GERD & Associated Disease



나국주

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- ✓ Introduction
- ✓ Clinical features
- ✓ Pathophysiology Anatomical consideration
- ✓ Preoperative evaluation
- ✓ Medical treatment
- ✓ Hiatal hernia
- ✓ Antireflux surgery : indication, techniques, outcomes
- ✓ Conclusion



Introduction

- What Is an standard definition of GERD?
 - Heartburn, Regurgitation
 - Reflux esophagitis ~ Barrett's esopahgus

 A chronic symptom of mucosal damage caused by stomach acid coming up from the stomach into the esophagus



제7차 전공의 학술세미나

Google, WIKIPEDIA

The Montreal definition & classification of GERD



제7차 전공의 학술세미나 Vakil N, et al. Am J Gastroenterol 2006

Update on the epidemiology of GERD (16 studies)

Increase in GERD prevalence since 1995 (p<0.0001), *particularly in North America and East Asia*



제7차 전공의 학술세미나

El-Serag HB, et al. Gut 2013

Introduction

GERD in Korea



연평균 14.2%의 증가율

Introduction

GERD in Korea

최근 5년간(2008~2012년) 위식도 역류질환 진료인원 현황(명)



제7차 전공의 학술세미나 출처: 건강보험심사평가원

Various anatomic conditions of the EG junction

• 791 pts with reflux symptoms & esophagitis





Normal GEJ	Reducible Sliding Hiatus Hernia	Hiatal Insufficiency	Concentric Hiatus Hernia	Obvious Short Esophagus	Incarcerated Hiatus Hernia
135	417	78	45	60	56
(17%)	(53%)	(10%)	(6%)	(7%)	(7%)
[R] 55	52 (70%)	[]/	A] 183 (23	%)	[MIHH]

제7차 전공의 학술세미나

Mattioli S, et al. Dig Dis Sci 2003



Typical symptoms

– Heartburn

burning sensation in the retrosternal area (behind the breastbone)

- Regurgitation

the perception of flow of refluxed gastric content into the mouth or hypopharynx

- Dysphagia



제7차 전공의 학술세미나 Vakil N, et al. Am J Gastroenterol 2006

Atypical / Waring signs of GERD

• Atypical signs of GERD

Chronic cough Asthma Recurrent sore throat Recurrent laryngitis

Dental enamel loss Subglottic stenosis

Globus sensation Chest pain Onset of symptoms at age > 50 Alarm/Warning signs suggesting complicated GERD

> Dysphagia Odynophagia GI Bleeding

Iron Deficiency Anemia Weight Loss

Early satiety Vomiting

University of Michigan GERD guidelines 2013

Esophageal / Extraesophageal syndromes

sophageal syndromes
njury (with or without esophageal symptoms)
Reflux esophagitis: necrosis of esophageal epithelium causing erosions or ulcers at or immediately above the gastroesophageal junction
Stricture: a persistent luminal narrowing of the esophagus caused by reflux-induced inflammation
Barrett's esophagus: endoscopically suspected and histologically confirmed metaplasia in the distal esophagus, usually with the added stipulation that it be specialized intestinal metaplas
Esophageal adenocarcinoma
ymptoms with or without esophageal injury
Common symptoms: heartburn, regurgitation, dysphagia, chest pain
Less common symptoms: odynophagia (pain with swallowing), water brash (excessive salivation prompted by acid reflux), subxiphoid pain, nausea
xtraesophageal syndromes
association with gastroesophageal reflux disease established but good evidence for causation only when accompanied by an esophageal syndrome
Chronic cough
Laryngitis (hoarseness, throat clearing): reflux usually a cofactor along with excessive use of the voice, environmental irritants, and smoking
Asthma (reflux as a cofactor leading to poorly controlled disease)
Erosion of dental enamel
roposed association with gastroesophageal reflux disease but neither association nor causation established
Pharyngitis
Sinusitis
Recurrent otitis media
Idiopathic pulmonary fibrosis

