GERD AND HIATAL HERNIA – PREOPERATIVE ASSESSMENT

Preoperative investigations (gastroscopy; high-resolution manometry) before bariatric surgery

PROS

Rossella Palma MD PhD
Endoscopic Surgeon
University of Rome

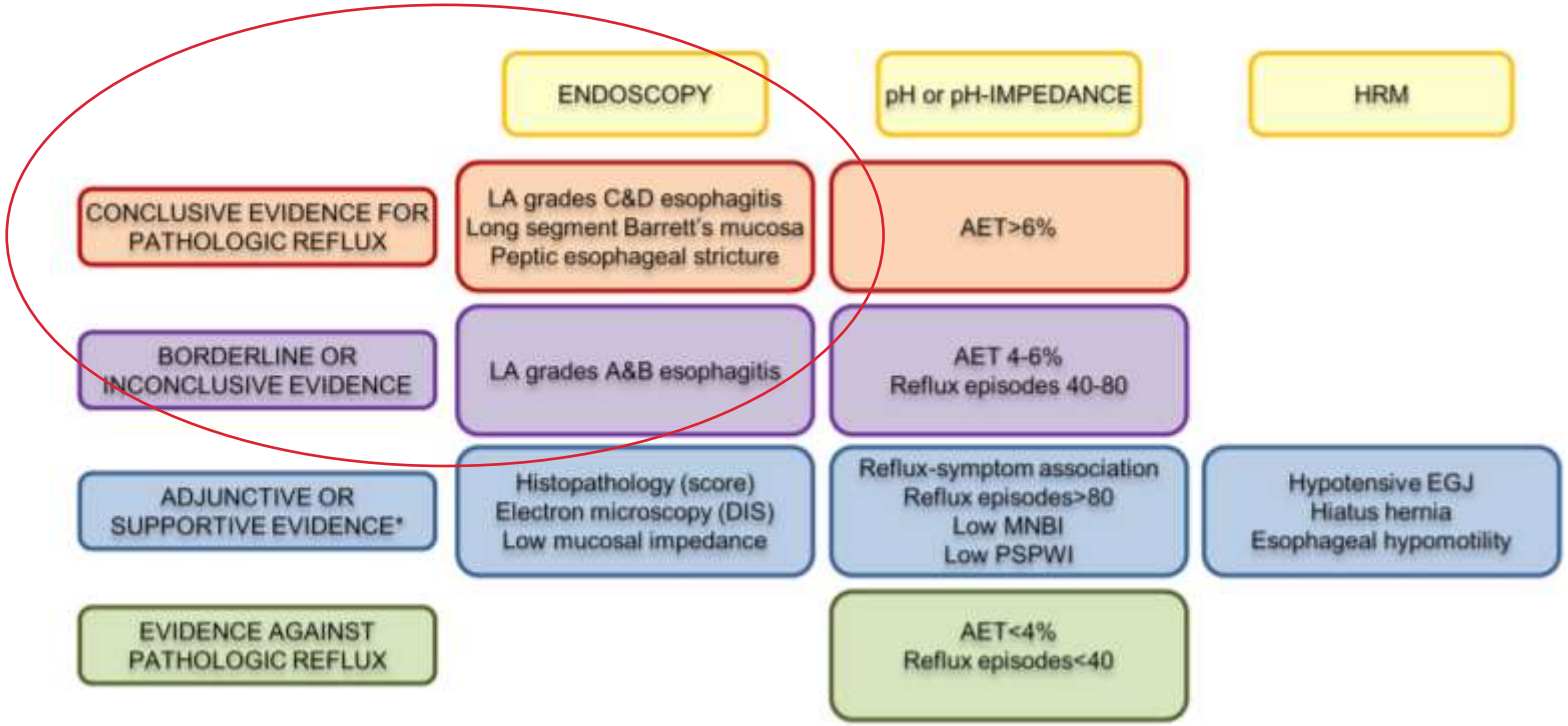
Antonella Santonicola MD PhD
Gastrointestinal Unit
University of Salerno

R. Palma and A. Santonicola have no potential conflict of interest to report

OPEN ACCESS

Modern diagnosis of GERD: the Lyon Consensus

C Prakash Gyawali,[1] Peter J Kahrilas,[2] Edoardo Savarino,[3] Frank Zerbib,[4] Francois Mion,[5,6,7] André J P M Smout,[8] Michael Vaezi,[9] Daniel Sifrim,[10] Mark R Fox,[11,12] Marcelo F Vela,[13] Radu Tutuian,[14] Jan Tack,[15] Albert J Bredenoord,[8] John Pandolfino,[2] Sabine Roman[5,6,7]



TOPICS TO BE ADDRESSED

- Preoperative GERD diagnosis with its variables
- Intraoperative HH diagnosis
- Hiatal hernia repair

Obesity Surgery (2020) 30:4243–4249
https://doi.org/10.1007/s11695-020-04776-x

ORIGINAL CONTRIBUTIONS

A Step in the Right Direction: Trends over Time in Bariatric Procedures for Patients with Gastroesophageal Reflux Disease

Zaina Naeem[1] · Jie Yang[2] · Jihye Park[2] · Junying Wang[2] · Salvatore Docimo[1] · Aurora D. Pryor[1] · Konstantinos Spaniolas[1]

Source: MBSAQIP registry 2015-2018

Variable	Total ($n = 595,308$) n (% of column total)	No concomitant hiatal hernia repair ($n = 500,461$) (% of column total)	Concomitant hiatal hernia repair ($n = 94,847$) (% of column total)
Year			
2015	130,772 (21.97%)	109,079 (21.80%)	21,693 (22.87%)
2016	145,783 (24.49%)	121,996 (24.38%)	23,787 (25.08%)
2017	154,478 (26.45%)	132,845 (26.54%)	24,633 (25.97%)
2018	161,275 (27.09%)	136,541 (27.28%)	24,734 (26.08%)

Surgical Endoscopy
https://doi.org/10.1007/s00464-020-07668-4

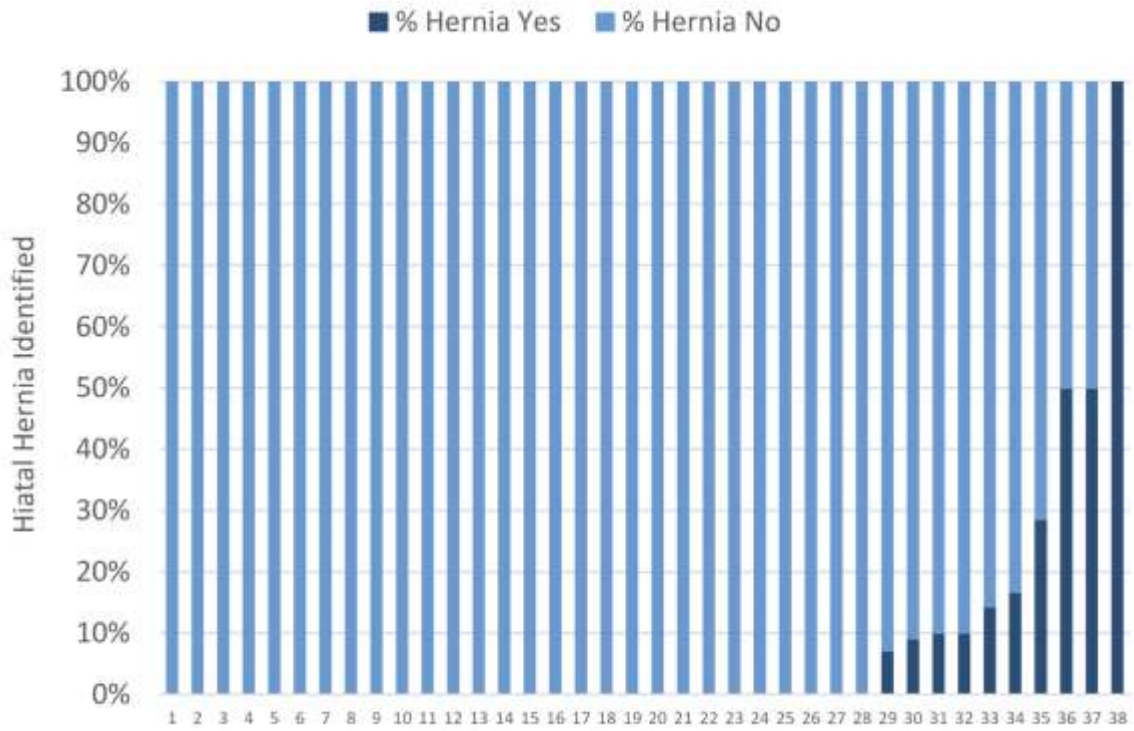
In the eye of the beholder: surgeon variation in intra-operative perceptions of hiatal hernia and reflux outcomes after sleeve gastrectomy

