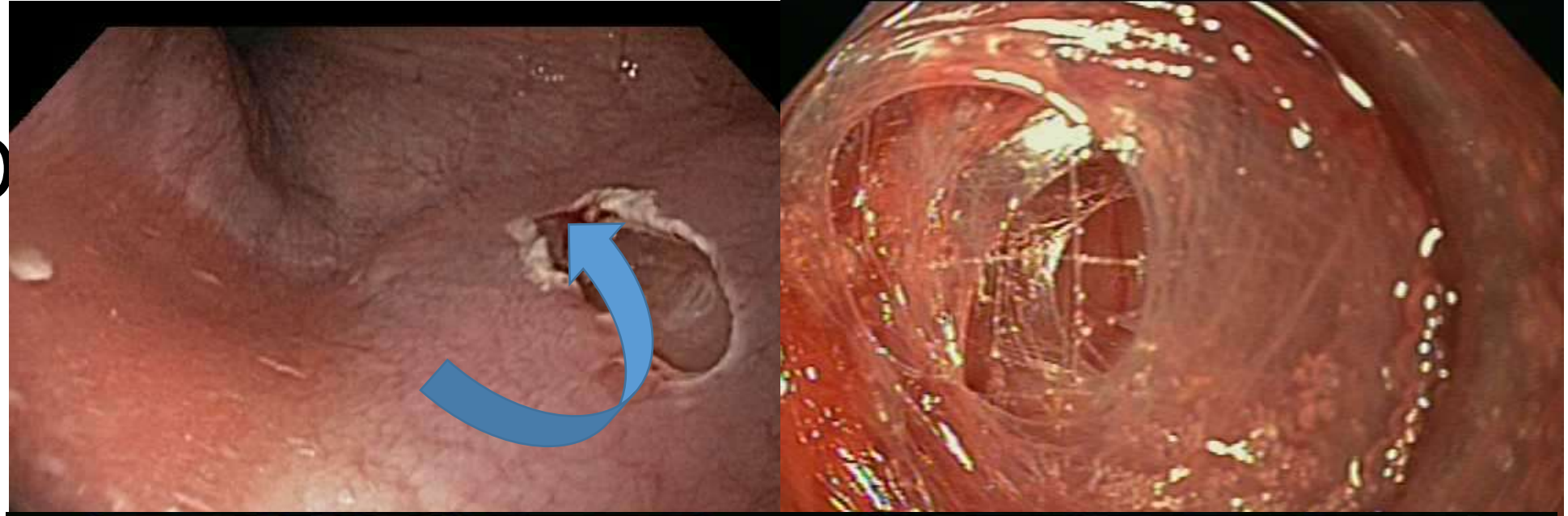

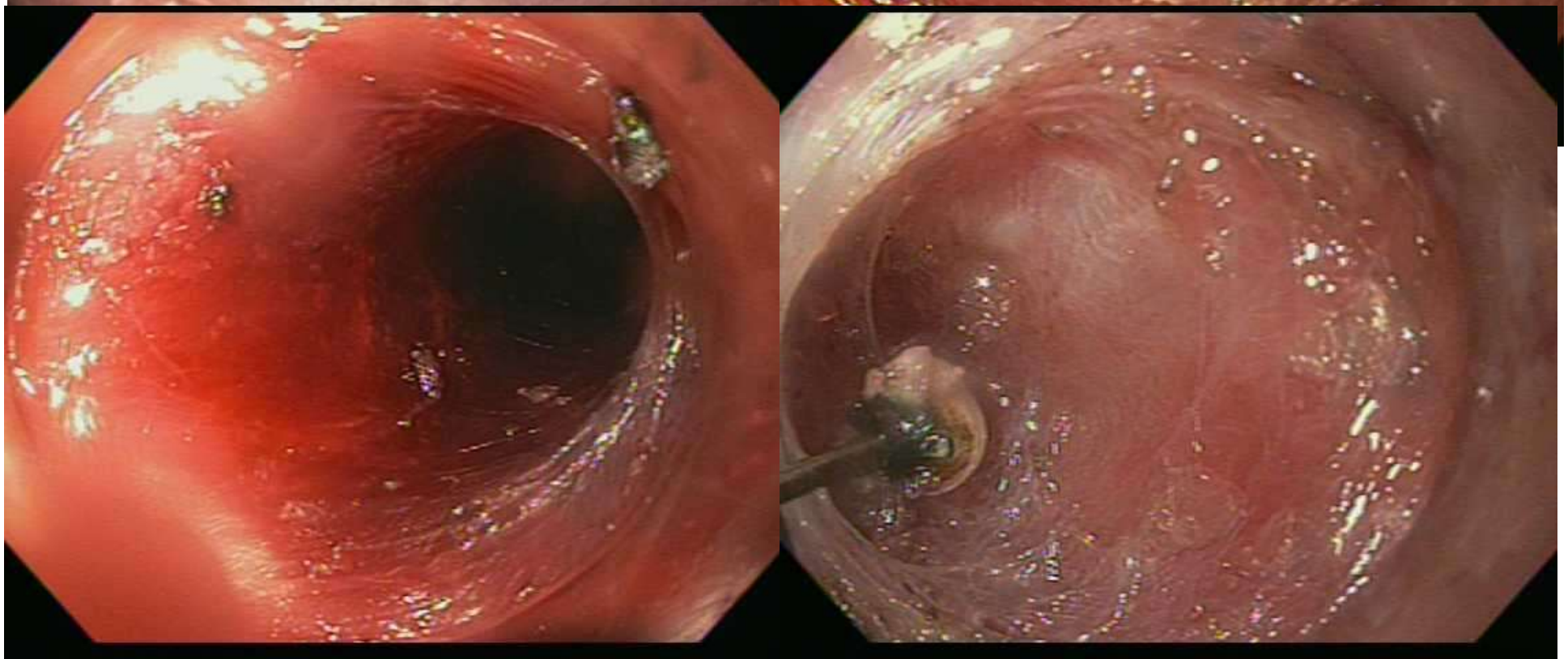

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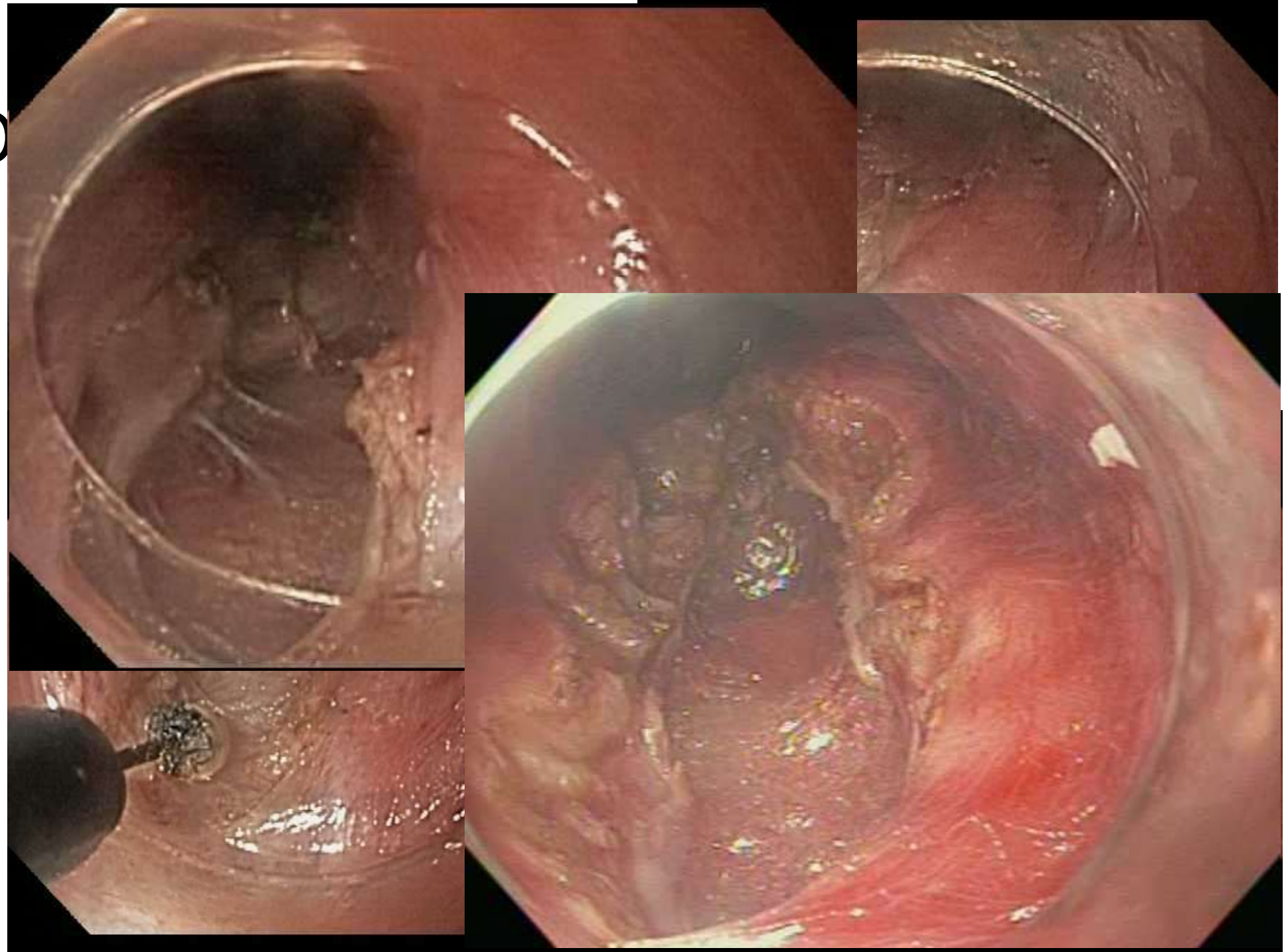