제7차 전공의 학술세미나

Kahrilas PJ, N Engl J Med 2008



Antireflux Barrier



Occludes esophagus to prevent reflux

1. GEV

2. LES

- 3. Post. attachment of the GEJ (Intra-abdominal esophagus)
- 4. Crural diaphragm
- 5. Phrenoesophageal ligament
- 6. Esophageal peristalsis



Movement of reflux



Pathophysiology

Different reflux mechanisms with HH

• Excess GE reflux in patients with HH is caused by mechanisms other than transient LES relaxations



van Herwaarden MA, et al. Gastroenterology 2000 제7차 전공의 학술세미나

Diagnostic testing for GERD

Diagnostic test	Indication	Highest level of evidence	Recommendation
PPI trial	Classic symptoms, no warning signs,	Meta-analysis	Negative trial does not rule out GERD
Barium swallow	Not for GERD diagnosis. Use for evaluation of dysphagia	Case-control	Do not use unless evaluating for complication (stricture, ring)
Endoscopy	Alarm symptoms, screening of high-risk patients, chest pain	Randomized Controlled Trial	Consider early for elderly, those at risk for Barrett's, non- cardiac chest pain, patients unrespon- sive to PPI
Esophageal biopsy	Exclude non- GERD causes for symptoms	Case-Control	Not indicated for diagnosis of GERD
Esophageal manometry	Preoperative evaluation for surge <mark>rv</mark>	Observational	Not recommen- ded for GERD diagnosis. Rule out achalasia/ scleroderma-like esophagus preop
Ambulatory reflux monitoring	Preoperatively for non-erosive disease. refractory GERD symptoms, GERD diagnosis in question	Observational	Correlate symptoms with reflux, docu- ment abnormal acid exposure or reflux frequency

Katz PO, et al. Am J Gastroenterol 2013

Barium esophagography

- Delineation of the anatomy(such as large hiatal hernia)





Pearson's Thoracic and Esophageal Surgery, 3rd Edition 제7차 전공의 학술세미나

Esophagogastroduodenoscopy(EGD)

- Confirmation of diagnosis, identification of other etiologies
- Allowance of biopsy



Esophageal manometry

- Identification of contraindicative fundoplication(such as achalasia)
- Evaluation of esophageal motility



제7차 전공의 학술세미나 General Thoracic Surgery, 7th edition

pH-metry (24-hr pH monitoring)

- Standard for confirming the diagnosis of pathologic





제7차 전공의 학술세미나 Richter JE, et al. Am J Med Sci 2003

50

pH-metry (24-hr pH monitoring)

– Reflux episode; < pH 4</p>

Numerical Scoring on Acid Refluxes		Score
Number of Acid Refluxes	(refl/24 hour)	12.5
Number of Long Acid Refluxes	(refl/24 hour)	5.1
Longest Acid Reflux	(min)	5.4
Fraction Time pH below 4.00	(Total %)	8.2
Fraction Time pH below 4.00	(Upright %)	2.2
Fraction Time pH below 4.00	(Supine %)	22.4
Total score DeMeester Normals: <14.72 (95th percentil	le)	55.8

DeMeester Scoring on Acid Refluxes

The formula for the *Component Score* is:

where,

Pt Value = Patient Value Mean = Mean Value SD = Standard Deviation

제7차 전공의 학술세미나

DeMeester TR, 1989

pH score(DeMeester score-result of 24-hr pH monitoring)

- 173 pts (Excellent or good) VS 26 pts (Fair or poor)

	Outcome		
Variable	Excellent/Good No. (%)	Fair/Poor No. (%)	P value
Response to acid suppression therapy			
Complete/partial	143 (92)	12 (8)	
Minor/none	30 (68)	14 (32)	0.00008
Symptom		()	
Typical	146 (92)	13 (8)	
Atypical	27 (67.5)	13 (32.5)	0.0001
24-hour esophageal pH score	· · ·		
Abnormal	154 (91)	16 (9)	
Normal	19 (65.5)	10 (34.5)	0.001
% Time esophageal pH <4		,	
Abnormal	141 (90)	15 (10)	
Normal	32 (74)	11 (26)	0.01