Anne P. Ehlers[1,2] · Karan Chhabra[2,3,4] · Jyothi R. Thumma[2] · Justin B. Dimick[1,2] · Oliver Varban[1]

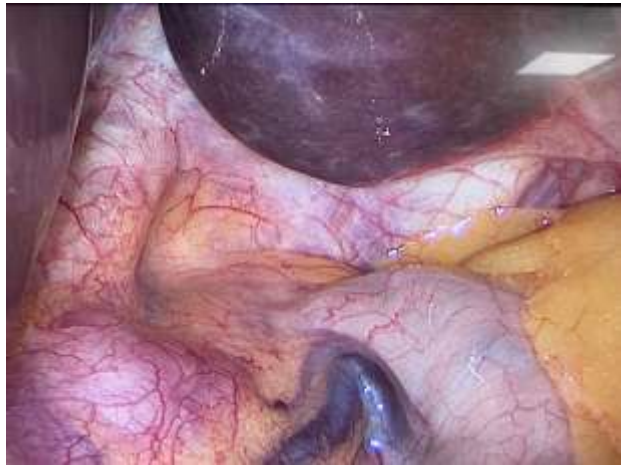
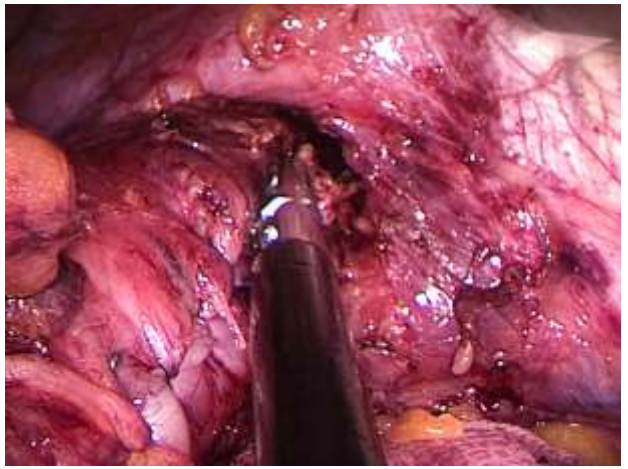
Received: 5 March 2020 / Accepted: 20 May 2020

Surgeons (n = 38) reviewed 33 videos of LSG in which no hiatal hernia repair was performed.

Surgeons who identified hiatal hernias during video review had a higher rate of concurrent hiatal hernia repairs in their practice.



Intraoperative Diagnosis

Does gastroscopy have a role in the pre-operative diagnosis?

The role of preoperative endoscopy: Definitions

Guidelines

OPEN ACCESS

Kyoto international consensus report on anatomy, pathophysiology and clinical significance of the gastro-oesophageal junction

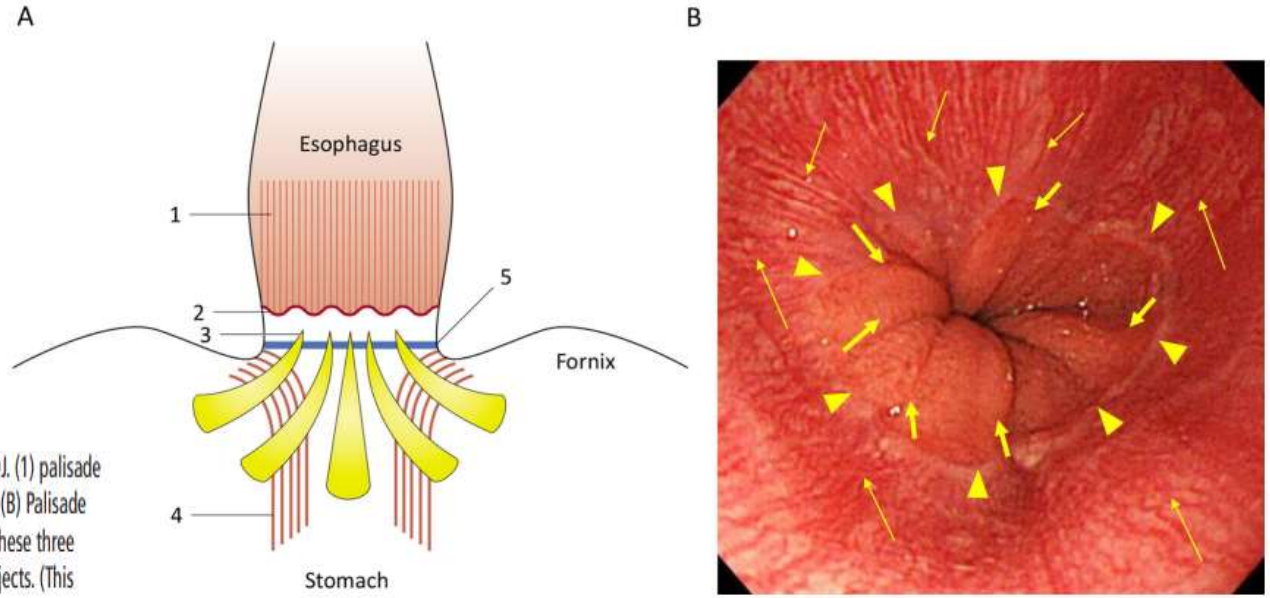
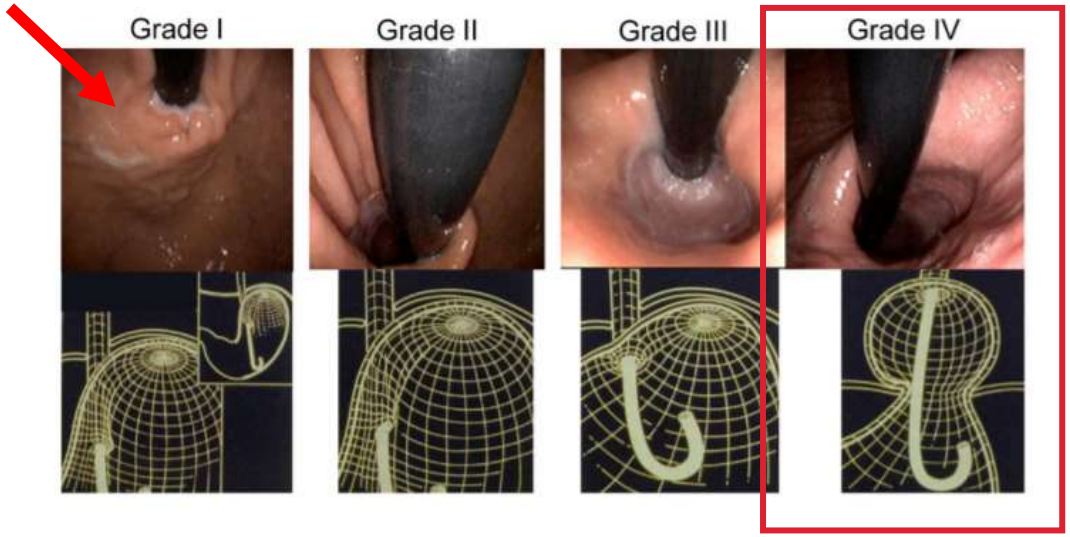


Figure 1 Landmarks of gastro-oesophageal junction (GOJ). (A) Schema of the landmarks used for GOJ. Endoscopic view of the GOJ. (1) palisade vessels, (2) squamocolumnar junctional line (Z line), (3) proximal end of the gastric folds, (4) gastric sling fibres and (5) angle of His. (B) Palisade vessels (thin arrows), squamocolumnar junctional line (Z-line) (arrow heads) and the end of gastric folds (thick arrows) are shown. These three landmarks (distal end of palisade vessels, Z-line and proximal end of gastric folds) are closely aligned with each other in normal subjects. (This endoscopic Image was provided by Prof. MF.).

