



Management of GERD

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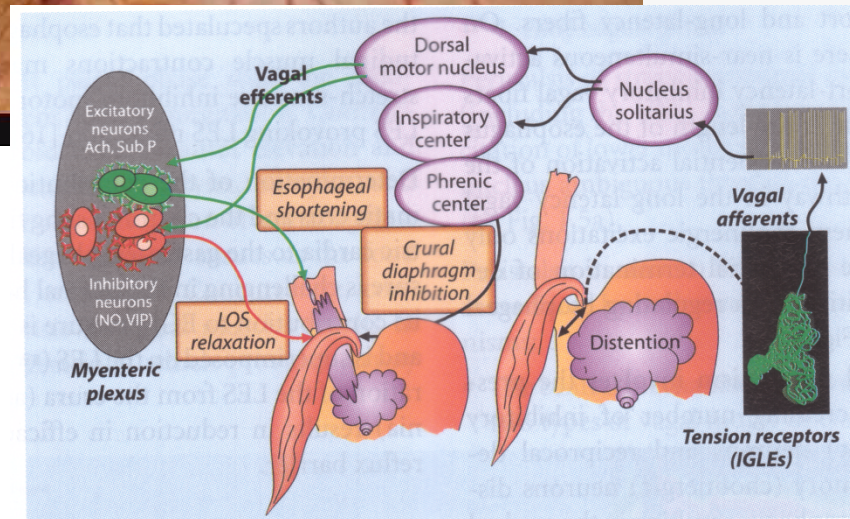
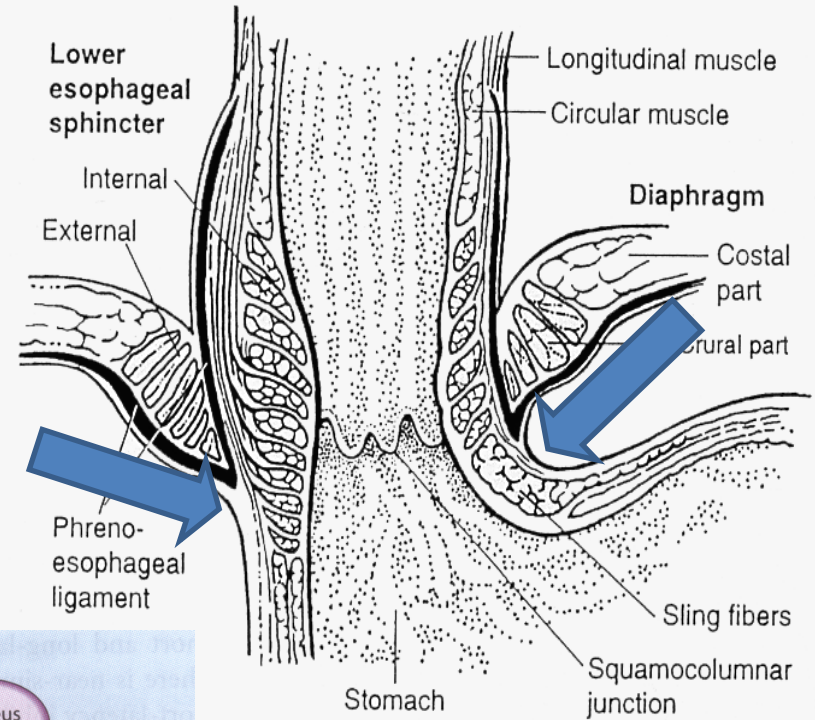
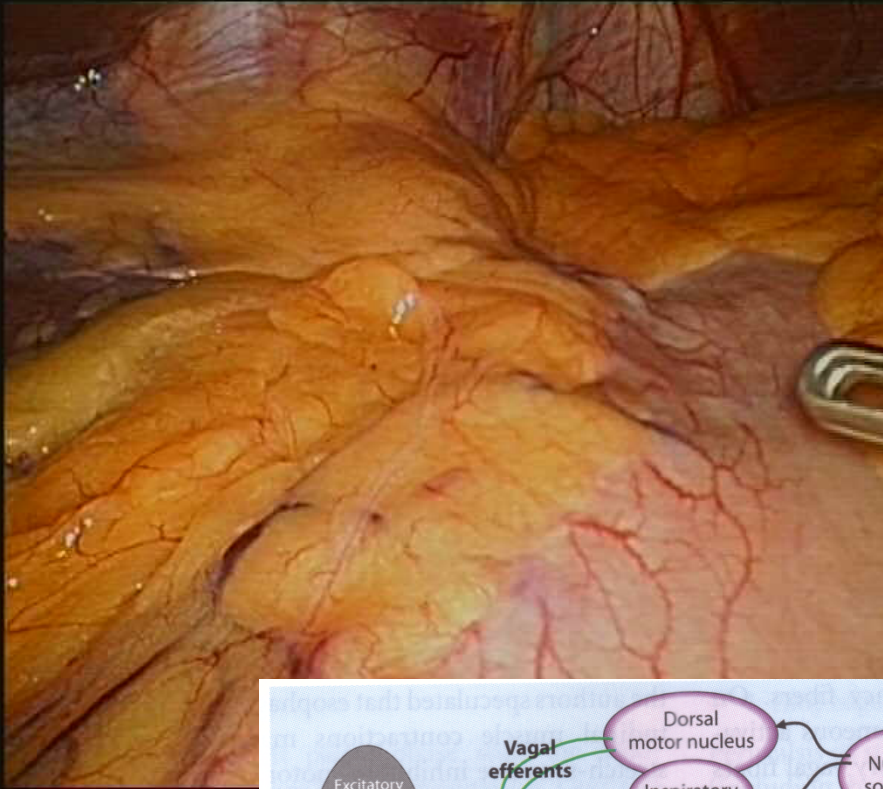
Disclosure

- Nothing to disclose

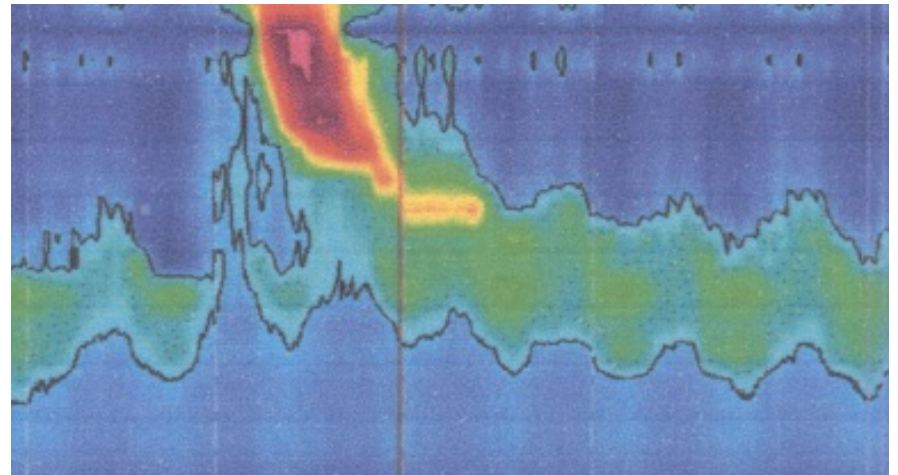
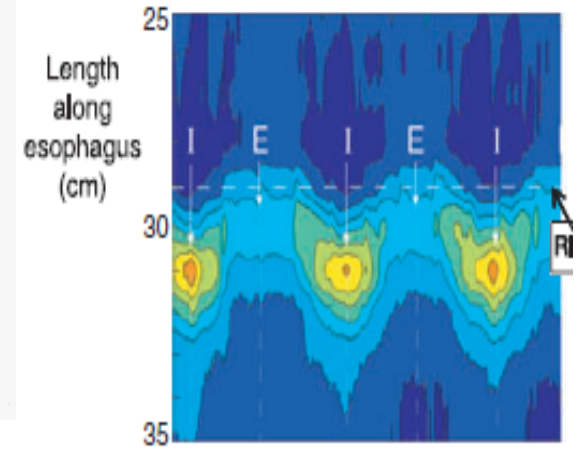
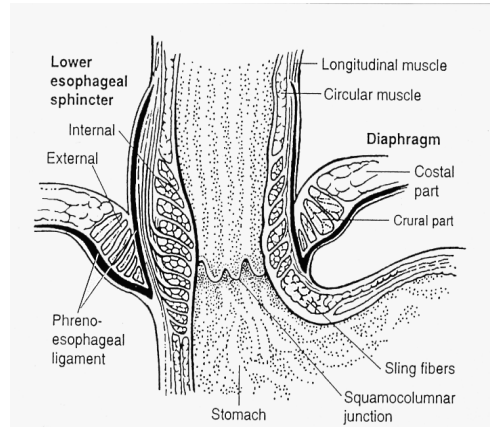
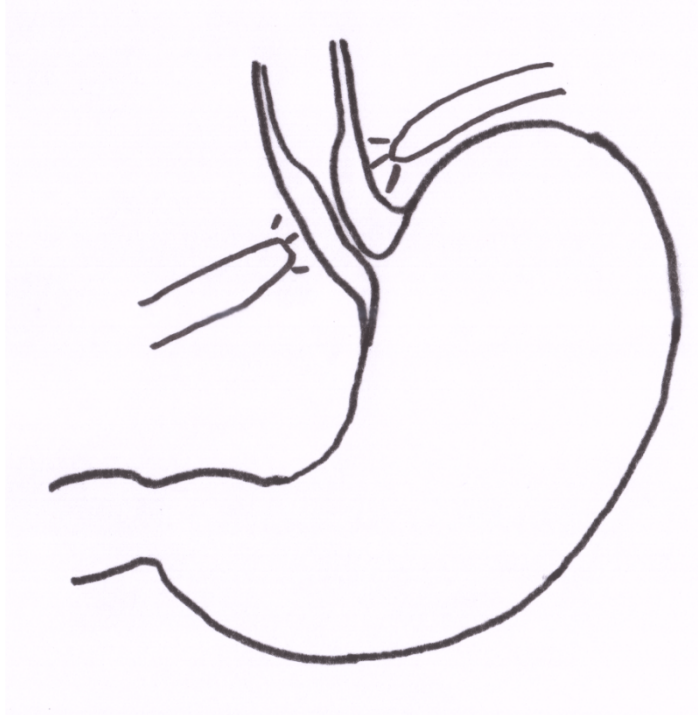
Management of GERD

- Anatomy and Pathophysiology
- Clinical Presentation
- Diagnostics
- Decision Making for long-term Therapy
- Surgical Therapy and Technique
- Outcome
- Specialties and Problems

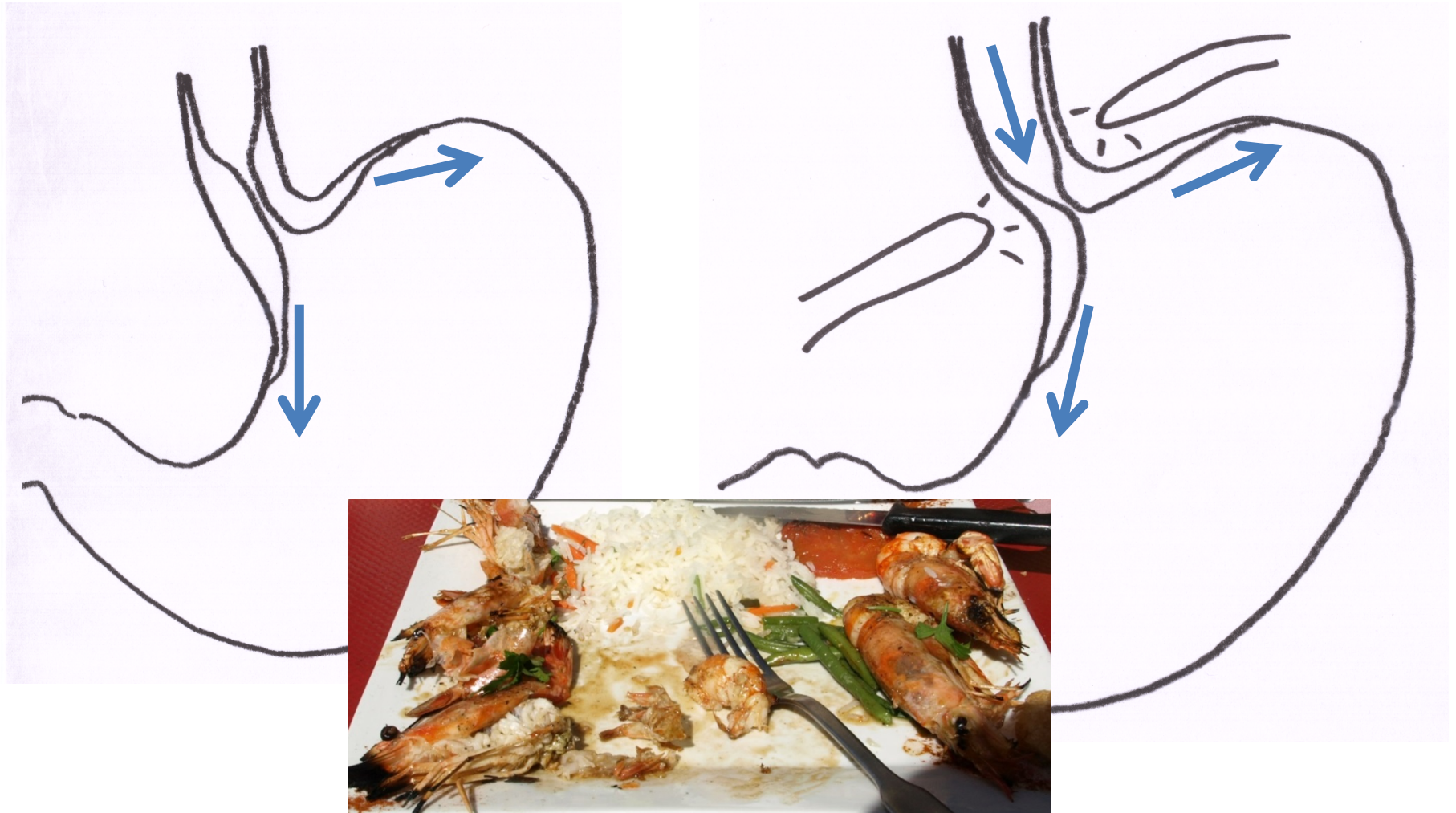
Esophago-Gastric Junction



The Gastroesophageal Junction



Shortening of the LES high-pressure zone by overfilling of the fundus

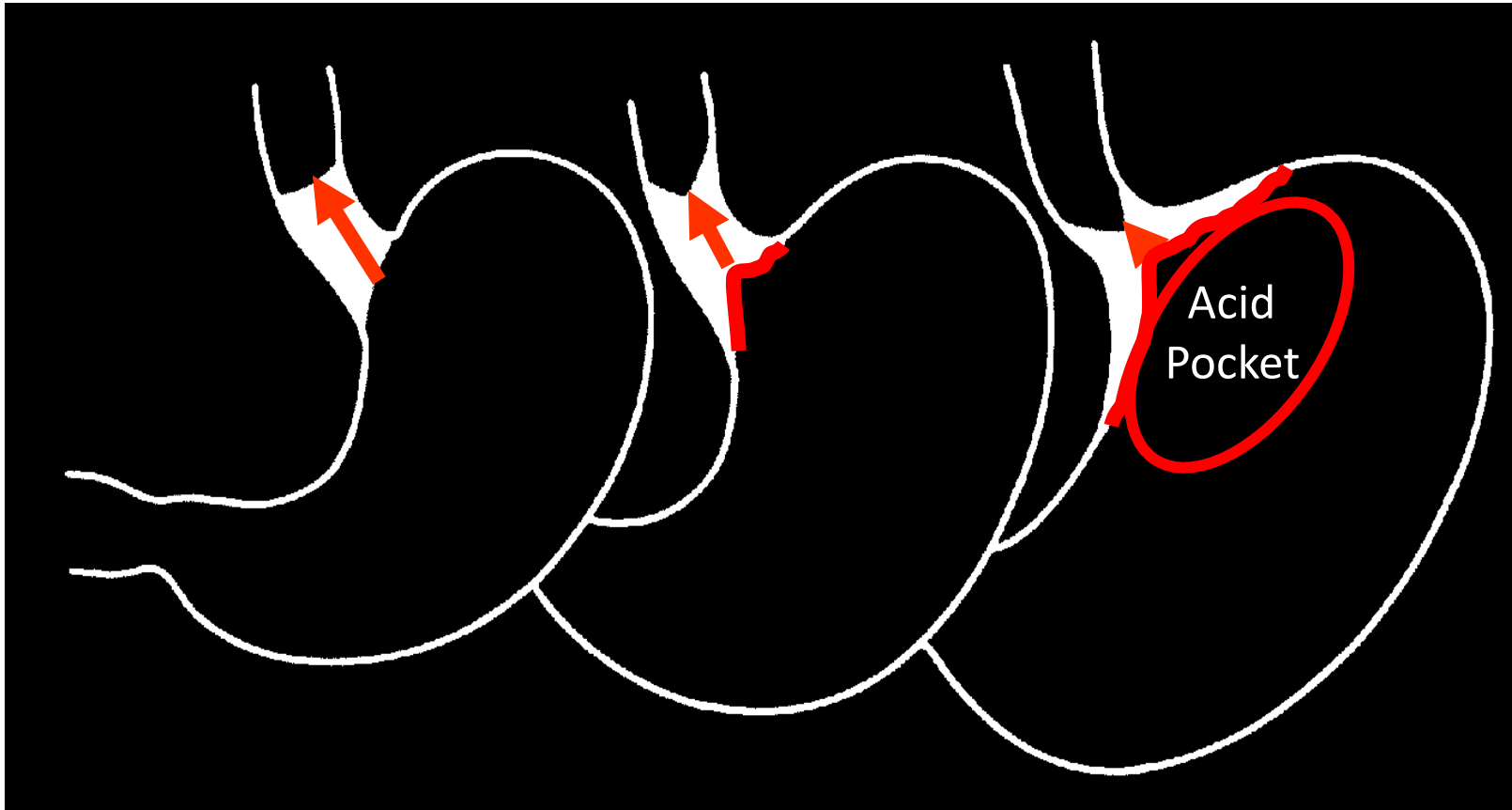


Effacement of GE-junction by overeating



Transient shortening of the LES

Pathologic acid Reflux

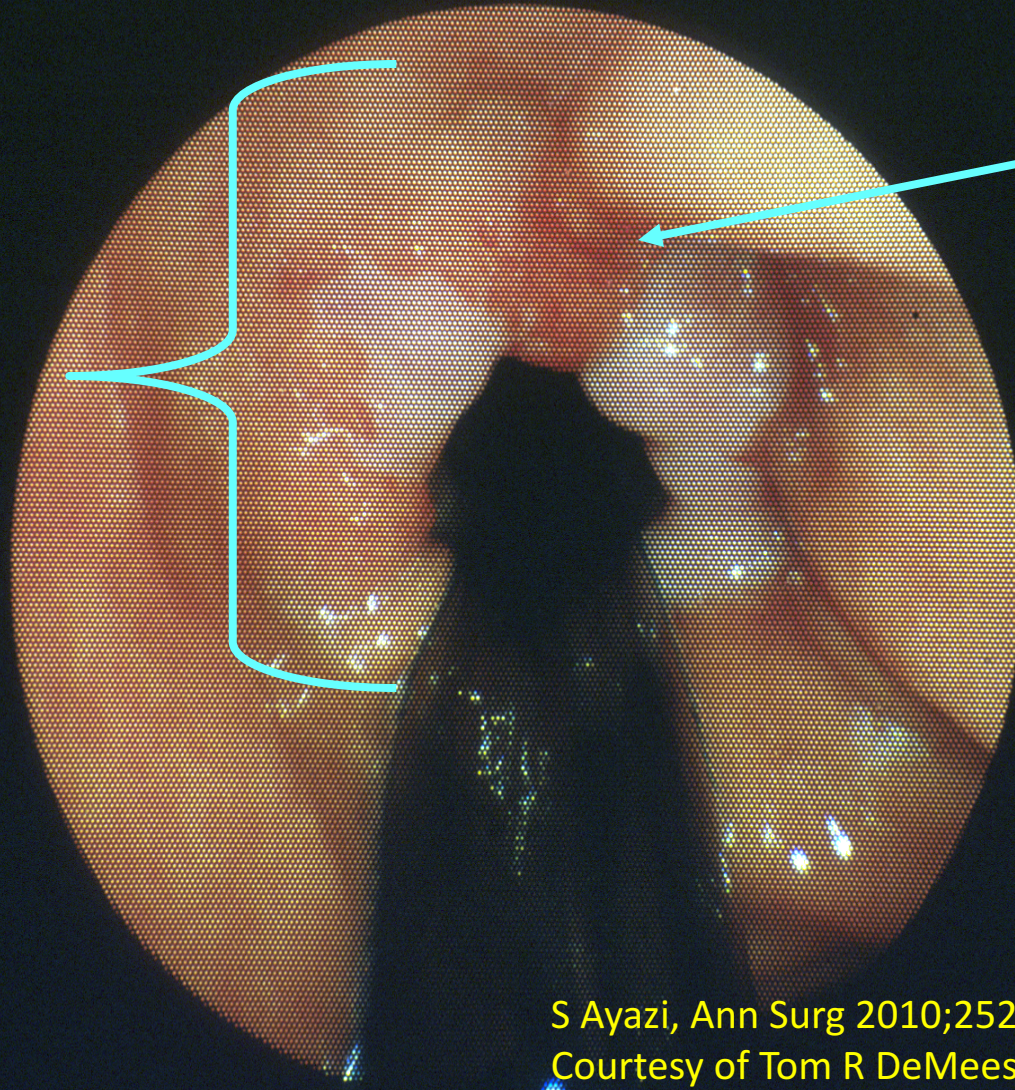


GERD: The outbreak of the disease

Injured squamous epithelium in an acid environment heals as metaplastic cardiac mucosa.