Predictor	Adjusted odds ratio (95% confidence interval)	Wald's P value
24-hour esophageal pH score		
Abnormal	5.4 (1.9-15.3)	< 0.001
Normal	_	
Primary symptom		
Typical	5.1 (1.9-13.7)	< 0.001
Atypical		—
Response to acid suppression therapy		
Complete/partial	3.3 (1.3-8.7)	0.02
Minor/none	—	—

Campos GMR, et al. J Gastrointest Surg 1999 제7차 전공의 학술세미나

Other investigations

- Gastric emptying study
 - Important in patients who require reoperation
- Spectrophotometer
 - Assessment of alkaline reflux (bilirubin)
- Esophgeal impedence monitoring

Medical treatment

• Life style modifications

University of Michigan GERD guidelines 2013

Elevate head of bed 6-8 inches

Decrease fatty meals

Stop smoking

Avoid recumbency/sleeping for 3-4 hours

postprandially

Avoid certain foods: chocolate, alcohol, peppermint, caffeinated coffee and other beverages, onions, garlic, fatty foods, citrus, tomato

Avoid large meals

Weight loss

Avoid medications that can potentiate symptoms: calcium channel blockers, β -agonists, α -adrenergic agonists, theophylline, nitrates, and some sedatives (benzodiazepines).

Lifestyle intervention	Effect of inter- vention on GERD parameters	Sources of data	Recommendation
Weight loss (46,47,48)	Improvement of GERD symptoms and esophageal pH	Case–Control	Strong recommenda- tion for patients with BMI>25 or patients with recent weight gain
Head of bed elevation (50–52)	Improved esophageal pH and symptoms	Randomized Controlled Trial	Head of bed eleva- tion with foam wedge or blocks in patients with nocturnal GERD
Avoidance of late evening meals (180, 181)	Improved nocturnal gastric acidity but not symptoms	Case–Control	Avoid eating meals with high fat content within 2–3h of reclining
Tobacco and alcohol cessation (182–184)	No change in symptoms or esophageal pH	Case–Control	Not recommended to improve GERD symptoms
Cessation of chocolate, caffeine, spicy foods, citrus, carbonated beverages	No studies performed	No evidence	Not routinely recom- mended for GERD patients. Selective elimination could be considered if patients note correlation with GERD symptoms and improvement with elimination

제7차 전공의 학술세미나 Katz PO, et al. Am J Gastroenterol 2013

Medical treatment

• Proton-pump inhibitors

- An 8-week course of PPIs is the therapy of choice for symptom relief and healing of erosive esophagitis. There are no major differences in efficacy between the different PPIs.
- In patients with partial response to PPI therapy, increasing the dose to twice daily therapy or switching to a different PPI may provide additional symptom relief.
- Maintenance PPI therapy should be administered for GERD patients who continue to have symptoms after PPI is discontinued, and in patients with complications.
- H₂ -receptor antagonist (H₂RA) therapy can be used as a maintenance option in patients without erosive disease if patients experience heartburn relief.
- There is no role for sucralfate in the non-pregnant GERD patient.
- PPIs are safe in pregnant patients if clinically indicated.

Indication for Antireflux Surgery

Guidelines for surgical tx of GERD

1) have failed medical management

 inadequate symptom control, severe regurgitation not controlled with acid suppression, or medication side effects

2) opt for surgery despite successful medical management

 due to quality of life considerations, lifelong need for medication intake, expense of medications, etc

3) have complications of GERD

- e.g., Barrett's esophagus, peptic stricture

4) have extra-esophageal manifestations

- asthma, hoarseness, cough, chest pain, aspiration



Society of American Gastrointestinal and Endoscopic Surgeons http://www.sagescms.org

Reason for undergoing surgery

Reason for the Procedure*	Number (%) of Patients	Number (%) Satisfied with Outcome [†]
Medications did not work	37 (46)	32 (87)
Physician recommended it	36 (45)	27 (75)
Thought it would cure the disease	22 (27)	18 (82)
Did not wish to take medications for long term	12 (15)	11 (92)
High cost of medications	4 (5)	2 (50)
To prevent cancer	3 (4)	1 (33)

* Some patients reported more than one reason.