The role of preoperative endoscopy: Hill Classification

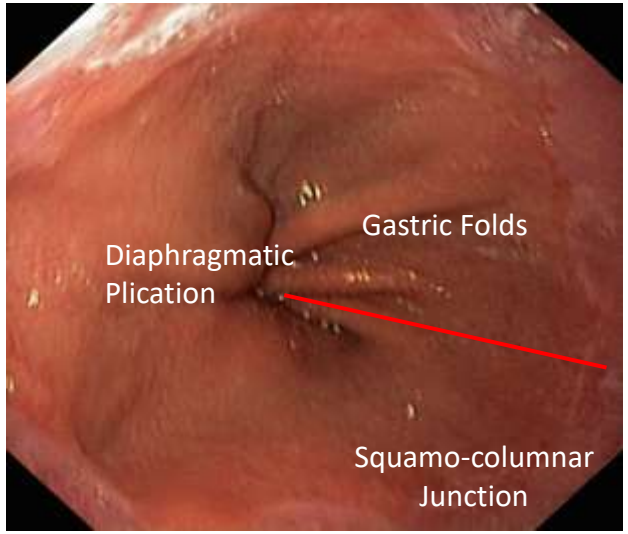
Hill Grade IV: there is no fold, and the lumen of the esophagus is open, often allowing the squamous epithelium to be viewed from below. A hiatal hernia is always present.

EGJ flap valve



Kahrilas *et al*
Best Pract Res Clin Gastroenterol, 2008

The role of preoperative endoscopy: Definitions



Conclusions: Hiatal Hernia (Grade IV according to Hill Classification)

Obesity Surgery (2020) 30:3135–3153
https://doi.org/10.1007/s11695-020-04720-z

REVIEW

IFSO Position Statement on the Role of Esophago-Gastro-Duodenal Endoscopy Prior to and after Bariatric and Metabolic Surgery Procedures

Wendy A. Brown[1] · Yazmin Johari Halim Shah[1] · George Balalis[1] · Ahmad Bashir[1] · Almino Ramos[1] · Lilian Kow[1] · Miguel Herrera[1] · Scott Shikora[1] · Guilherme M. Campos[1] · Jacques Himpens[1] · Kelvin Higa[1]

1. EGD should be considered for all patients with upper GI symptoms planning to undergo a bariatric procedure due to the frequency of pathology that may alter management.

2. EGD should be considered for patients without upper GI symptoms who are planning to undergo a bariatric procedure due to the 25.3% chance of an unexpected finding that may alter management or contra-indicate surgery.

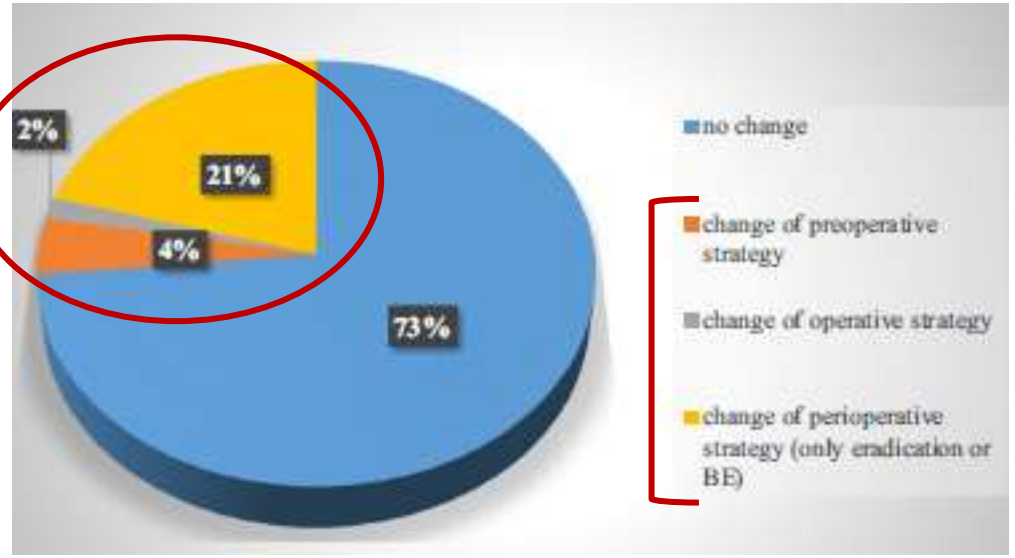
3. EGD should be routinely considered in populations where the community incidence of significant gastric and esophageal pathology is high, particularly when the procedure will lead to part of the stomach being inaccessible (for example RYGB and OAGB).

Preoperative UGIE: Essential or Optional?

Pre-op UGIE
Significant impact on decision making

Group	*Endoscopic findings*	*Clinical relevance*
Group I	No relevant endoscopic or histological findings	No change of the perioperative and operative strategy
Group II	Hp infection, BE, gastric ulcer, severe hemorrhagic gastritis	Change of the perioperative strategy
Group III	Autoimmune gastritis, malignancies, GERD, and BE	Change of the operative strategy

Hp Helicobacter pylori; *GERD* gastroesophageal reflux disease; *BE* Barrett's Esophagus



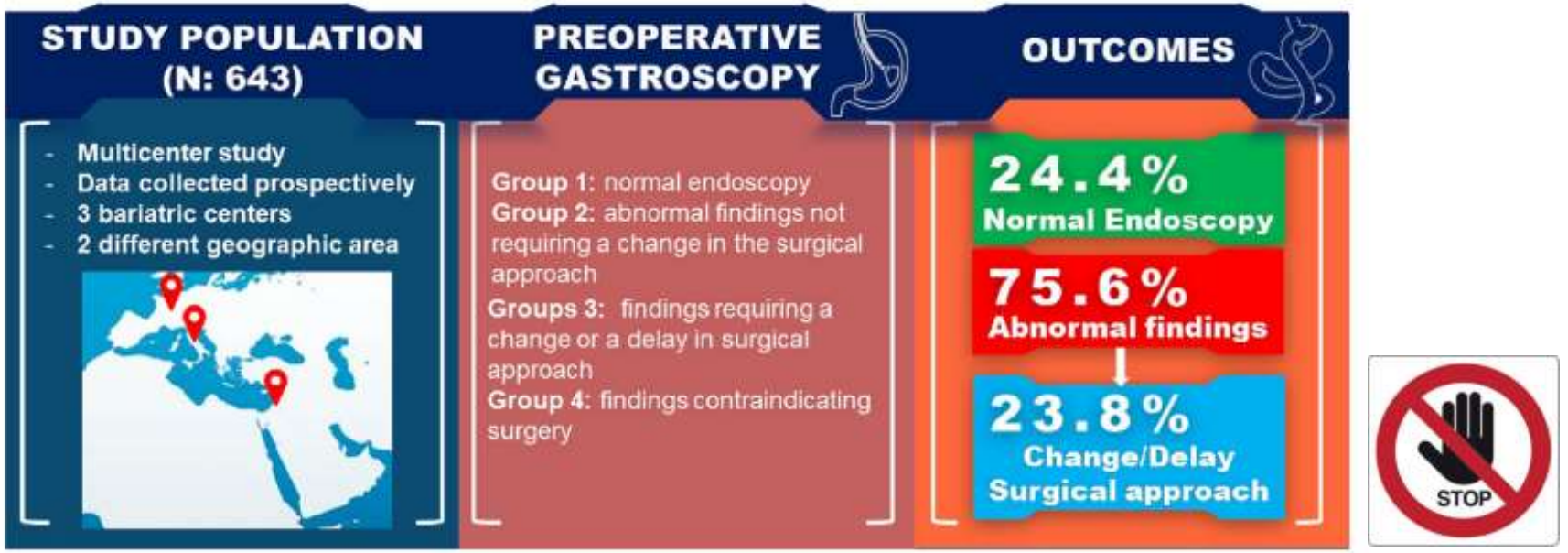
Hiatal insufficiency or hiatal hernias were detected endoscopically in 207 patients (32.5%)