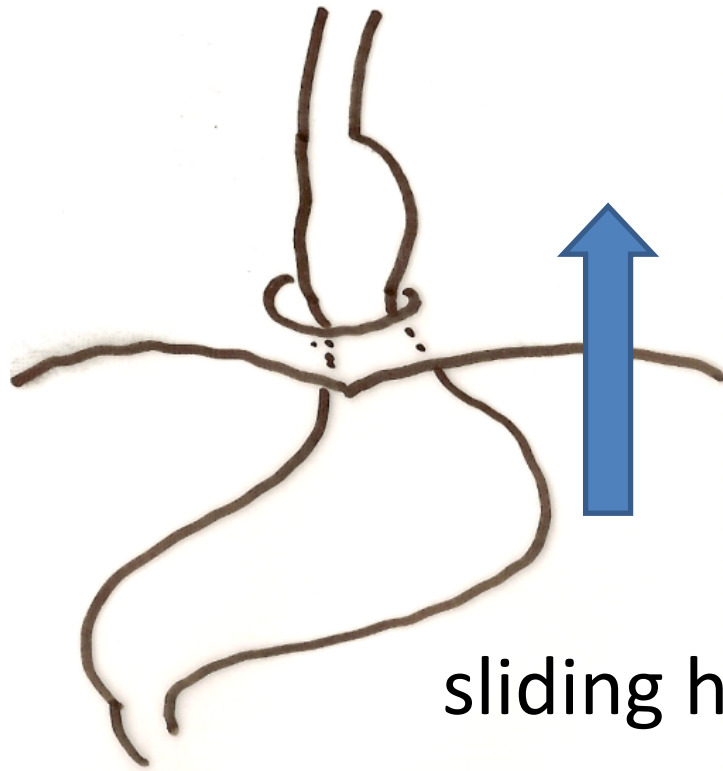
Effaced
Distal
LES

Inflamed
metaplastic
cardiac
mucosa

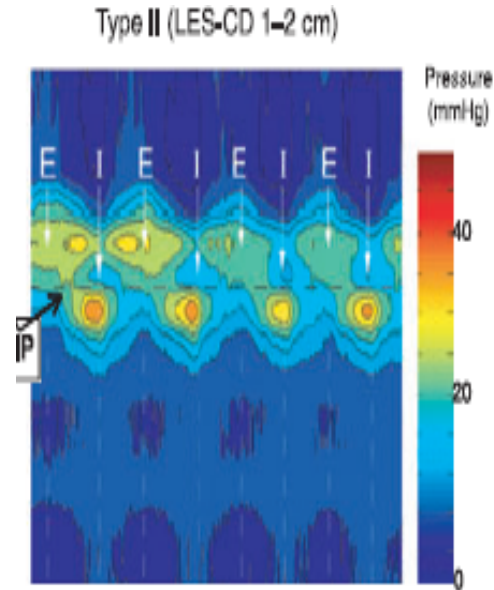


S Ayazi, Ann Surg 2010;252:857-862
Courtesy of Tom R DeMeester

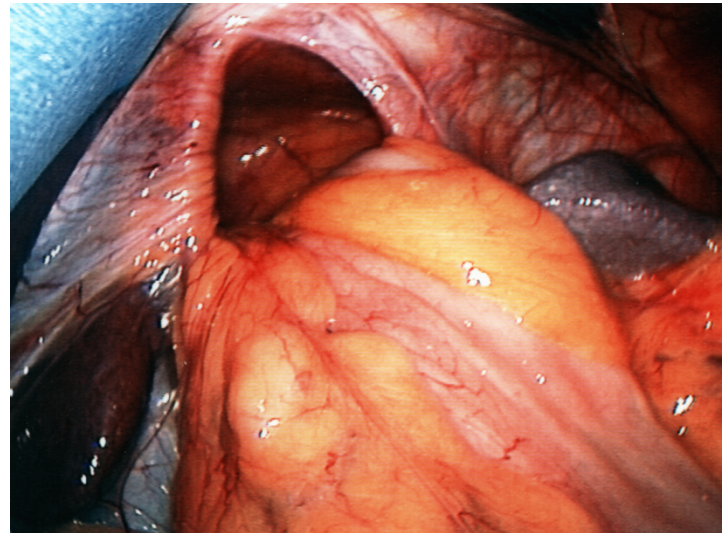
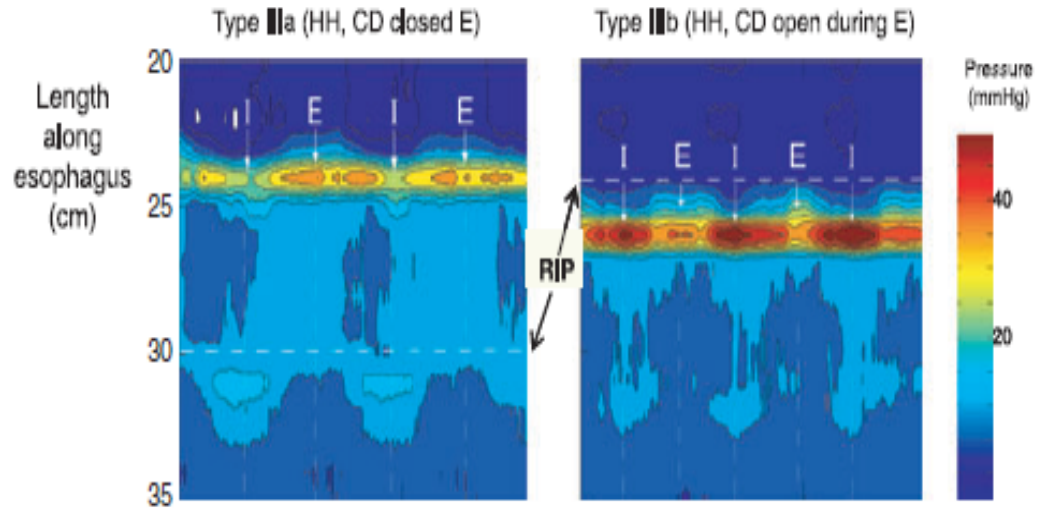
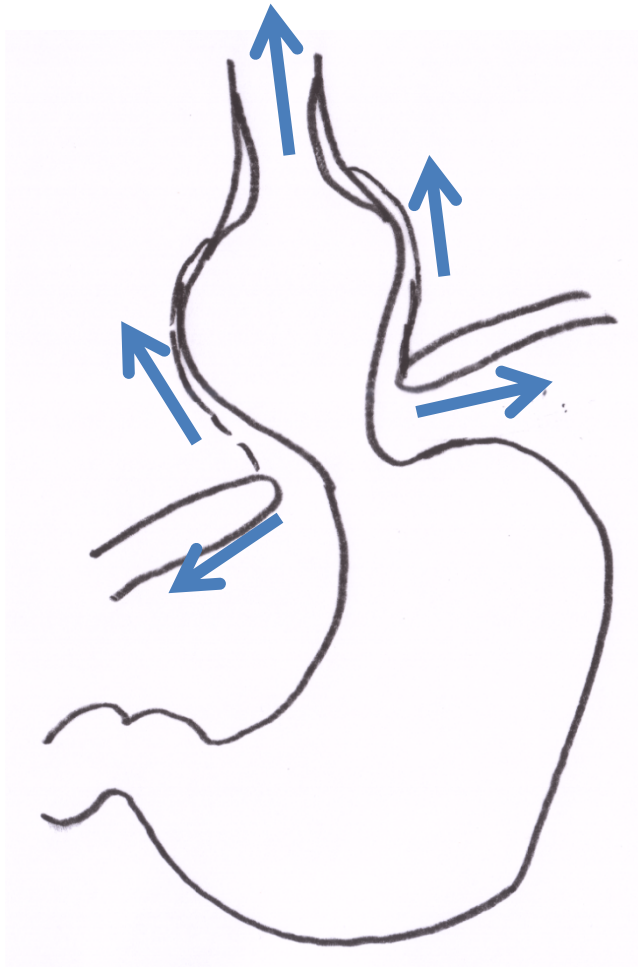
The gastroesophageal Junction



sliding hernia

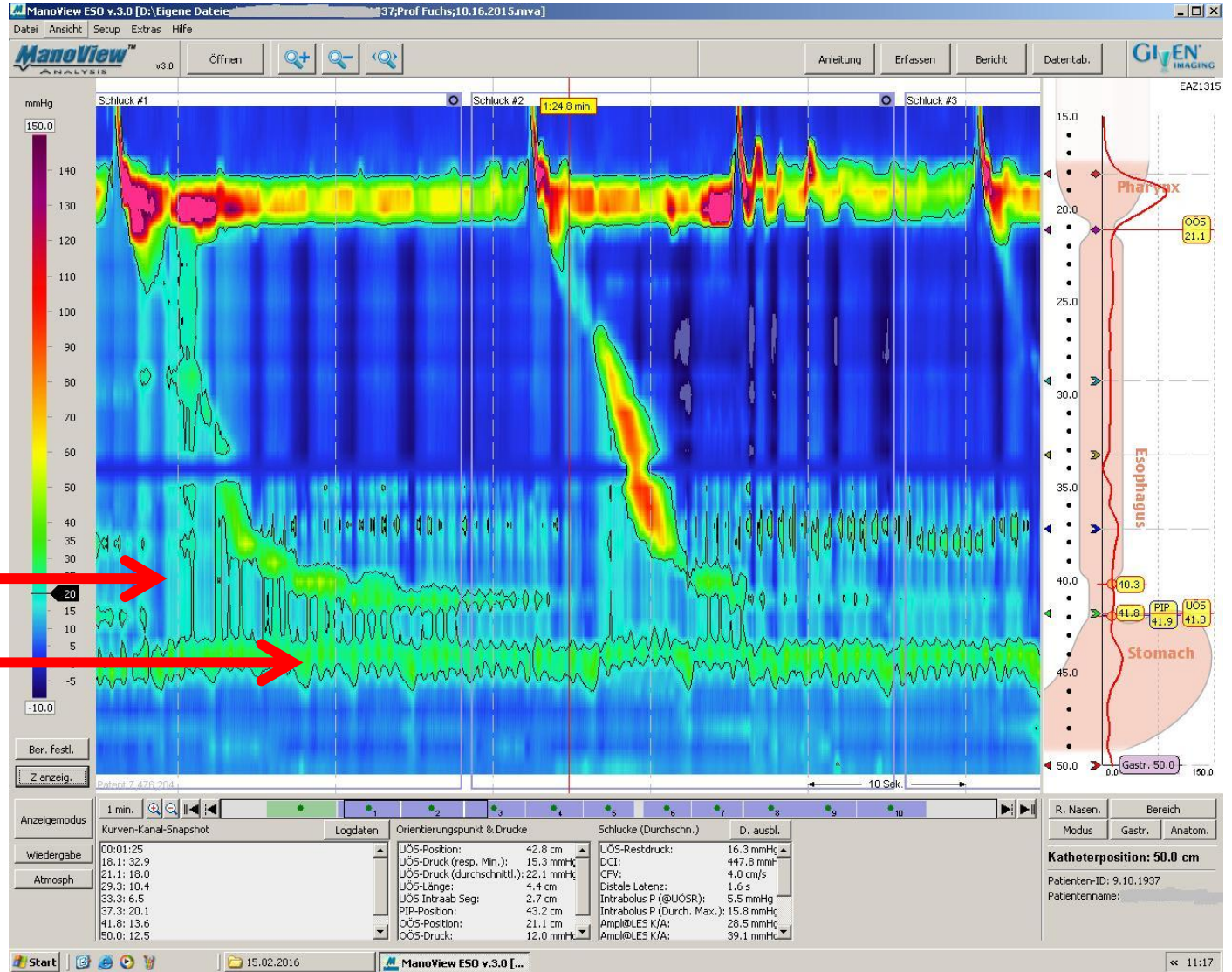


Hiatal Hernia and change of the phreno-esophageal ligament



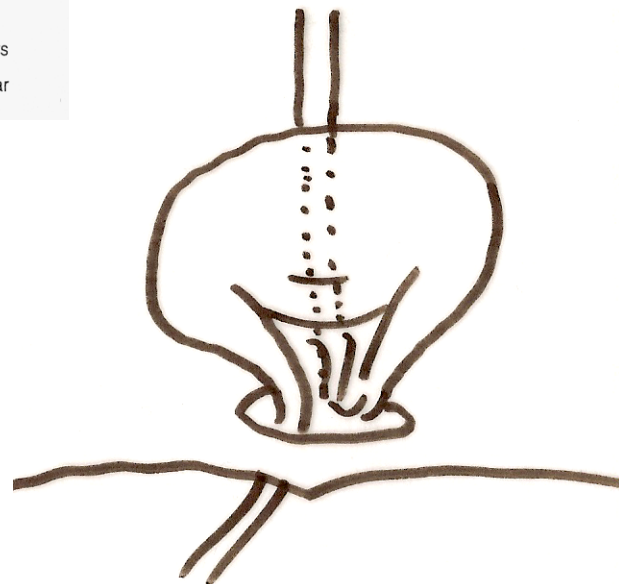
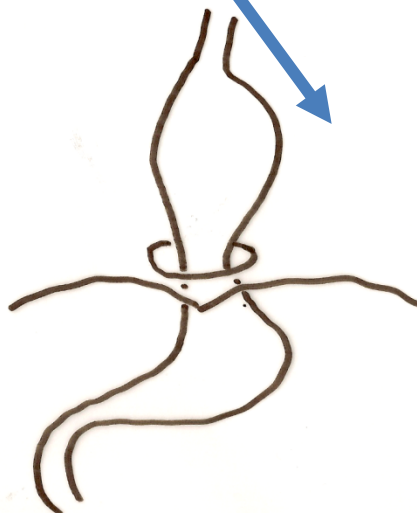
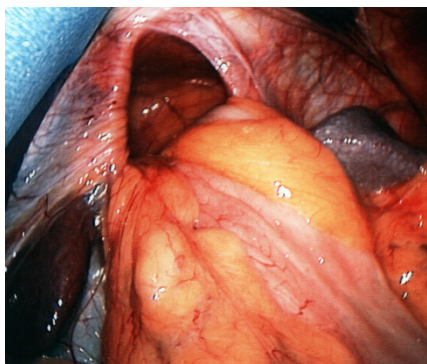
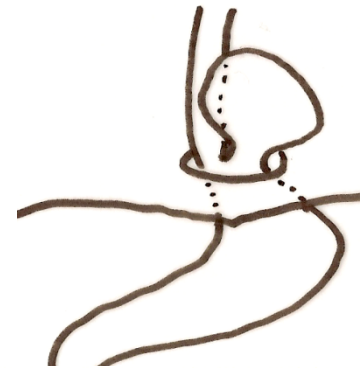
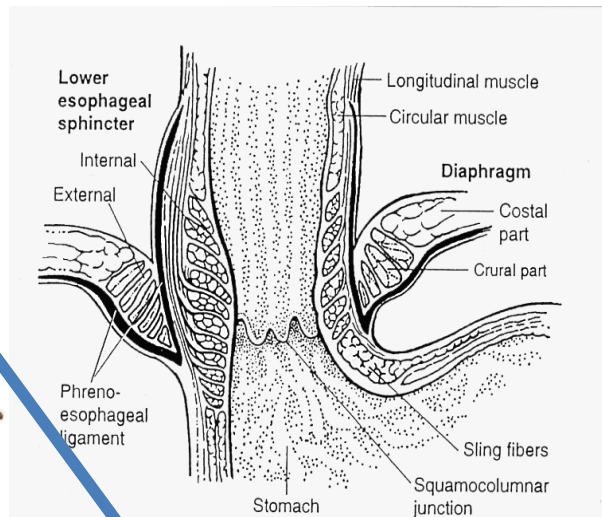
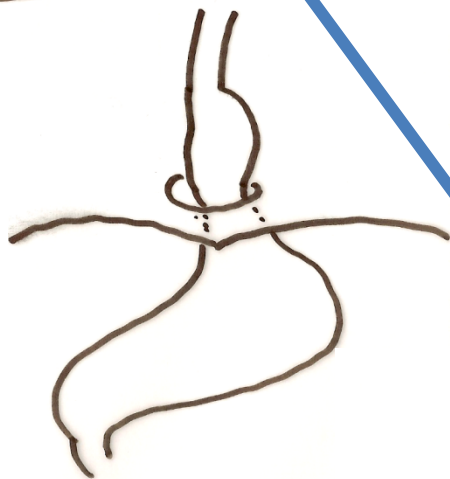
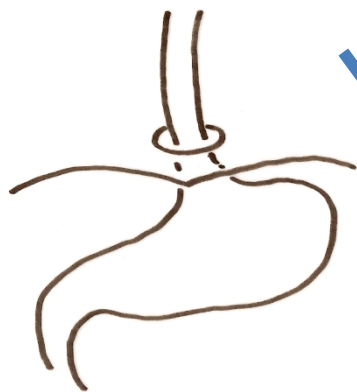
GERD + incomp. LES + HH

LES
Hiatal Crurae



Anatomy at the Hiatus

Phreno-esophageal ligament

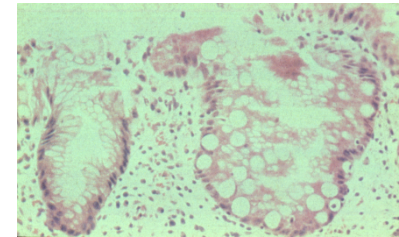


Multifactorial Causes of GERD

LES	-	-	0,02	-
Hiatushernia	-	-	0,001	-
Acid	0,05	-	0,03	0,03
Bile	-	-	-	0,03

Normal > NERD > ERD_{AB} > ERD_{CD} > Barrett

Progression-rate(%): **5,9** **12,1** **19,7**



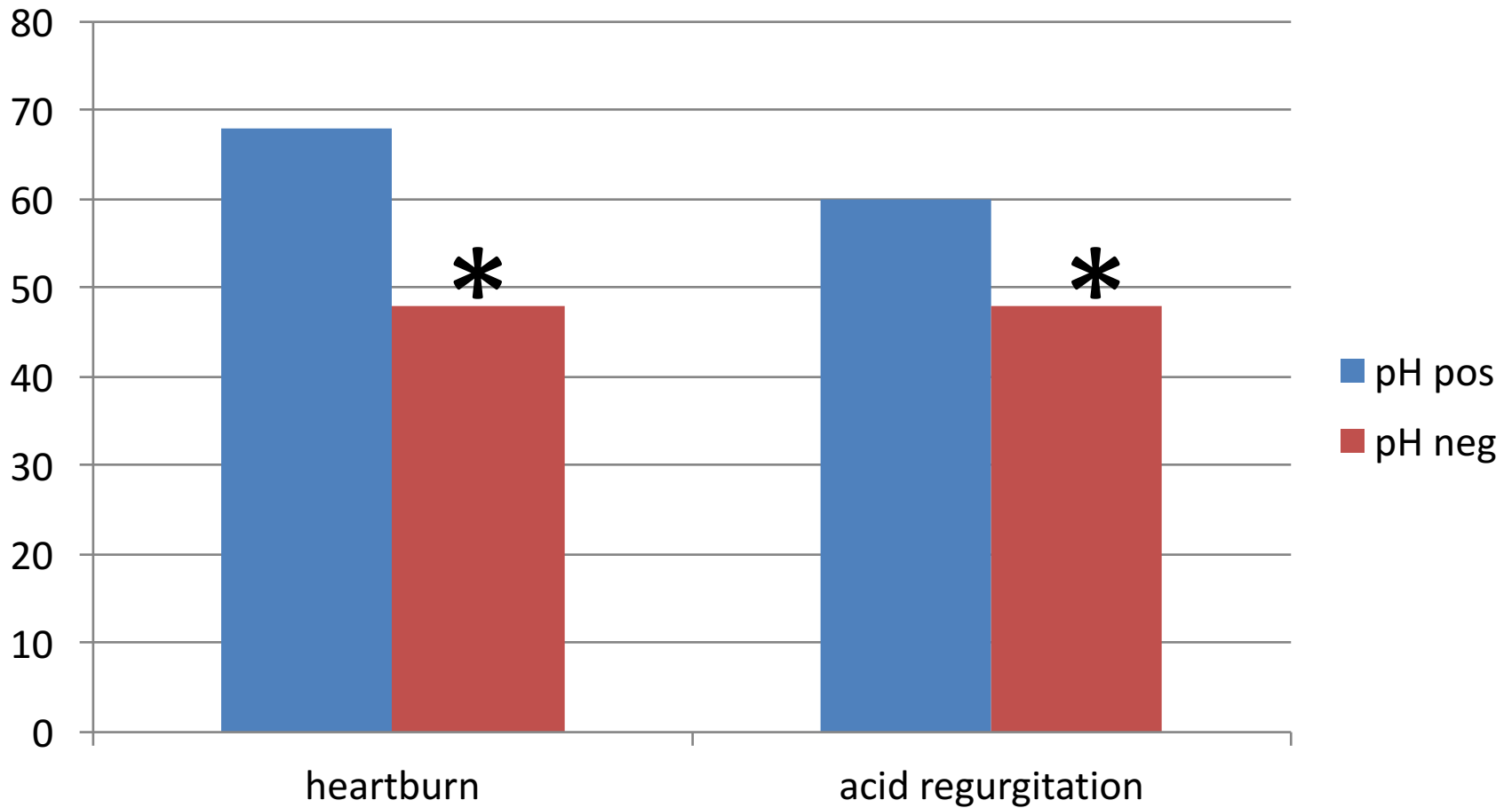
Progression 2-16 years

Lord / DeMeester 2009

Malfertheiner et al 2012

Clinical Presentation: Symptoms and GERD

Klauser et al. 1990 Lancet (304 pat)



GERD and symptoms

symptoms	Presence in GERD	Presence in other disorders (dyspepsia)
Heartburn	36-99 %	6-20 %
Regurgitation	33-86 %	
Epigastric pain	12-67 %	Up to 71 %
Dysphagia	5-19 %	
Extraesophageal symptoms Cough, hoarseness	Up to 38 %	

EAES consensus conference

GERD and symptoms

Area	Heartburn in healthy population % (n)	Heartburn in GERD patients % (n)
Germany	16,5 % (256)	72 % (389)
Spain		99 % (301)
USA	11 % (2561)	82 % (5796)
India	7,6 % (3224)	78 % (245)
China	3,1 % (16091)	
Korea	25 % (22960)	35 % (1810)

GERD symptoms failing PPI therapy

Galindo et al. 2013

- N=275: Complete GERD testing:
- **NERD: 40,0%**
- **ERD: 19,3%**
- **Barrett: 5,5%**
- Eosinophilic esophagitis: 5,5%
- Achalasia: 2,5%
- Other motility disorders: 5,8%
- Functional heartburn: 16%
- Gastroparesis: 5,8%

