

2025 /03/28 Case report

Case report:

A 70 y/o male with refractory GERD after fundoplication

Presenter: 陳寬智 醫師

Supervisor: 連漢仲 醫師

Patient data

- Chart No: 000873807G
- Name: 呂OO
- Age: 70 y/o
- Gender: Male
- Family history: Nil
- Height/ Weight: 176 cm / 69kg, BMI:22.2

Drug history

- Lansoprazole 30mg QD
- Mosapride 5mg TID

Medical history

- 1. Laparoscopic Fundoplication at A Hospital 2020/12/24.

Personal history

- Smoke : ex-smoker(2-3 yrs). Quit 30+ yrs.
- Alcohol : nil.
- Betel nuts : nil.
- Allergy history : nil.
- Family history : no related.
- Occupation: retired bank clerk

Present illness

2020/12

Hoarseness and recurrent vocal cord leukoplakia for 2 years, refer from ENT.

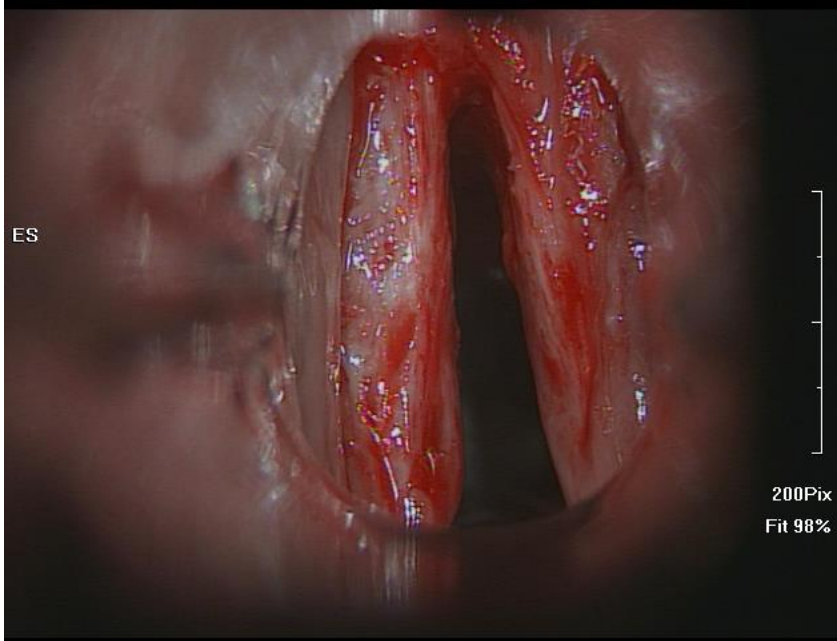
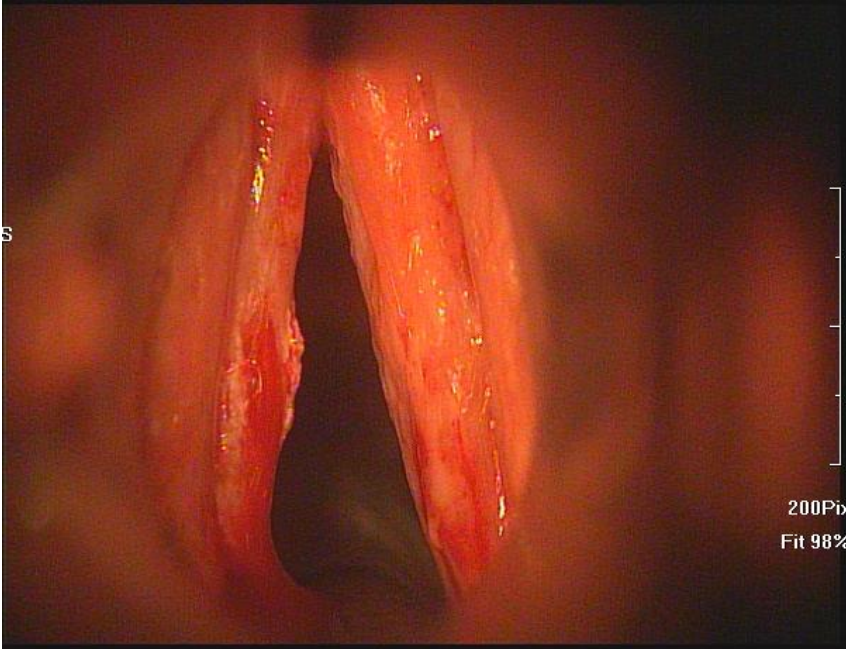
-Underwent /p ELM twice for Bil. vocal cord leukoplakia, on 2020/4/30 & 10/21 Bx.

Squamous cell carcinoma in situ

-s/s: acid reflux, could be controlled by PPI.

- He will undergo **fundoplication** in other hospital and is asking for pH-impedance test prior to surgery.