[†] Percentage refers to those with the specific reason.

제7차 전공의 학술세미나

Vakil N, et al. Am J Med 2003

To receive the benefits from surgery

Patient Factors Likely to Result in a Good Outcome after Fundoplication

Increased esophageal exposure to gastric juice of the distal esophagus 5 cm above the lower esophageal sphincter Increased esophageal exposure to gastric juice of the proximal esophagus 1 cm below the cricopharyngeal sphincter Respiratory symptoms that occur simultaneously with or within 3 minutes after an episode of reflux A structurally or dynamically defective lower esophageal sphincter by manometry Normal gastric emptying Normal esophageal body motility Improvement or relief of symptoms with acid-suppression medication

Principles of Antireflux Surgery

- Reconstruction of a functional LES
 - Formation of an optimal wrap requires the restoration of 1.5 to 2.0 cm of tension-free intra-abdominal esophagus
 - − Resting LES pr \approx 3 times of resting gastric pr
- The vagus nerve must be identified and preserved
- Adequate wrapping
 - neither excessively long or tight
- Closure of the crural defect

Operative Techniques

	Wrap	Approach
Nissen fundoplication	Total (360-degree)	Transabdominal or transthoracic
Dor fundoplication	Anterior partial	Transabdominal
Toupet fundoplication	Posterior partial	Transabdominal
Belsey-Mark IV repair	Partial	Transthoracic
Hill repair	Partial	Transabdominal
Collis gastroplasty	Esophageal lengthening procedure	Transabdominal or transthoracic



Nissen Fundoplication

- Well documented procedure
- 360-degree wrap
- Transabdominal approach
- Transthoracic approach
 - Safe mobilization of the distal esophagus
 - (esp. previously left thoracotomy)
 - Esophageal shortening

Op techniques

Transabdominal Approach : Nissen



Op techniques

Transthoracic Approach : Nissen



Laparoscopic Approach : Nissen



Indications for Toupet Fundoplication

General Indications

Documented GERD Adequate esophageal length Ability to tolerate general anesthesia

Indications for Toupet versus Nissen Repair

Poor esophageal body motility Following Heller's myotomy Severe aerophagia Inadequate gastric fundus for a full wrap Tubular stomach Previous gastric surgery Previous splenorrhaphy

Op techniques

Toupet Procedure



Op techniques

Dor Procedure




Belsey Mark IV Repair

- Advantages
 - Exposure of the entire intrathoracic esophagus
 - Failure of transabdominal repair for obese patients
 - Combination with an esophageal lengthening procedure
 - Management of coexisting disease in the left chest wall, lung, esophagus, or upper abdomen
- Disadvantages
 - 'A fairly easy operation to do but a difficult one to do well'
 - Not possible for scopic surgery
 - Post-thoracotomy pain

Belsey Mark IV Procedure





- Post. fixation of the EGJ instead of using the gastric fundus to re-form the 'angle of His' and reinforcement of the LES
- Ideal antireflux operation : 5 goals
 - Closure of the esophageal hiatus loosely about the esophagus
 - Reduction of the hiatal hernia with firm post. fixation of the EGJ
 - Calibration of the LESP to a normal range
 - Restoration of the GEV

- Prevention of a paraesophageal hernia

Hill Procedure





Gastroplasty

• Esophageal lengthening technique

that reduces tension on an antireflux repair in patients with 'short esophagus'

- Transthoracic approach
- Transabdominal approach

Collis-Nissen Procedure : Transthoracic



Collis-Nissen Procedure : Transabdominal



Short Esophagus

- Definition
 - Intra-abdominal esophageal length of less than 2.5cm, intraoperatively
- Complication of GERD



Hiatal Hernia

- Definition
 - The herniation of parts of the abdominal contents through the esophageal hiatus of the diaphragm
- Possible 3 mechanisms
 - Widening of the diaphragmatic hiatus
 - Pulling up of the stomach by esophageal shortening
 - Pushing up of the stomach by increased intra-abdominal pr.