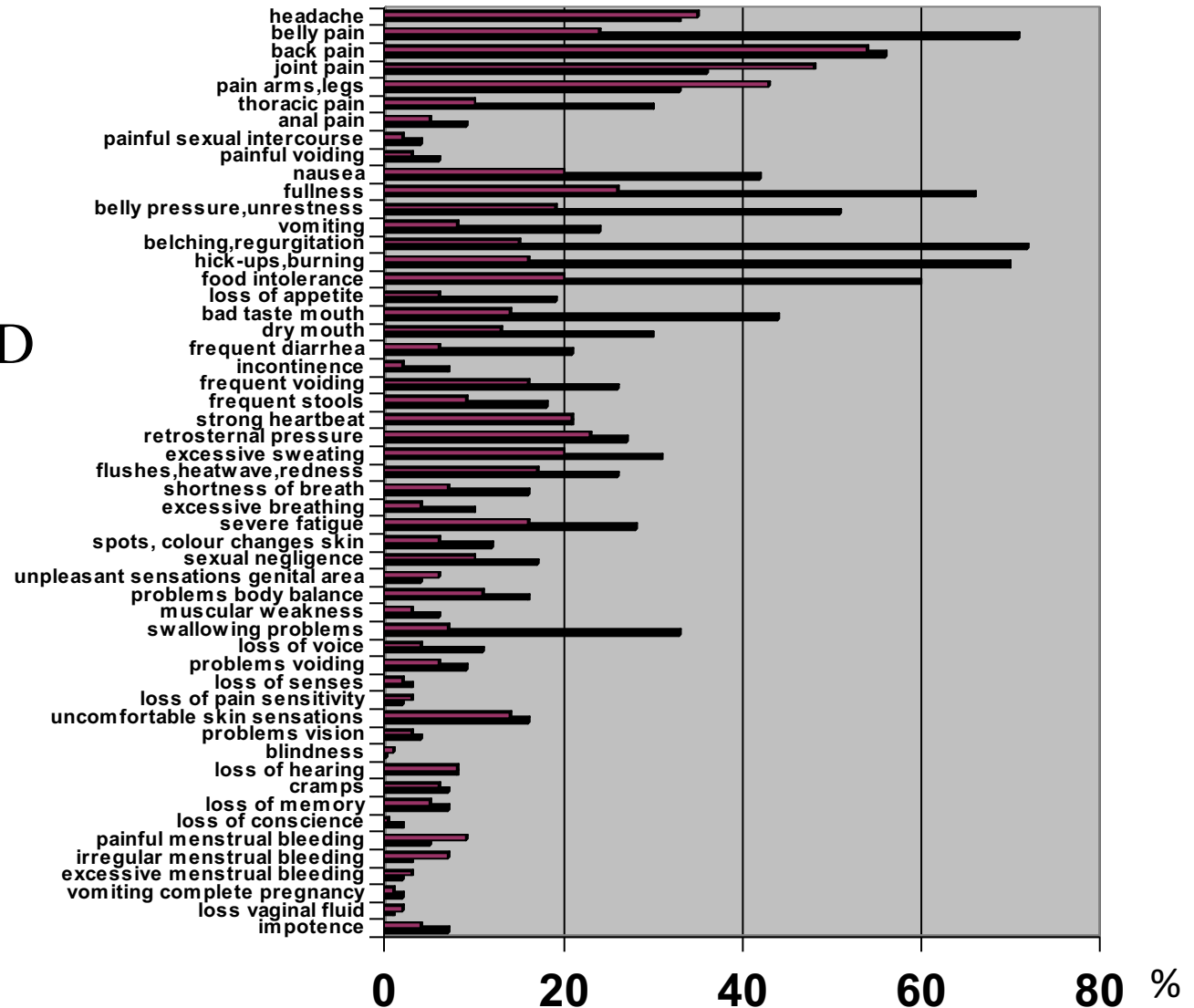
Patients with refractory reflux symptoms often do not have GERD

Herregods et al. 2015

- N=106
- Positive Impedance reflux and acid exposure
n=60 (57%) ; 25 pos SAP; 35 neg SAP
- Final diagnosis of GERD:69 patients
- Functional heartburn: 32 patients
- Achalasia: 2 patients
- Others: 3 patients

Presence of symptoms in 651 patients with foregut symptoms

Only in 60 % GERD

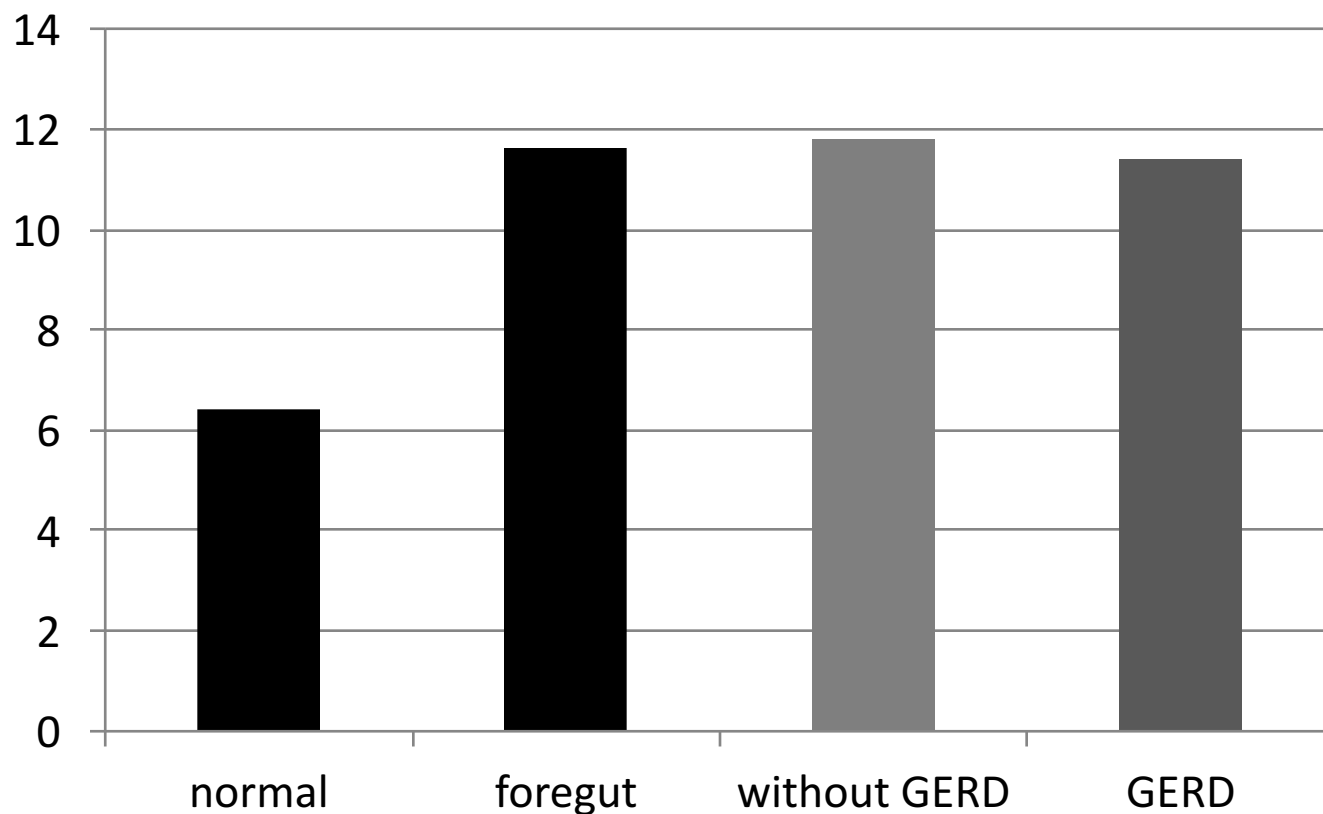


Symptoms listed in the SOMS-instrument “screening test for somato-form disorders” by Rief et al (1996)

1. headache and facial pain
2. stomach pain (abdominal pain)
3. back pain
4. joint pain
5. pain in arms and legs
6. thoracic pain
7. anal pain
8. painful sexual intercourse
9. painful voiding (urinating)
10. nausea
11. fullness
12. stomach pressure
13. vomiting (excluding pregnancy)
14. belching, regurgitation
15. “hick-ups” or burning/belching from stomach
16. intolerance of certain foods
17. loss of appetite
18. bad taste in mouth
19. dryness of mouth
20. frequent diarrhea
21. incontinence/loss of fluid stools
22. frequent voiding (urinating)
23. frequent stools
24. strong heartbeat/ heart sensations
25. retrosternal pressure
26. excessive sweating
27. flushes / heatwaves/ redness
28. short of breath / dyspnoea
29. excessive breathing
30. severe fatigue /being tired
31. spots and colour-changes on skin
32. sexual negligence
33. unpleasant sensation in genital area
34. problems in body balance
35. muscular weakness
36. swallowing problems and “lump in throat”
37. loss in strength of voice
38. difficulties in voiding (urinating)
39. loss of senses
40. loss of pain sensitivity
41. uncomfortable skin sensations
42. problems vision /problems seeing
43. blindness
44. loss of hearing ability
45. cramp attacks
46. loss of memory
47. loss of conscience
48. painful menstrual bleeding
49. irregular menstrual bleeding
50. excessive menstrual bleeding
51. excessive vomiting during pregnancy
52. excessive loss of vaginal fluid
53. impotence or other disorders of ejaculation

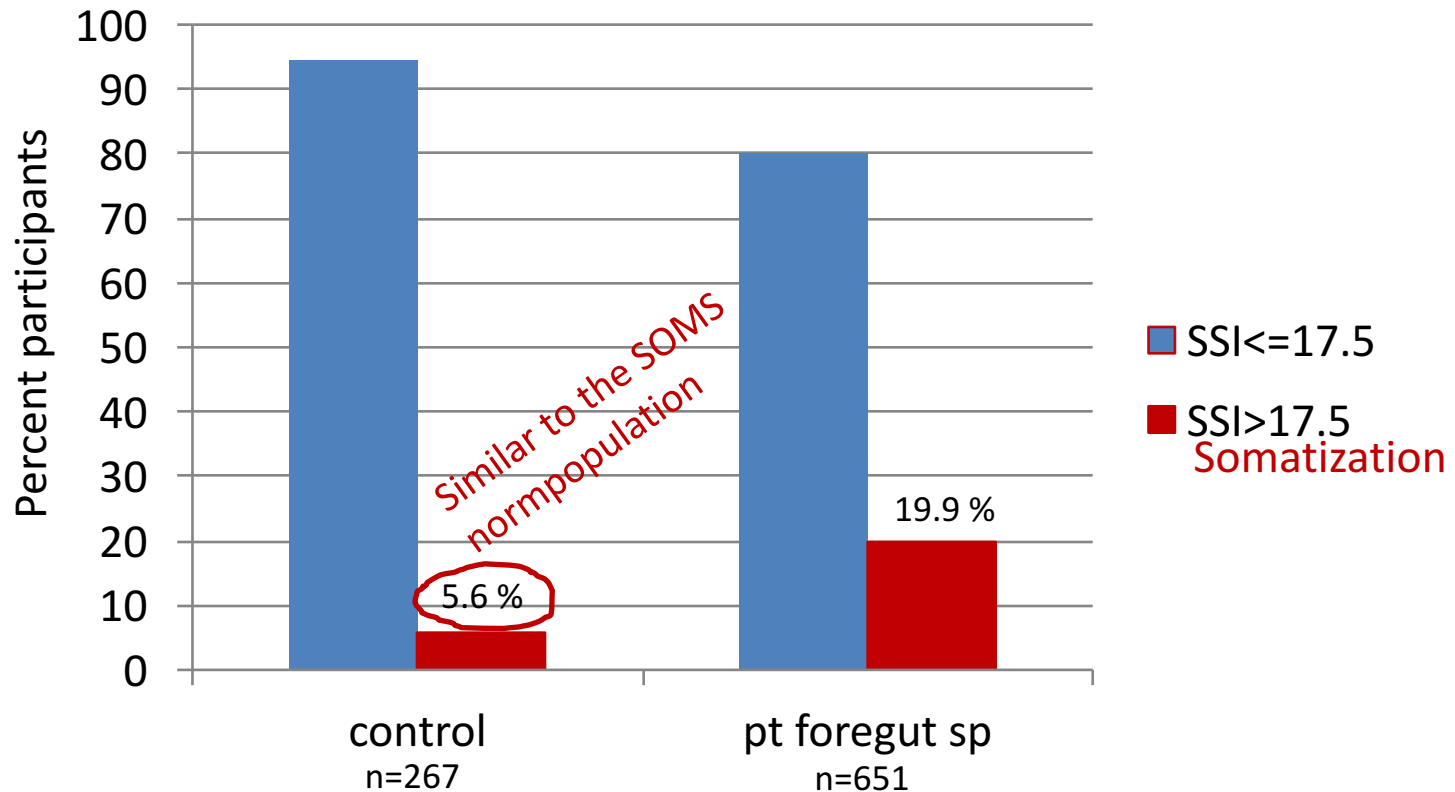
Somatoform Symptom Index SSI in health, foregut symptoms and GERD

SSI = 53 different items (symptoms)

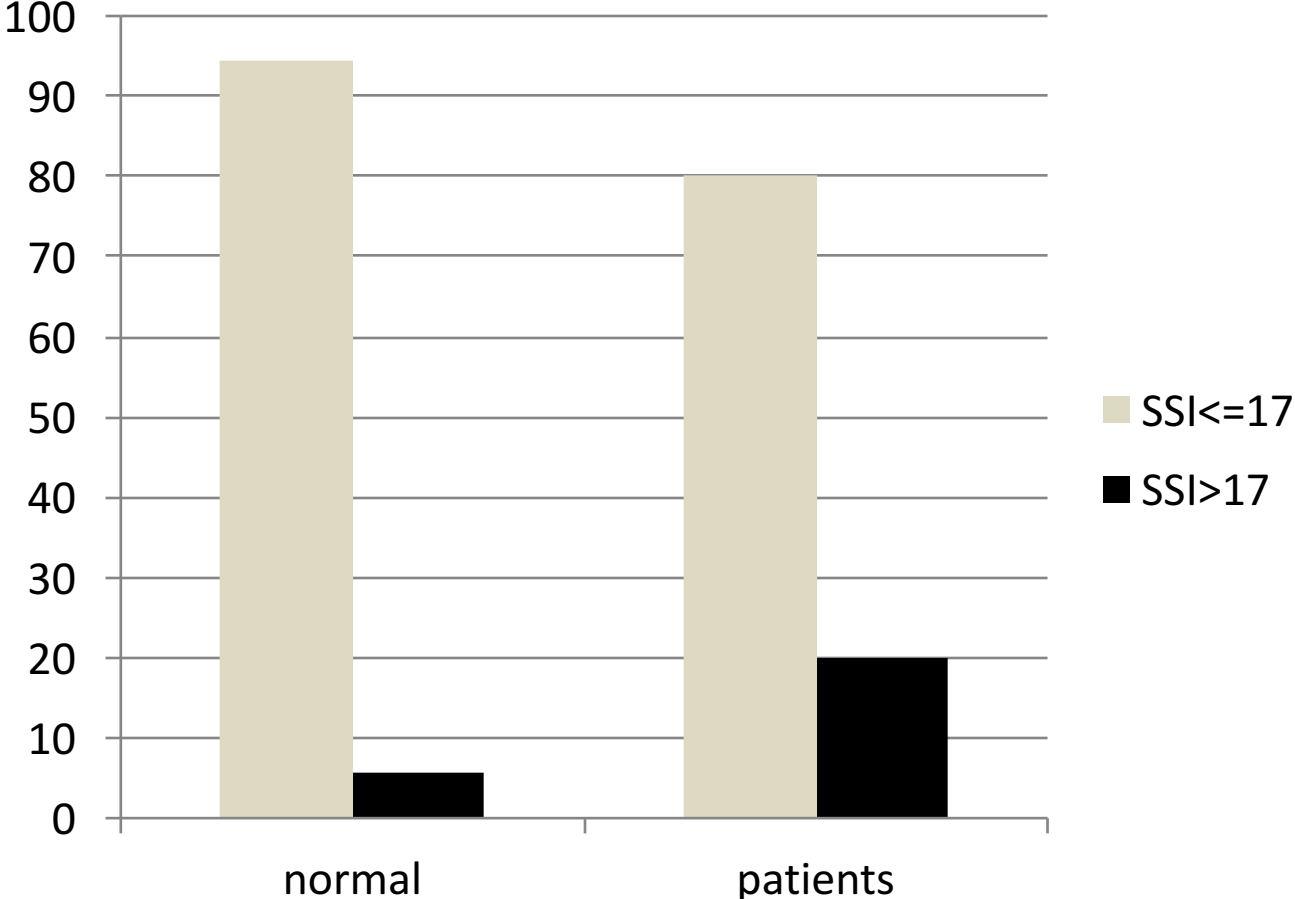


Somatization in health and disease

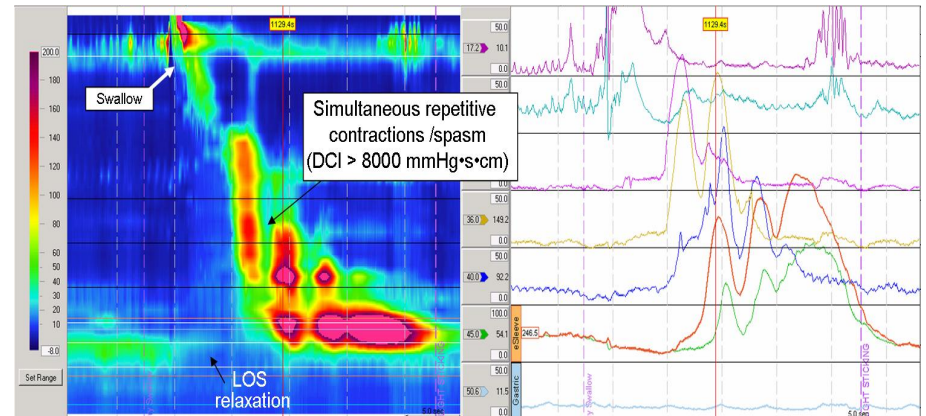
Borderline: > 17 symptoms



Somatiform Tendencies in Health and patients with GERD

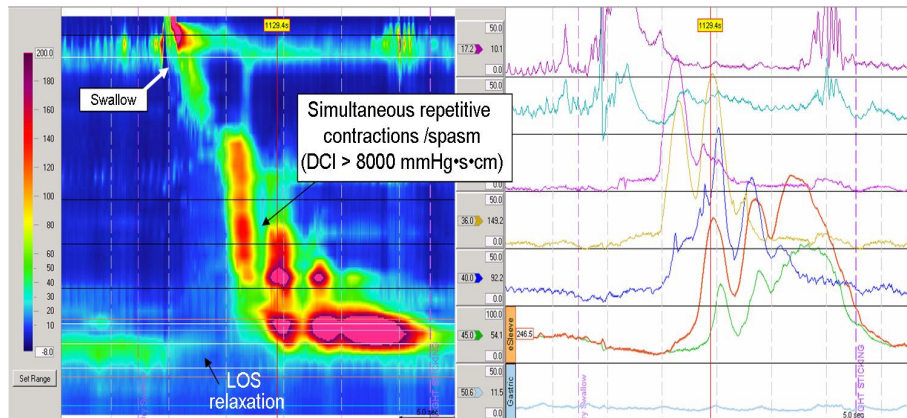
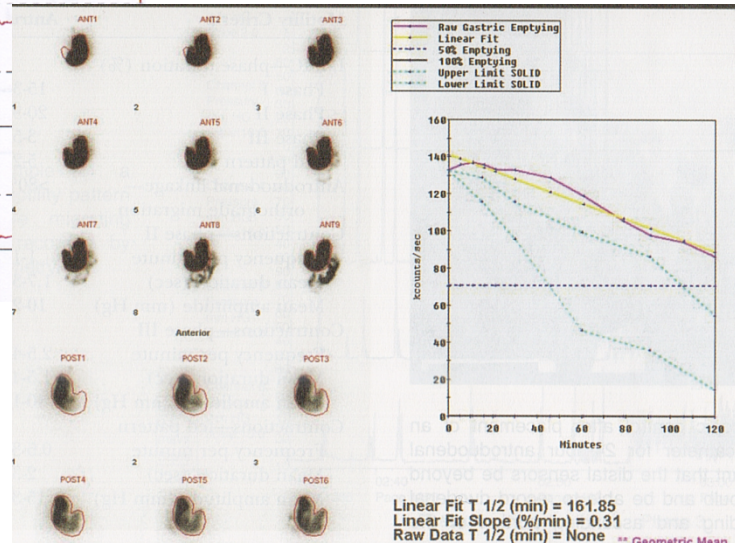
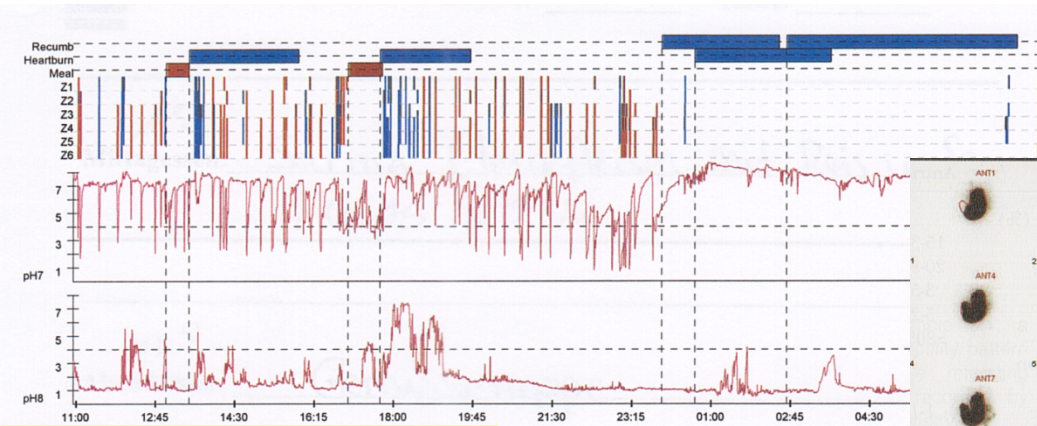


Patient Selection and Diagnostics

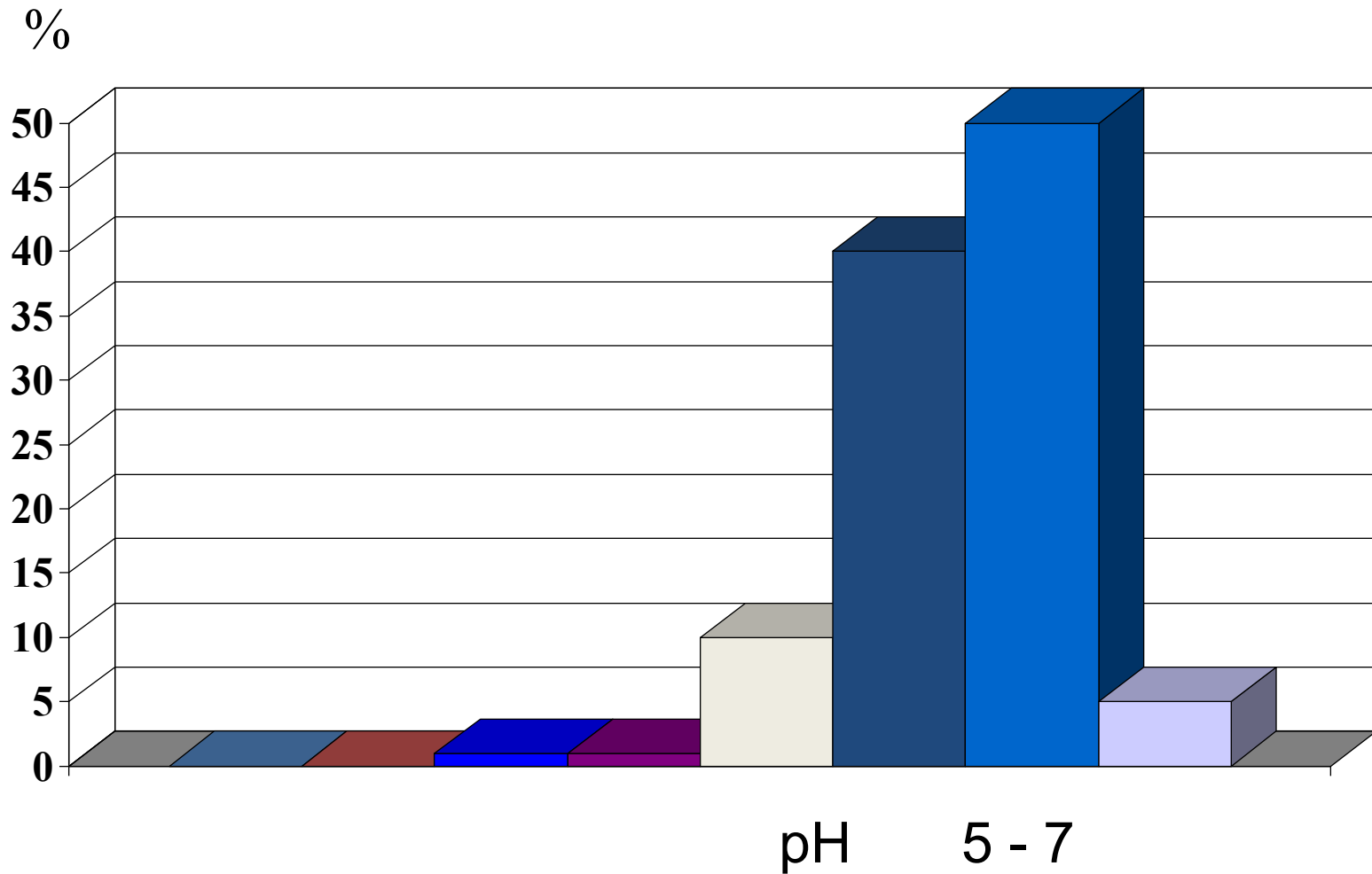


- Only 59% of patients (n=651) with reflux symptoms have GERD F
Ulbricht et al 2012
- 1-4 % of patients with reflux symptoms have spastic esophageal motility disorder E Furnee et al. 2009; CS Davies et al 2010;