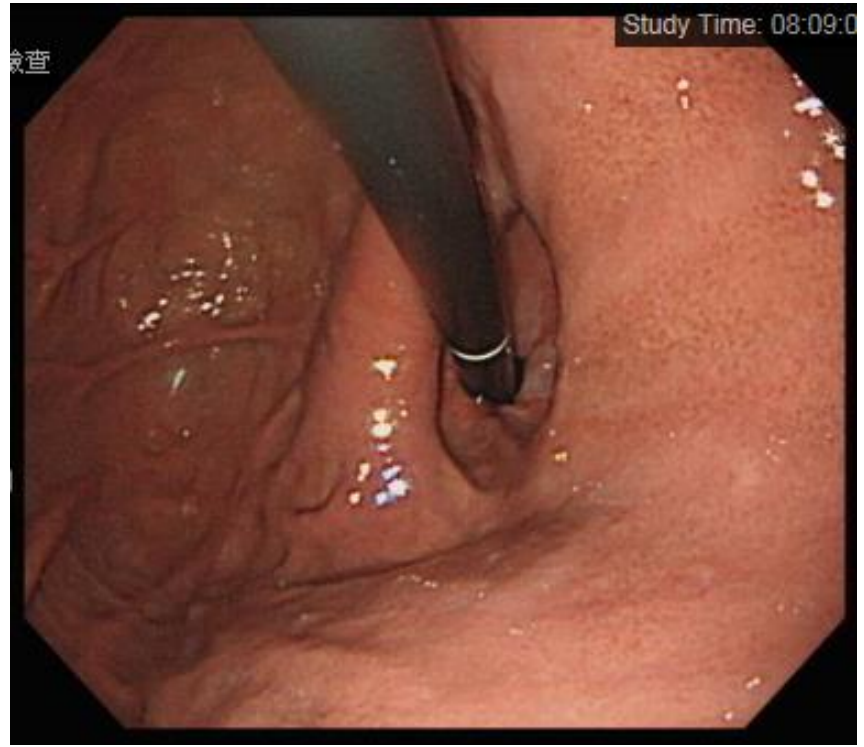
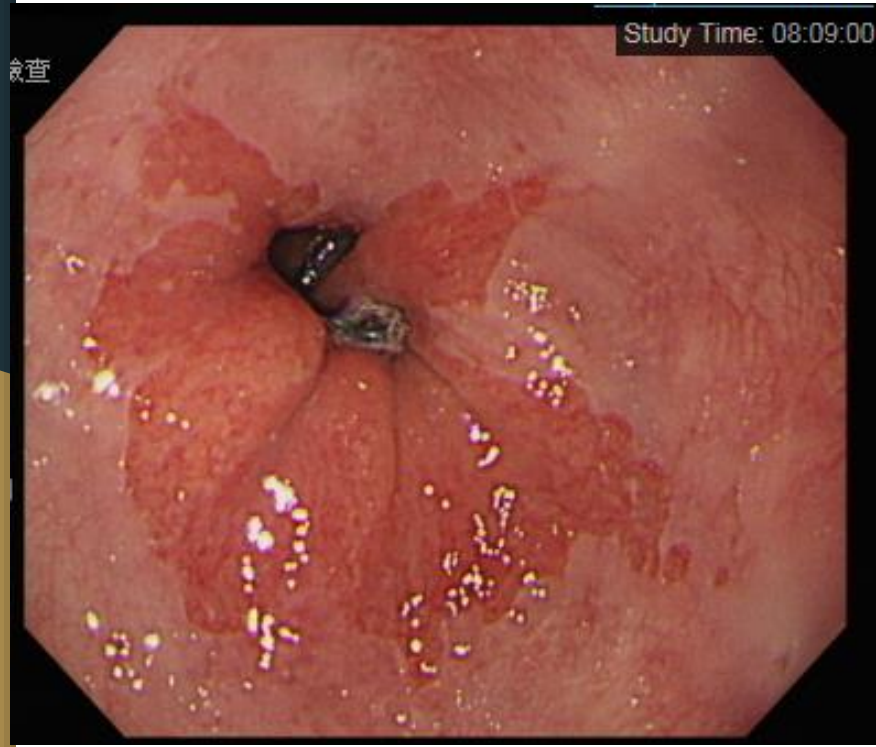
2020/04/29 & 10/22 laryngoscope.



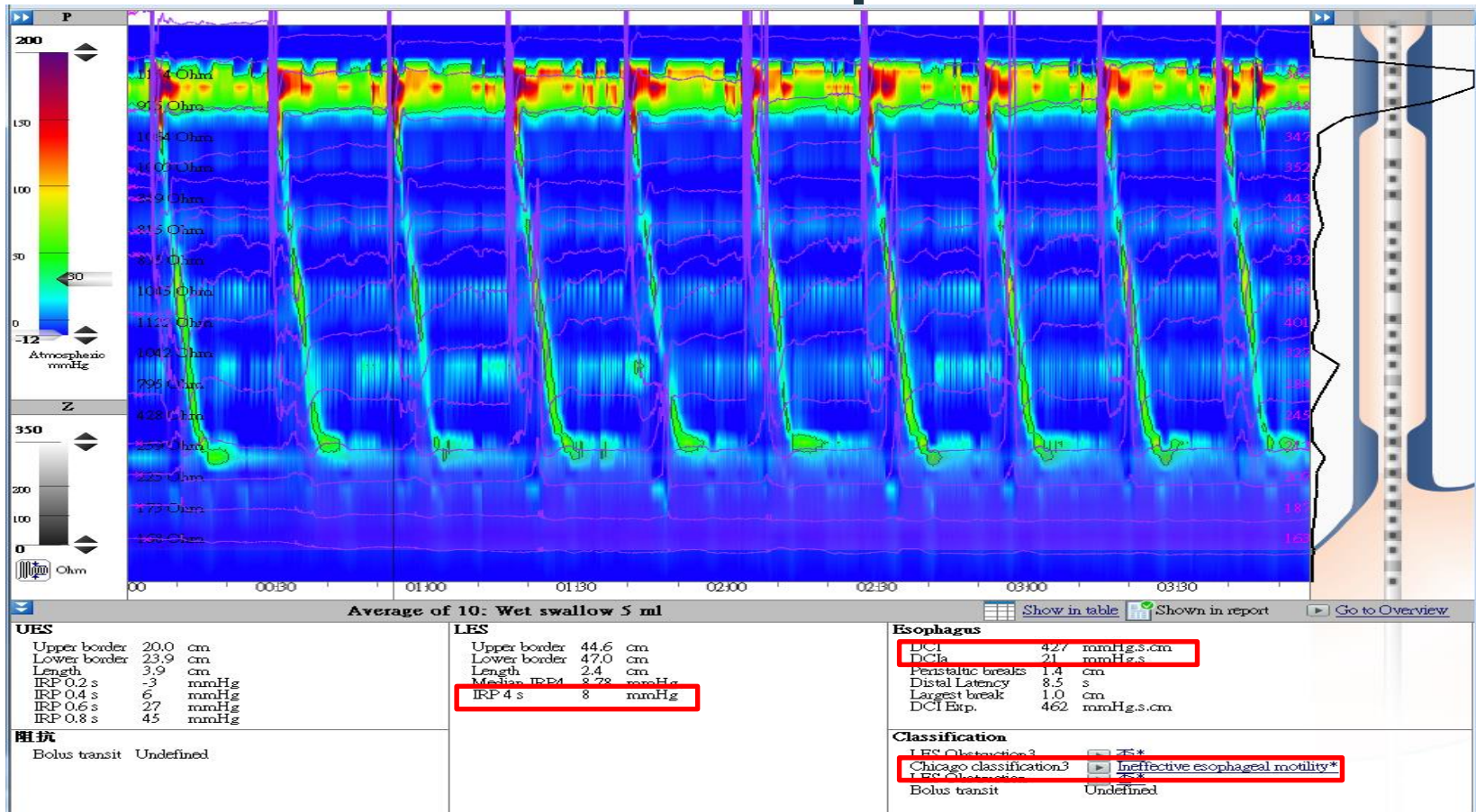
2020/11/16 other hospital UGI scope.