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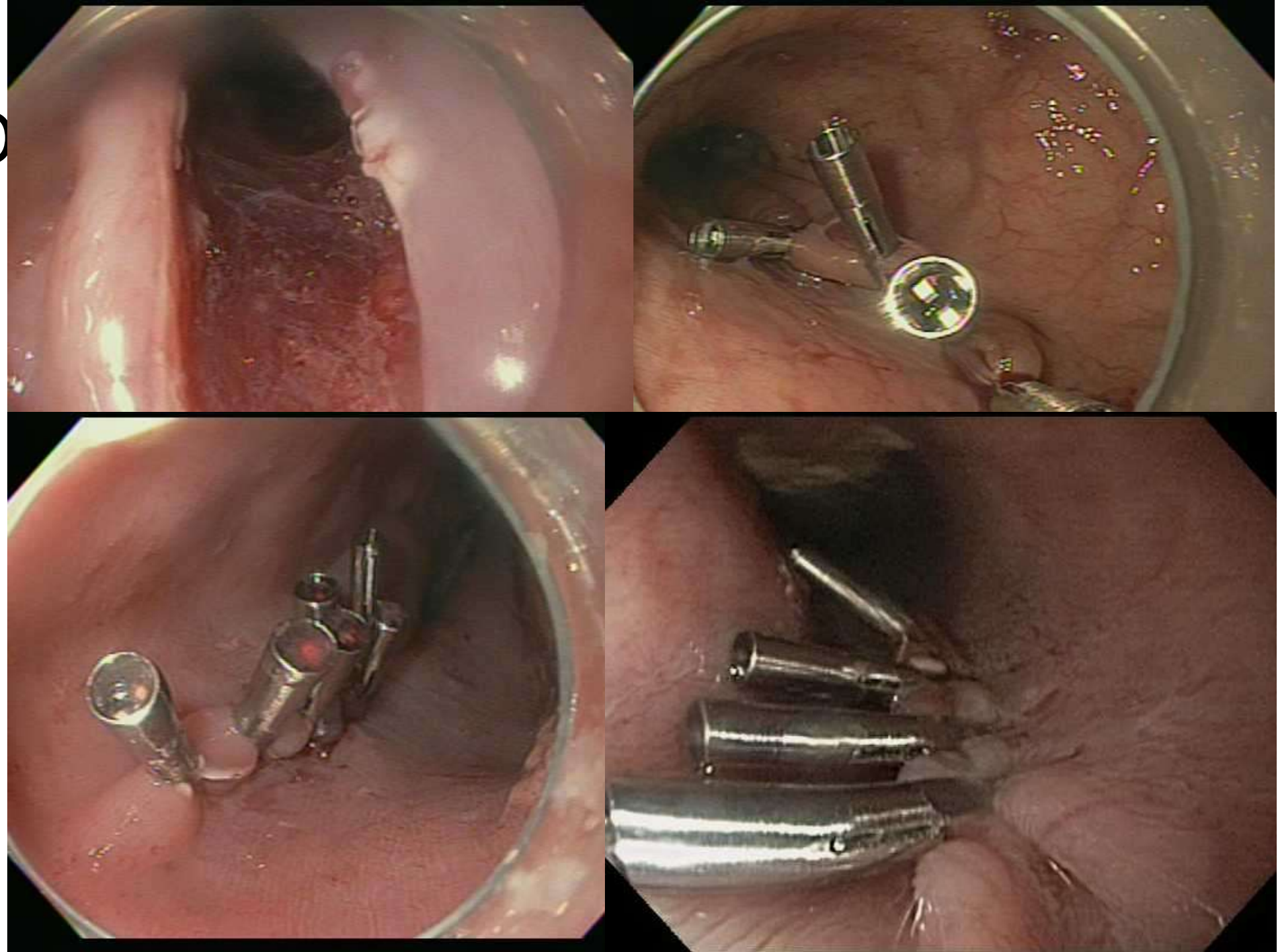

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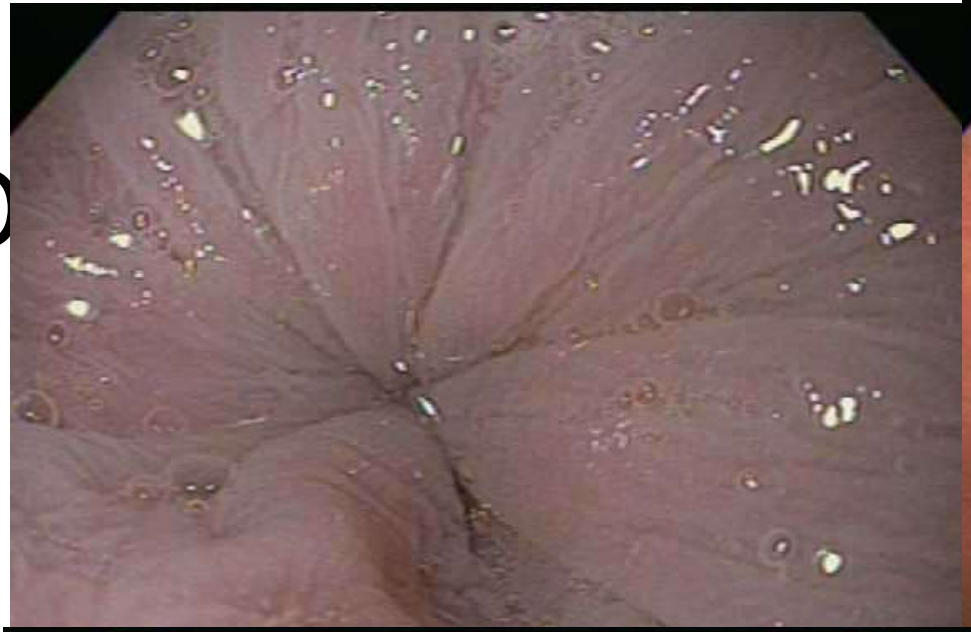

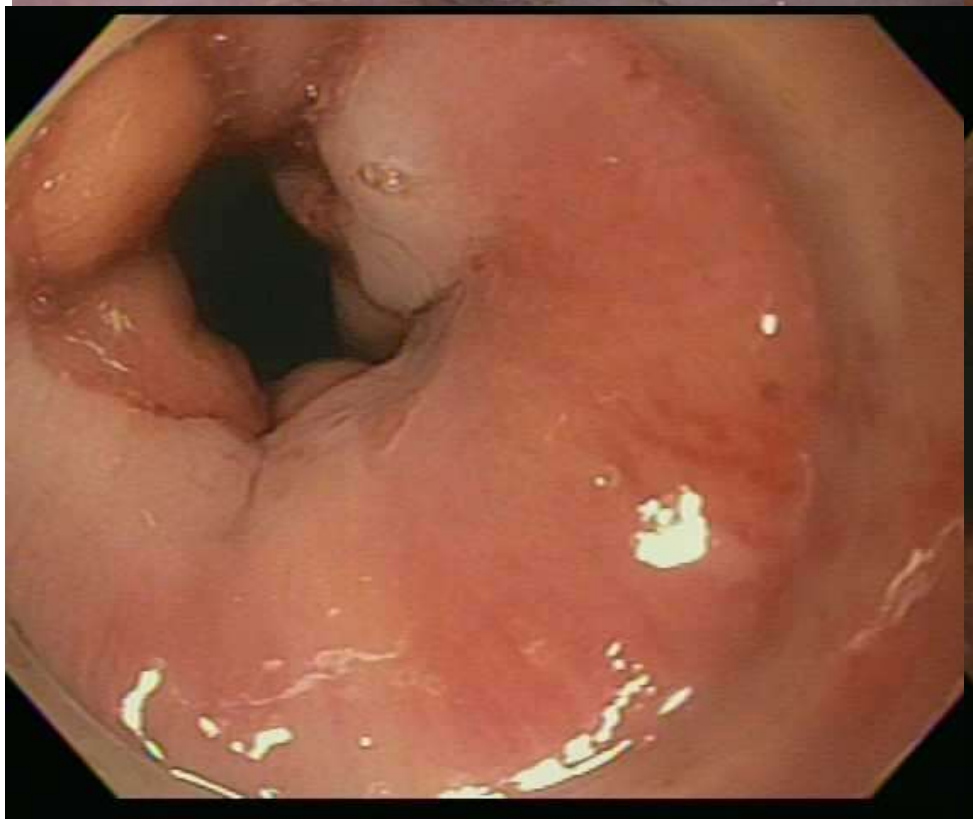

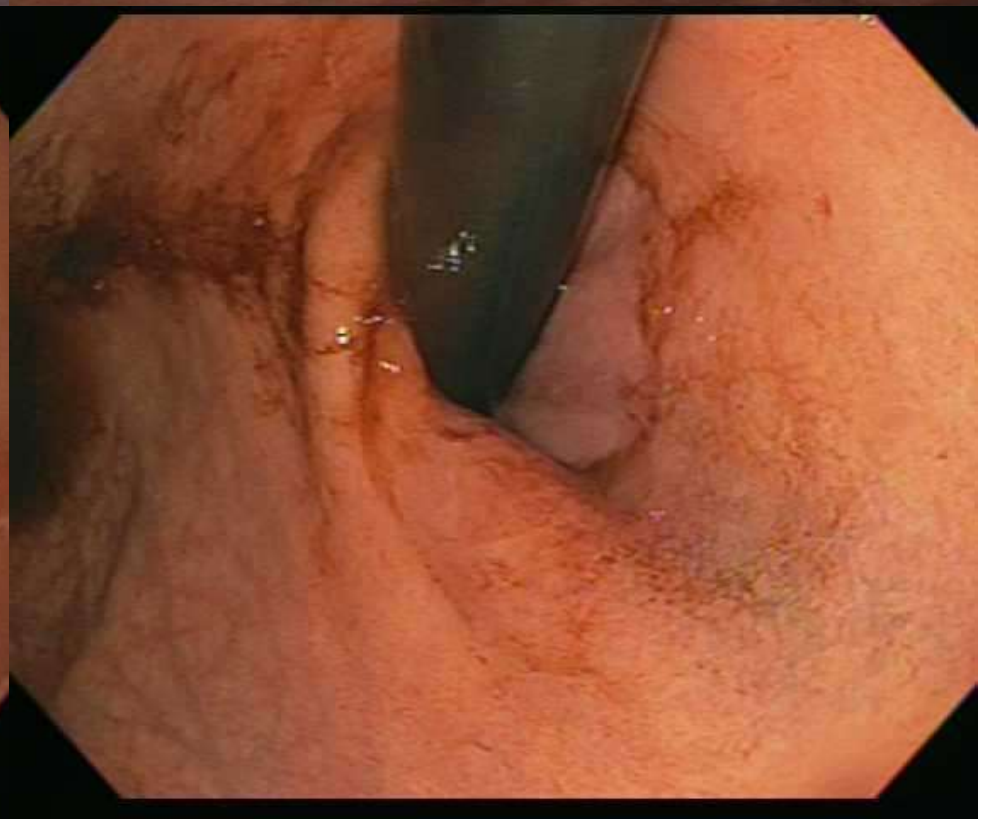

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E-POEM

Safety and feasibility of performing POEM as an outpatient procedure with same-day discharge

Benias PC… Carr-Locke D. Gastrointest Endosc. 2019 Oct;90(4):570-578

103 POEMs – 101 successful

62.4% same day discharge without esophagram

29.7% admitted for mild pain

7.9% admitted for observation

SAE none

Post-procedure pain requiring admission (univariate analysis):

- duration of disease > 3 years
- longer length of procedure (50.9 vs 68.5 min, $P < .0001$)
- longer length of myotomy (7.2 vs 8.5 cm, $P < .0068$)

POEM after Heller Myotomy?