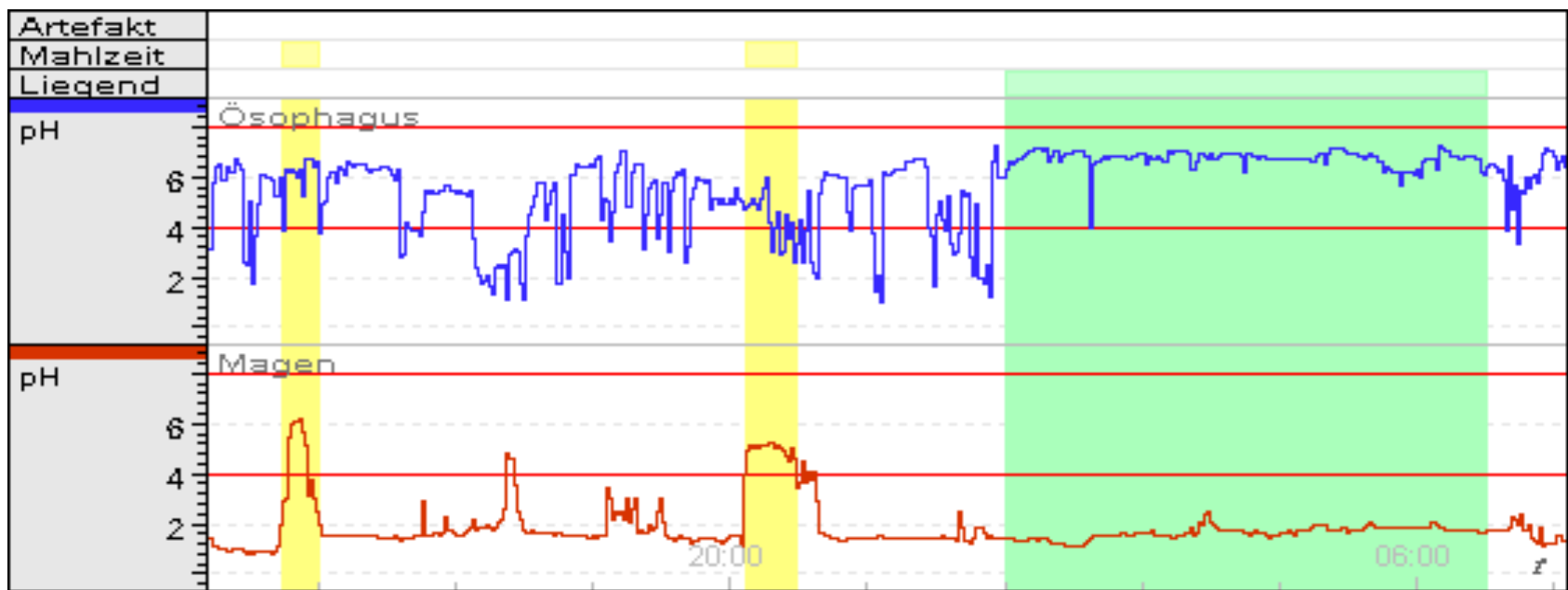
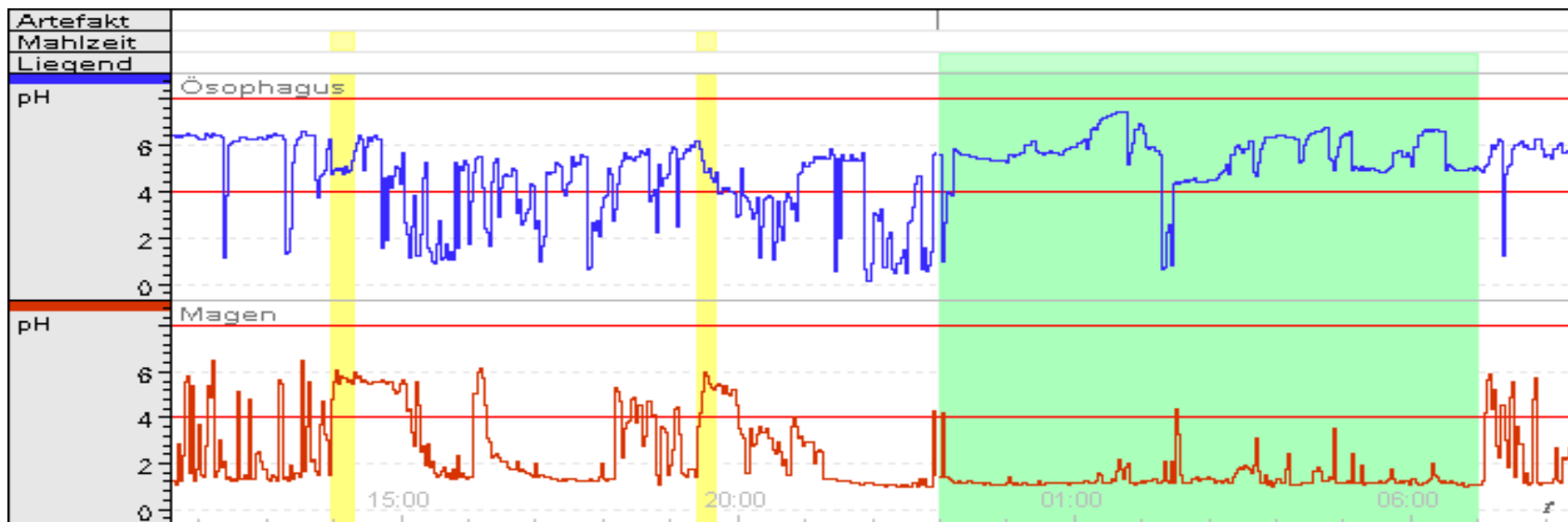
GERD Diagnostics



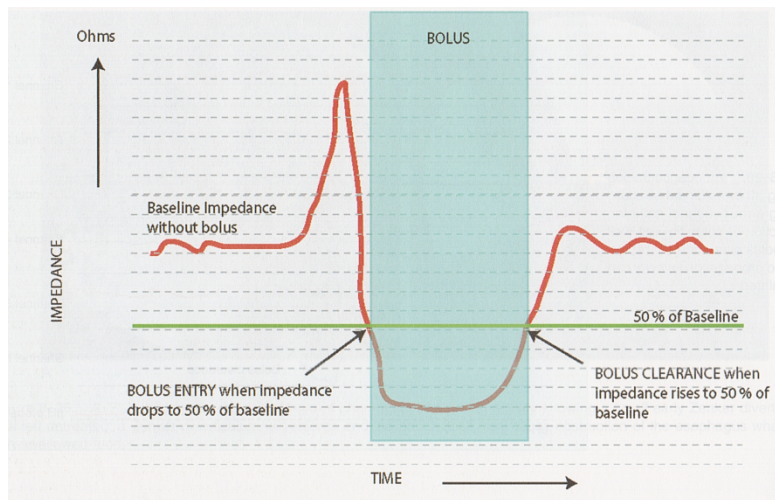
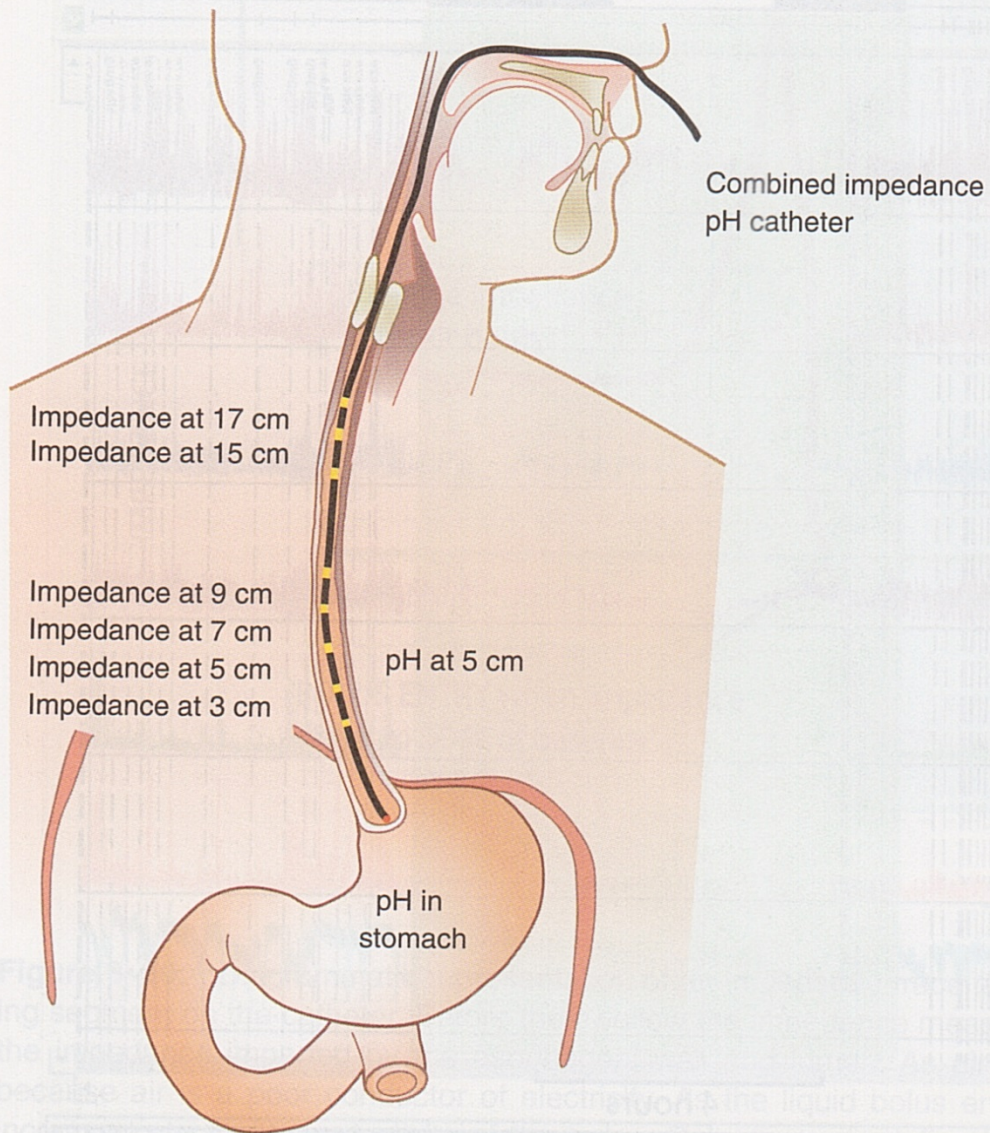
Esophageal pH-Spectrum



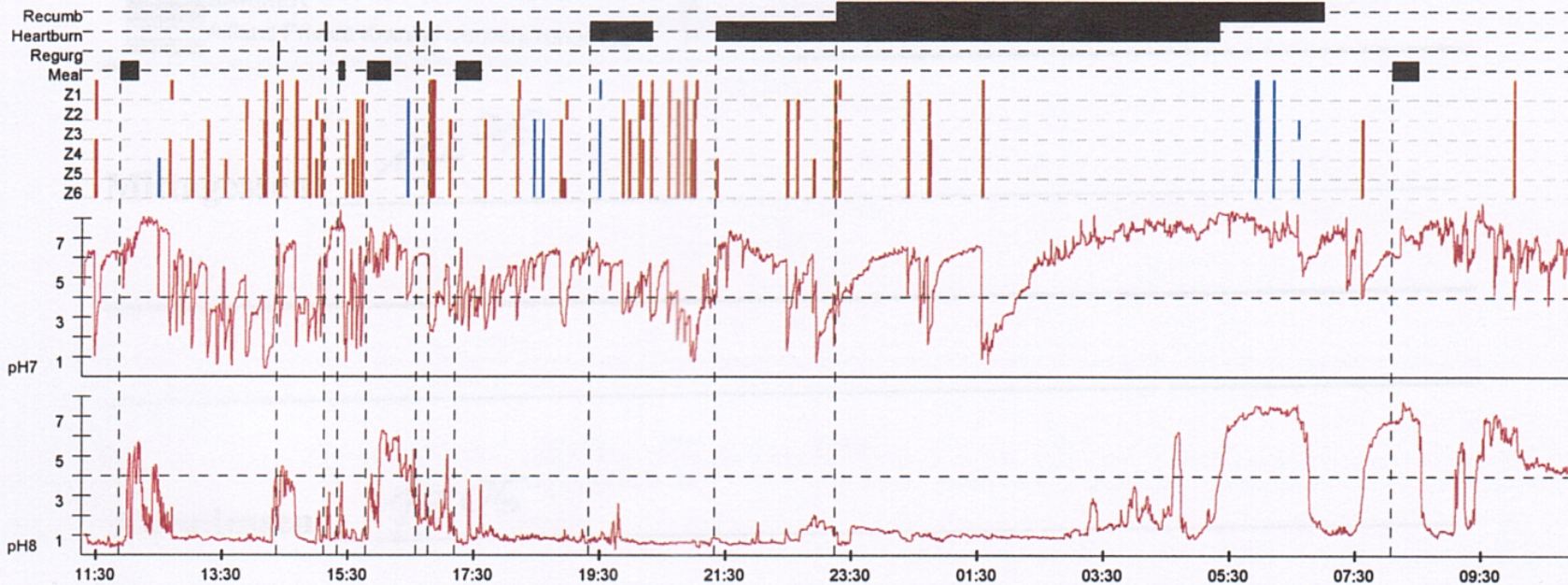
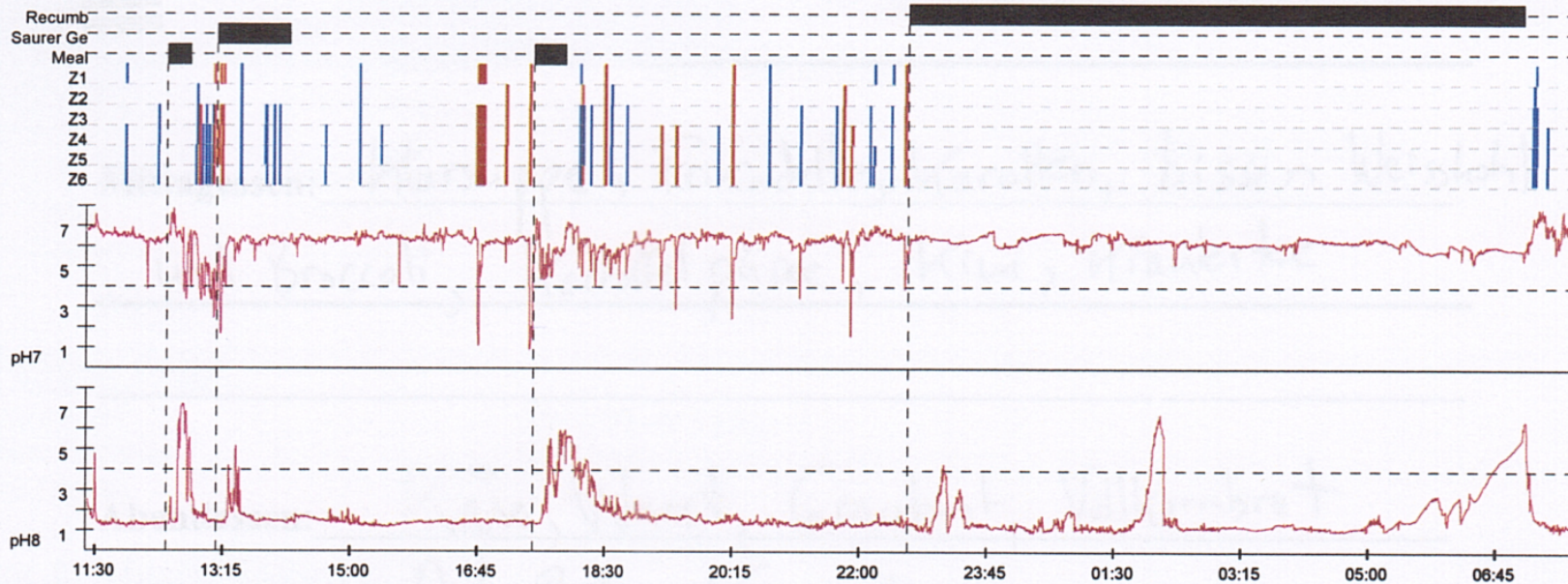
combined esophageal and gastric 24 h pH-monitoring