Types of Hiatal Hernia



Type I

Type II

Pathophysiologic Effects of HH

- Intra-abdominal length of the LES \downarrow
- LES pressure \downarrow
- Impairment of the diaphagmatic sphincter
- Impairment of esophageal peristalsis
- Cross-sectional area of the EGJ \uparrow
- Esophageal acid clearance \downarrow
- Esophageal acid exposure ↑

Prevalence of HH

Authors	Year	Location	No of Pts	Frequen	cy of HH	
				Pts with esophagitis(%)	Pts without esophagitis(%)	
Kang JY	1999	UK/Singapore	383	64	6	
Yoem SJ	1999	Korea	1010	32	3	
Kang JY	1993	Singapore	11943	13	2	
Stene-Larson G	1988	Norway	1224	68	11	
Berstad A	1986	Norway	670	63	8	
Wright RA	1979	USA	293	84	13	
Cronstedt J	1978	Sweden	1000	72	9	

Gordon C. et al. Aliment Pharmacol Ther 2004;20:719-32 제7차 전공의 학술세미나

Comparison with Operative Methods

Total versus Partial Fundoplication

Open versus Scopic Surgery

Analysis of Dysphagia

	TF,	PF,
Study or subcategory	No./Total	No./Total
Segol et al, 1989 ¹²	1/20	0/18
Thor et al, 1989 ¹³	4/12	2/19
Lundell et al, 1996 ¹⁵	4/38	1/33
Walker et al, 1992 ¹⁷	2/26	4/26
Laws et al, 1997 ¹⁸	0/23	0/16
Watson et al, 1999 ¹⁹	21/53	8/54
Zornig et al, 2002 ²¹	30/100	11/100
Chrysos et al, 2003 ²²	2/14	3/19
Watson et al, 2004 ²³	11/52	8/60
Baigrie et al, 2005 ²⁴	4/84	1/79
Spence et al, 2006 ²⁵	28/39	18/40
Subtotal (95% CI)	461	464
Total events: 107 (TF), 56 (PF)	
lest for heterogeneity: χ_9^2 = Test for overall effect: 7-5	(1.17, P=.62, P=)	0%
rest for overall effect. z = 0.	.00,7 <.001	



Analysis of Bloating



Analysis of Flatulence



Analysis of Reoperation Rate

	TF,	PF,
Study or subcategory	No./Total	No./Total
Segol et al, 1989 ¹²	0/20	1/18
Thor et al, 1989 ¹³	3/12	0/19
Laws et al, 1997 ¹⁸	0/23	0/16
Watson et al, 1999 ¹⁹	1/53	2/54
Hagedorn et al, 2002 ¹⁶	5/54	2/56
Zornig et al, 2002 ²¹	13/100	1/100
Chrysos et al, 200322	0/14	0/19
Baigrie et al, 2005 ²⁴	4/84	6/79
Spence et al, 2006 ²⁵	3/39	2/40
Subtotal (95% CI)	399	401
Total events: 29 (TF), 14 (PF Test for heterogeneity: χ_6^2 = 1 Test for overall effect: z=2.3) 1.43, <i>P</i> =.08, I ² : 3, <i>P</i> =.02	=47.5%



Weight, %	OR, Fixed (95% CI)
10.88	0.28 (0.01-7.44)
2.04	14.37 (0.67-307.36)
	Not estimable
13.75	0.50 (0.04-5.69)
12.61	2.76 (0.51-14.85)
6.16	14.79 (1.90-115.40)
	Not estimable
41.67	0.61 (0.17-2.24)
12.90	1.58 (0.25-10.03)
100.00	2.11 (1.13-3.95)