Surgical Endoscopy (2023) 37:1342–1348
https://doi.org/10.1007/s00464-022-09656-2

ORIGINAL ARTICLE

Indications for upper gastrointestinal endoscopy before bariatric surgery: a multicenter study

Hussein Abdallah[1] · Mehdi El Skalli[2] · Hussein Mcheimeche[3] · Biagio Casagranda[1,4] · Nicolò de Manzini[1,4] · Silvia Palmisano[1,4]



Surgical Endoscopy (2023) 37:1342–1348
https://doi.org/10.1007/s00464-022-09656-2

ORIGINAL ARTICLE

Indications for upper gastrointestinal endoscopy before bariatric surgery: a multicenter study

Hussein Abdallah[1] · Mehdi El Skalli[2] · Hussein Mcheimeche[3] · Biagio Casagranda[1,4] · Nicolò de Manzini[1,4] · Silvia Palmisano[1,4]

Table 2 Endoscopic reports and related surgical management

Groups	UGE findings	Number of patients, *N* (%)	Descriptions/Surgical management
Group 1	Normal gastroscopy	157 (24,4%)	Normal and Abnormal findings not requiring a change in surgical management
Group 2	-Mildesophagitis, gastritis and/or duodenitis -Benign polyps -Esophageal webs	333 (51,8%)	
Group 3	-H. pylori -Mass lesions (mucosal/submucosal), Gastrointestinal Stromal Tumors (GIST), Neuroendocrine tumor (NET) -Ulcers (any location) -Severe erosive esophagitis, gastritis and/or duodenitis -Barrett's esophagus -Bezoar -Hiatal hernia * -Peptic stricture -Esophageal diverticula -Arteriovenous malformations	153 (23,8%)	Abnormal findings requiring a change or a delay in surgical approach
Group 4	-Upper GI cancer -Varices	0 (0%)	Contraindication to bariatric surgery

* Hiatus hernia 168/26.1%
Hiatal insufficiency or small hiatal hernia ≤ 3 cm 151/89.9%
Large hiatal hernia > 3 cm with/or without parae-sophageal hernia 17/10.1%

JGH Open An open access journal of gastroenterology and hepatology Open Access
JGHF
doi:10.1002/jgh3.12388

ORIGINAL ARTICLE

Accuracy of hiatal hernia diagnosis in bariatric patients: Preoperative endoscopy *versus* intraoperative reference

Daniel L Chan,*[,†,‡] Simon K-H Wong,* Hon Ting Lok,* Jim Iliopoulos,[†] Michael L Talbot,[†,‡] Annemarie Hennessy[†] and Enders K-W Ng*

Study type: retrospective analysis

Endpoint: Endoscopy results were compared to intraoperative findings, and subgroup analysis of >2 cm hernias was performed.

Conclusions: Endoscopy can achieve an accuracy comparable to HRM in high-volume endoscopy centers.

	Endoscopy HH diagnosis (all)	Endoscopy HH (>2 cm) diagnosis
	Value (95% confidence interval)	Value (95% confidence interval)
Sensitivity (TP/TP + FN)	75.68% (58.80–88.23%)	32.43% (18.01–49.79%)
Specificity (TN/FP + TN)	91.44% (88.24–94.00%)	98.49% (96.74–99.44%)
Positive likelihood ratio (sensitivity/1 – specificity)	8.53 (6.11–12.79)	21.46 (8.55–53.86)
Negative likelihood ratio (1 – sensitivity/specificity)	0.27 (0.15–0.47)	0.69 (0.55–0.86)
Positive predictive value (TP/TP + FP)	45.16% (36.27–54.38%)	66.68% (44.36–83.40%)
Negative predictive value (TN/TN + FN)	97.58% (95.80–98.62%)	93.99% (92.59–95.13%)
Accuracy (sensitivity × prevalence) + (specificity × [1 – prevalence])	90.09% (86.89–92.74%)	92.85% (90.01–95.09%)

HIGH RESOLUTION MANOMETRY (HRM)

SHOULD WE PERFORM IT BEFORE BARIATRIC SURGERY????

YES!!!!

WHAT ADDITIONAL INFORMATION FOR THE SURGEON?