COMBINED 6 SEGMENT IMPEDANCE AND 2 CHANNEL pH CATHETER

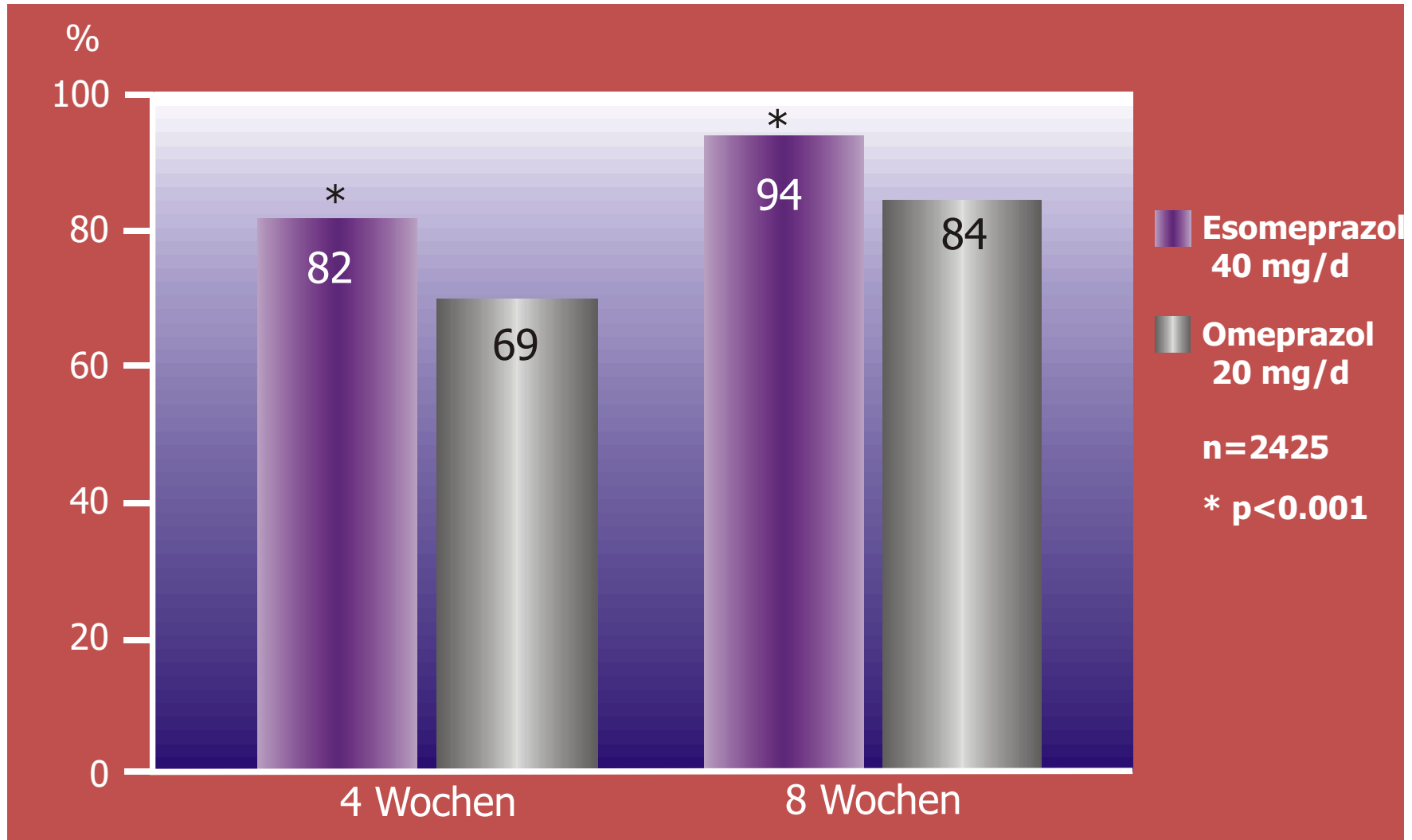


Impedance-pH



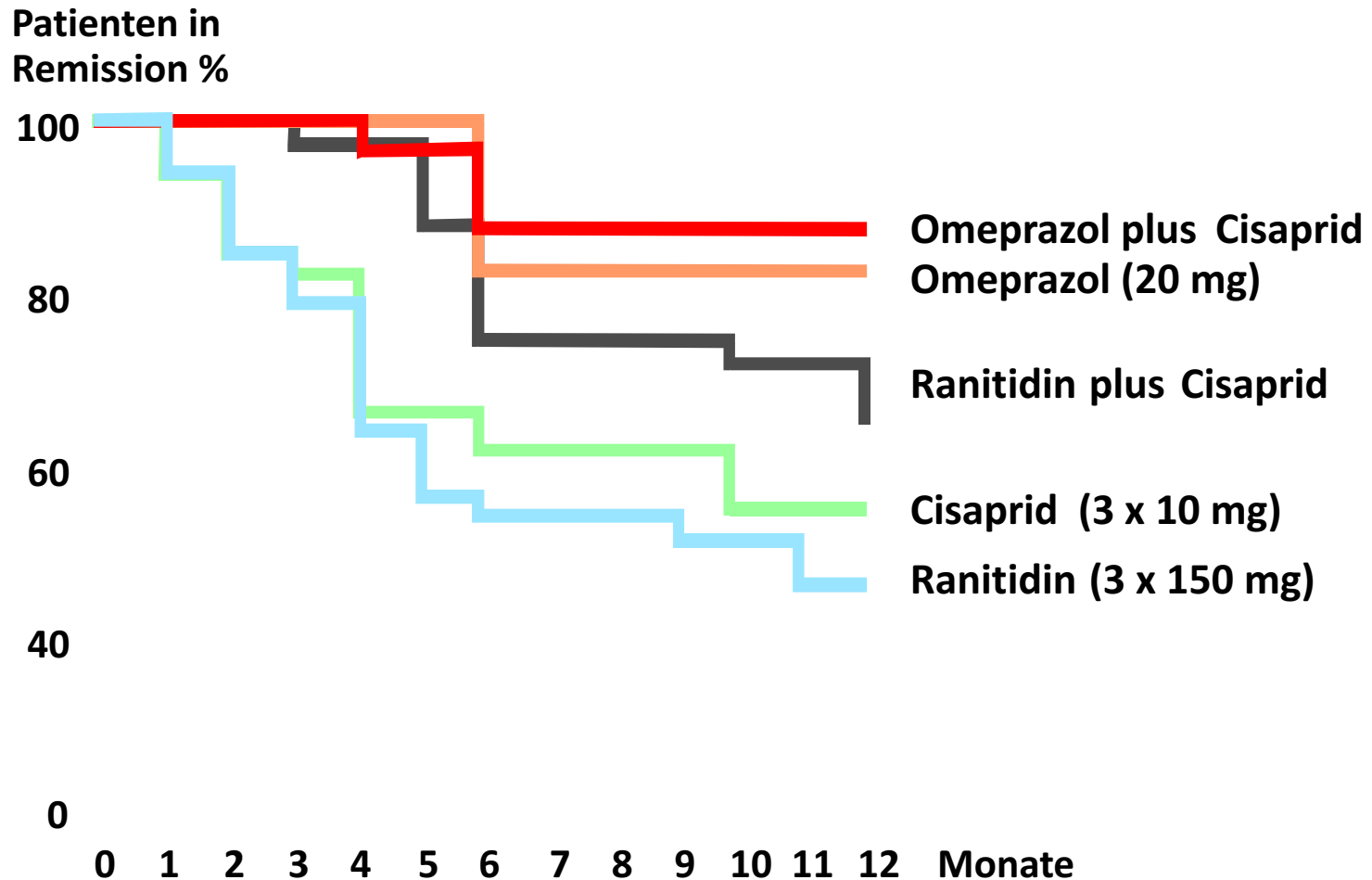
Decision Making for Long-term Therapy

Healing rates of Refluxesophagitis

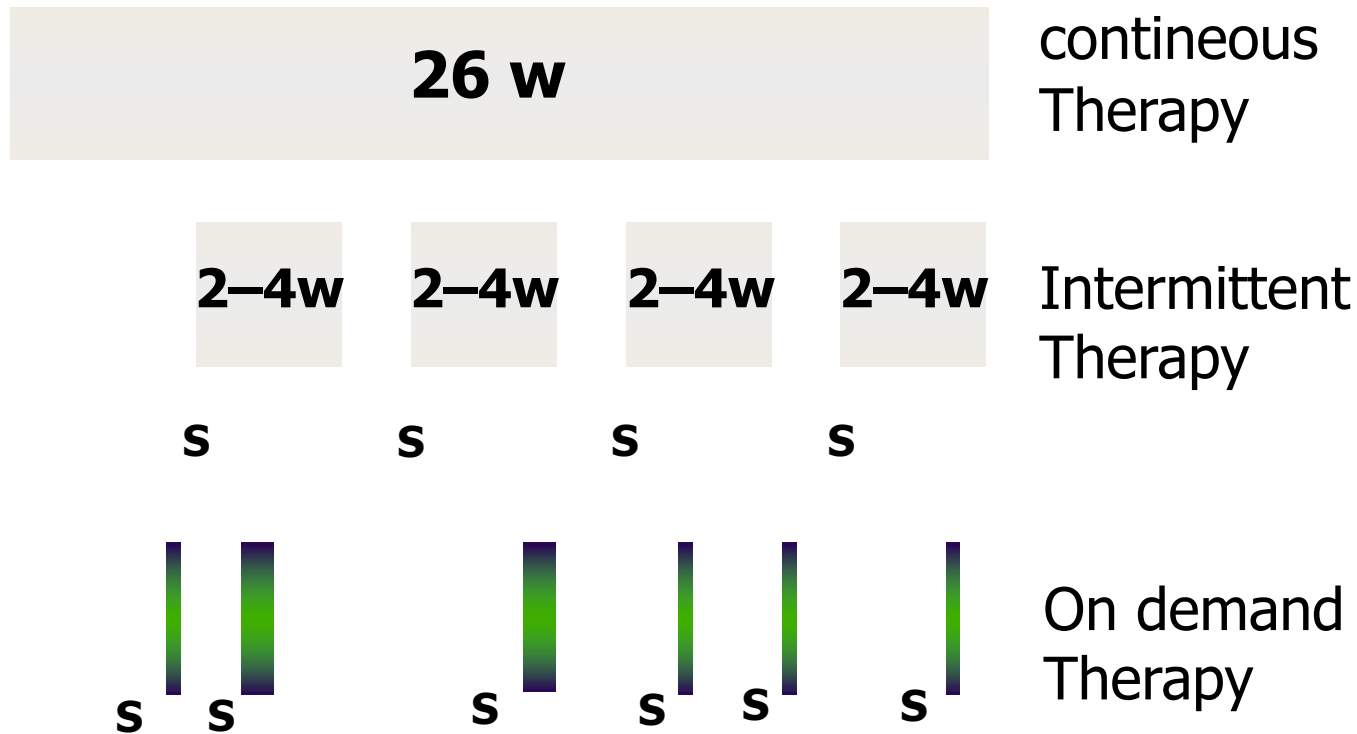


Richter et al, Gastroenterology 2000

Long-term Therapy of Refluxesophagitis

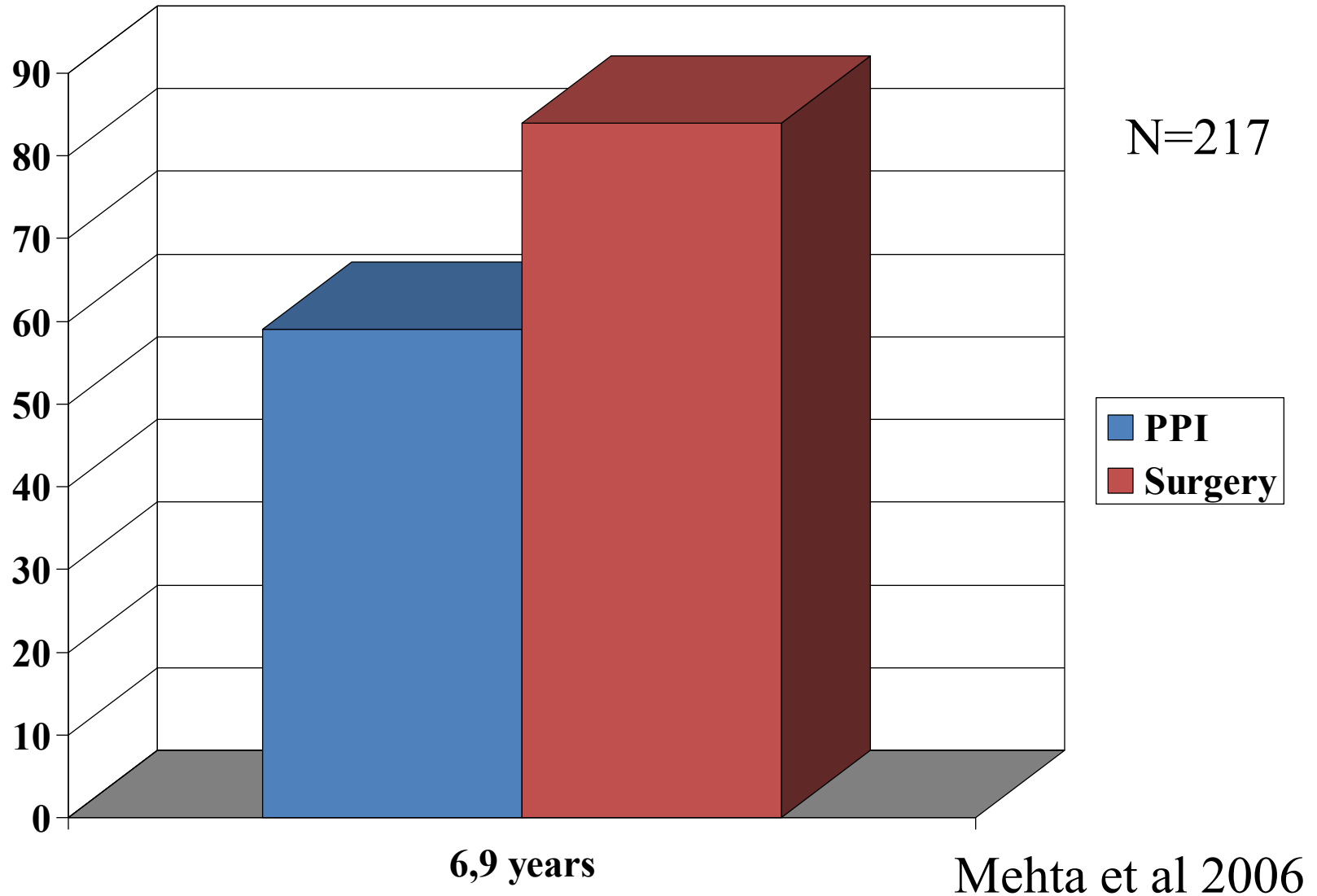


Strategy of long-term medical Therapy of GERD



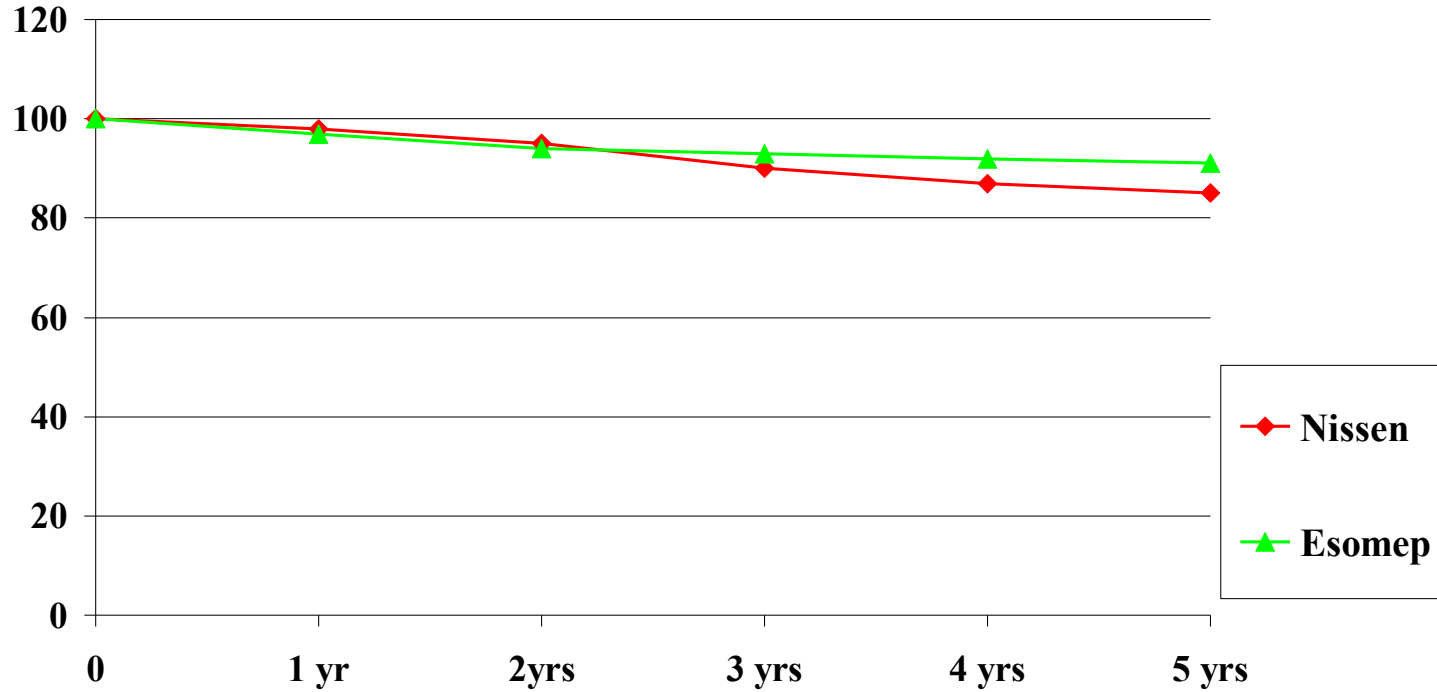
s = Symptom recurrence

RCT: Satisfaction Score after Antireflux Therapy



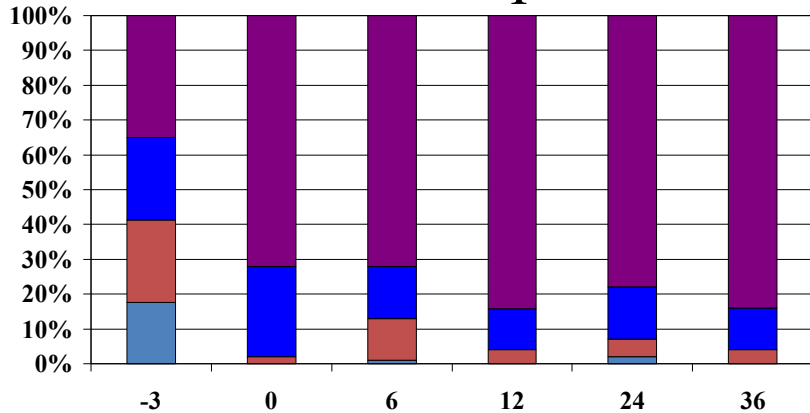
LOTUS: RCT: PPI vs LARS

Lundell 2008
Galmiche 2011

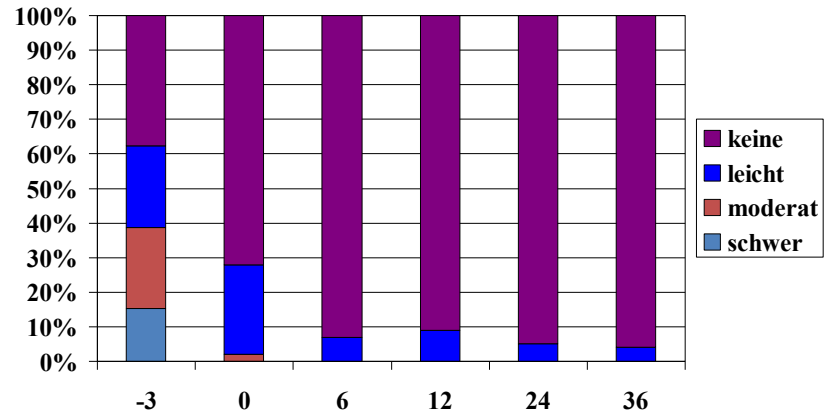


LOTUS

Heartburn: Esomeprazol



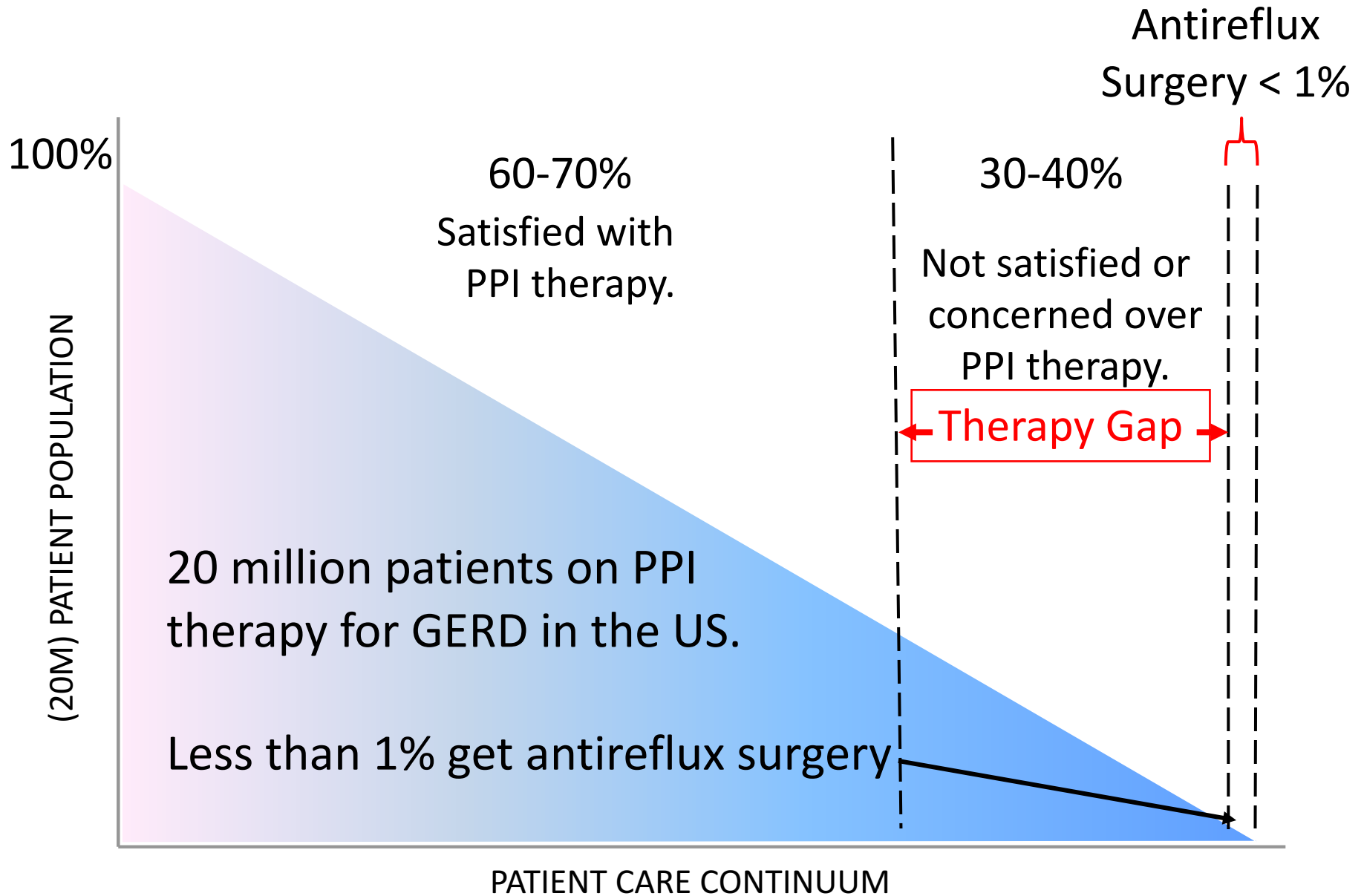
LARS



RCT`s Lap Fundoplication versus PPI

- 4 RCT`s
- Mehta et al. pro OP
- Anvari et al. pro OP
- Galmiche et al. (LOTUS) pro PPI
- Grant AM (REFLUX-trial) pro Op

GERD Therapy



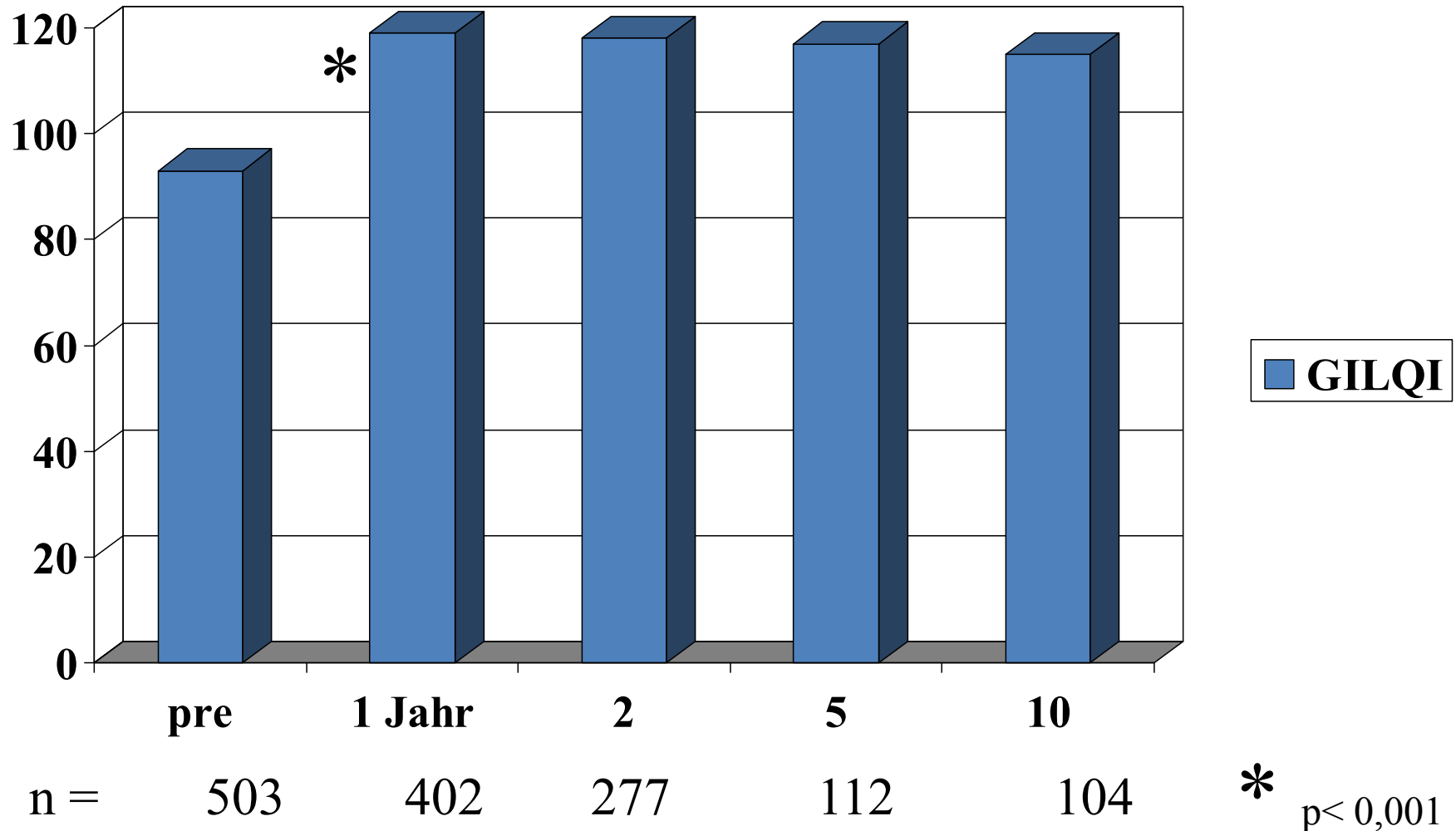
Surgical Therapy

Criteria, driving the decision for Antireflux Surgery

- Year-long history of GERD
- Typical Symptoms (Heartburn , Regurgitation)
- Persistent non-acid related symptoms (Regurgitation, Volume Reflux)
- Altered Anatomy (Hiatal Hernia)
- Chronic Esophagitis
- Objectively proven GERD (pH-Impedance)
- Mechanical and functional failure of the LES
- Positive PPI-response
- PPI-Dosage escalation