Dysphagia

	Dysp	hagia			
Reference	Nissen	Toupet	Weight (%)	Risk ratio	Risk ratio
Booth et al.28	14 of 59	9 of 58	29.0	1.53 (0.72, 3.25)	+0
Chrysos et al.29	2 of 14	3 of 19	8·1	0.90 (0.17, 4.71)	_
Guérin <i>et al.</i> 51	2 of 64	3 of 57	10.1	0.59 (0.10, 3.43)	o
Laws <i>et al.</i> 52	0 of 23	0 of 16		Not estimable	
Mickevicius et al.53	11 of 64	8 of 63	25.7	1.35 (0.58, 3.14)	
Shaw et al.54	2 of 47	0 of 48	1.6	5·10 (0·25, 103·57)	
Strate et al.55	19 of 100	8 of 100	25.5	2.38 (1.09, 5.17)	
Total	50 of 371	31 of 361	100.0	1.61 (1.06, 2.44)	◆
Heterogeneity: $\chi^2 = 3.42$, 5 d.f., $P = 0.64$, $I^2 = 0\%$					0.01 0.1 1 10 100
Test for overall effect:	Z = 2.26, P = 0.02	2.26, $P = 0.02$			Favours Nissen Favours Toupet

Broeders JA. et al. Br J Surg 2010;92:1318-30

Postop Dilatation for Dysphagia

	Postop. dilatation for dysphagia				
Reference	Nissen	Toupet	Weight (%)	Risk ratio	Risk ratio
Booth <i>et al.</i> ²⁸ Chrysos <i>et al.</i> ²⁹	2 of 59 0 of 14	1 of 58 0 of 19	14.0	1·97 (0·18, 21·09) Not estimable	
Laws <i>et al.⁵²</i> Mickevicius <i>et al</i> . ⁵³	2 of 23 0 of 64	1 of 16 0 of 63	16.4	1·39 (0.14, 14·07) Not estimable	
Strate et al.55	14 of 100	5 of 100	69.6	2.80 (1.05, 7.48)	
Total	18 of 260	7 of 256	100.0	2.45 (1.06, 5.68)	•
Heterogeneity: $\chi^2 = 0.3$ Test for overall effect: 2	3, 2 d.f., <i>P</i> = 0.85, <i>I</i> Z = 2.09, <i>P</i> = 0.04	² = 0%			0·01 0·1 1 10 100 Favours Nissen Favours Toupet

Broeders JA. et al. Br J Surg 2010;92:1318-30

Nissen vs Toupet

Reoperation Rate

	Reoperat	tion rate								
Reference	Nissen	Toupet	Weight (%)	Risk ratio	Risk			sk ratio		
Booth et al.28	1 of 64	1 of 63	9.4	0.98 (0.06, 15.40)						
Chrysos et al. ²⁹	0 of 19	0 of 14		Not estimable						
Laws et al.52	0 of 23	1 of 16	16.4	0.24 (0.01, 5.45)						
Mickevicius et al.53	3 of 76	1 of 77	9.3	3.04 (0.32, 28.58)		-		-o		
Shaw <i>et al.</i> 54	4 of 47	3 of 48	27.7	1.36 (0.32, 5.76)		-				
Strate et al.55	15 of 100	4 of 100	37.3	3·75 (1·29, 10·91)						
Total	23 of 329	10 of 318	100.0	2·19 (1·09, 4·40)			-			
		12			L	1		I		
Heterogeneity: $\chi^2 = 3.7$	3 , 4 d.t., $P = 0.44$,	1- = 0%			0.01	0 ·1	1	10	100	
Test for overall effect: 2	Z = 2.19, P = 0.03				Fa	vours Nisse	n F	avours Tou	pet	

Broeders JA. et al. Br J Surg 2010;92:1318-30

Nissen vs Toupet

Inability to Belch

	Inability	to belch							
Reference	Nissen	Toupet	Weight (%)	Risk ratio		Ris	k ratio		
Booth et al.28	8 of 59	3 of 58	17.7	2.62 (0.73, 9.40)					
Guérin et al.51	2 of 64	1 of 59	6.1	1.84 (0.17, 19.81)					
Strate et al.55	25 of 100	13 of 100	76.2	1.92 (1.04, 3.54)					
Total	35 of 223	17 of 217	100.0	2.04 (1.19, 3.49)			•		
Heterogeneity: χ^2 = Test for overall effe	= 0·19, 2 d.f., <i>P</i> = 0· ect: <i>Z</i> = 2·61, <i>P</i> = 0·	91, / ² = 0% 009			0-01 Fa	0·1 avours Nissen	1 Favou	10 Irs Toup	 100 pet