-GERD LA GrA, with hiatal hernia, sliding type 2 cm, Hill Gr IV

-ESEM(endoscopic suspect esophageal metaplasia.) . Bx: no IM.



2020/12 HRM before fundoplication



2020/12 HRM before fundoplication(other hospital)

Results: Average: Wet swallow 5 ml

All	UES	LES	Esophagus	Classification	Classification3 / Scoring						
Name	IRP 4 s (mmHg)	DCI (mmHg.s.cm)	Distal Latency (s)	Largest break (cm)	Peristaltic breaks (cm)	Contraction vigor					
Wet swallow 5 ml [1]	9	547	7.9	2.6	2.6	Normal					
Wet swallow 5 ml [2]	12	353	8.2	0.9	0.9	Weak					
Wet swallow 5 ml [3]	10	134		2.5	5.0	Weak					
Wet swallow 5 ml [4]	8	595	8.4	0.0	0.0	Normal					
Wet swallow 5 ml [5]	4	183	9.2	2.3	3.3	Weak					
Wet swallow 5 ml [6]	10	379	8.2	0.1	0.1	Weak					
Wet swallow 5 ml [7]	5	619	8.9	0.0	0.0	Normal					
Wet swallow 5 ml [8]	5	490	8.8	0.2	0.2	Normal					
Wet swallow 5 ml [9]	7	547	8.6	1.9	1.9	Normal					
Wet swallow 5 ml [10]	10	419	8.4	0.0	0.0	Weak					
Average	8	427	8.5	1.0	1.4	Normal					
中間	9										
LES Obstruction3	否										
Chicago classification3	Ineffective esophageal motility										
Normal	50	%									
Ineffective	50	%									
Failed contraction	0	%									

Conclusions: Ineffective esophageal motility (IEM)

2020/12 MIIpH testing, on PPI therapy.

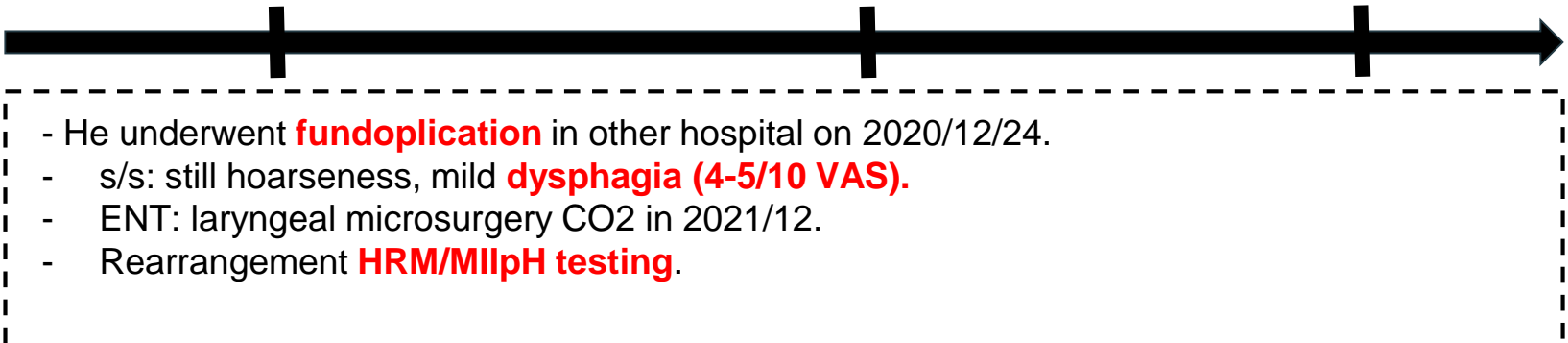
FRACTION TIME OF PH < 4.0=	2.4	% (NORMAL 4.0 ~ 4.5 %)		
DEMEOSTER SCORE	= 12.9	(NORMAL 14 ~ 15)		
AET/no.of REFLUX TOTAL	UPRIGHT	SUPINE	DEMEESTER SCORE	
	(<4.2%) / (<80)	(<6.3%)	(<1.2%)	(<14.7)
24HRS	2.4/48	3.5	0.1	12.9
SYMPTOM INDEX: 1/1 (100%) (<50%)				
SYMPTOM ASSOCIATION PROBABILITY: 86% (<95%)				

THIS IS A PH-IMPEDANCE TEST WITH 2 PH SENSORS LOCATED AT HYPOPHARYNX AND DISTAL ESOPHAGUS, RESPECTIVELY, WHILE THE PATIENT WAS ON QD AC ESOMEPRAZOLE 40 MG. HE REPORTED 1 EVENT OF REGURGITATION, WHICH WAS ASSOCIATED WITH ACID REFLUX. THERE WAS NO ACID IN HYPOPHARYNX. THE ACID SUPPRESSION IS ADEQUATE, WHILE THE PATIENT MAY BE HYPERSENSITIVITY TO ACID REFLUX. PPI TRIAL IS HIGHLY RECOMMENDED FOR SYMPTOM CONTROL.

Impression: **Adequate acid reflux.** Reflux hypersensitivity to acid reflux.
Bernstein test: **positive.**

Present illness

2021/02

- 
- He underwent **fundoplication** in other hospital on 2020/12/24.
 - s/s: still hoarseness, mild **dysphagia (4-5/10 VAS)**.
 - ENT: laryngeal microsurgery CO2 in 2021/12.
 - Rearrangement **HRM/MIIPH testing**.