DeMeester 1986
Fuchs 1995
Kamolz 2003
Dallemagne 2006
Fein 2008

Quality of Life 10 years after laparoscopic Antireflux-Operation



EAES guidelines: GERD 2014

- Indication for surgical therapy in GERD
- Prior to the indication for surgery or any other invasive therapy, it must be proven that patients are in **need of long term treatment** for GERD.
- Evidence (B); consensus 100%
- Patients with continuing **reduced quality of life**, persisting troublesome symptoms and/or progression of disease despite an adequate PPI therapy in dosage and intake, should be offered laparoscopic antireflux surgery after **proper diagnostic testing**.
- Evidence (A); consensus 100%

EAES: GERD 2014

- A list of criteria relating to GERD, can be withdrawn from literature, which are important for indication for antireflux surgery. These criteria are the most frequently mentioned parameters regarding reasons for surgical therapy:
 - Typical symptoms for GERD
 - Documented symptom-reflux correlation
 - Year-long reflux history
 - Reduced Quality of Life
 - Positive PPI response
 - PPI dosage increase
 - Hiatal hernia
 - Documented esophagitis (in the past before PPI)
 - Proven LES incompetence
 - Documented acid reflux

Indication for Antireflux-Surgery

- Advanced and progressive disease: proven anatomical alteration, functional defects, heartburn and regurgitation, PPI positive response and dosage escalation
- Persisting non-acid related Symptoms (aspiration, regurgitation, volume reflux)
- Alternative to PPI- longterm therapy despite good Quality of Life

Surgical Technique: Fundoplication – Rudolf Nissen 1956

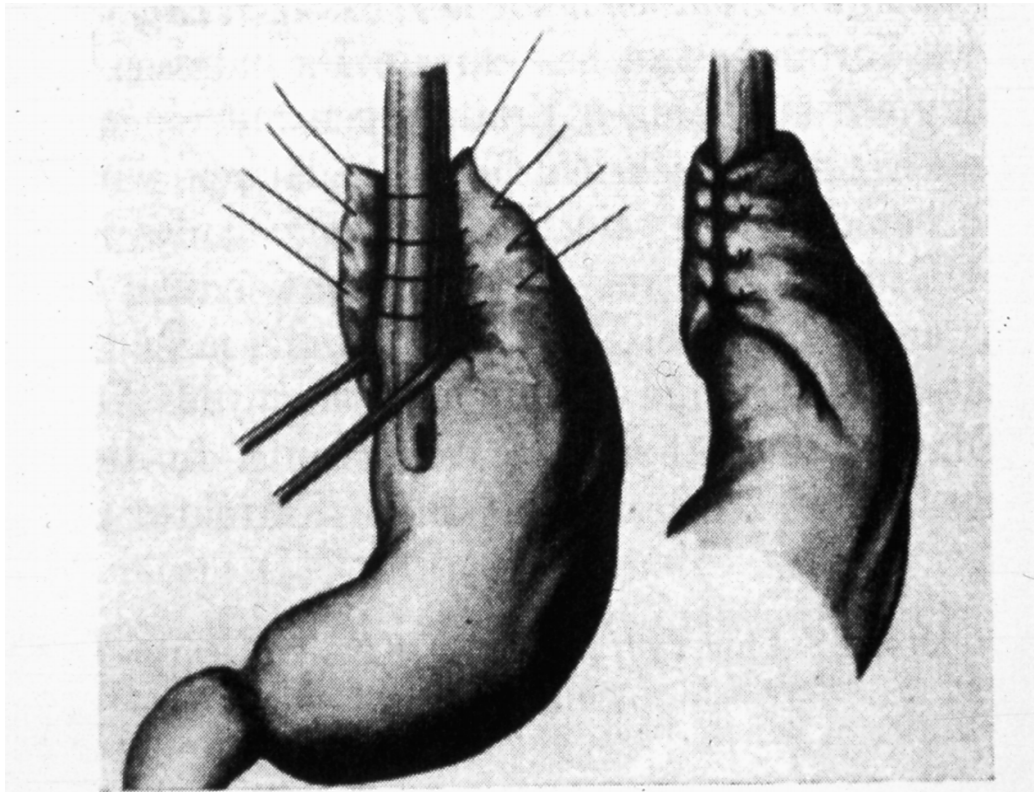
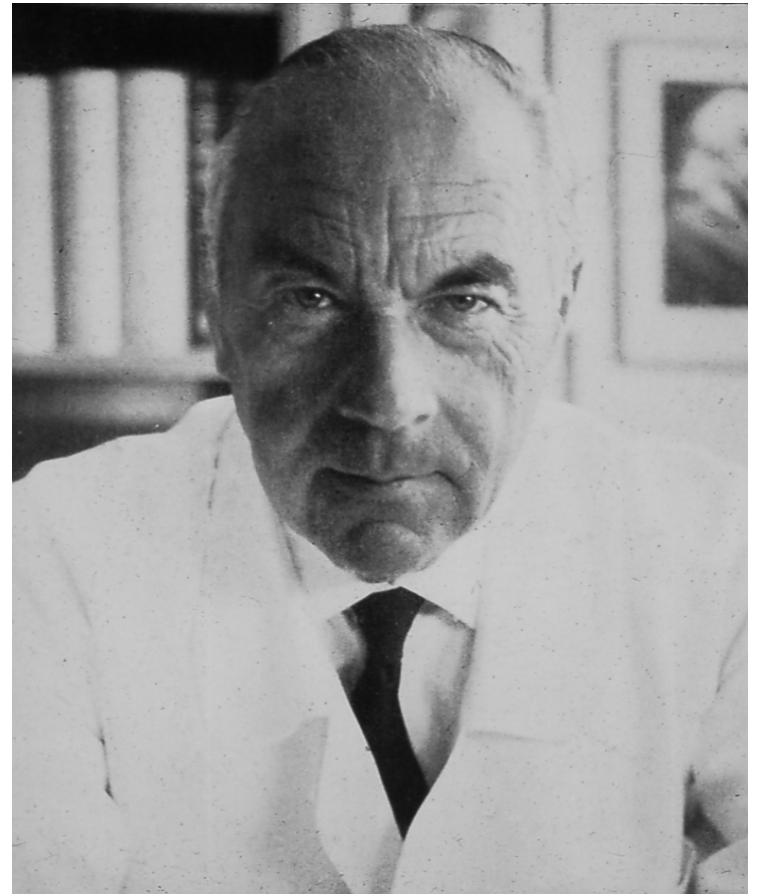


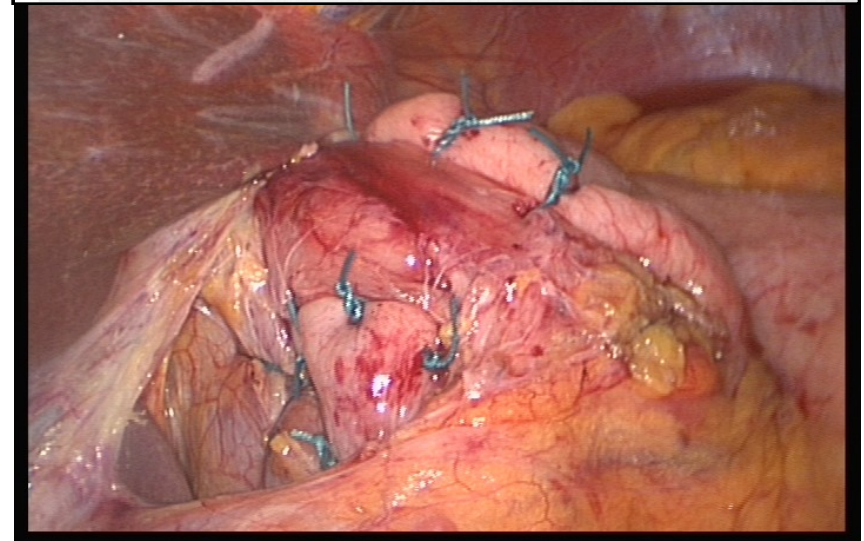
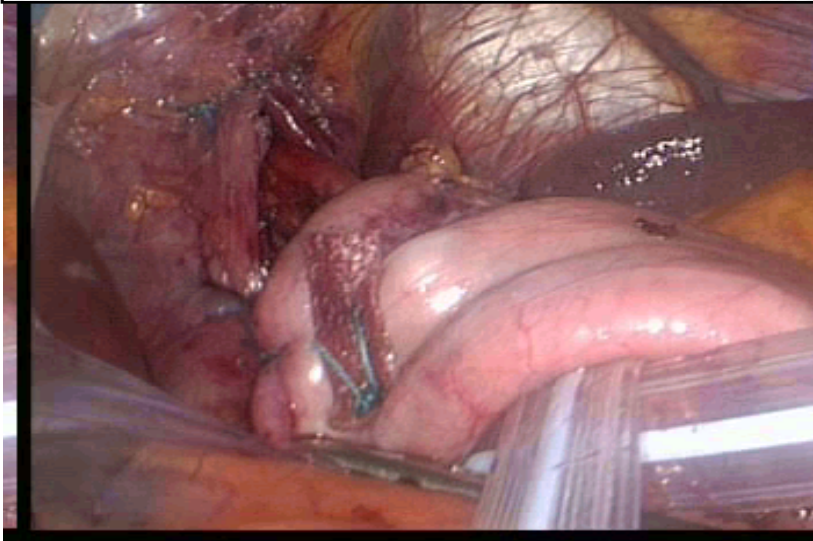
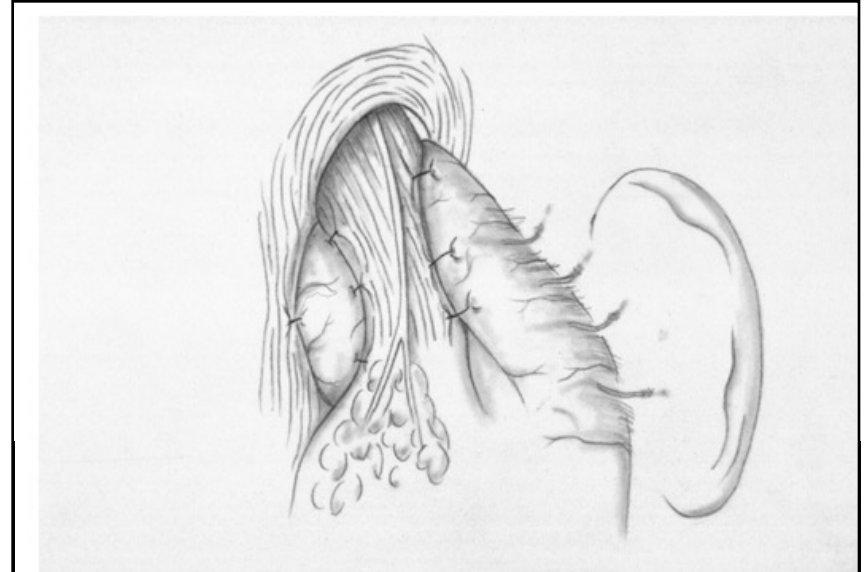
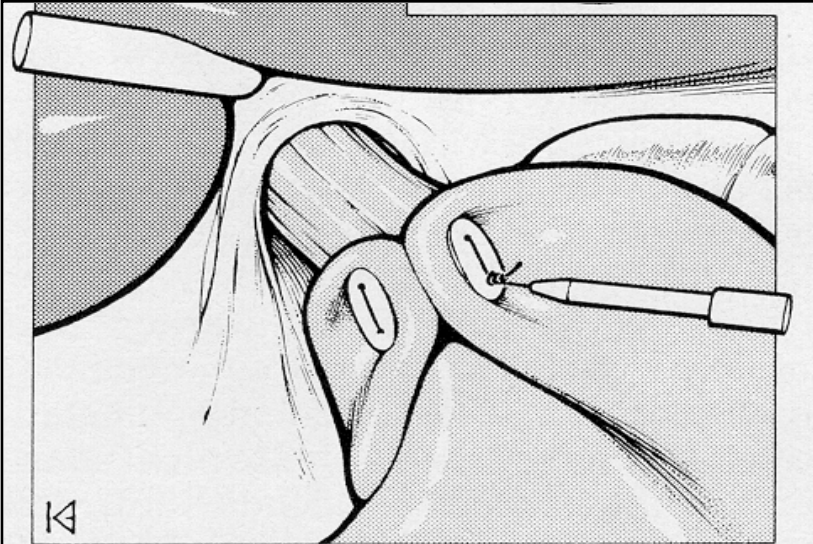
Abb. 1. Gastroplicatio
zur Verhinderung des ösophagealen Magensaftrefluxes.



Antireflux Operationen

NISSEN

TOUPET



GERD: Laparoscopic Fundoplication

DGVS S2 guidelines

The optimal shape of the wrap is discussed controversially:

13 RCT and 3 Metaanalyses: (647 Patients)

Partial Hemifundoplication: less side effects and less Re-operationrate.
Nissen bis 15%, Toupet bis 7,8%.

8 case-control-studies from experienced centers and 2 metaanalyses:
(2668 Pat.)

Nissen with low Dysphagia-Rate (<4%) and low Re-OP-Rate (<5%).

Surgeons should do the fundoplication technique, they are trained best..... be it Nissen or Toupet.

Systematic review and meta-analysis of laparoscopic Nissen (posterior total) *versus* Toupet (posterior partial) fundoplication for gastro-oesophageal reflux disease

J. A. J. L. Broeders¹, F. A. Mauritz¹, U. Ahmed Ali¹, W. A. Draaisma¹, J. P. Ruurda¹, H. G. Gooszen¹, A. J. P. M. Smout², I. A. M. J. Broeders³ and E. J. Hazebroek¹

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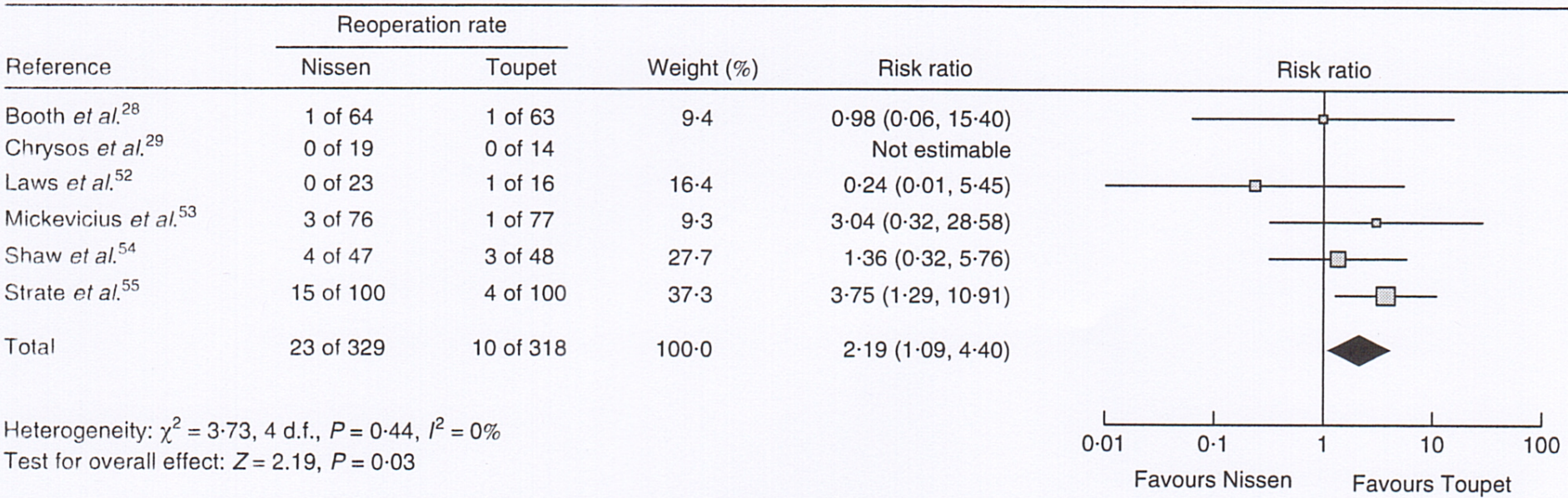


Fig. 6 Meta-analysis of reoperation rate for gastro-oesophageal reflux disease. Risk ratios are shown with 95 per cent confidence intervals. **Reop-Rate 15 vs 4 %**

Technical Standards in Antireflux Operations

- laparoscopic better than open

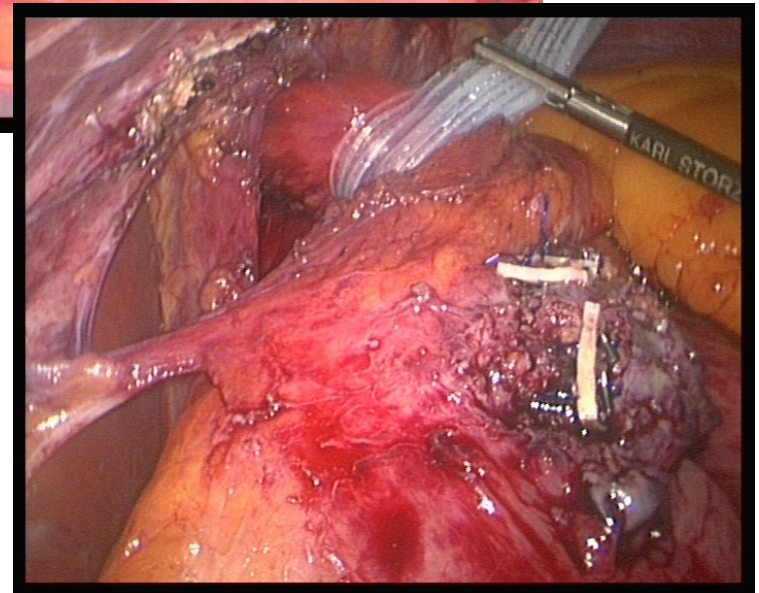
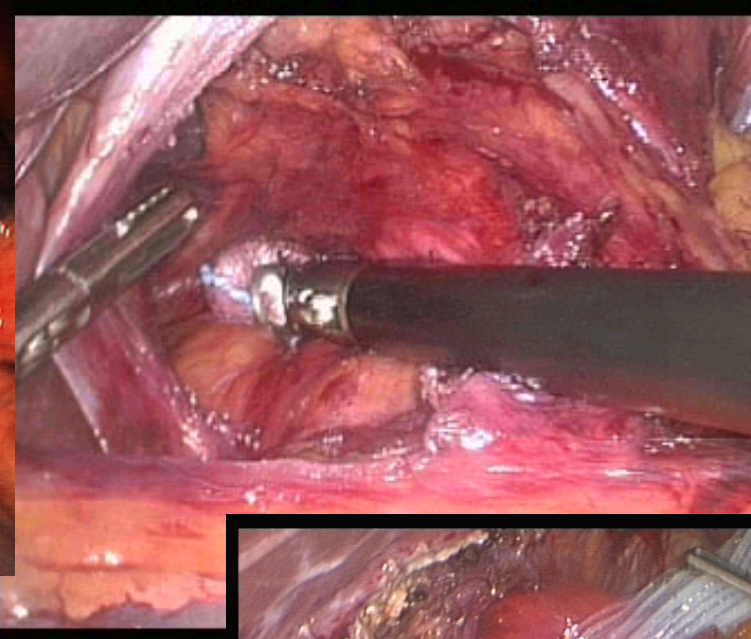
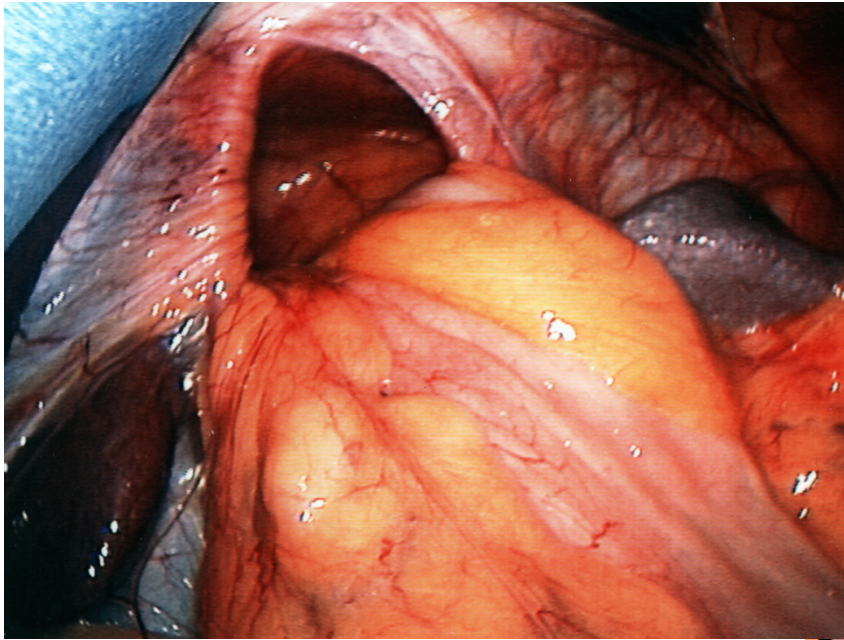
Salminen 2007
Broeders 2009

- Dissection of hiatus
- Mobilisation of esophagus with tension-free positioning of LES in abdomen
- Hiatal narrowing
- Adaptation, positioning and fixation of symmetric wrap around LES