[Zhang X et al (NY) GIE 2018;87:972-85]

2009-2016, 318 consec POEMs

	prior HM	p	no HM
N	46		272
Disease duration yr	12	<0.01	2
Time since HM yr	6		
Pre-POEM LESP mmHg	20.7	<0.01	44.3
Pre-POEM Eckardt	7	<0.01	8
POEM Orientation	83% post		50% post
Post-POEM LESP mmHg	15.6		18.4
Post-POEM Eckardt	1		0
Success %	95.7		95.1

"Rescue treatment of choice after failed Heller"

POEM v LHM Meta-analyses

1045 pts, 29 studies

- Changes in Eckardt score: NS (p=0.078)
- Less operative time w POEM (p=0.026)
- Post-operative pain score: NS (p=0.489)
- Post-operative analgesic dose: NS (p=0.450)
- Length of hospital stay: NS (p=0.156)
- Risk of adverse events: NS (p=0.220)
- Symptomatic GER (11%): NS (p=0.156)

[Talukdar, Rupjyoti, Inoue, Reddy. Surgical Endoscopy (2014)]

1213 pts, all studies to Sep 2018

[Park CH et al (Korean) GIE 2019; Jun 10]

"POEM superior to HM"

POEM: anterior or posterior?

[Khashab MA et al (USA/France/Greece/China/Japan) GIE 2019;Aug 10]

Single-blinded, non-inferiority RCT

150 pts (138 w 1 year f/u)

		Anterior	Posterior
N		73	77
Tech success	%	97.3	100
LOS median days		2	2
AE %		11	9
Clinical success %		90	89
Abnormal acid Exposure %		49	42

GERD after POEM

% pH/EGD/Symptoms positive

73/28/18 @ 3mo, 48/35/13 @ 6 mo, 55/30/15 @ 12 mo

on PPI 5/2/6 @ 24 mo, 4/1/6 @ 48 mo

[Hernandez-Mondragon et al (Mex) Rev Gastroenterol Mex 2019; Jun 4

Gastric myotomy length >2.5 cm increases reflux

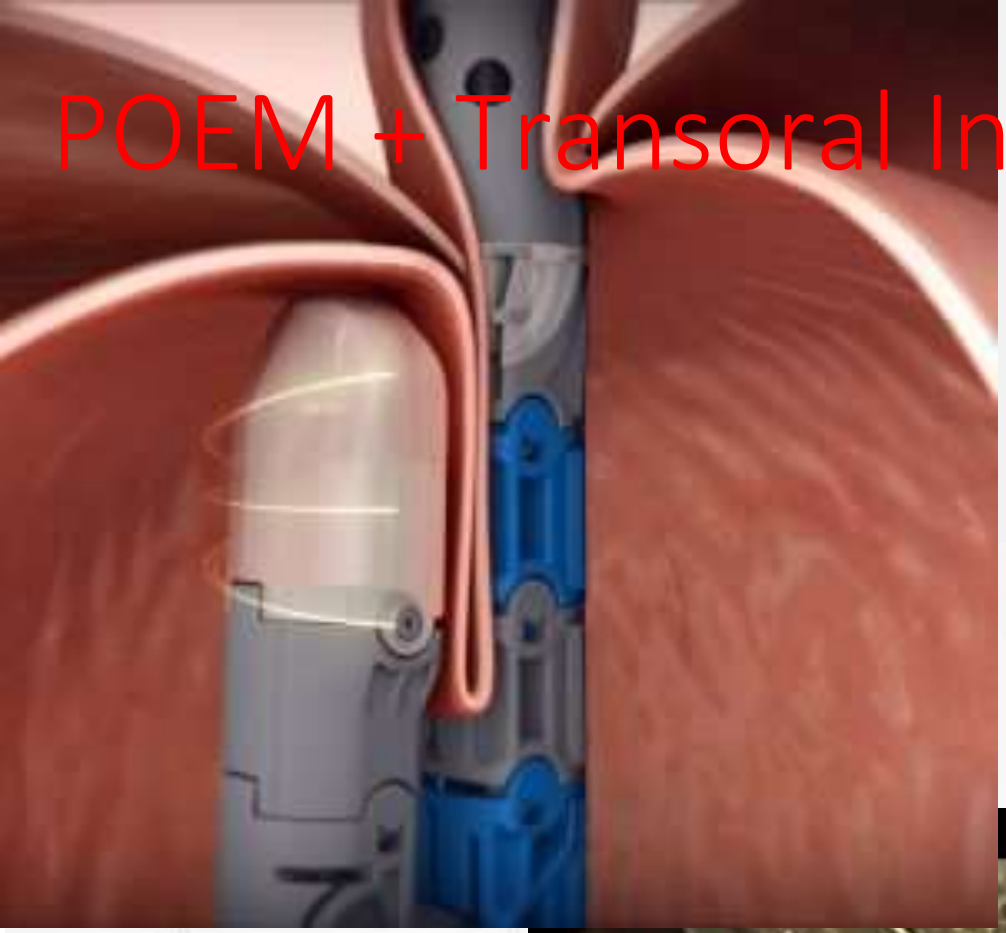
– use double scope method to improve accuracy

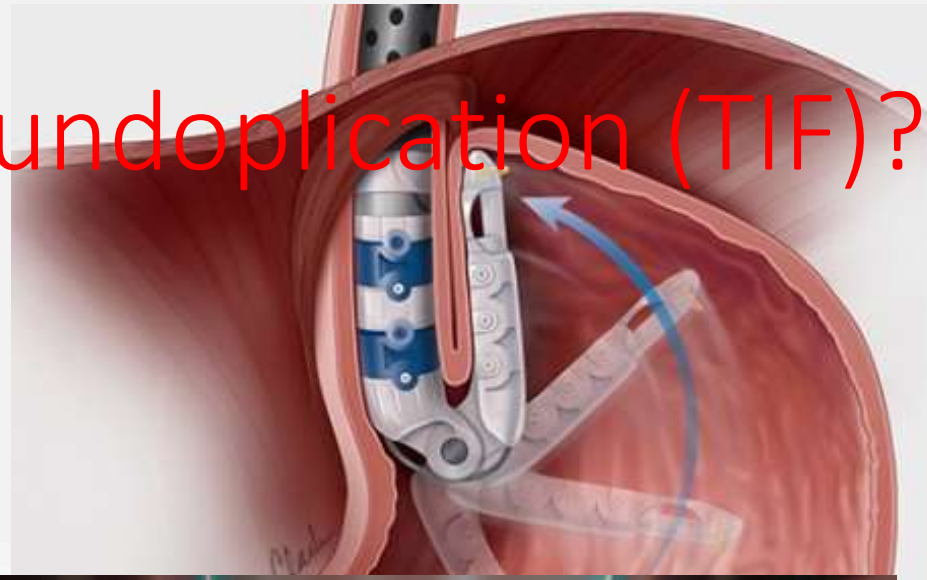
[Grimes et al (US/Tokyo) Surg Endosc 2019; Aug 28]

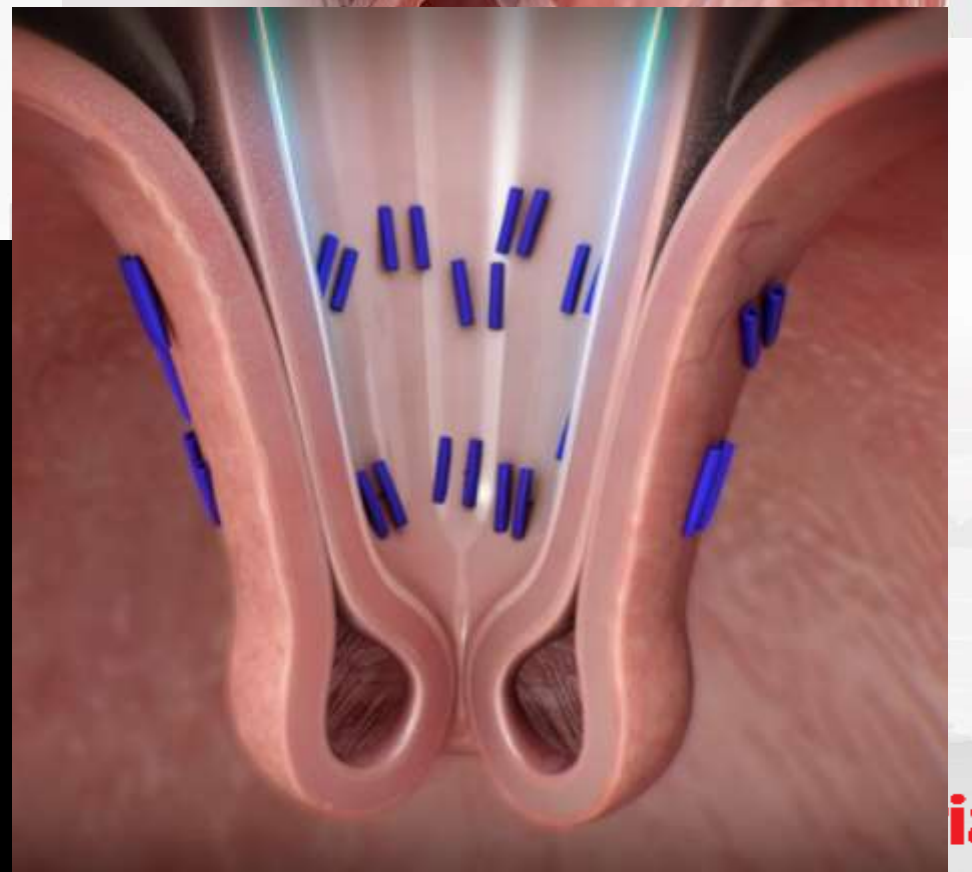
Use 'two penetrating vessel' myotomy marker reduces reflux

[Tanaka S et al (Kobe) J Gastro Hep 2019; Aug 1]

POEM + Transoral Incisionless Fundoplication (TIF)?