2021/2 2nd HRM after fundoplication(other hospital)

Results: Average: Wet swallow 5 ml

All	UES	LES	Esophagus	Classification	Classification3 / Scoring				
Name	IRP 4 s (mmHg)	DCI (mmHg.s.cm)	Distal Latency (s)	Largest break (cm)	Peristaltic breaks (cm)	Contraction vigor	Contraction pattern3		
Wet swallow 5 ml [1]	21	145	9.7	18.6	18.6	Weak	Failed		
Wet swallow 5 ml [2]	23	143	10.1	11.4	14.3	Weak	Failed		
Wet swallow 5 ml [3]	28	119	10.5	18.7	18.7	Weak	Failed		
Wet swallow 5 ml [4]	22	120	10.1	19.0	19.0	Weak	Failed		
Wet swallow 5 ml [5]	26	59	10.2	19.7	19.7	Failed	Failed		
Wet swallow 5 ml [6]	24	170	10.6	18.4	18.4	Weak	Failed		
Wet swallow 5 ml [7]	24	60	10.1	19.8	19.8	Failed	Failed		
Wet swallow 5 ml [8]	32	4		21.5	21.5	Failed	Failed		
Wet swallow 5 ml [9]	28	45	10.4	19.7	19.7	Failed	Failed		
Wet swallow 5 ml [10]	27	45	10.6	19.8	19.8	Failed	Failed		
Average	26	91	10.2	18.7	19.0	Weak	Failed		
中間	25								
LES Obstruction3	是								
Chicago classification3	Type I achalasia								
Normal	0	%							
Ineffective	100	%							
Failed contraction	100	%							

Conclusions: Ineffective esophageal motility (IEM)

2021/2 2nd MIIpH off PPI.

Result: FRACTION TIME OF PH < 4.0 = 2.0 % (NORMAL 4.0 ~ 4.5 %)
DEMEOSTER SCORE = 7.3 (NORMAL 14 ~ 15)

AET/no.of REFLUX	TOTAL	UPRIGHT	SUPINE	DEMEESTER SCORE
	(<4.2%)/(<80)	(<6.3%)	(<1.2%)	(<14.7)
24HRS	2.0/32	2.5	0.0	7.3

THIS IS A PH-IMPEDANCE TEST WITH 2 PH SENSORS LOCATED AT HYPOPHARYNX AND DISTAL ESOPHAGUS, RESPECTIVELY, WHILE THE PATIENT WAS OFF PPI DURING THE STUDY. HE REPORTED NO SYMPTOM DURING THE RECORDING PERIOD. THERE WAS NO ACID IN HYPOPHARYNX. IN ADDITION, FREQUENT NON-ACIDIC RELUXES WERE OBSERVED WITH NO SYMPTOMS REPORTED AT BOTH UPRIGHT AND RECUMBENT POSITIONS. SUGGESTING A LOW POSSIBILITY OF GERD-RELATED HOARSENESS AND DYSPHAGIA.

Negative.

Bernstein test: hypersensitivity.

2020/12/24開刀

The Reflux Symptom Index (RSI)	2020/12/8	2020/12/10	2020/2/8	2020/3/12
1 你有沙啞或聲音的問題	5	5	5	5
2 清喉嚨	5	3	2	3
3 過多喉嚨黏液或鼻涕倒流	4	1	2	1
4 吞嚥食物，液體或藥丸困難	0	0	3	4
5 進食或躺下後咳嗽	1	0	0	0
6 呼吸困難或噎到事件	0	0	0	0
7 令人討厭或惱人的咳嗽	0	0	0	0
8 有東西黏在你喉嚨或有塊狀物在你喉嚨的感覺	2	0	0	1
9 心灼熱，胸痛，消化不良或胃酸跑上來	5	2	0	0
Total	22	11	12	14

the higher the score, the more severe the symptom.

Lien HC, 2015 Value Health

Reflux Disease Questionnaire (RDQ)

2020/12/24開刀

回想過去一個月，您認為以下症狀出現時的如何？		2020/12/8		2020/12/1 0		2021/2/8		2021/3/1 2	
程度：0-不會，5-重度 頻率：0-不會，5-每天		程度	頻率	程度	頻率	程度	頻率	程度	頻率
1	胸骨後方感到灼熱-----	1	1	0	0	0	0	0	0
2	胸骨後方感到疼痛-----	0	0	0	0	0	0	1	2
3	上腹中間感到灼熱-----	1	1	0	0	0	0	0	0
4	上腹中間感到疼痛-----	1	0	0	0	0	0	1	2
5	口腔內有酸味-----	4	4	3	3	0	0	0	0
6	有東西從胃部向上移動而感到不適	1	0	0	0	3	3	3	3
Total		11		6		6		9	

分數範圍: 0-40分；正常值<12

Shaw MJ, 2001 Am J Gastroenterol CHINESE
GERD STUDY GROUP, 2004 Chin J Dig Dis

2020/12/24開刀

The GERDyzer (0-完全沒有 ; 10-很嚴重)		2020/12/8	2020/12/10	2021/2/8	2021/3/12
1	整體來說，過去7天您覺得如何？	5	10	5	4
2	過去7天，生病所帶來的痛苦不適對您造成的影響有多大？	5	10	5	6
3	過去7天，生病對您身體健康造成的影響有多大？	8	10	5	6
4	過去7天，生病對您精神活力造成的影響有多大？	10	10	5	6
5	過去7天，生病對您日常活動造成的干擾有多大？	7	10	5	10
6	過去7天，生病對您休閒活動造成的干擾有多大？	7	10	5	6
7	過去7天，生病對您社交生活造成的干擾有多大？	10	10	5	6
8	過去7天，生病對您飲食習慣造成的干擾有多大？	8	10	5	10
9	過去7天，生病對您心情造成的影響有多大？	10	8	5	7
10	過去7天，生病對您睡眠造成的影響有多大？	1	8	5	3
	Total	48.5	68	35	41.5

Score range: 0-70, the higher the score,
the worse the QoL.