Yousef 2006
Mehta 2006
Rathore 2007
Mattioli 2008

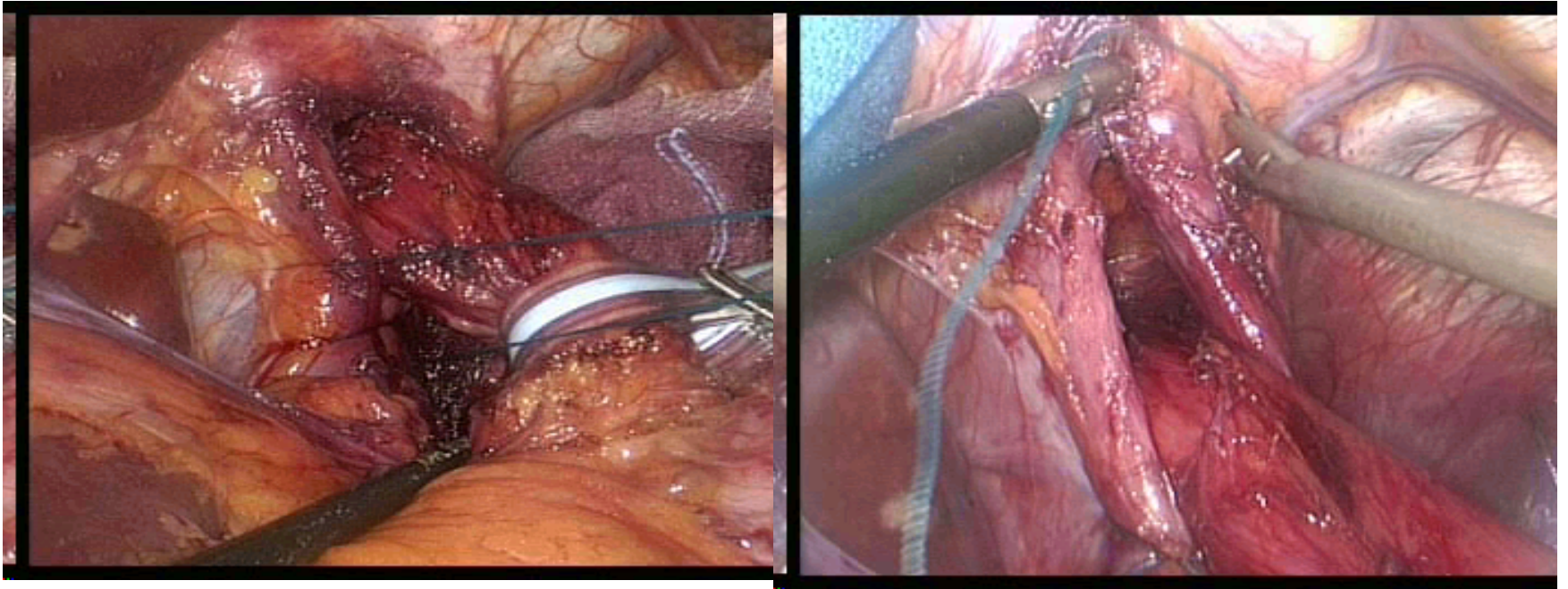
Lundell 2001
Lundell 2008
Peters 1998

Dissection and Mobilisation:



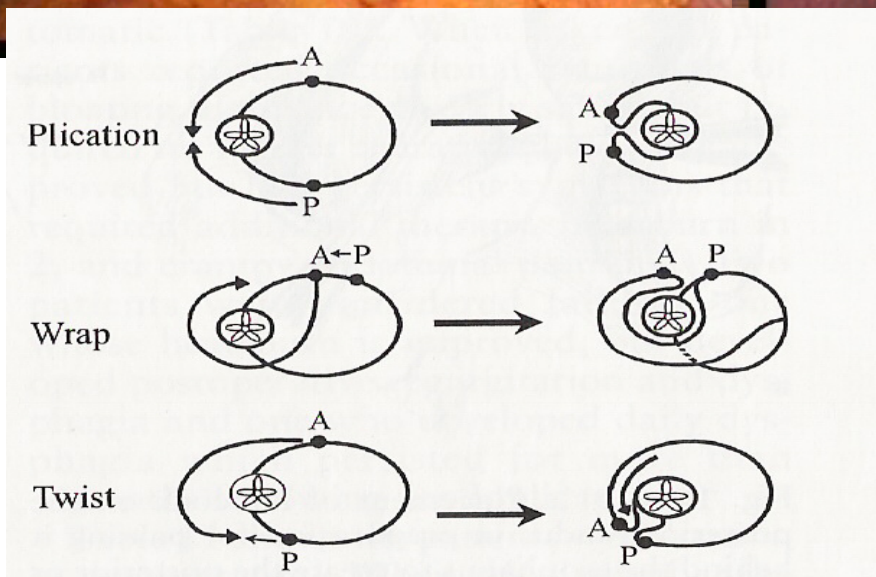
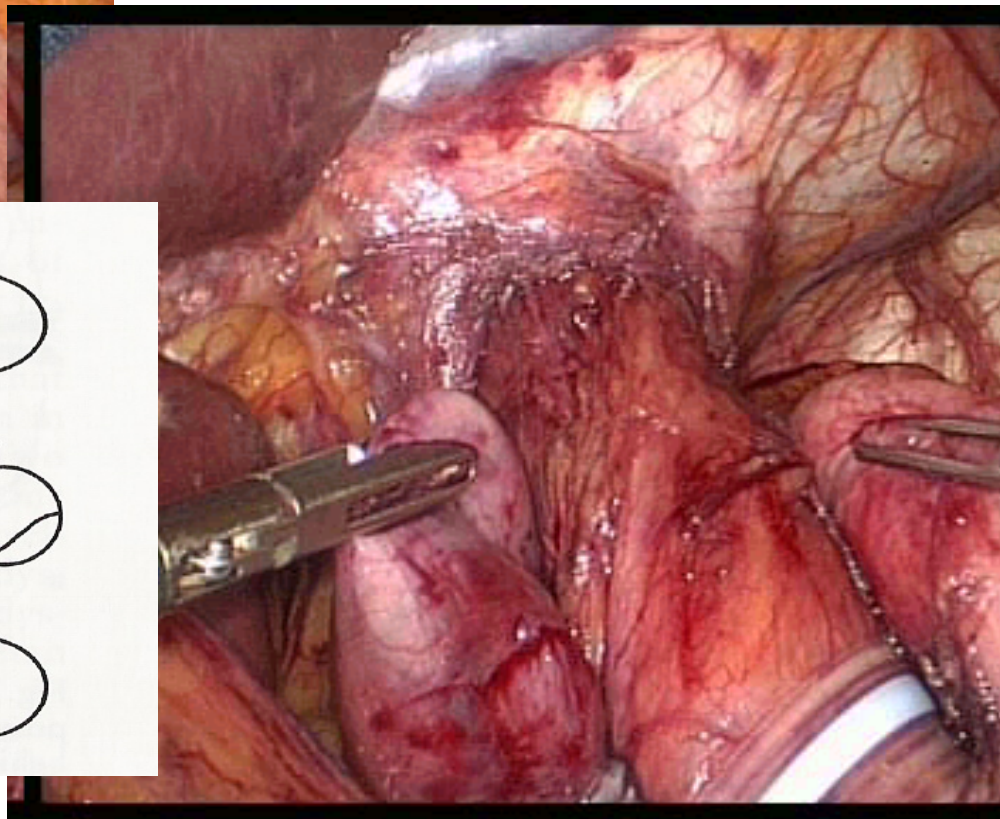
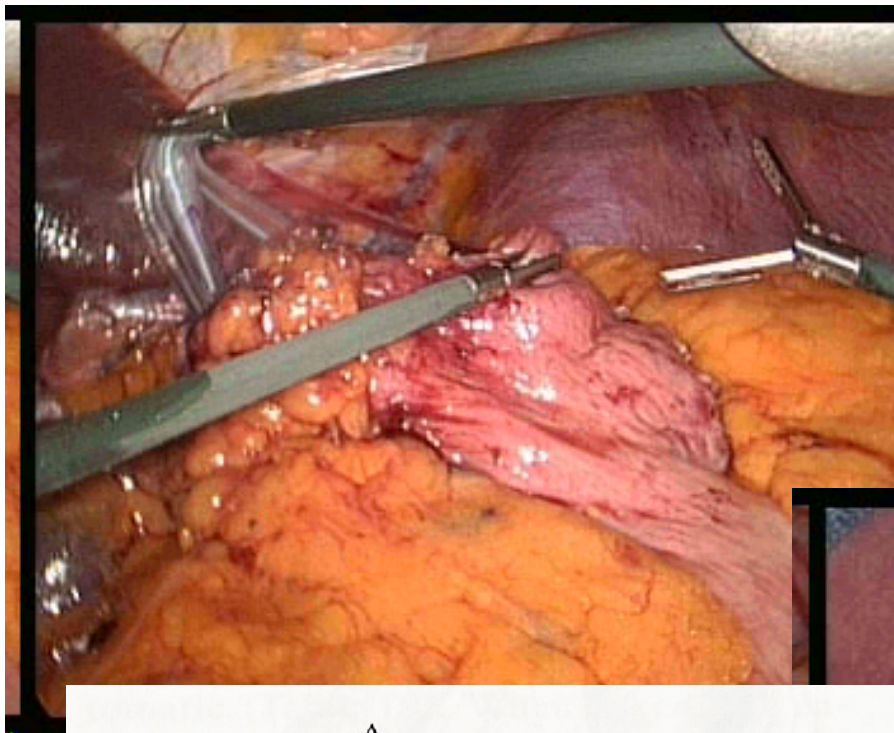
Resection of hernia sac
Resection of any fat and Lipomas
Mobilisation of the esophagus
sufficient intraabdominal Length
of LES

Hiatal approximation



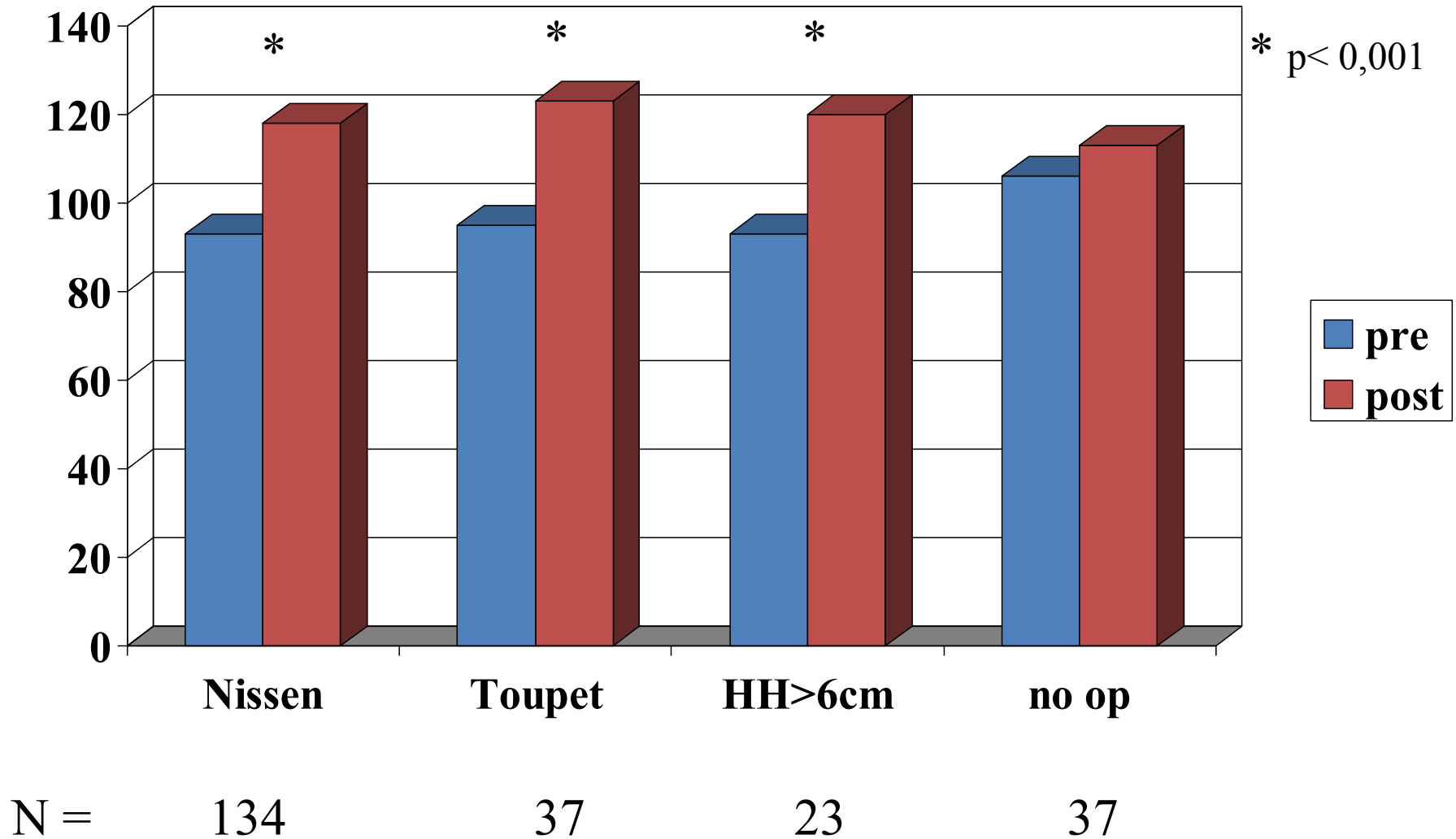
Anterior and posterior

Create floppy wrap



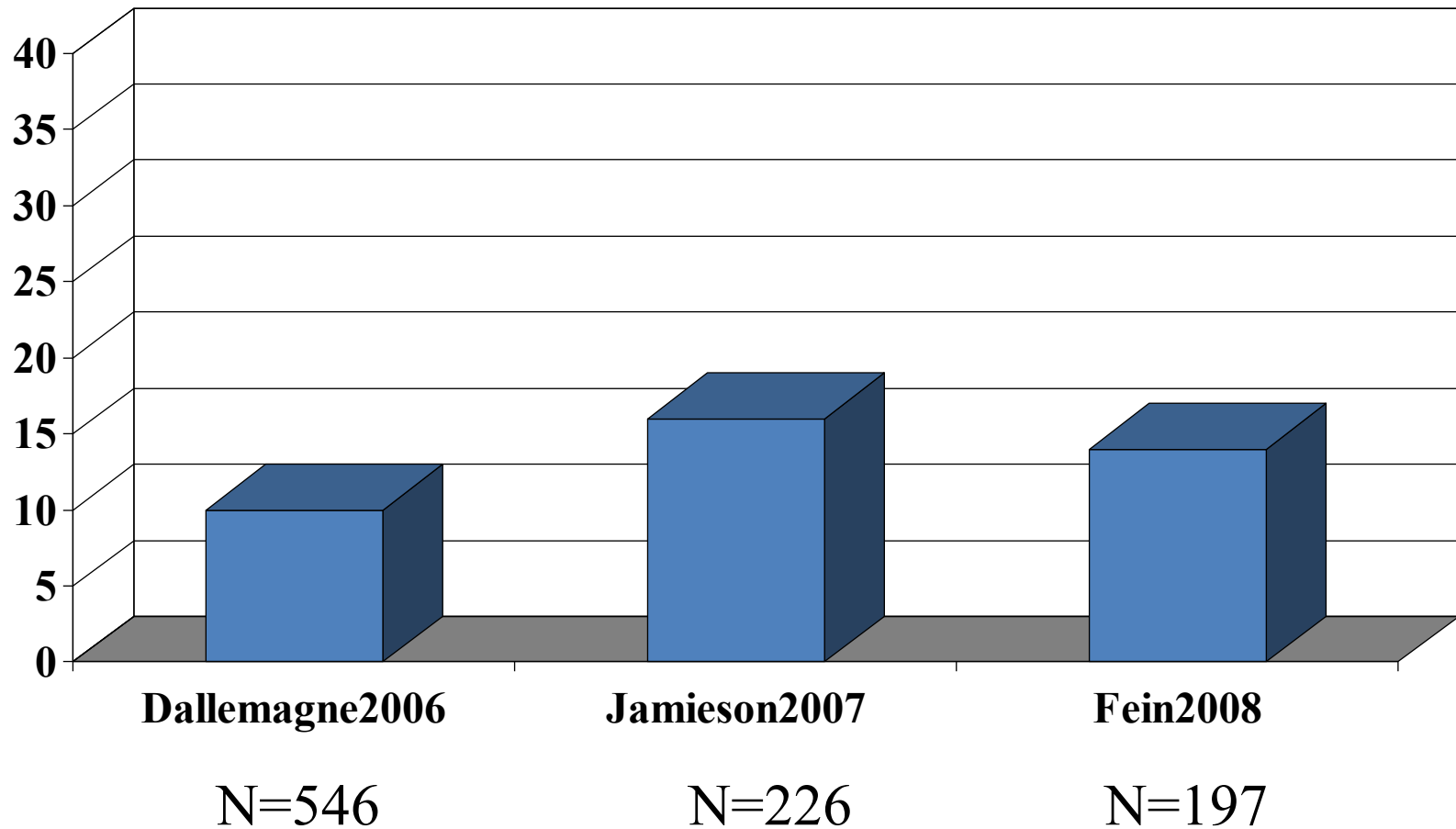
J Peters et al. Ann Surg 1998

Quality of Life in GERD patients 5 years after onset of therapy

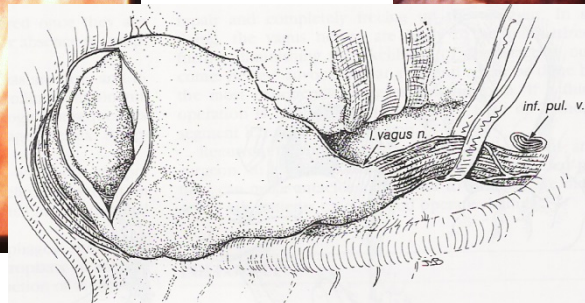
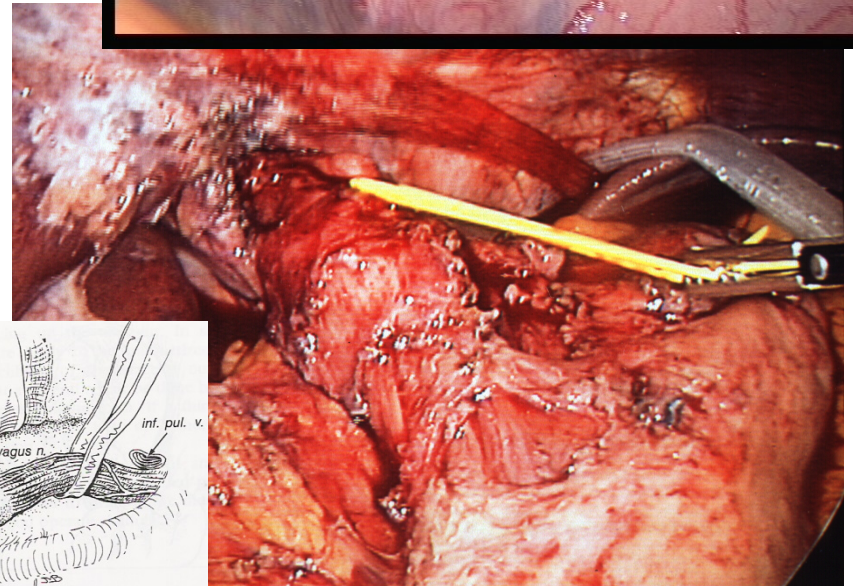
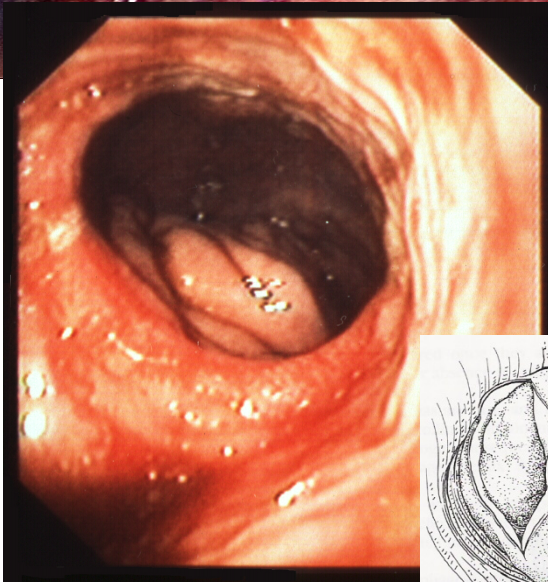
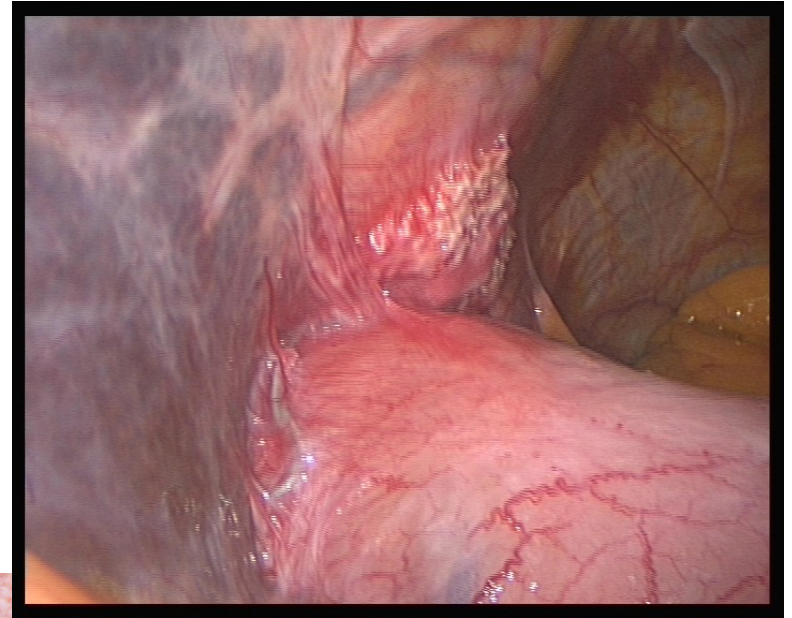
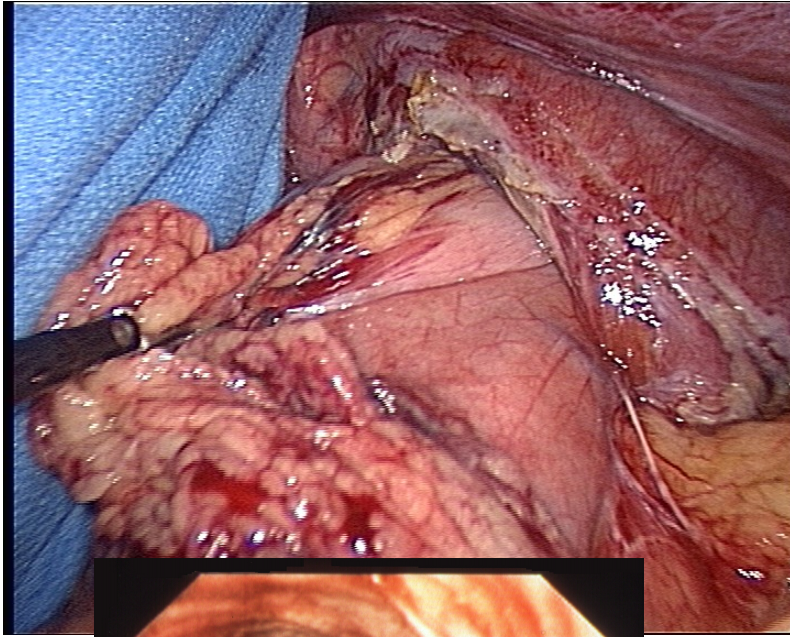