Safety and feasibility of performing POEM as an outpatient procedure with same-day discharge

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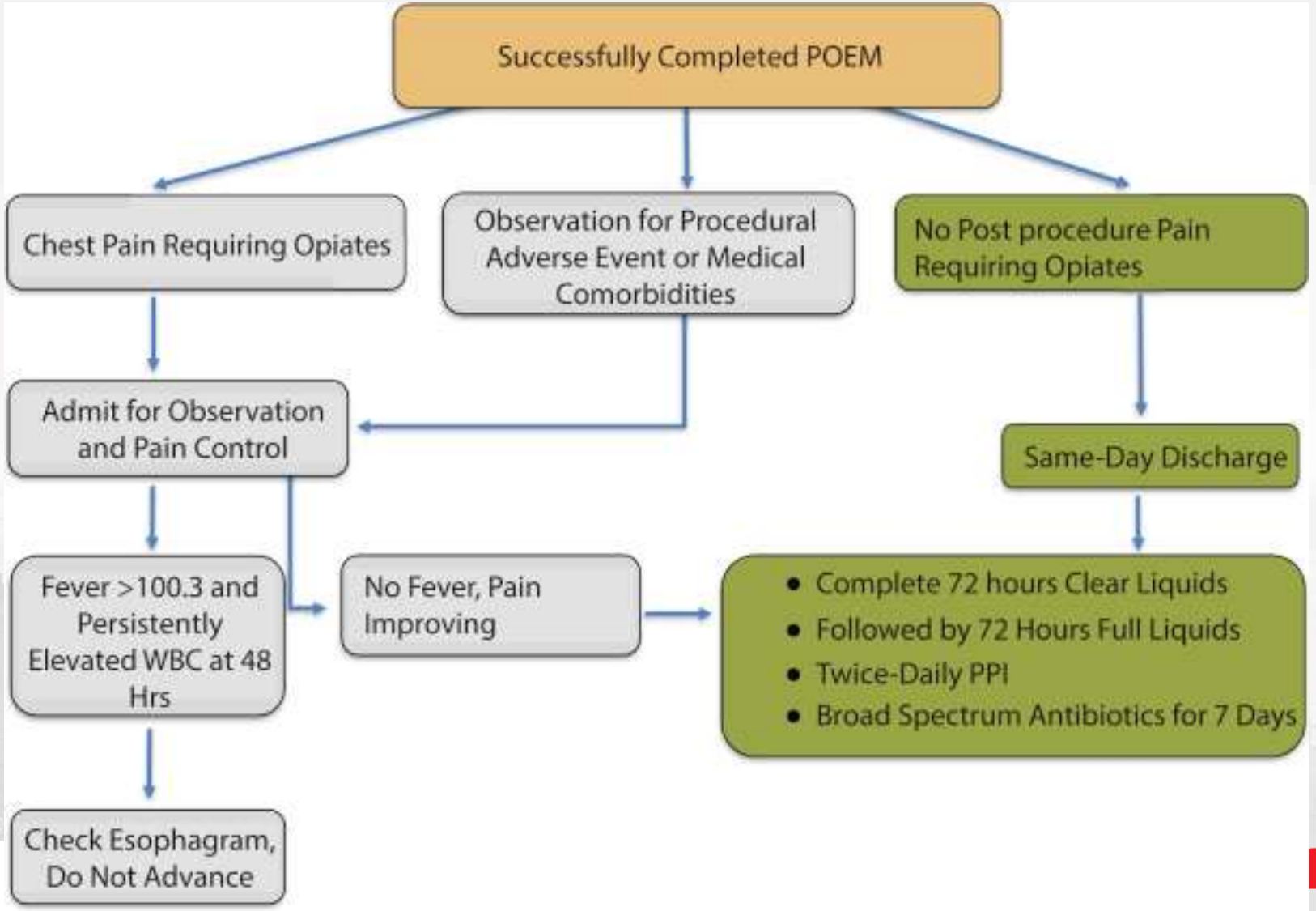

POEM 2024

- Relief of dysphagia >90%
- Maintained at 5 year
- Adverse events <5%
- Outpatient procedure in >60%
- Pediatric to geriatric: equivalent results
- Equivalent or superior to Laparoscopic Heller Myotomy
- Training (40-70 for competence, 60-100 for mastery)
- Standardized approach to assessment before/after POEM
- Solve the issue of reflux

E-POEM

Is now an acceptable alternative to other endoscopic therapies and surgery for achalasia

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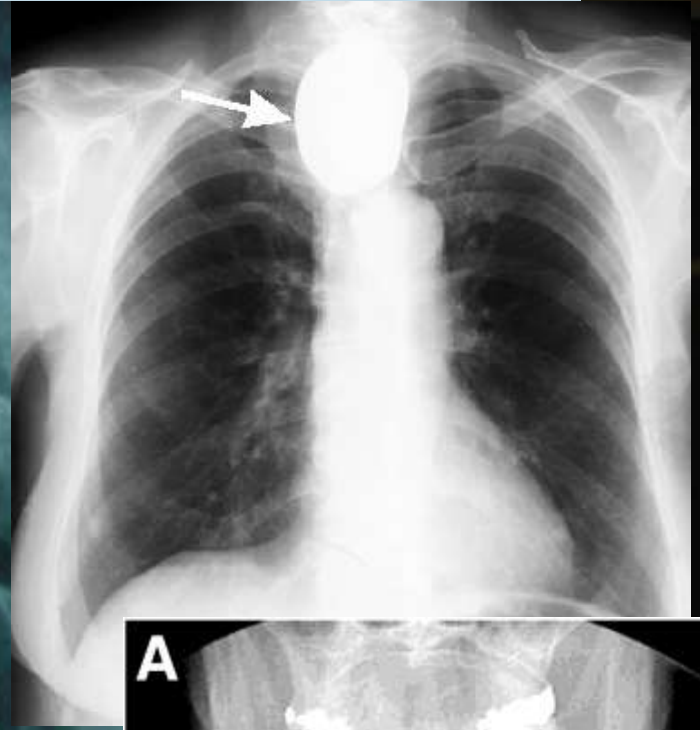
Friedrich Albert von Zenker
1825 -1898

Krankenheiten des Oesophagus. HW von Ziemsen's Handbuch der allgemeinen Therapie, 1874;7:1-208




RAD BARIUM SWALL
M1
H102176
FRAME= 12

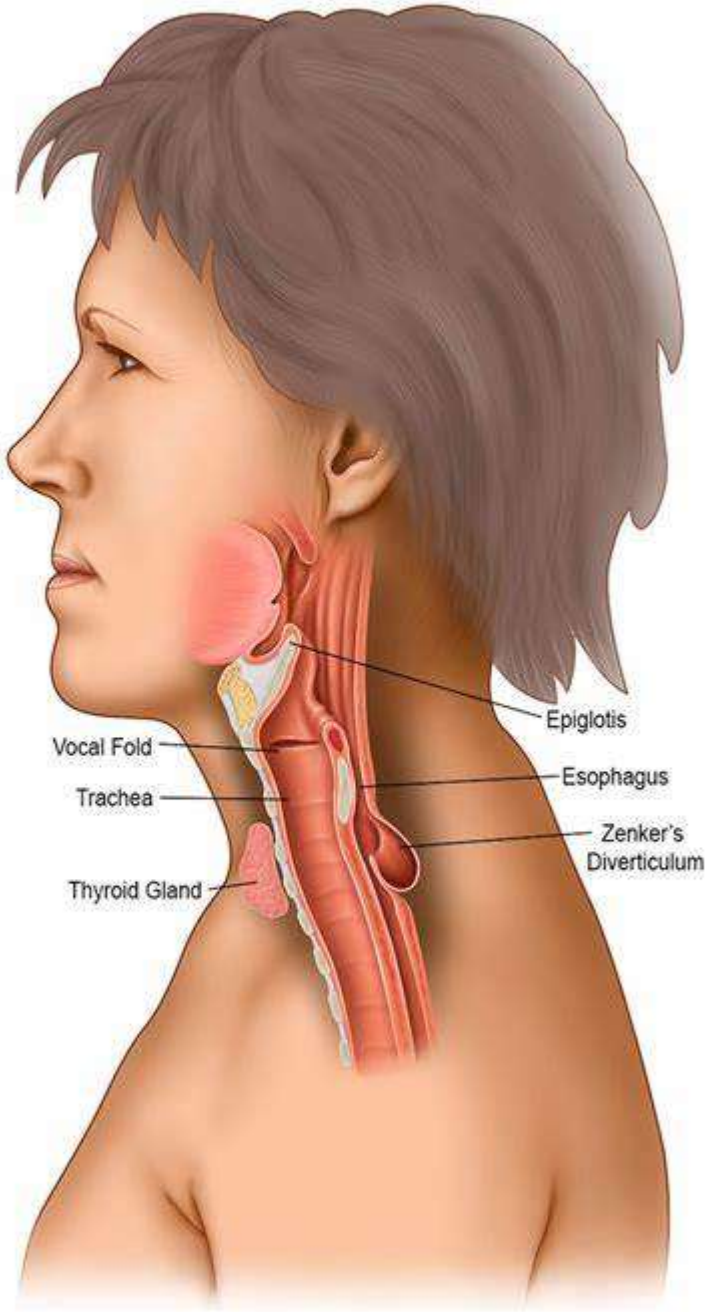

A
Distance = 25 mm


B

Zenker's Diverticulum

Herniation of mucosa posteriorly between the cricopharyngeus and the inferior pharyngeal constrictor muscles