Holtmann G, 2009 Aliment Pharmacol
Ther Wu CP & Lien HC, 2016 Medicine

2024/07 3rd HRM

Supine

Scoring parameter percentages⁴

Scoring 4		Intrabolus pressure pattern	
Normal	0 %	Normal	0 %
Ineffective	100 %	EGJ	0 %
Failed contraction	100 %	Compartmentalized	0 %
Premature	0 %	Panesophageal	0 %
Hyper	0 %	Unknown pressurization	100 %
Fragmented	0 %		

Average esophagus results

Wet swallow 5 ml - Supine	DCI	Peristaltic breaks	Distal Latency
	mmHg.s.cm		
1	34	16.6	11.3
2	0	20.5	-
3	1	18.5	-
4	202	13.9	7.8
5	1	19.3	-
6	67	13.0	10.9
7	42	14.1	7.6
8	32	19.3	8.4
9	8	19.7	-
10	0	20.7	-
Average	39	17.6	9.2

Upright

Scoring 3		Intrabolus pressure pattern	
Normal	0 %	Normal	0 %
Ineffective	90 %	EGJ	0 %
Failed contraction	90 %	Compartmentalized	0 %
Premature	0 %	Panesophageal	0 %
Hyper	0 %	Unknown pressurization	100 %
Fragmented	10 %		

Scoring parameter percentages⁴

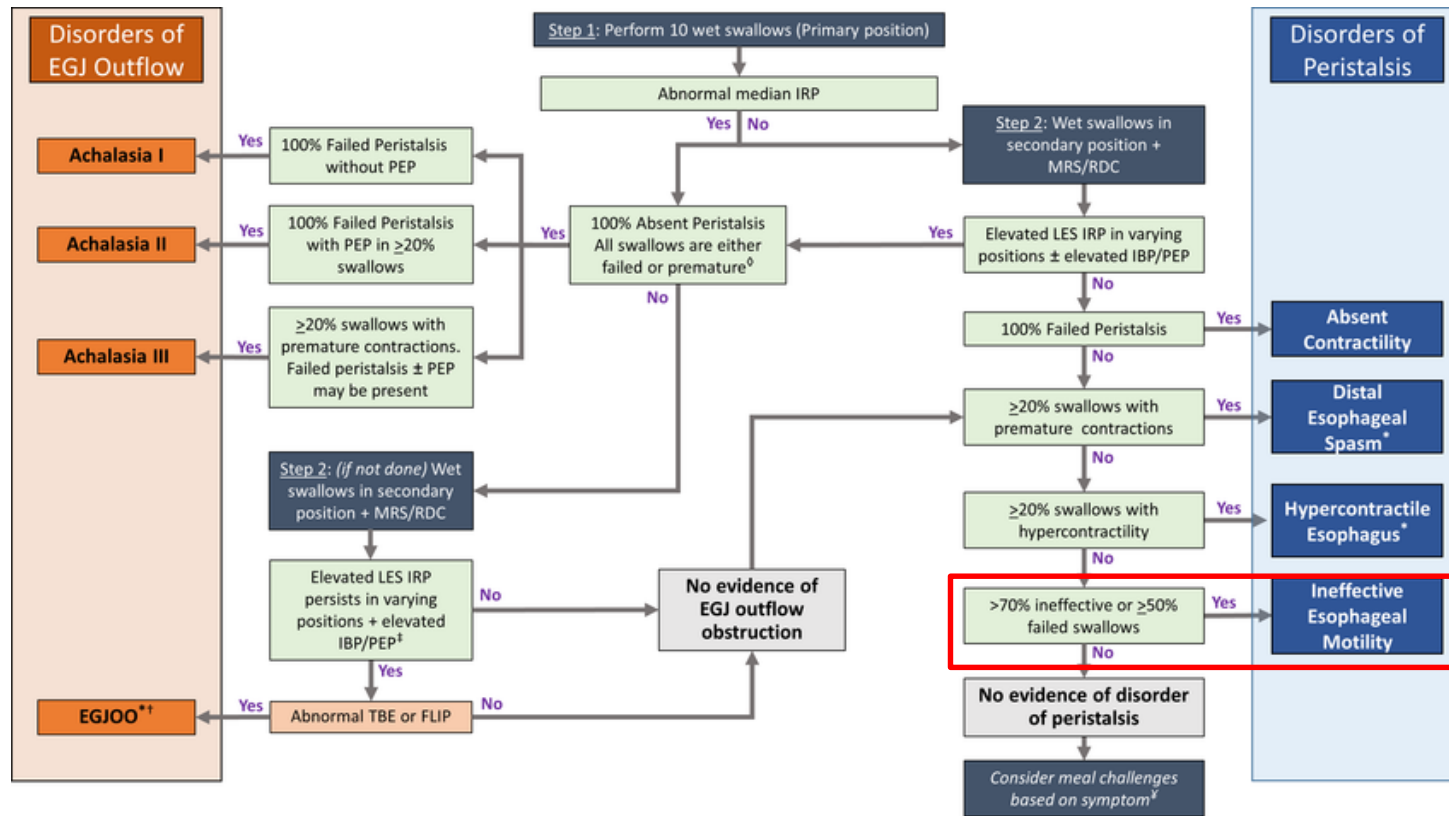
Scoring 4		Intrabolus pressure pattern	
Normal	0 %	Normal	0 %
Ineffective	90 %	EGJ	0 %
Failed contraction	90 %	Compartmentalized	0 %
Premature	0 %	Panesophageal	0 %
Hyper	0 %	Unknown pressurization	100 %
Fragmented	10 %		

Average esophagus results

Wet swallow 5 ml - Upright	DCI	Peristaltic breaks	Distal Latency
	mmHg.s.cm		
1	21	17.7	-4.7
2	127	16.6	11.7
3	603	8.6	11.6
4	15	19.7	-
5	150	16.2	8.2
6	242	13.6	12.0
7	31	18.8	-
8	30	17.1	11.9
9	439	10.0	11.4
10	179	14.2	11.3
Average	184	15.2	9.2

Conclusions: Ineffective esophageal motility (IEM)

Chicago Classification v4.0



2024/07 3rd MIIpH test, off PPI.