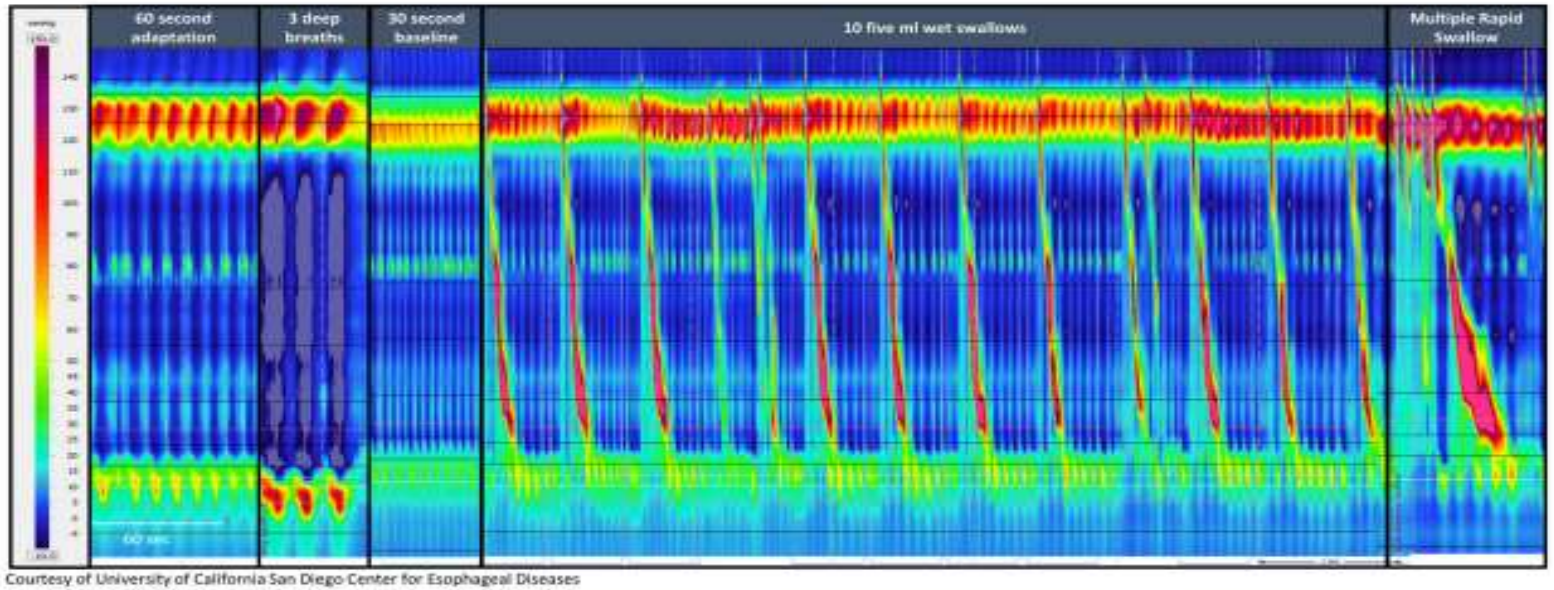
IFSO
NAPOLI
2023

HIGH RESOLUTION MANOMETRY (HRM) SYSTEMS

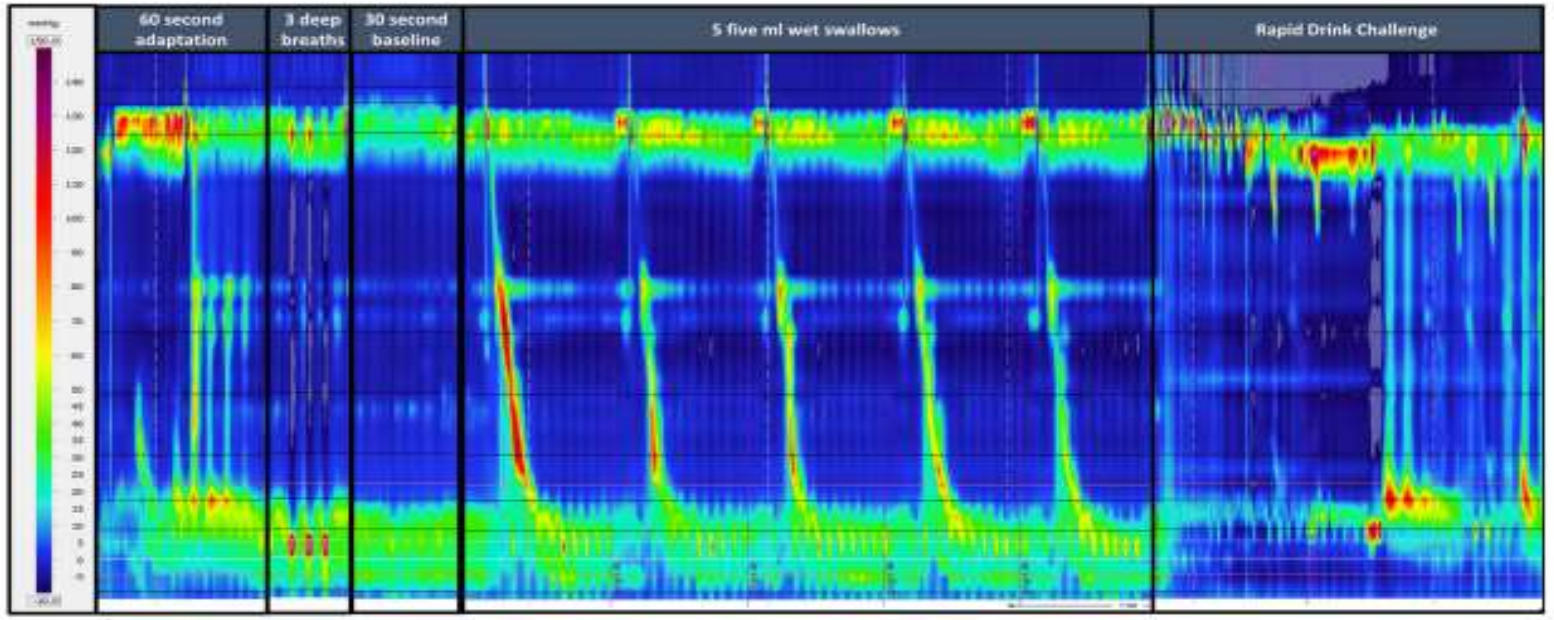
Solid-state HRM system

Water-perfused HRM system

HRM CHICAGO 4 PROTOCOL



Courtesy of University of California San Diego Center for Esophageal Diseases



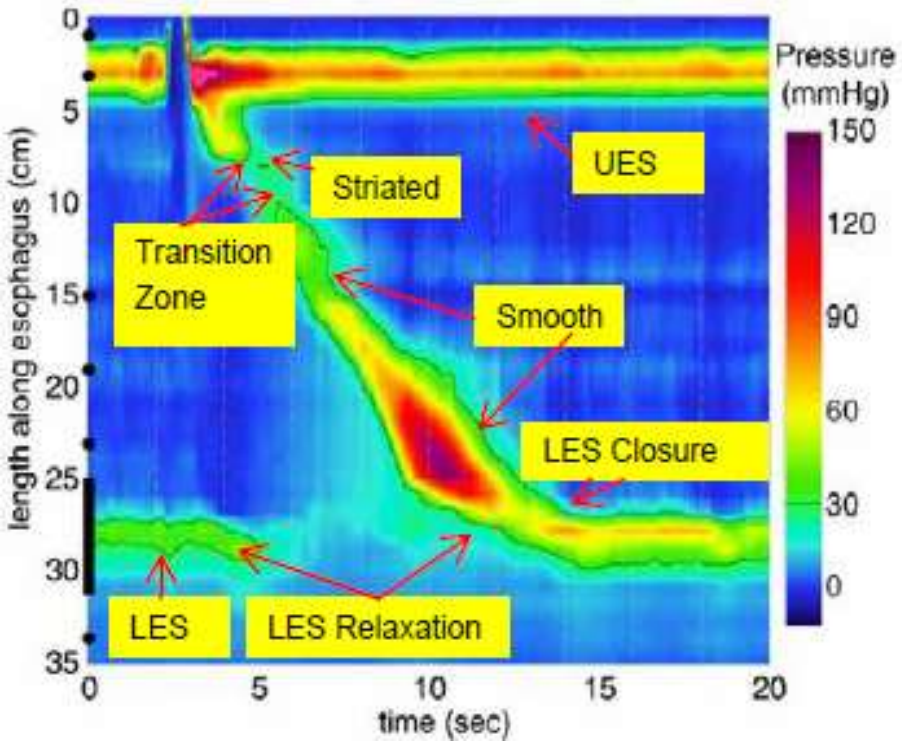
Supine position

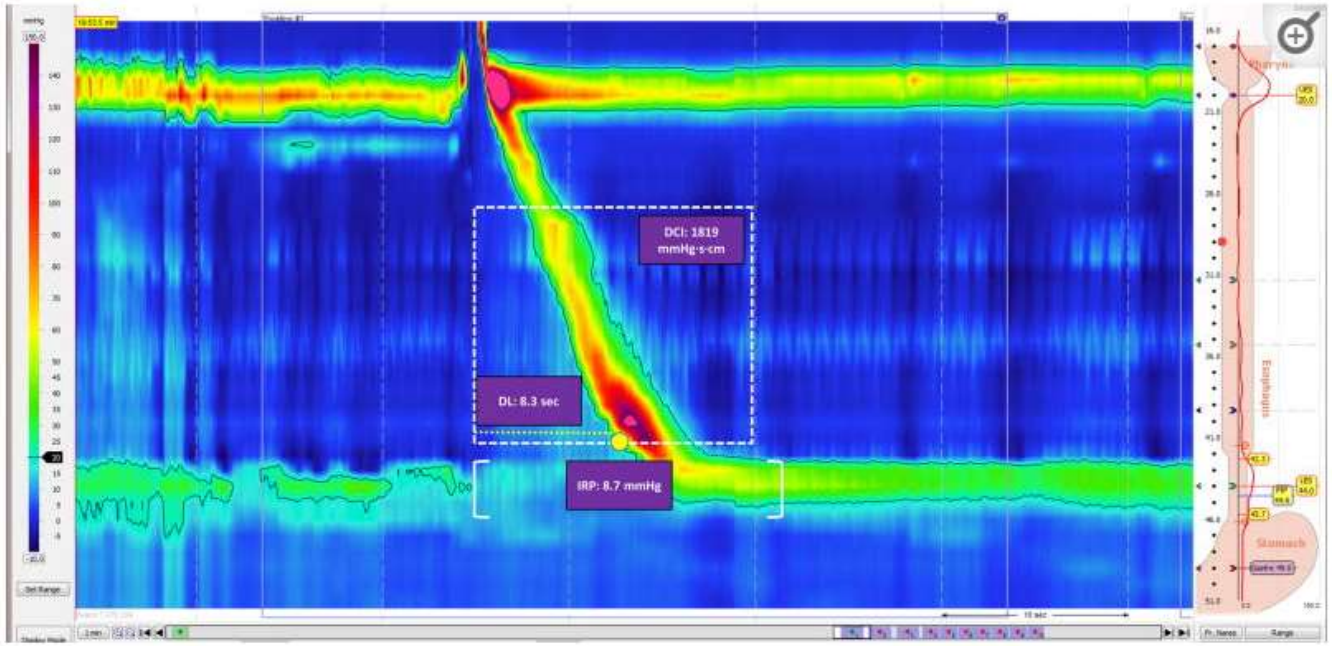
- **a 60 second adaptation period,**
- **3 deep breaths,**
- **30 second baseline period,**
- **10 five ml wet swallows and**
- **one multiple rapid swallow.**