Pseudo-diverticulum



Zenker's Diverticulum

Treatment

Surgical

Cricopharyngeal myotomy

+/- Diverticulectomy

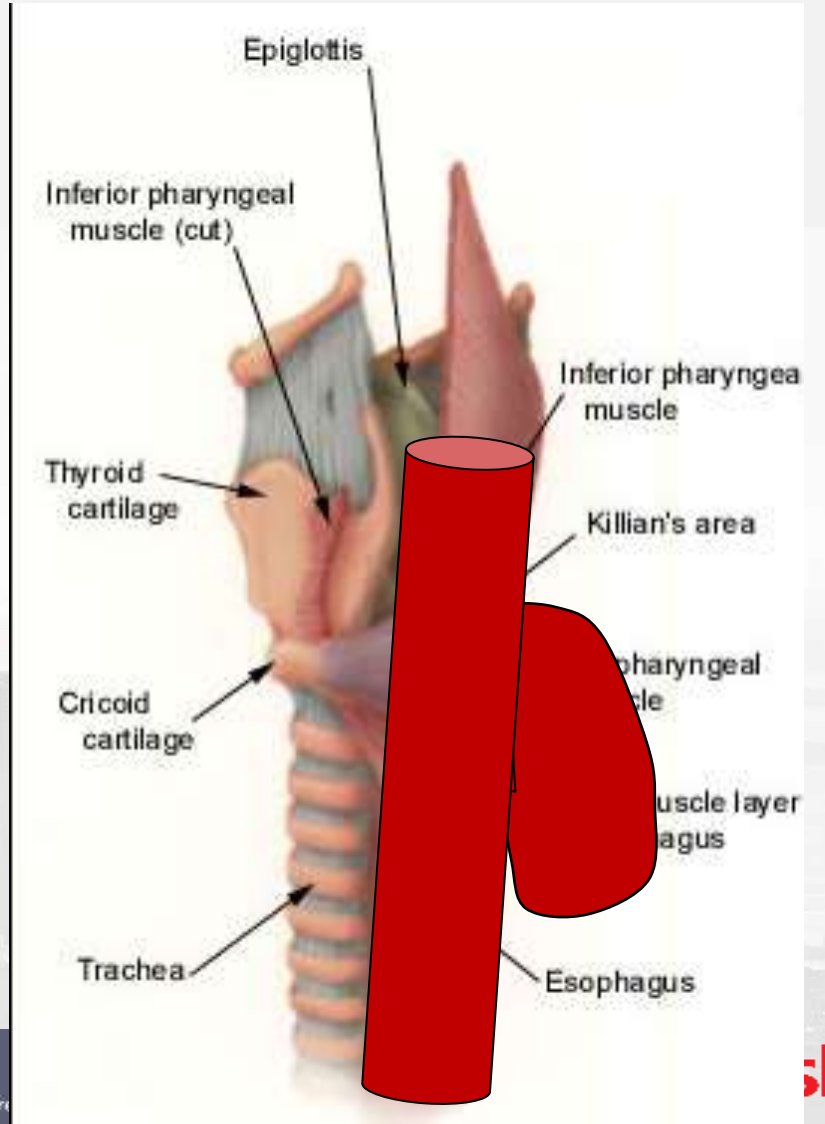
+/- Diverticulopexy

+/- Diverticulostomy

Endoscopic

Cricopharyngeal

(muco)myotomy



Open Surgical Therapy

- **Cricopharyngeal myotomy with diverticulectomy or diverticuloplexy**

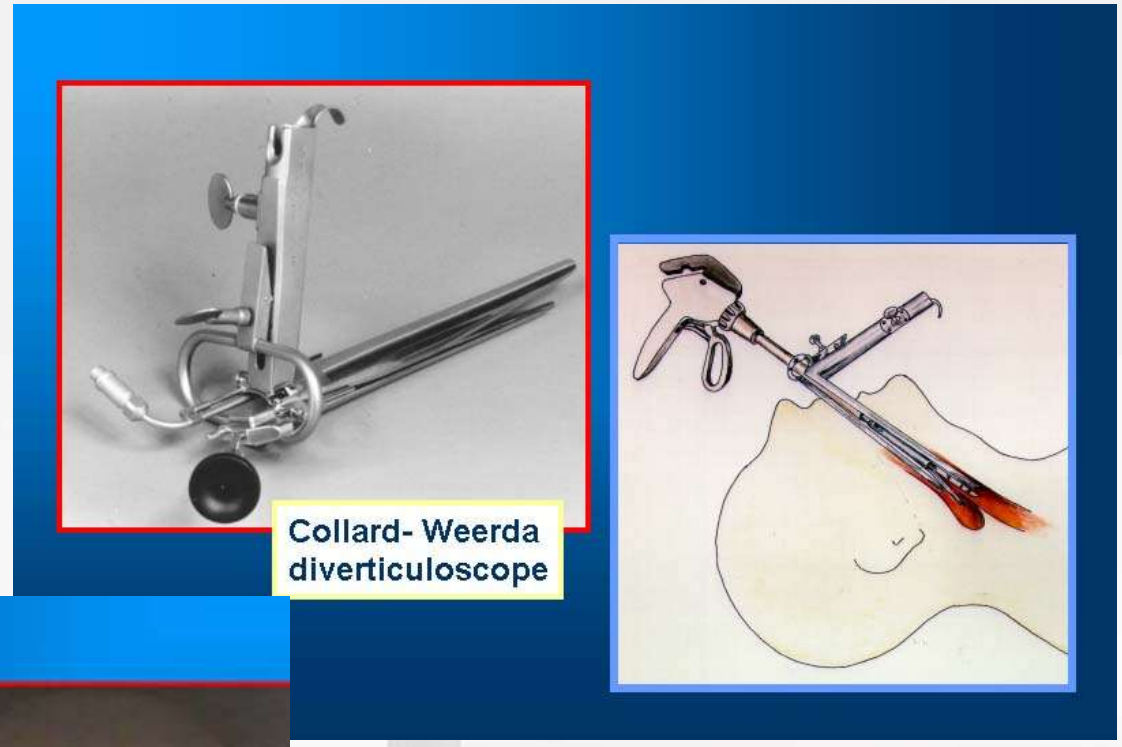
  [Wheeler 1887]

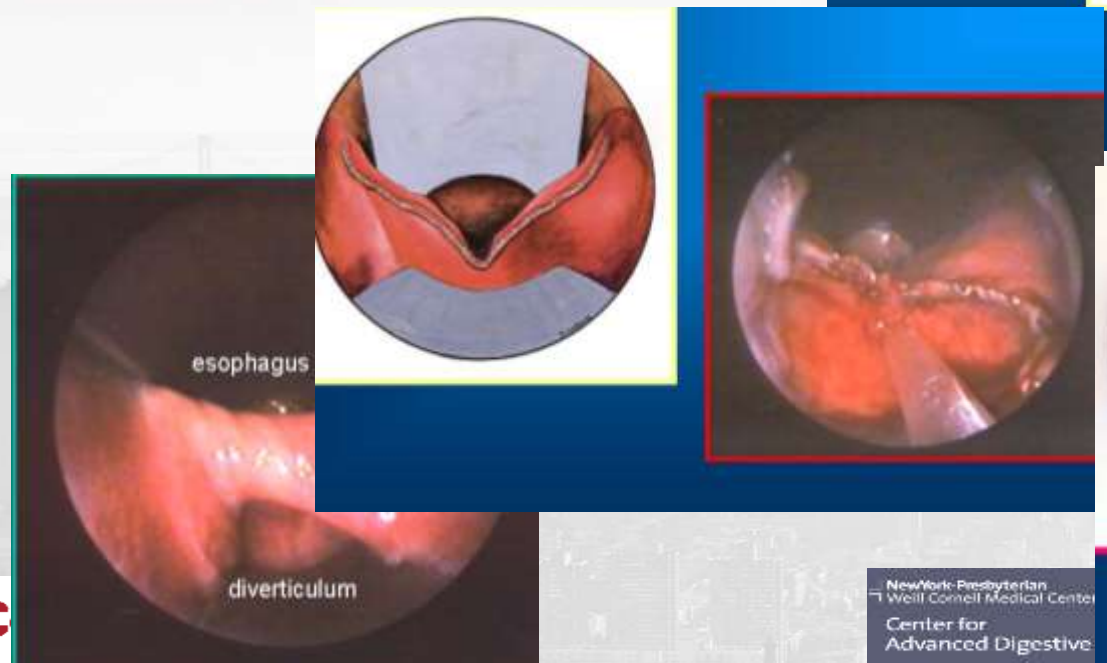
Mortality 1-2%

Perforation, mediastinitis, fistula, stenosis, recurrent laryngeal N palsy - 6%

Rigid Endoscopic Surgical Therapy

Rigid endoscopy + staples, scissors, or laser to dissect septum [1917]