[pH]Acid Reflux Analysis	Total	Upright	Supine	Post-prandial
Ch 1 Prox.				
Acid exposure time (HH:MM)	00:00	00:00	00:00	00:00
Acid exposure time (%)	0.0	0.0	0.0	0.0
Number of refluxes	0	0	0	0
Number of long refluxes	0	0	0	0
Longest reflux (min)	N/A	N/A	N/A	N/A
Ch 2 Dist.				
Acid exposure time (HH:MM)	01:09	00:36	00:33	00:04
Acid exposure time (%)	6.0	4.9	7.9	0.9
Number of refluxes	69	44	25	13
Number of long refluxes	2	1	1	0
Longest reflux (min)	7.5	6.4	7.5	1.2

[pH]DeMeester Score	Score	Normal*
Ch 2 Dist.	24.4	<14.7

95th Percentile

[Z]Additional Analysis Parameters	Value	Normal
Mean Nocturnal Baseline Impedance (MNBI, kOhm) 3.0 cm above LES	0.49	

*AET: 6.0 (<4.2%) [Upright] 4.9 (<6.3%) [Supine] 7.9 (<1.2%)

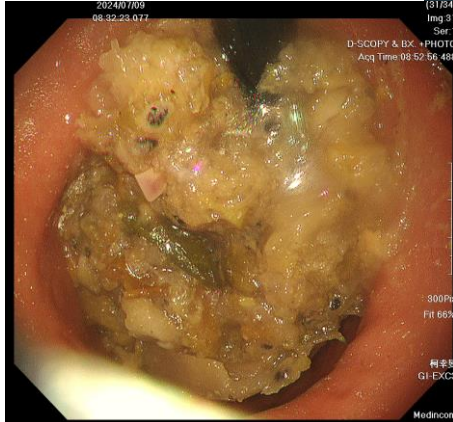
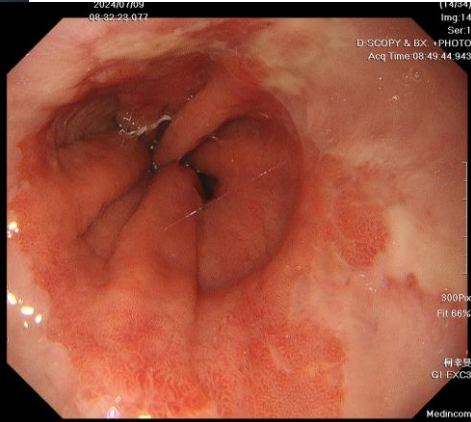
*DeMeester score [Total] 24.4 (<14.7)

*TNR: 69 (<80) [Upright] 63 [Supine] 6 *MNBI: 490 ohm (<1500 ohm)

Conclusions: conclusive GERD.

Bernstein test: positive.

2024/07/09 EGD



【Endoscopic diagnosis/Impression】

DIAGNOSIS/IMPRESSION:

1. Reflux esophagitis, LA, Gr B, BX
2. RESIDUAL FOOD IN STOMACH, C/W GASTROPARESIS

【Endoscopic treatment/Additional procedures】

【Suggestions】

申請時間：2024/07/09 09:30 簽收時間：2024/07/09 14:15 檢體： Pathology
診斷醫師：陳奕先 陳志榮 報告時間：2024/07/18 17:11 病理號：S1330635

Pathologic diagnosis:

Esophagus, distal, endoscopic biopsy --- Chronic active inflammation of squamous and gastric mucosa with intestinal metaplasia, consistent with Barrett's esophagus.

Ancillary study for diagnosis:

Giemsa stain for Helicobacter Pylori identification done.

Prognostic and predictive factor:


No Helicobacter-like microorganism found.

Discussions:

- Prediction factors for GERD recurrences after fundoplication ?



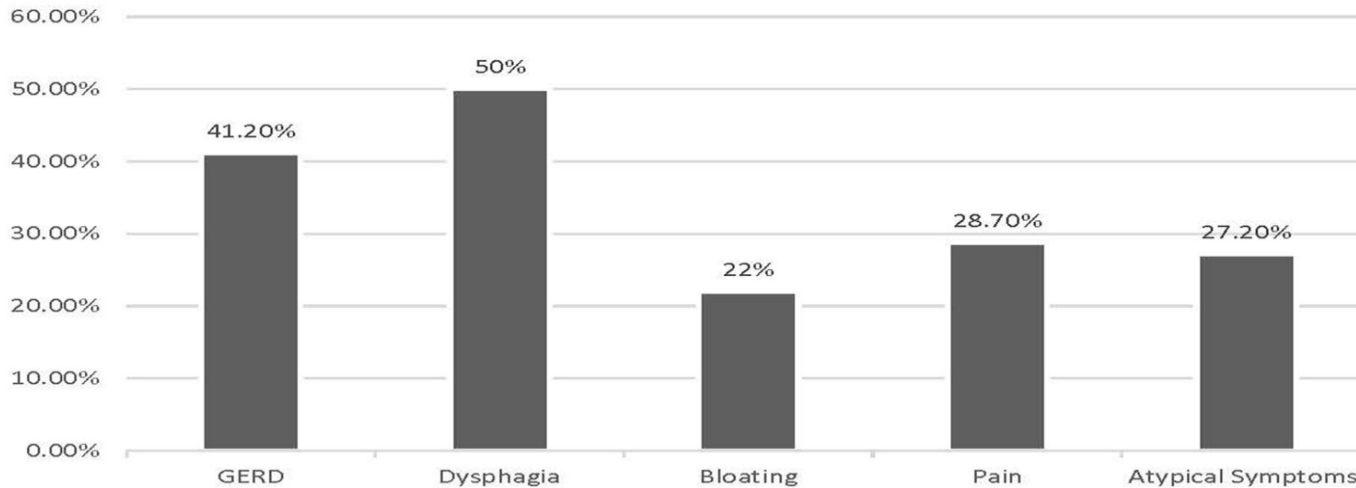
Presence of refractory GERD-like symptoms following laparoscopic fundoplication is rarely indicative of true recurrent GERD