Broeders JA. et al. Br J Surg 2010;92:1318-30

Nissen vs Toupet

Gas Bloating

	Gas bl	loating							
Reference	Nissen	Toupet	Weight (%)	Risk ratio		l	Risk ratio		
Booth et al.28	11 of 59	6 of 58	11·2	1.80 (0.71, 4.55)					
Chrysos et al.52	1 of 14	1 of 19	1.6	1.36 (0.09, 19.88)					
Mickevicius et al.53	10 of 64	4 of 63	7.5	2.46 (0.81, 7.44)					
Strate et al.55	63 of 100	43 of 100	79.7	1.47 (1.12, 1.92)					
Total	85 of 237	54 of 240	100.0	1.58 (1.21, 2.05)			•		
Heterogeneity: $\chi^2 = 0.9$ Test for overall effect:	99, 3 d.f., <i>P</i> = 0·80 <i>Z</i> = 3·42, <i>P</i> < 0·00	, / ² = 0%			0-01 Fa	0·1 avours Nisse	1 en Fa	10 avours Tou	 100 pet

Broeders JA. et al. Br J Surg 2010;92:1318-30



- There are no differences in perioperative morbidity
- *Partial fundoplication* is associated with
 - less postoperative dysphagia, fewer reoperations, and
 - similar patient satisfaction and effectiveness in controlling GERD compared with total fundoplication up to 5 years after surgery
- Anterior partial fundoplication may be less effective in the long term

- surgeons appropriately trained in minimally invasive techniques may minimize postoperative dysphagia
 - by choosing partial fundoplication
 - or short total fundoplication(1–2 cm) over a large bougie(56 French)

and maximize the effectiveness of the procedure

- by choosing total fundoplication or longer(at least 3 cm) post fundoplication

Open vs Scope

Outcome variable	Jadad score	No of pts	No of	Pooled OR or	Test for ove	rall effect	Tes	t for heterog	eneity
			studies	WMD(95% CI)	Z	<i>P</i> value	Q	<i>P</i> value	l ² -index(%)
Duration of hospital stay	Less than 3	329	4	-2.91	-8.88	<0.0001	5.51	0.1378	45.56
	At least 3	416	5	-2.34	-2.53	0.0113	30.35	<0.0001	86.82
		745	9	-2.68	-6.06	<0.0001	40.89	<0.0001	80.43
Return to normal activity	Less than 3	93	1	-7.60	-2.94	0.0033	NA	NA	NA
	At least 3	416	5	-6.83	-1.45	0.1461	17.31	0.0017	76.89
		509	6	-7.75	-2.30	0.0216	18.80	0.0021	73.40
Operating times	Less than 3	329	4	35.65	1.93	0.0541	74.81	<0.0001	95.99
	At least 3	416	5	42.01	3.81	<0.0001	37.28	<0.0001	89.27
		745	9	39.02	3.64	0.0003	146.78	<0.0001	94.54
Complication rate	Less than 3	580	6	0.18	-3.44	0.0006	10.84	0.0547	53.87
	At least 3	416	5	0.61	-1.02	0.3075	7.69	0.1038	47.98
		996	11	0.35	-2.69	0.0072	27.02	0.0026	62.99
Failure rate	Less than 3	536	5	1.31	0.46	0.6481	15.55	0.0037	74.28
	At least 3	416	5	1.52	1.14	0.2545	4.95	0.2925	19.19
		952	10	1.39	0.95	0.3423	21.11	0.0122	57.37
Re-operation rate	Less than 3	536	5	1.45	0.88	0.3791	4.70	0.3198	14.89
	At least 3	416	5	2.89	1.99	0.0464	1.24	0.8712	0
		952	10	1.79	1.96	0.0500	7.10	0.6262	0