Flexible Endoscopic Cricopharyngeal Mucomyotomy

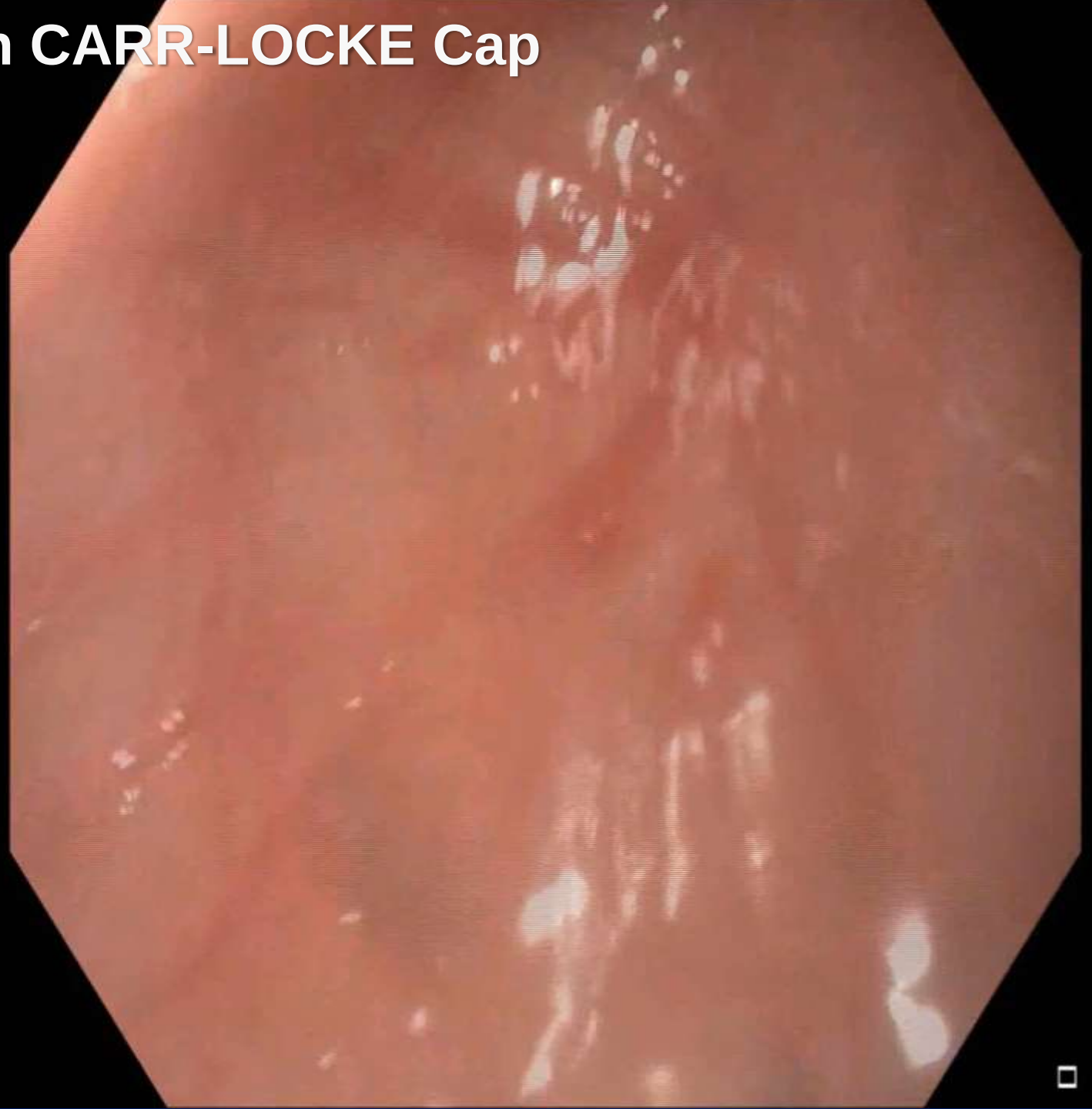
- First described in 1995 [Mulder and Ishioka]
- Incision of the septum during endoscopy
- 93-100% success rate (follow up 6-7 mo)
- Morbidity 5 - 13%: perforation
  hemorrhage

Cricopharyngeal Myotomy

[Aiolfi A et al (Milan) WJGIE 2015;7:87-93]

	N	Good Outcome	Morbidity
Surgery (myotomy +)	1664	91%	6.6%
Rigid Endoscopy	853	93%	5.0%
Flexible Endoscopy	449	91%	5.2%

Mucomyotomy with CARR-LOCKE Cap



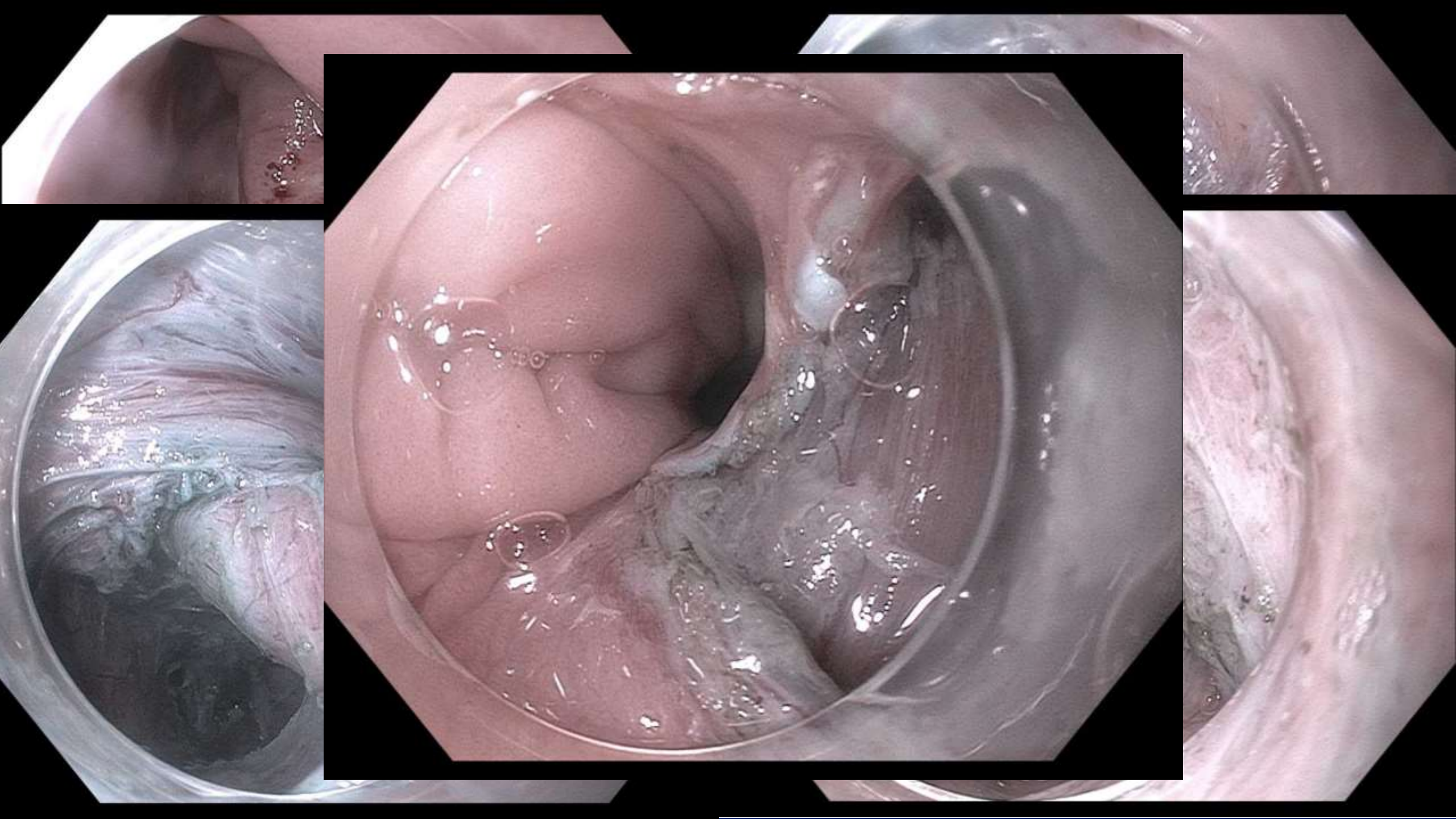
Endoscopic Treatment of Zenker's
Systematic Review & Meta-analysis

20 studies, 813 pts

Success	91%
AE	11%
Recurrence	11%

"Feasible, safe and effective"

[Ishaq et al (IntMC) GIE 2016;83:1076-89]



Z-POEM for Zenker's

[Yang J et al (IMC) GIE 2020 Jan;91(1):163-168

75 pts, mean 73.3 years, median ZD 3.1 cm
Tech success 97.3%
AE 6.7% (1 bleed, 4 perforations)
Procedure time 52.4 min

LOS 1.8 days
Clinical success 92%
Mean dysphagia score 1.96 to 0.25
Median F/U 10 mo
1 symptomatic recurrence at 12 mo