Karla Bernardi¹  · Lauren Hawley¹ · Vivian L. Wang¹ · Anahita D. Jalilvand¹ · Kelly R. Haisley¹ · Kyle A. Perry¹

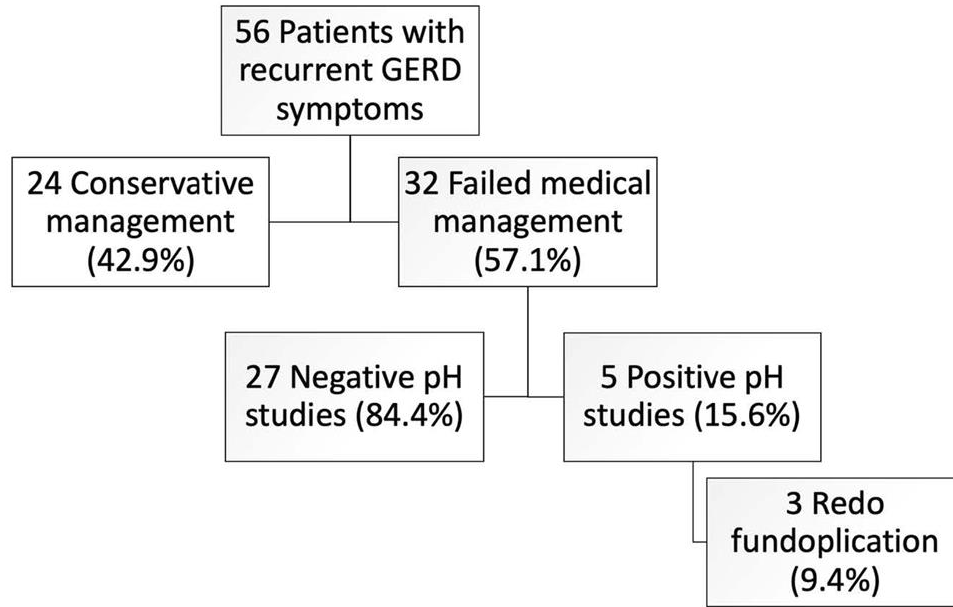
Received: 26 September 2022 / Accepted: 28 January 2023 / Published online: 22 February 2023
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- This is a retrospective cohort study of **353** consecutive patients undergoing LF(complete (Nissen) or partial (Toupet) fundoplication)for GERD between 2011 and 2017.
- Baseline demographics, objective testing, GERD-HRQL scores, and follow-up data were collected in a prospective database.

Reason for post-operative patients to return to clinic N=136




- **Fifty-six (16%)** patients returned during the study period for an evaluation of recurrent **GERD-like symptoms** (median interval of **51.2 (26.2–74.7) months.**)



- **Few patients with recurrent GI symptoms(15.6%)** require **surgical revision**.
- Evaluation, including **objective reflux testing**, is critical to evaluating these symptoms.



Evaluation of factors associated with reflux recurrence after fundoplication

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Methods

This retrospective study evaluates the recurrence of reflux in patients diagnosed with GERD who underwent primary robotic fundoplication at our institution between October 2017 and January 2023. This study was approved by the Weill Cornell Medicine Institutional Review Board (IRB 19-05,020,206).

Exclusion criteria:

Previous foregut or bariatric surgery, patients who have not undergone objective post-operative evaluation, and patients who did not adhere to median follow-up of 13.4 IQR (9–26.7) months.

Total = 137	No recurrence of reflux 120 (87.5)	Recurrence of reflux 17 (12.4)	<i>p</i> value
Recurrence treated with			
Surgery		9 (6.5)	
No surgery		8 (5.8)	
Age	54 (38–64)	51 (43–68)	0.66
BMI	26.6 (23.3–29.7)	26.4 (24.1–30)	0.6
Sex			0.79
Male	49 (40.8)	6 (35.2)	
Female	71 (59.1)	11 (64.7)	
Race			
White	81 (67.5)	11 (64.7)	0.78
Black	12 (10)	1 (5.8)	> 0.999
Hispanic	13 (10.8)	2 (11.7)	> 0.999
Others	14 (11.6)	3 (17.6)	0.44
Comorbidities			
Hypertension	40 (33.3)	5 (29.4)	> 0.999
Diabetes mellitus	13 (10.8)	1 (5.8)	> 0.999
Asthma/COPD	20 (16.6)	3 (17.6)	0.9
Coronary artery disease	5 (4.1)	0 (0)	> 0.999

Values presented as median (IQR) or *n* (%). All patients underwent post-operative objective evaluation with pH studies

Results

A total of 487 patients underwent primary fundoplication between 2017 and 2023 of whom 137 patients met our inclusion criteria. Out of these, 120 (87.5%) patients reported no recurrent reflux, while 17 (12.4%) patients developed recurrent reflux, with nine patients (6.5%) required surgical re-intervention (see Table 1). The duration of follow-up

Exclusion criteria:

Previous foregut or bariatric surgery, patients who have not undergone objective post-operative evaluation, and patients who did not adhere to median follow-up of 13.4 IQR (9–26.7) months.

Total = 137	No recurrence of reflux 120 (87.5)	Recurrence of reflux 17 (12.4)	<i>p</i> value
Recurrence treated with			
Surgery		9 (6.5)	
No surgery		8 (5.8)	
Fundoplication type			0.6
Partial	52 (43.3)	9 (52.9)	
Nissen	68 (56.6)	8 (47)	
Mesh use	58 (48.3)	11 (64.7)	0.3
Collis procedure	3 (2.5)	1 (5.8)	0.41
Relaxing incision	2 (1.6)	1 (5.8)	0.33
Operative time	102 (93–123)	117 (111–162)	0.6
Length of stay	1 (0–1)	0 (0–1)	0.43
30-day readmission	20 (16.6)	0 (0)	0.13
EndoFLIP use	70 (58.3)	11 (64.7)	0.3

Values presented as *n* (%) or median (IQR). All patients underwent post-operative objective evaluation with pH studies