Upright position

- **a 60 second adaptation,**
- **3 deep breaths,**
- **30 second baseline period,**
- **5 five ml wet swallows**
- **a rapid drink challenge**

HIGH RESOLUTION MANOMETRY

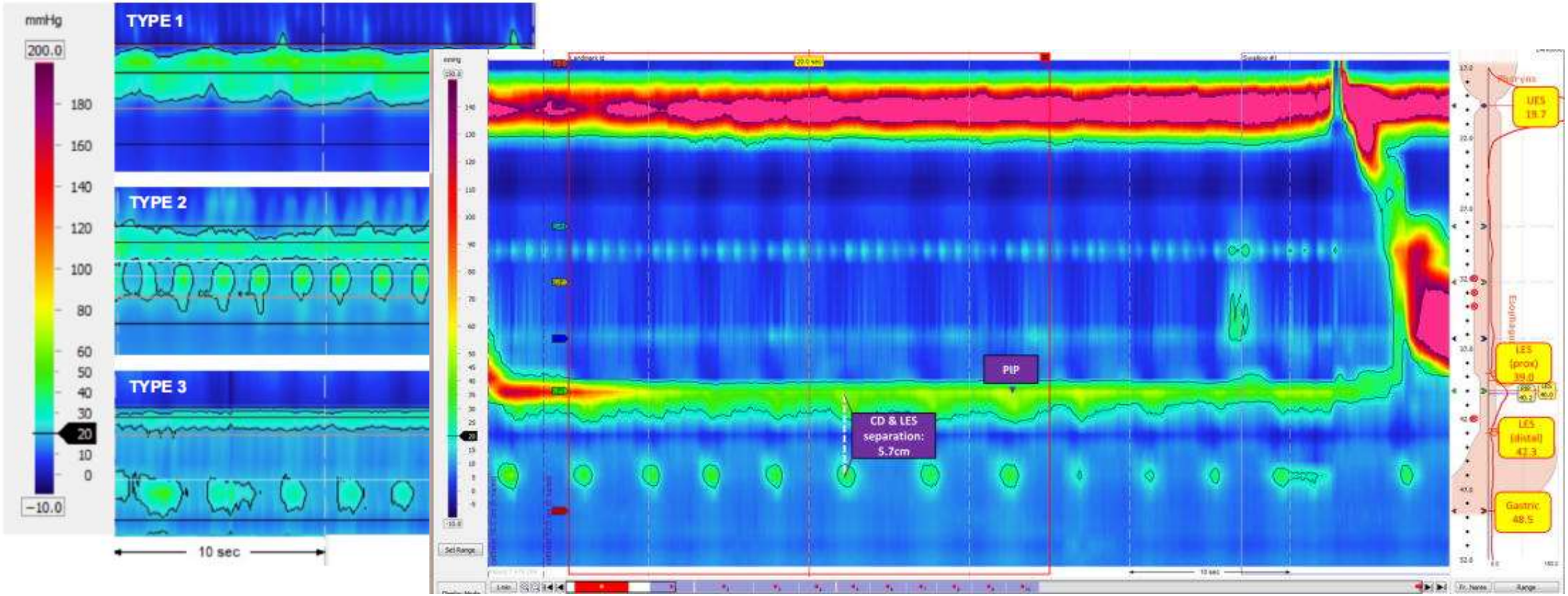




- **ESOPHAGOGASTRIC JUNCTION (EGJ)**
- **ESOPHAGEAL MOTILITY**

Distal contractile integral (DCI) measures the contractile vigor along time and the distance spanning the transition zone and proximal border of the LES. **DCI measures the vigor of peristalsis in the smooth muscle esophagus.**

ESOPHAGOGASTRIC JUNCTION (EGJ)



IFSO NAPOLI 2023

Surgical Endoscopy
https://doi.org/10.1007/s00464-019-06865-0

Hiatal hernia diagnosis prospectively assessed in obese patients before bariatric surgery: accuracy of high-resolution manometry taking intraoperative diagnosis as reference standard

Antonella Santonicola[1] · Luigi Angrisani[2] · Antonio Vitiello[2] · Salvatore Tolone[3] · Nigel John Trudgill[4] · Carolina Ciacci[1] · Paola Iovino[1]

- 41 consecutive morbidly obese patients underwent GERD questionnaires, barium swallow, UGIE, and HRM before bariatric surgery.
- The intraoperative diagnosis of HH was considered the reference standard. All the surgical procedures were performed by a single surgeon who was blinded to UGIE, HRM, and barium.
- HH was intraoperatively diagnosed in 11/41 patients

Table 3 Sensitivity, specificity, predictive value of positive and negative tests for HRM, UGIE, and barium swallow using intraoperative assessment as reference standard for HH

	HRM	UGIE	Barium swallow
Sensitivity (%)	90.9	72.7	45.5
Specificity (%)	63.3	66.7	86.7
PVPT (%)	47.6	44.4	55.5
PVNT (%)	95	86.9	81.3

HRM high-resolution manometry, *UGIE* upper gastrointestinal endoscopy, *HH* hiatal hernia, *PVPT* predictive value of positive test, *PVNT* predictive value of negative test

Conclusions

HRM is a very safe and beneficial tool that is able to diagnose HH in obese patient candidates for bariatric surgery. It might be used routinely in combination with the highly recommended UGIE, avoiding the need for barium swallow with its exposure to radiation. The lack of a preoperative HH diagnosis may influence the choice of procedure or change the operative strategy, prolonging the planned operative time.

The combination of UGIE together with HRM reached a sensitivity of 100%.

Santonicola et al. Surgical Endoscopy 2019

HIGH RESOLUTION MANOMETRY (HRM) WHAT ADDITIONAL INFORMATION FOR THE SURGEON?

✓ **PREOPERATIVE DETECTION OF HH**

CAN PREOPERATIVE HRM PREDICT THE ONSET OF GERD SYMPTOMS AFTER BARIATRIC SURGERY (especially SG)?

Obesity Surgery (2021) 31:3490–3497
https://doi.org/10.1007/s11695-021-05427-5

ORIGINAL CONTRIBUTIONS

Do Preoperative Esophageal pH Monitoring and High-Resolution Manometry Predict Symptoms of GERD After Sleeve Gastrectomy?

- 160 patients who underwent SG between 2013 and 2017 and performed preoperative 24-h esophageal pH monitoring and HRM.
- Symptoms of GERD, proton pump inhibitors (PPI) use, weight loss (WL), and diet were recorded in all patients before and 1 year after surgery
- 58 patients (36.3%) complained of GERD symptoms 1 year SG

The presence of GERD symptoms before SG **but not** the preoperative manometric findings are predictive of postoperative GERD

	GERD symptoms at 12 months $N = 58$	No GERD symptoms at 12 months $N = 102$	Univariate OR [95% CI]	*p* value
Age at surgery (years)	40.5 ± 9	42.1 ± 9	0.99 [0.96–1.02]	0.397
Sex female	50 (86.2%)	89 (87.3%)	0.91 [0.36–2.45]	0.850
Preoperative tobacco consumption	6 (10.3%)	11 (10.8%)	0.92 [0.30–2.56]	0.871
Preoperative GERD symptoms	25 (43.1%)	27 (26.5%)	**2.10 [1.07–4.18]**	**0.032**
Preoperative PPI use	8 (13.8%)	16 (15.7%)	0.86 [0.33–2.10]	0.747
Preoperative pH monitoring				
Positive APM	19 (32.8%)	20 (19.6%)	**2.00 [1.02–3.96]**	**0.045**
DeMeester score	17.4 ± 11.7	12.8 ± 9.4	**1.02 [1.00–1.04]**	0.080
Preoperative manometric parameters				
LES resting pressure	20.6 ± 7.6	21.3 ± 9.1	0.99 [0.96–1.02]	0.709
Distal contractile integral	1150 ± 586	1374 ± 792	1.00 [1.00–1.00]	0.151
Presence of hiatal hernia	22 (37.9%)	34 (33.3%)	1.24 [0.63–2.43]	0.534
IEM syndrome	12 (20.7%)	19 (18.6%)	1.13 [0.49–2.50]	0.774
Normal esophageal contractions (%)	64.83 ± 35.65	62.35 ± 34.99	1.00 [0.99–1.01]	0.668
Weight loss after surgery				
TWL (kg)	35.7 ± 7.0	33.9 ± 7.4	1.02 [0.99–1.05]	0.276
%TWL (%)	30.3 ± 5.0	29.5 ± 6.2	1.01 [0.97–1.06]	0.537
BMI at month 12 (kg/m^2)	30.4 ± 4.4	30.8 ± 4.4	0.99 [0.93–1.05]	0.721
%EWL (%)	62.5 ± 12.8	61.4 ± 15.5	1.42 [0.24–8.62]	0.700
Postoperative dietary habits				
Daily caloric intake	1192 ± 210	1124 ± 261	1.00 [1.00–1.00]	0.253
Meals per day	4.9 ± 1	4.7 ± 1	1.17 [0.82–1.70]	0.390
% Lipids	34.8 ± 5.3	34.5 ± 4.3	1.01 [0.95–1.07]	0.817
% Carbohydrates	46.7 ± 6.7	47.5 ± 4.8	0.98 [0.93–1.04]	0.372
% Proteins	18.4 ± 3.1	18.0 ± 2.9	1.03 [0.94–1.12]	0.543