Z-POEM &
Endoscopic Cricopharyngeal Mucomyotomy

Is now an acceptable alternative to open and rigid endoscopic surgery

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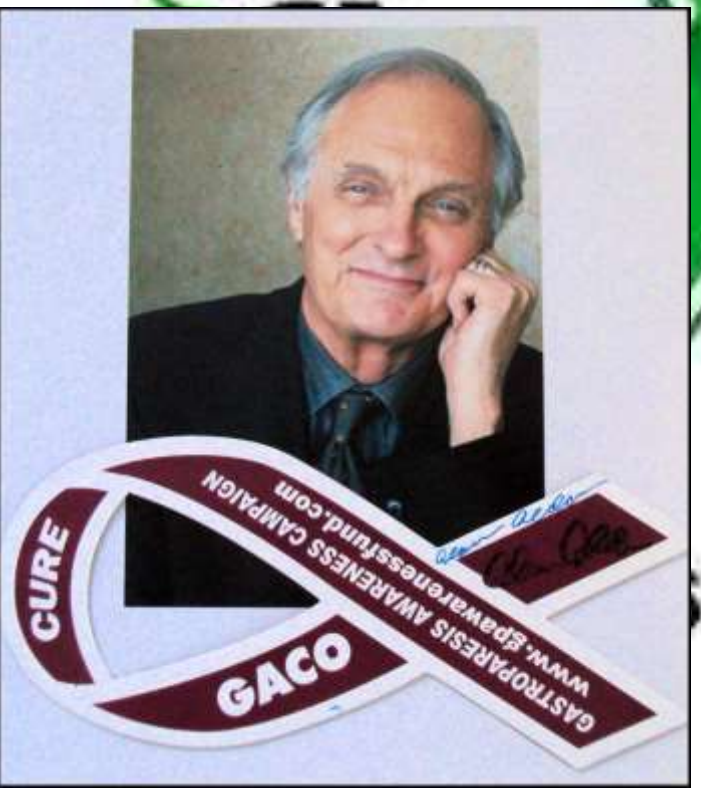
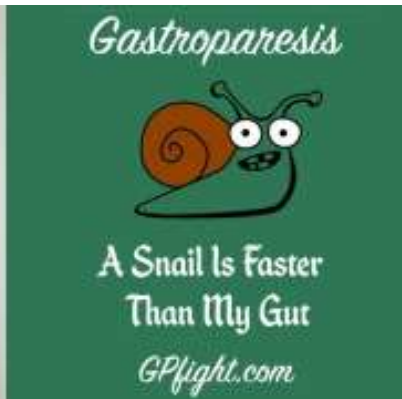
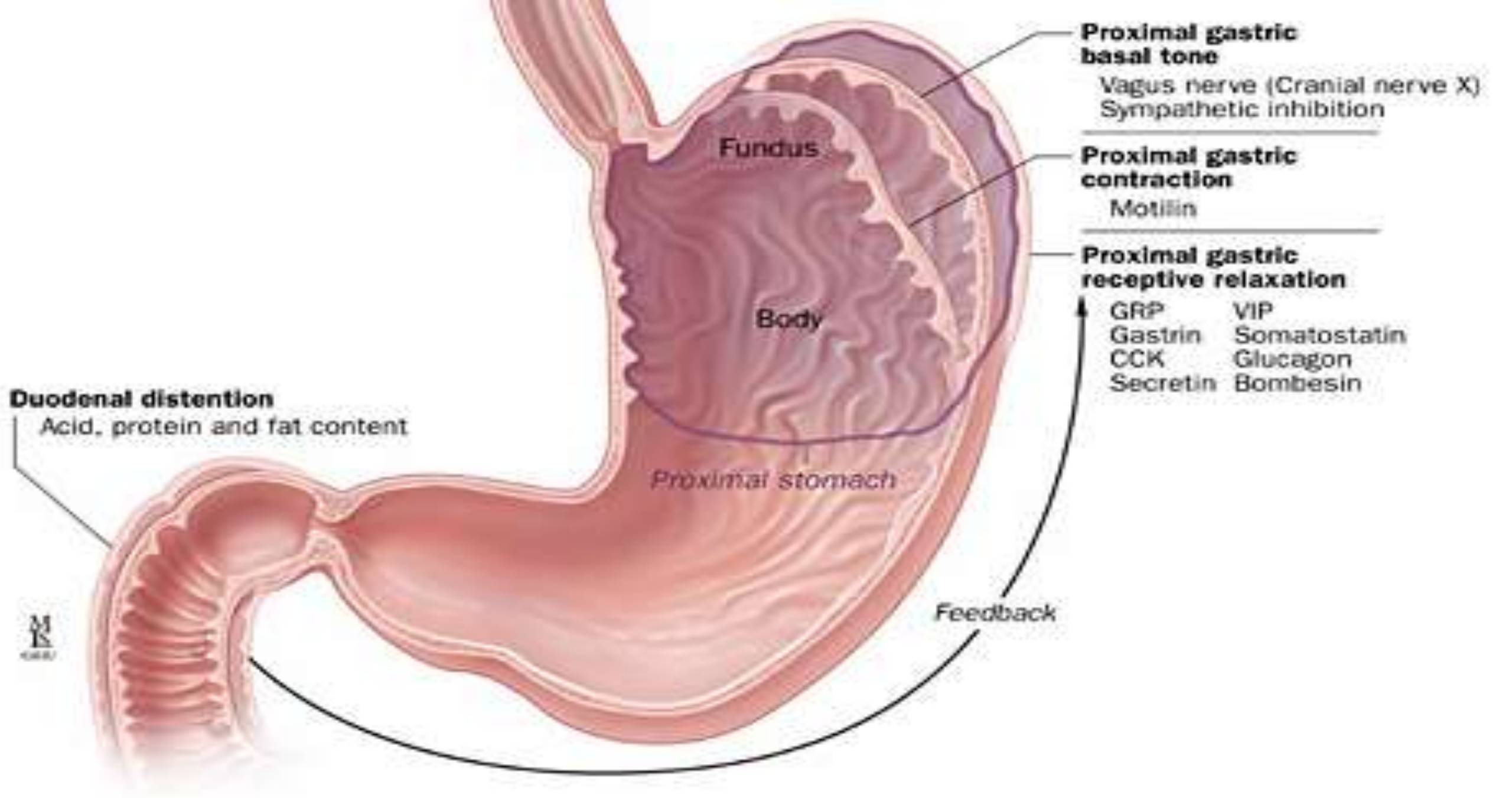


se It Matters...




Proximal gastric basal tone
Vagus nerve (Cranial nerve X)
Sympathetic inhibition
Proximal gastric contraction
Motilin
Proximal gastric receptive relaxation
GRP
Gastrin
CCK
Secretin
VIP
Somatostatin
Glucagon
Bombesin
Fundus
Body
Proximal stomach
Duodenal distention
Acid, protein and fat content
Feedback

Gastroparesis - Pathophysiology

Diabetes I & II

Eating disorders

Ehlers-Danlos syndrome

Parkinson’s disease, MS, amyloid

- Vagal trauma (surgical)
- Drugs: narcotics, cannabis
- Idiopathic (?viral)

Gastroparesis - Treatment

Diets & control diabetes

Prokinetics: metoclopramide, erythromycin, [cisapride], domperidone

Experimental: sildenafil, mirtazepine (5HT3)

Nutritional support: jejunostomy, TPN

Stomach: pacemaker, stimulator

Pylorus: Botox, gastrojejunostomy, pyloroplasty pyloromyotomy (GPOEM)

Gastroparesis - Diagnosis

Normal Gastric Emptying Study

>90% @ 4 hours

Gastroparesis Cardinal Symptom Index (GCSI)

[Revicki DA et al (Bethesda) AP&T 2003;18:141-150]

Average of A mean + B mean + C mean Index range is 0-5		None	Very Mild	Mild	Mod	Severe	Very severe
1. Nausea	A	0	1	2	3	4	5
2. Retching		0	1	2	3	4	5
3. Vomiting		0	1	2	3	4	5
4. Stomach fullness	B	0	1	2	3	4	5
5. Not able to finish a normal-sized meal		0	1	2	3	4	5
6. Feeling excessively full after meals		0	1	2	3	4	5
7. Loss of appetite		0	1	2	3	4	5
8. Bloating	C	0	1	2	3	4	5
9. Stomach or belly visibly larger		0	1	2	3	4	5

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4.	Stomach fullness	0	1	2	3	4	5
5.	Not able to finish a normal-sized meal	0	1	2	3	4	5
6.	Feeling excessively full after meals B	0	1	2	3	4	5
7.	Loss of appetite	0	1	2	3	4	5
8.	Bloating	0	1	2	3	4	5
9.	Stomach or belly visibly larger C	0	1	2	3	4	5

Willhelm Conrad Ramstedt (1867-1963)

Berichte über Krankheitsfälle und Behandlungsverfahren.

Aus der Hedwigsklinik (Dr. Rammstedt) und dem Säuglingsheim (Dr. Schulte) in Münster i. W.

Zur Operation der angeborenen Pylorusstenose[2])

von

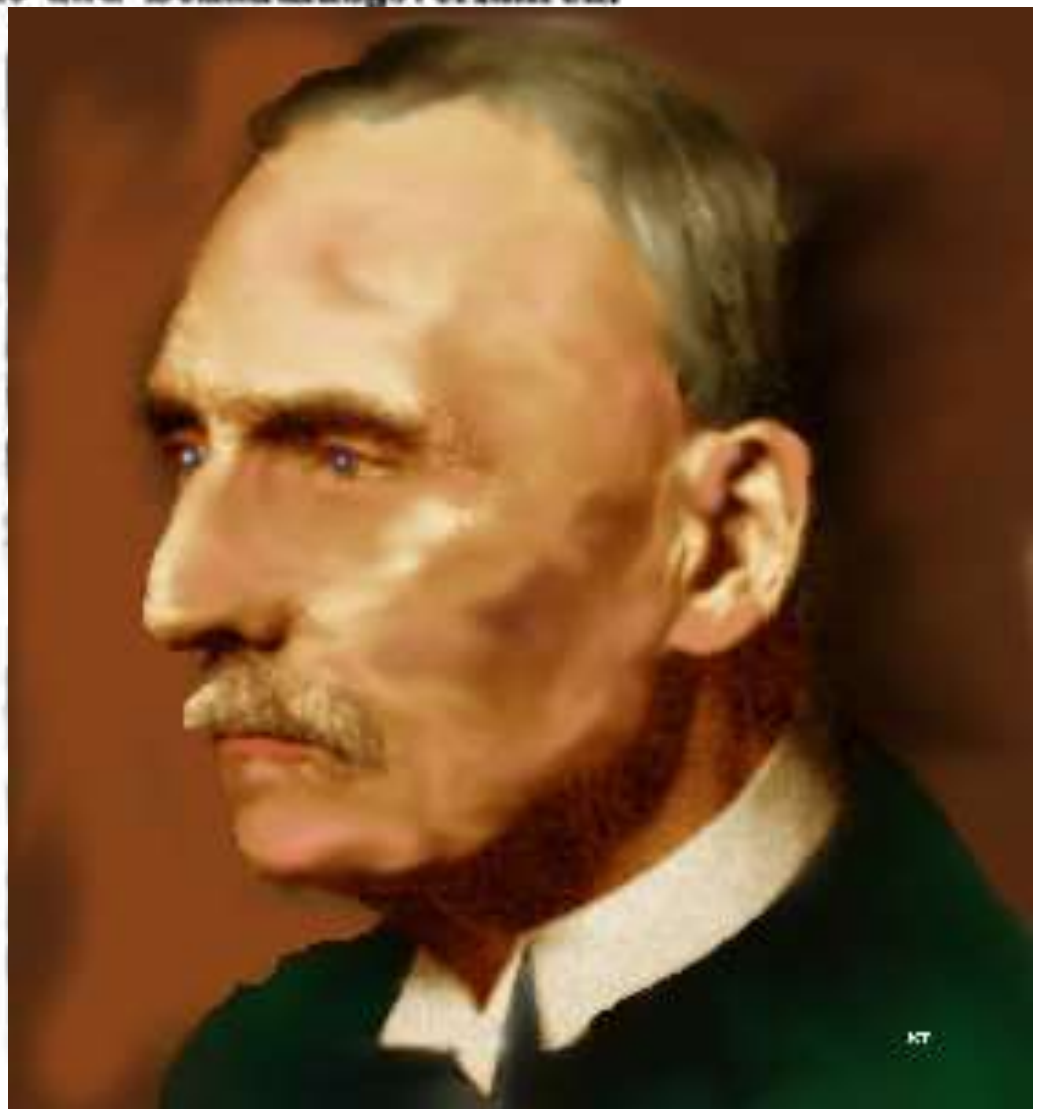
Prof. Dr. **Rammstedt**, Oberstabsarzt.