Total = 137	No recurrence of reflux 120 (87.5)	Recurrence of reflux 17 (12.4)	<i>p</i> value
Recurrence treated with			
Surgery		9 (6.5)	
No surgery		8 (5.8)	
Post-operative BRAVO findings			0.6
% Acid exposure	0.3 (0.1–1.15)	10.5 (6.7–19.1)	<0.0001
Longest reflux	2.2 (0.4–6)	31 (20.3–61.8)	<0.0001
DeMeester score	1.6 (0.7–5.5)	43.3 (22.3–62.2)	<0.0001
Post-operative dysphagia rates			0.73
None	101 (84.1)	14 (82.3)	
Overall dysphagia	19 (15.8)	3 (17.6)	
Mild	6 (5)	1 (5.8)	
Moderate	12 (10)	2 (11.7)	
Severe	1 (0.83)	0 (0)	

Values presented as *n* (%) or median (IQR). Dysphagia was assessed according to Bazaz score as outlines in our methodology section over the same follow-up period of 13.4 IQR (9–26.7) months

Table 5 Absolute values of EndoFLIP measurements

A.	No recurrence of reflux <i>n</i> = 70	Recurrence of reflux <i>n</i> = 11	<i>p</i> value
Cross-section area			
Index	70 (42–104)	81 (59–113)	0.18
Post-wrap	33 (24–52)	48 (23–52)	0.64
Pressure			
Index	21.7 (17.7–27.4)	18.7 (13.1–22.7)	0.08
Post-wrap	31.4 (26.7–39.6)	30.8 (25.4–35.1)	0.81
High-pressure zone length			
Index	2 (1–2)	1.5 (0.7–1.7)	0.42
Post-wrap	3.5 (3–4)	2.5 (1.8–3)	<0.01
Distensibility index			
Index	3.3 (1.9–4.9)	4.5 (2.9–6.7)	0.13
Post-wrap	1.1 (0.7–1.5)	1.1 (0.7–2)	0.72

Fundoplication, also known as Anti-reflux surgery (ARS) has a **low recurrence rate of pathologic reflux at (12.4%)**.

A **low HPZ value** post-wrap was identified as a significant risk factor for recurrence.

EndoFLIP (endoscopic functional luminal imaging probe)

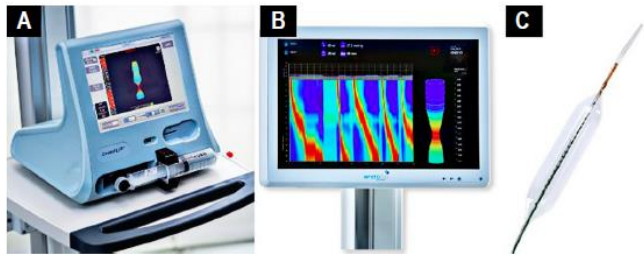


Figure 1. EndoFLIP device. A. EndoFLIP module with FLIP 1.0 system. B. FLIP system 2.0. C. Measuring catheter.

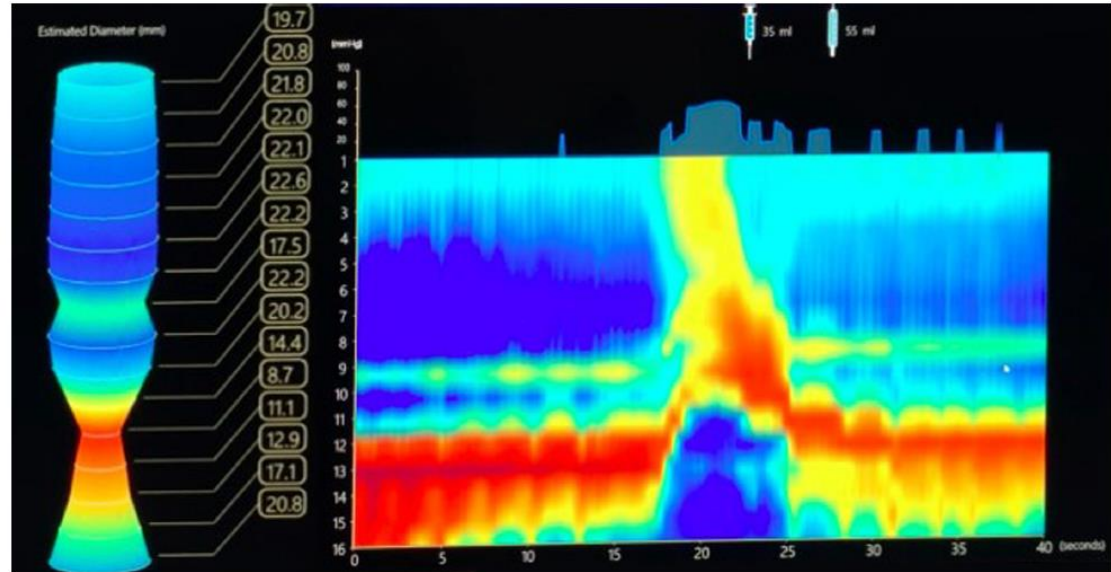


Figure 2. EndoFLIP performed with a 16cm EF-322 catheter. On the left, FLIP 1.0 module with 3D representation of the esophagus and its diameters. On the right, FLIP 2.0 with topographic image of the esophagus.

討論

- 本次討論聚焦於胃底摺疊術的成效與復發。個案顯示術後約4-5年可能復發，初期症狀雖改善，但長期仍惡化，最終確診仍有胃食道逆流。
- 客觀逆流測試（如 MIIpH）對術前評估與術後追蹤的重要性，MIIpH 等測試可能因昂貴或不方便而未普及，但若要評估手術效果，這些測試是必要的；避免僅依賴症狀判斷，以確保手術成效並預防不良後果診斷方法與挑戰。
- 強調客觀的逆流測試對於評估症狀很重要。僅依賴症狀來判斷手術效果是不足的，因為典型的 GERD 症狀患者中有一半可能沒有逆流。
- 建議未來可以蒐集醫院的個案資料，以了解哪些患者能從手術中獲益。
- 總結來說，本次討論探討了胃底摺疊術在治療 GERD 上的複雜性，強調了術前精確診斷和術後長期監測的重要性，並指出了手術復發的可能風險因子和挑戰。