Soliman et al. OBSU 2021

Obesity Surgery
https://doi.org/10.1007/s11695-023-06732-x

ORIGINAL CONTRIBUTIONS

Role of Preoperative High-Resolution Manometry in the Identification of Patients at High Risk of Postoperative GERD Symptoms 1 Year After Sleeve Gastrectomy

- Monocentric retrospective study
- 164 patients, with preoperative esophagitis/ GERD symptoms who underwent preoperative HRM and were submitted to SG (July 2020–February 2022)
- 36.6% of patients complained of GERD symptoms 1 year SG

Conclusion

Patients with preoperative risk factors for GERD (i.e., symptoms or esophagitis on EGDS) refusing or with contraindications to RYGB should be considered for an HRM. Moreover, when a DCI ≤ 1623 mmHg*s*cm is found, especially in females and in patients with preoperative GERD symptoms, a bariatric procedure different from SG might be considered.

Table 2 Multivariable logistic regression analysis evaluating determinant of postoperative gastroesophageal reflux disease (GERD)

Variable	OR	95% CI	*p*
Gender, female	3.402	1.540–7.513	0.002
DCI, > 1623 mmHg*cm*s	0.335	0.161–0.696	0.003
Preoperative esophagitis	–	–	–
Preoperative GERD symptoms	2.489	1.210–5.123	0.013

CI confidence interval, *GERD* gastroesophageal reflux disease, *OR* odds ratio

Patients with postoperative GERD showed a significantly lower DCI as compared to patients without symptoms

The weaker is the esophageal body, the more postoperative GERD occurs.

Bonaldi et al. OBSU July 2023

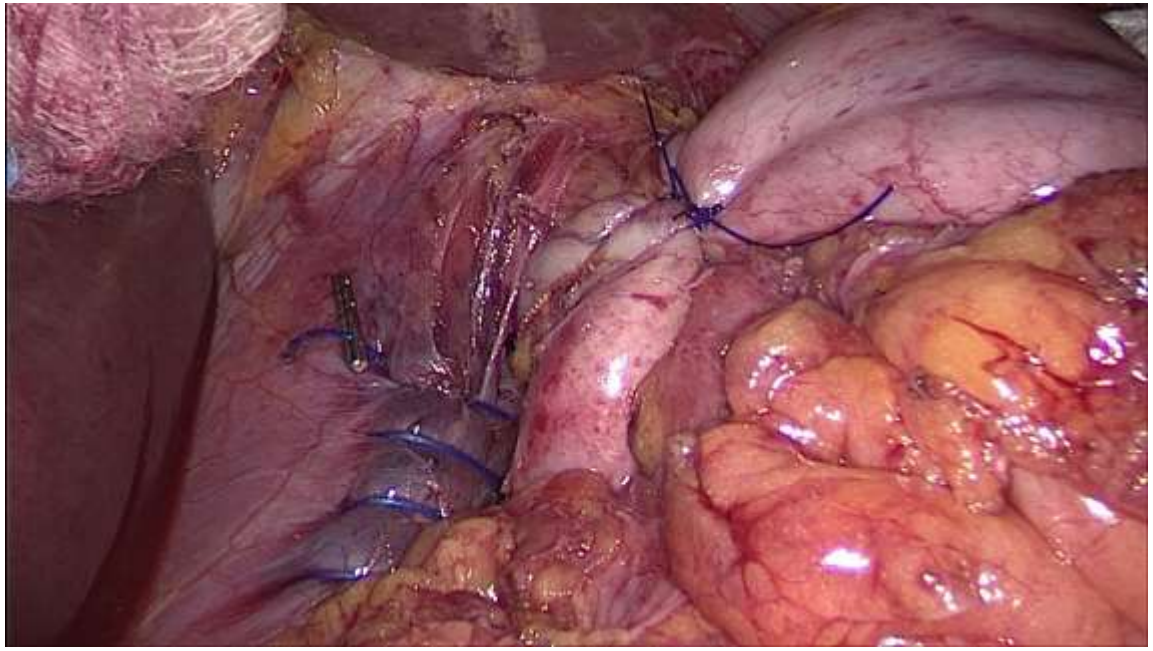
HIGH RESOLUTION MANOMETRY (HRM) WHAT ADDITIONAL INFORMATION FOR THE SURGEON?

✓ **PREOPERATIVE DETECTION OF HH**

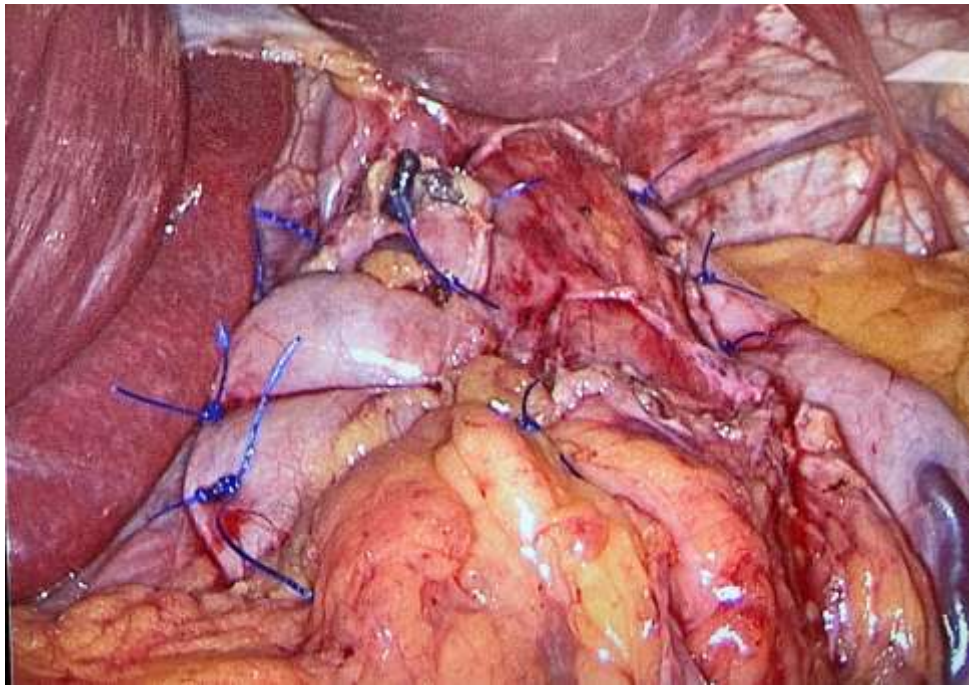
CAN PREOPERATIVE HRM PREDICT THE ONSET OF GERD SYMPTOMS AFTER BARIATRIC SURGERY (especially SG)?

CAN PREOPERATIVE HRM HELP THE SURGEON TO SELECT THE BEST PATIENTS FOR NISSEN OR TOUPET SLEEVE?