Die Frage, ob man die Pylorusstenose der Säuglinge intern oder operativ behandeln soll, wird heute wohl von keinem Pädiater mehr einseitig im Sinne der internen Behandlung beantwortet, sondern von Fall zu Fall entschieden. Da unzweifelhaft unter zweckmäßigen diätetischen Maßnahmen, wie sie besonders Heubner, Pfaundler, Ibrahim und Andere empfohlen haben, die größte Zahl der Säuglinge mit Pylorusstenose ausheilt, ist eine abwartende Therapie in allen Fällen erst zu versuchen. Schwieriger ist die Frage zu beantworten, wie lange man diese durchführen soll, wenn der Erfolg auf sich warten läßt. Diese Entscheidung wird, wie mir scheint, wesentlich mit dadurch be-

[1]) B. z. Chir., Bd. 58.

[2]) „Ueber chronische Wirbelsäulenversteifung". F. d. Röntg., Bd. 10, H. 5.

[3]) Nach einem Vortrage, gehalten auf der Naturforscherversammlung in Münster 1912.



THINKING OUTSIDE THE BOX

Gastric peroral endoscopic myotomy for refractory gastroparesis: first human endoscopic pyloromyotomy (with video)

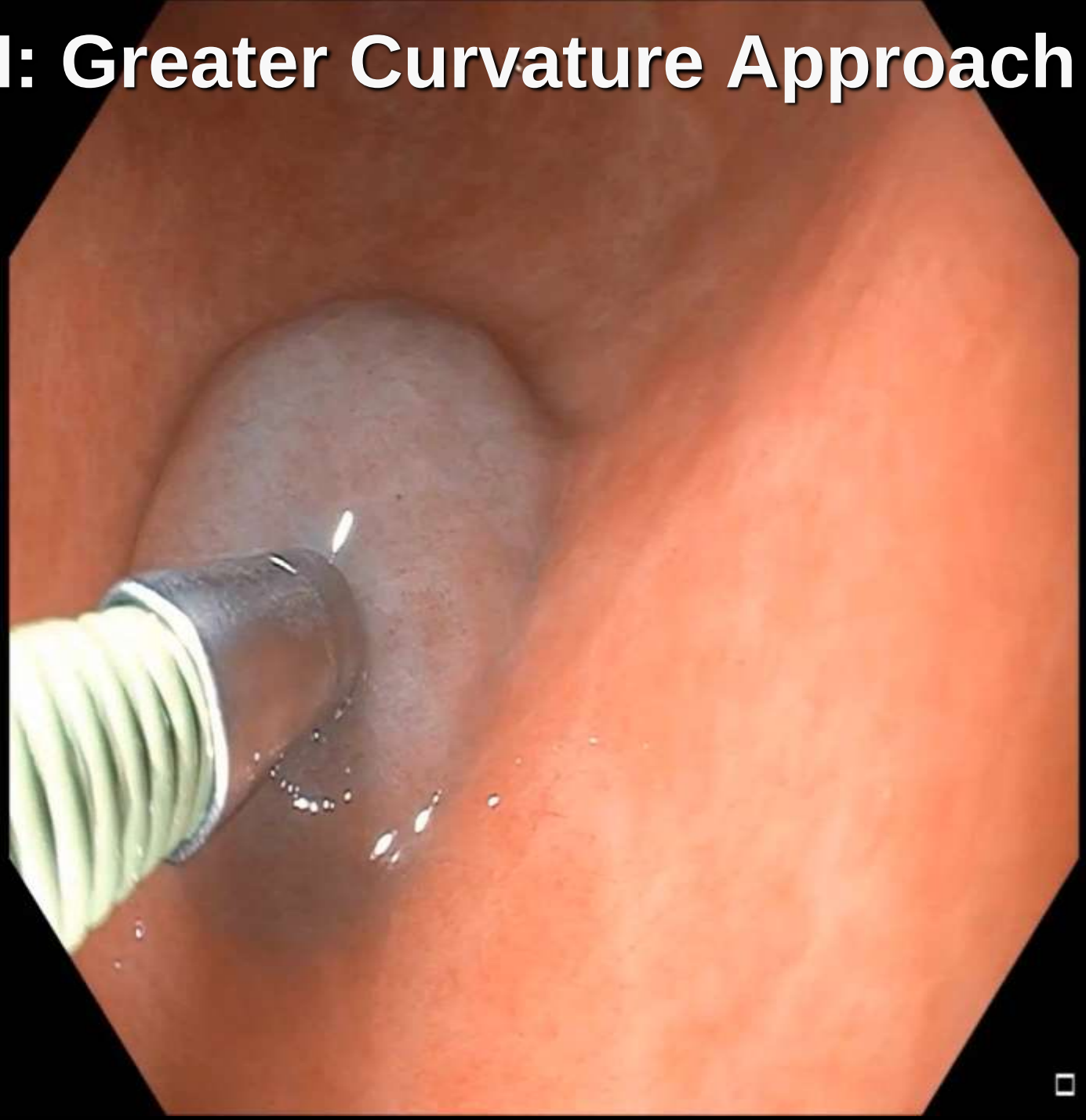
Mouen A. Khashab, Ellen Stein, John O. Clarke, Payal Saxena, Vivek Kumbhari, Bani Chander Roland, Anthony N. Kalloo, Stavros Stavropoulos, Pankaj Pasricha, Haruhiro Inoue GIE 2013;78:764–768

SAGES 2014

Early human experience with Per-Oral Endoscopic Pyloromyotomy (POP). E Shlomovitz, R Pescarus, A Sharata, KM Reavis, CM Dunst, LL Swanstrom.

GIE 2005;61:598-600.
Endoscopic pyloromyotomy for congenital pyloric stenosis.
Ibarguen-Secchia. San Antonio, TX

G-POEM: Greater Curvature Approach



GPOEM Lesser curve approach

G-POEM for Gastroparesis

[Khashab et al (MC) GIE 2017;85:123-8]

30 refractory gastroparesis
Prior Botox 12, transpyloric stenting 3, PEGJ 1
G-POEM in 100% in 72 min (35-223 min)
Myotomy length 2.6 ± 2.3 cm
LOS 3.3 days (range, 1-12 days)
AE 2 (6.7%): 1 capnoperitoneum/1 ulcer
Clinical response 26 (86%) f/u 5.5 months
Gastric emptying normalized in 8/17 (47%)
improved in 6/17 (35%)

Same day discharge after GPOEM

[Landreneau JP et al (Cleveland Clinic) Surg Endosc 2019;Sep 3]

44 pts, Jan 2016-May 2018

SDD compared with 54 admitted pts

Mean age 44.8, 85% female

idiopathic 53.7%, DM 29.6%, post-surg 11.1%

Operative time 25.4 v 31.1 min

Recovery time 4 h v 29.3 h

Readmission 7.4 v 18.5%

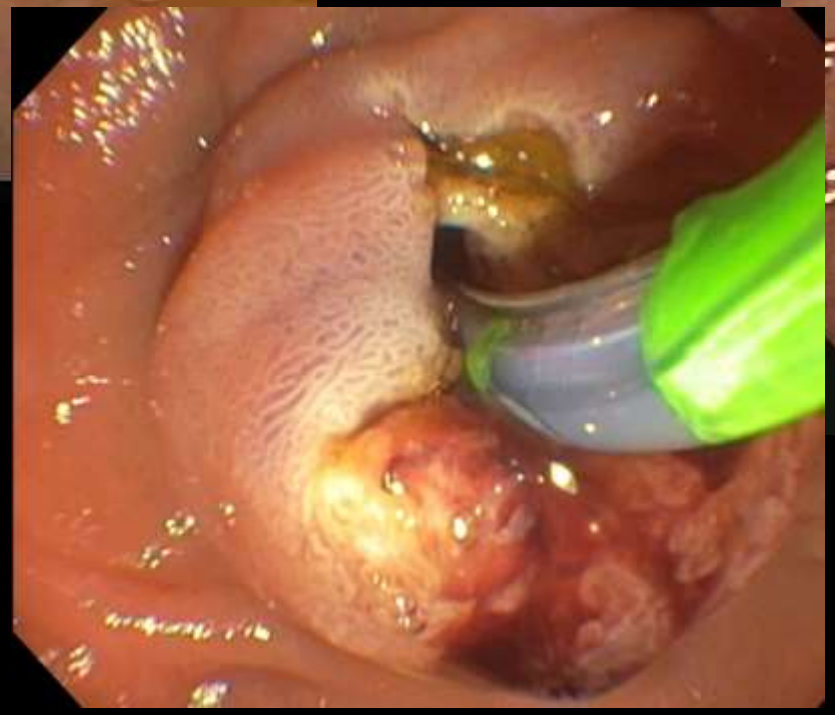
AE 1.9 v 3.7%

Cost 26% less with SDD

G-POEM (Pyloromyotomy)

Is now an acceptable treatment for selected patients with gastroparesis

Biliary-POEM & Pancreatic-POEM



Sleeve-POEM (Petros Benias, MD)

Per Rectal Endoscopic Myotomy for Adult Hirschsprung's Disease: First Human Case

[Bapaye A, et al [Pune India] Dig Endo 2016;28:680-684]

Myotomy Family

- Z-POEM (Zenker's)
- E-POEM (Achalasia)
- G-POEM (Gastroparesis)
- B-POEM (Biliary)
- P-POEM (Pancreatic)
- S-POEM (Sleeve)
- PREM (Hirschsprung's)

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