제7차 전공의 학술세미나 Peters MJ. et al. Am J Gastoenterol 2009;104:1548-61

Open vs Scope

- Laparoscopic fundoplication should be preferred over its open alternative as it is associated with
 - superior early outcomes

(shorter hospital stay, return to normal activities, fewer complications)

- and no significant differences in late outcomes
- Antireflux surgeons should be aware that
 - laparoscopic fundoplication takes longer to perform
 - and has a higher incidence of reoperations, at least in the short term

Outcomes of Surgery

Medical versus Surgical Treatment

QOL after surgery

Medical vs Surgical

Laparoscopic fundoplication provides better physiological control of reflux than maintenance medical therapy

Mahon D. et al. Br J Surg 2005;92:695-9

After 7 years, surgery was more effective in controlling overall disease symptoms, but specific post-fundoplication complaints remained a problem

Lundell L. et al. Br J Surg 2007;94:198-203

Both optimal PPI therapy and laparoscopic Nissen fundoplication are effective treatments for GERD. However, surgery offers additional benefit for those who have only partial symptomatic relief whilst on PPIs

Mehta S. et al. J Gastrointest Surg 2006;10:1312-1317 제7차 전공의 학술세미나

Medical vs Surgical

- Surgical therapy for GERD is an *equally effective alternative to medical therapy* and should be offered to *appropriately selected patients by appropriately skilled surgeons*
- Surgical therapy effectively addresses the mechanical issues associated with the disease and results in *long-term patient* satisfaction
- For surgery to compete with medical treatment, *it has to be associated with minimal morbidity and cost*.

Response of Typical GERD Sx

• Postoperative dysphagia : 1.8~10.8%

• Recurrence rates of heartburn : <10%

• Regurgitation rates : 0~11%

Response of Atypical Sx

- Overall improvement : 67~92%
- Cough : cure rates 53%
 - Short-term improvement rates : 69~100%
 - Long term improvement rates : 71%
- While atypical symptoms improve in a majority of patients after antireflux surgery, symptom persistence is higher compared with patients with typical symptoms

Postoperative Complications

- Conversion rate to open surgery : 0~24%
 - High-volume centers : < 2.4%</p>
- Gastric and esophageal perforation : 0~4%
- Pneumothorax : 0~1.5%
- Mortality : 0.07%
- Wound infection : 0.2~3.1%
- Port-site hernia : 0.17~9%
- Herniation of the wrap : 0.8~26%
- Reoperation rate : 0~15%

QOL and Satisfaction with Surgery

• Length of stay : 1~4 days

- Satisfaction rate : 62~97%
 Long-term satisfaction rate : 80~96%
- QOL significantly improved after laparoscopic antireflux surgery in both early and long-term studies

Data from CNUH

Ago /Sox	Diagnosia	On nome	Complications		
Age /Sex	Diagnosis	Op name	Early	Late	
62/F	нн	Lap Niss. & Collis gastroplasty	Mild dysphagia	None	
60/F	нн	Lap Niss.	Mild dysphagia	None	
37/M	нн	Lap Niss.	Mild dysphagia	None	
80/F	Huge PEH (Type IV)	Lap Niss.	None	None	
69/F	Huge PEH (Type IV)	Lap \rightarrow Open Niss. [†]	None	None	
76/F	Huge PEH	Lap Niss.	Mild dysphagia	None	
69/F	Huge PEH, HH	Lap Niss. & Collis gastroplasty	Dyspepsia	None	
73/F	Huge PEH	Open Niss. & pyloromyotomy [‡]	None	None	
75/F	нн	Lap Niss.	Mild dysphagia	Mild dysphagia \star	
67/F	нн	Lap Niss.	Mild dysphagia	None	

- [†] Severe adhesion (Colon-liver)
- [‡] Poor op field (relatively small abd cavity & large liver)
- ***** Too tight wrap ?



Conclusion

- Antireflux surgery is a well-documented, effective, long-term therapeutic alternative to control GERD
- These operations are safe but mortality can never attain a zero level and morbidity has to be realized
- Surgery should always be looked upon as complementary to medical therapy in the long-term management of pts with chronic GERD