NISSEN VS TOUPET FUNDOPLICATION



Nissen- Sleeve



Toupet- Sleeve

Courtesy of Prof Angrisani

OBES SURG (2010) 20:357–362
DOI 10.1007/s11695-009-0040-3

CLINICAL REPORT

Manometric Changes of the Lower Esophageal Sphincter After Sleeve Gastrectomy in Obese Patients

Italo Braghetto · Enrique Lanzarini · Owen Korn · Héctor Valladares · Juan Carlos Molina · Ana Henriquez

In our opinion, if patients have reflux symptoms or esophagitis, they must be thoroughly evaluated with functional esophageal tests and the most appropriate bariatic operation must be indicated for them.

In conclusion, sleeve gastrectomy produces an important decrease in LES pressure, which can promote the appearance of reflux symptoms and esophagitis after the operation due to the partial resection of the sling fibers during the gastrectomy. GERD symptoms and esophagitis observed in these patients can be explained due to this mechanism.

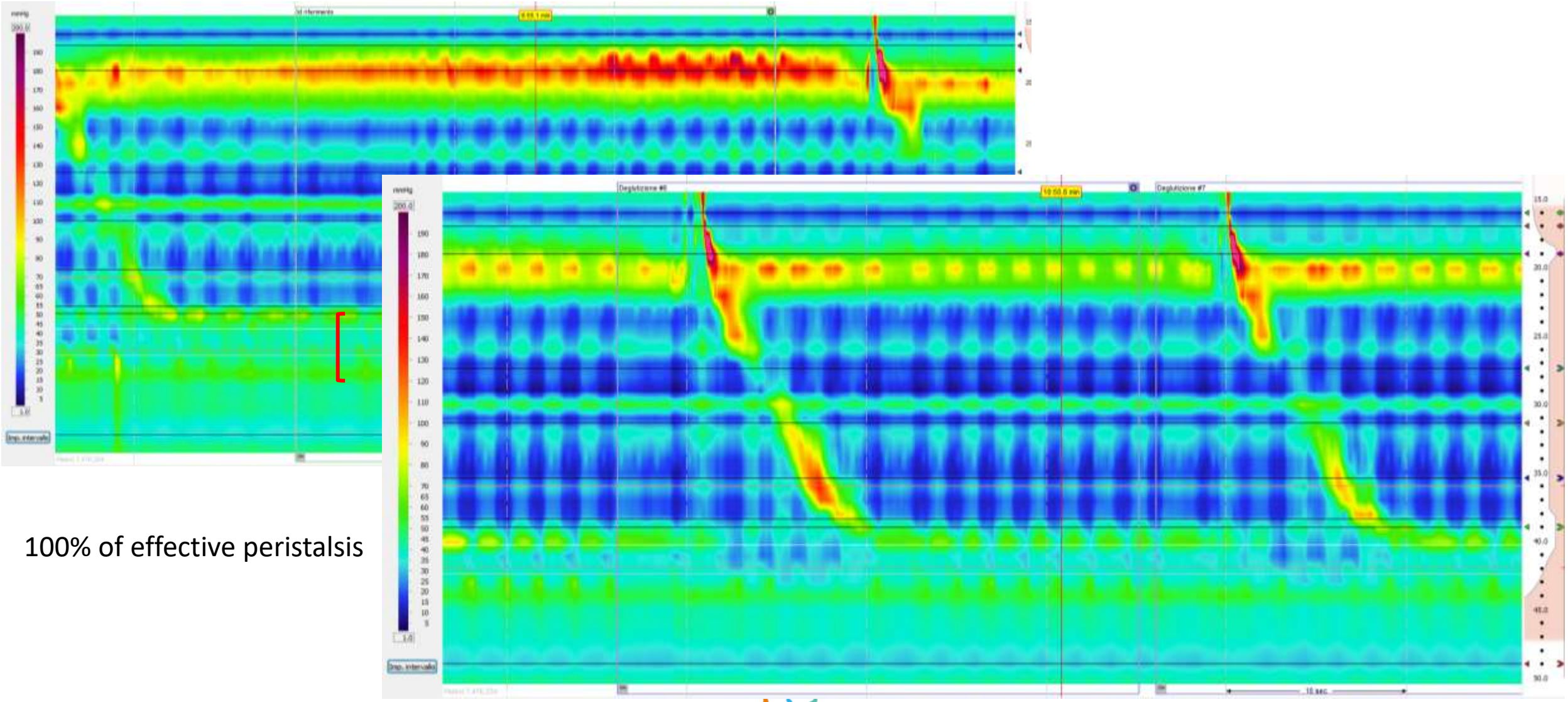
These findings should be considered in order to choose the best surgical option in obese patients with GERD or hiatal hernias.

The role of preoperative assessment: Clinical Case

F, 37 Y, BMI 41 kg/m2
GERD symptoms ++

Preop UGIE: 3 cm HH + Grade C esophagitis according to Los Angeles Classification + HP(+)

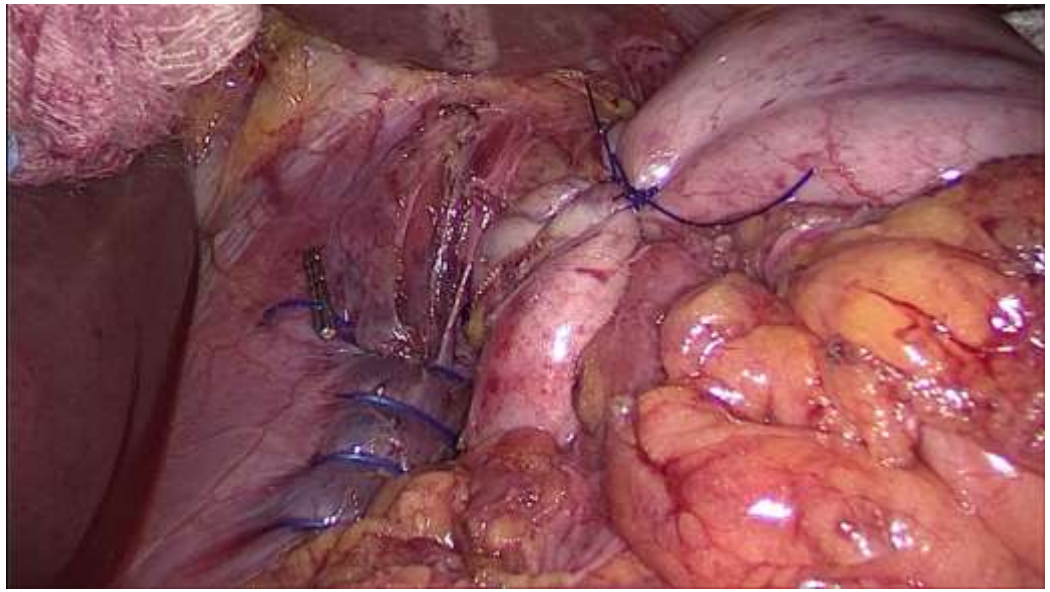
The patient refused RYGB



100% of effective peristalsis

The role of preoperative assessment: Clinical Case

The patient underwent Nissen-Sleeve Fundoplication



Six months FUP: 24,5% TWL, no GERD

Conclusions

- The role of preoperative UGIE is to identify a wide range of pathological findings in patients with obesity that could influence the therapeutic approach, including the choice of the proper bariatric procedure that should be tailored to the individual patient's characteristics.

- Hiatal hernia is a common condition in obese population probably understimated by the bariatric community.

- The emerging bariatric procedures in pts with GERD and HH require an accurate preoperative assessment in order to identify EGJ competency, Hiatal hernia, and the presence of esophageal motility disorders.

- Then we support the decision to perform UGIE for all patients eligible for bariatric operation regardless of symptoms and type of surgery planned.

Conclusions

- Actually the armamentarium of bariatric surgery is large and articulated. The choice of the type of procedure should be tailored considering patient's clinical characteristics but also data about EGJ morphology and esophageal motility.

- The HRM, a minimally invasive procedure, could be an additional preoperative tool for the surgeon and guide him in the best choice of bariatric treatment.

- Further prospective studies are needed in order to define the HRM role also in patients candidate to relatively new procedures such as sleeve with fundoplication

Thank you!

IFSO
NAPOLI
2023