Long-term success rate of LARS >10 years

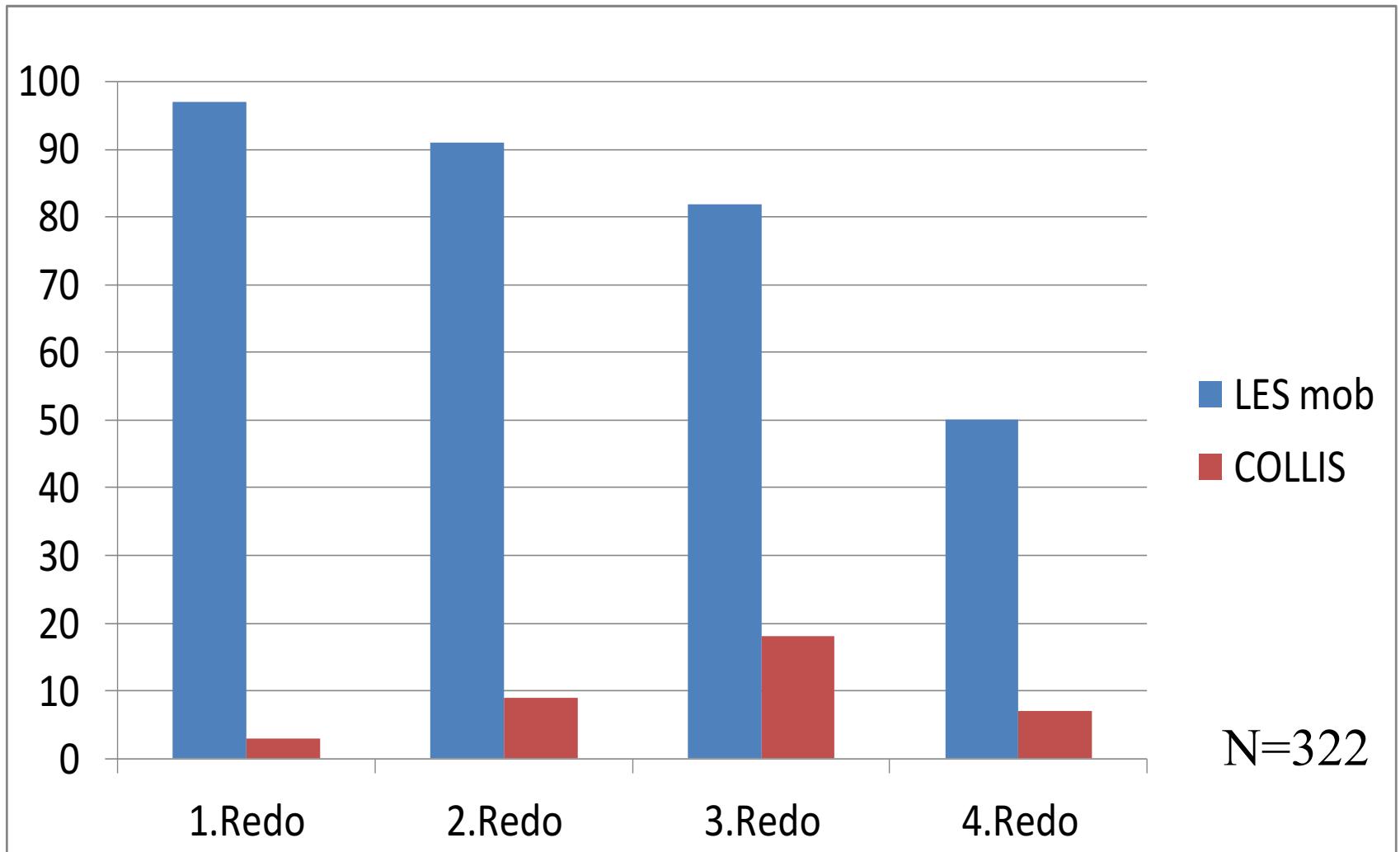
% failures / PPI intake



Special Problems: „short- esophagus“



Necessity of esophageal lengthening procedure



Special Problems: Mechanism of LARS Failures

	Furnee et al. N=3175 %	Redo N=276 %
Migration	42	61
Paraesophageale H	6	12
Hiatus open	5	13
Wrap breakdown	23	17
Wrap too tight	7	10
Wrong Diagnosis	1	3

Reason for Failure:

Wrong Diagnosis ----wrong Indication:

No Reflux: Esophageal motility disorder /
Achalasia

No reflux: Eosinophilic esophagitis

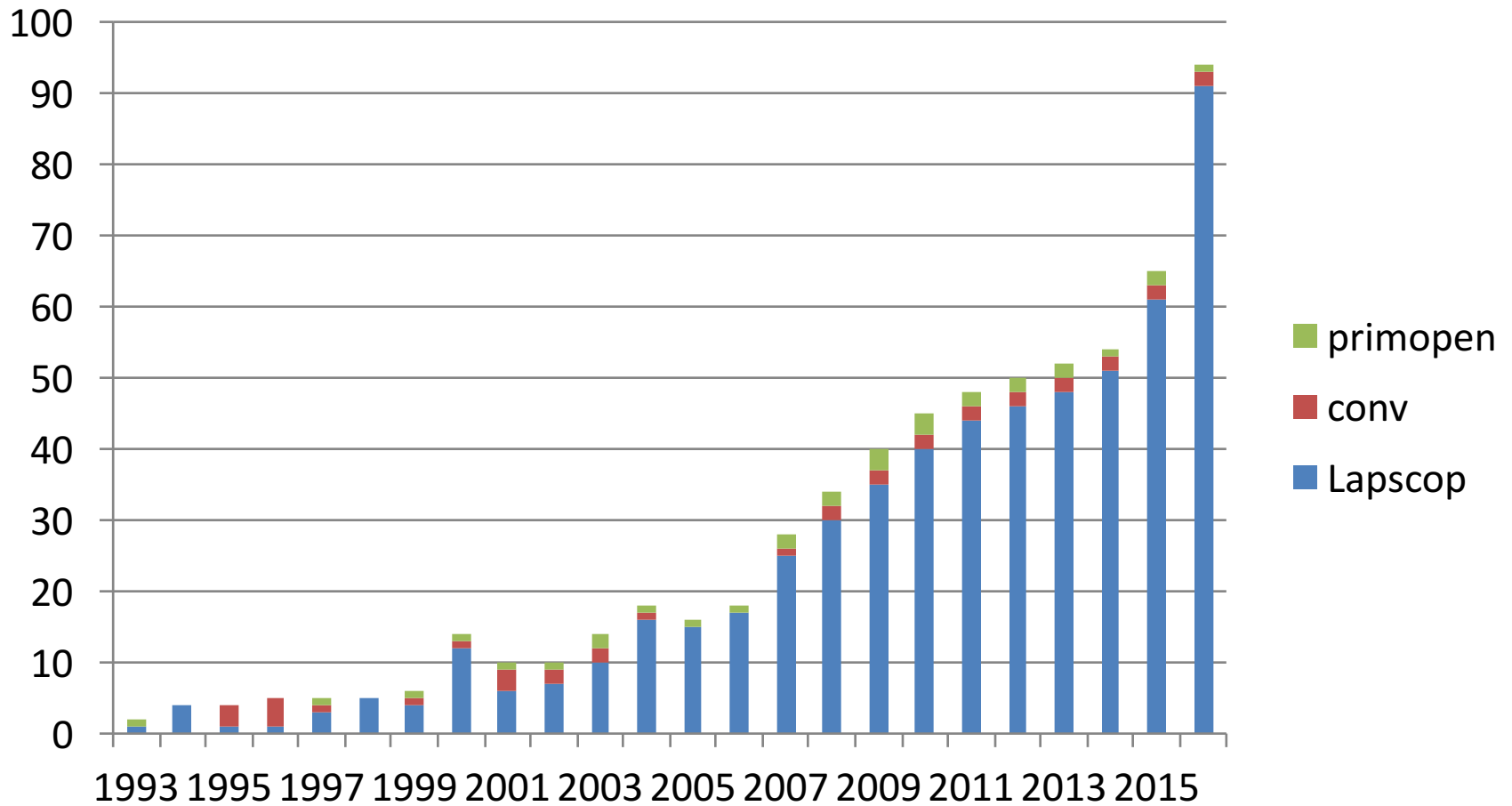
No Reflux: Somatisation

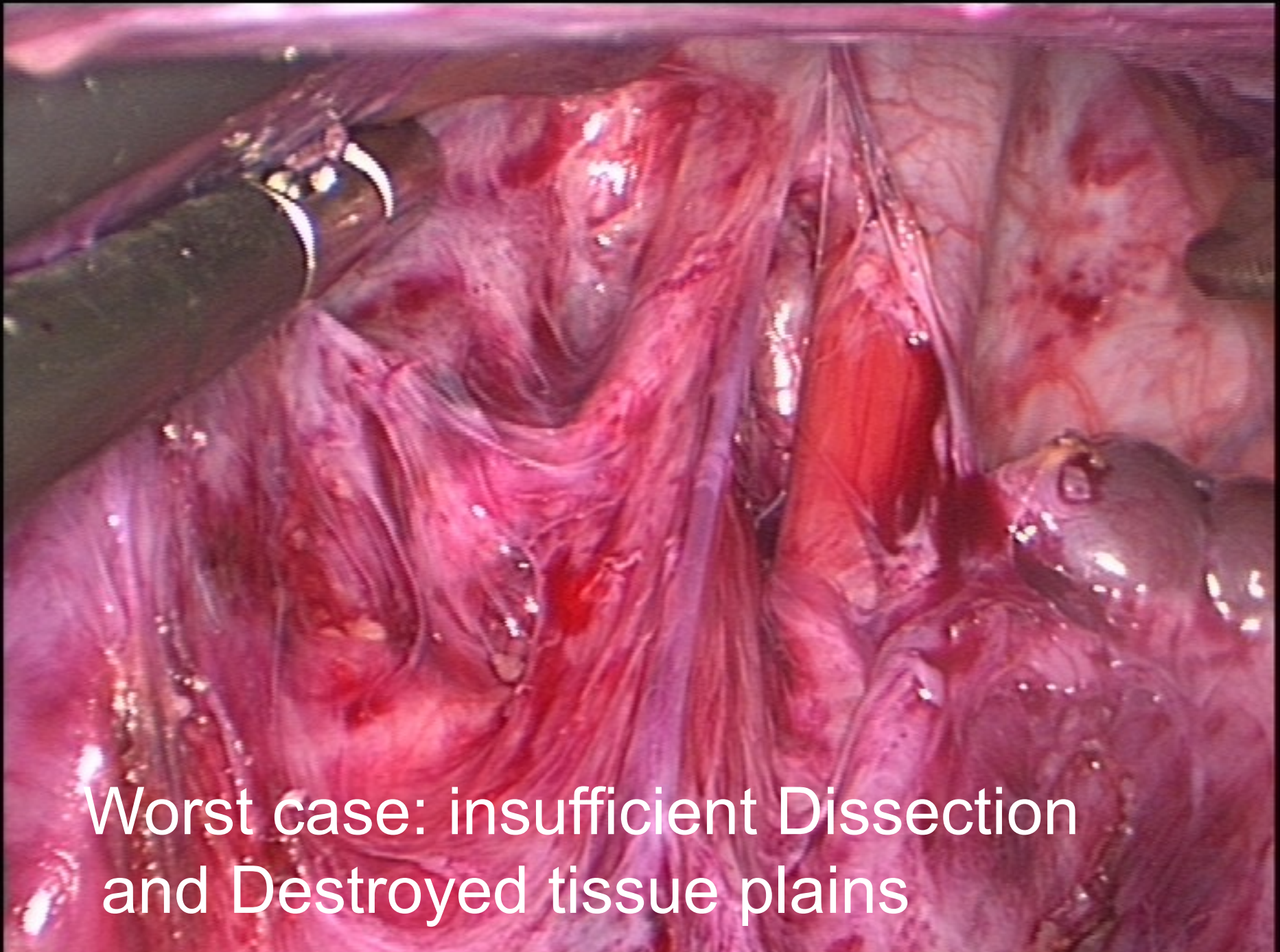
No Reflux: Gastro-Duodenal Dysfunction

Mild reflux: Antireflux surgery too much

Redo-Antireflux surgery

AGAPLESION Markus Krankenhaus Frankfurt





Worst case: insufficient Dissection
and Destroyed tissue plains

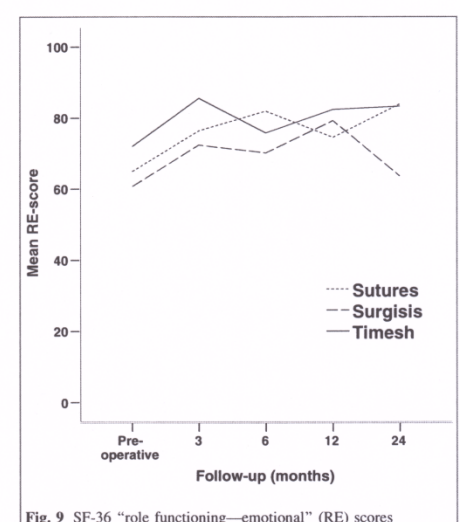
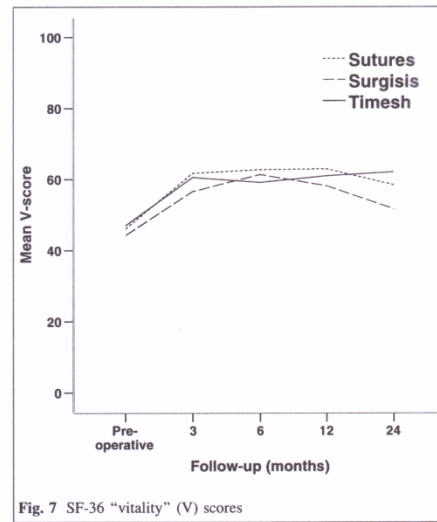
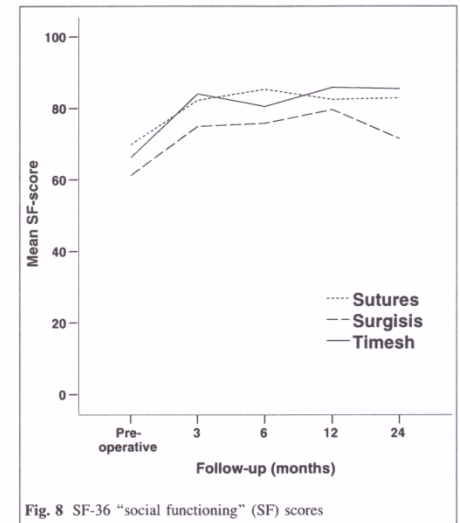
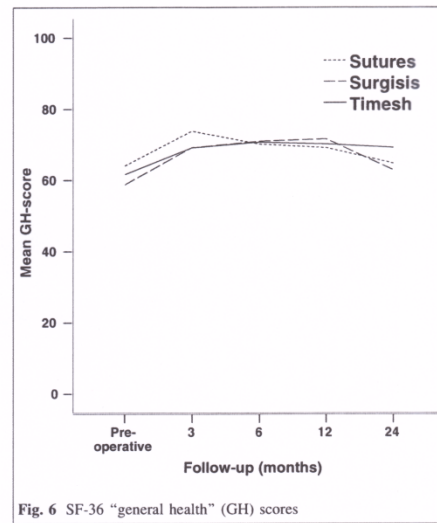
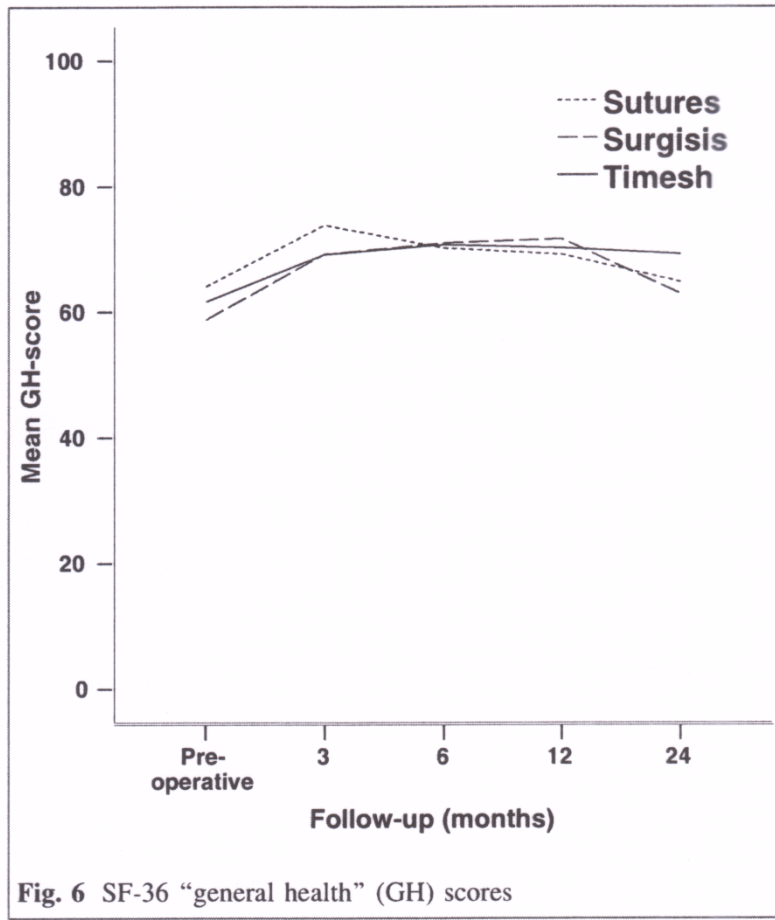
concept for Redo-Surgery

- Preoperative Analysis of possible causes
- Extensive and repetitive patient information and informed consent
- Experienced Team
- Intraoperative Analysis of causes
- Intraoperative „patience“
- Definition of anatomy
- follow operative Principles of Antireflux Surgery

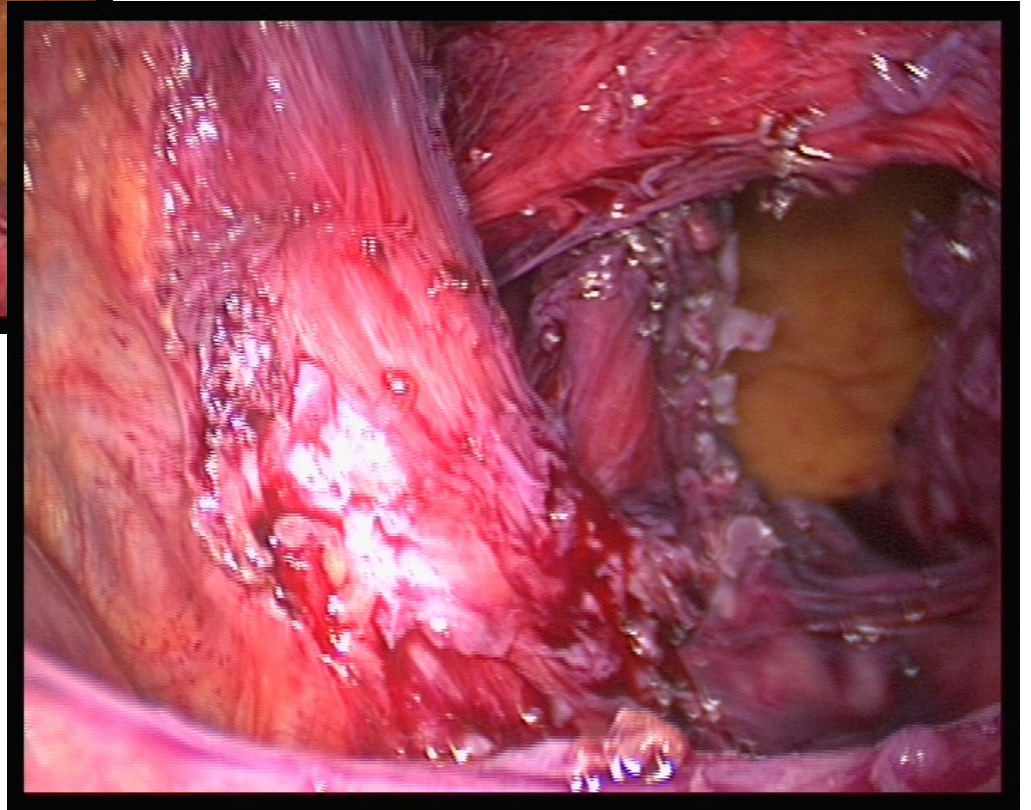
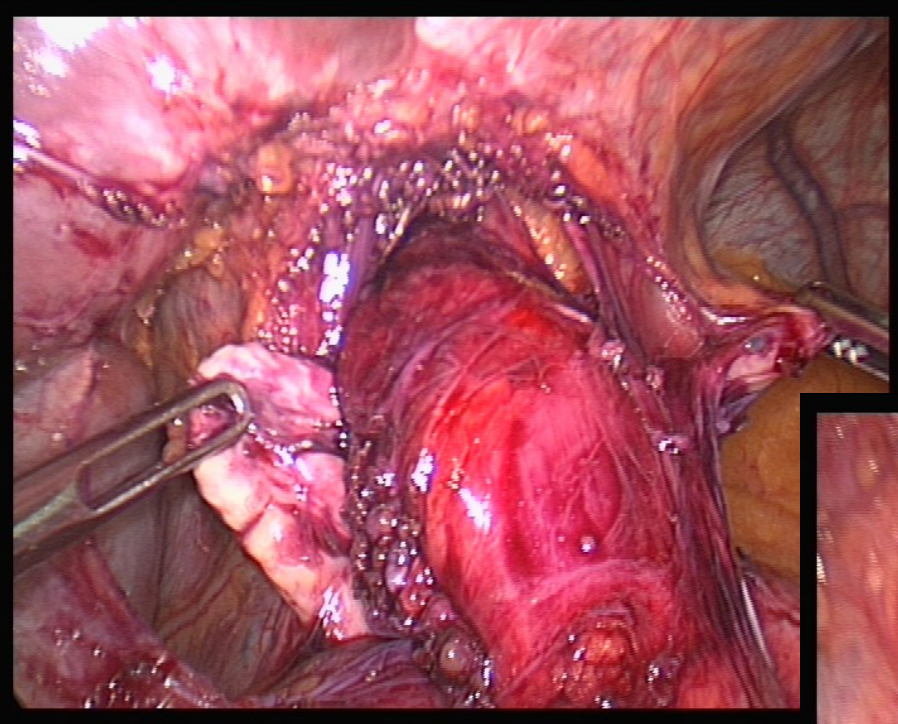
Mesh-Implantation at the Hiatus

Author /year	n	Results good	Recurrent Hernia
Hashemi 2000 DeMeester	54 Open TA/TT 27 Lapscop 27	Open 88% Lapscop 76%	Open 15% Lapscop 42%
Frantzides 2002 RCT	32 PTFE mesh 32 suture		0 22%
Granderath 2005 RCT	50 onlay mesh 50 suture		8% 26%
Oelschlaeger 2006 RCT 2011	51 sut +resMe 57 suture	6 Months 58 Months No Sympt. difference	9% 24% 59% 54%

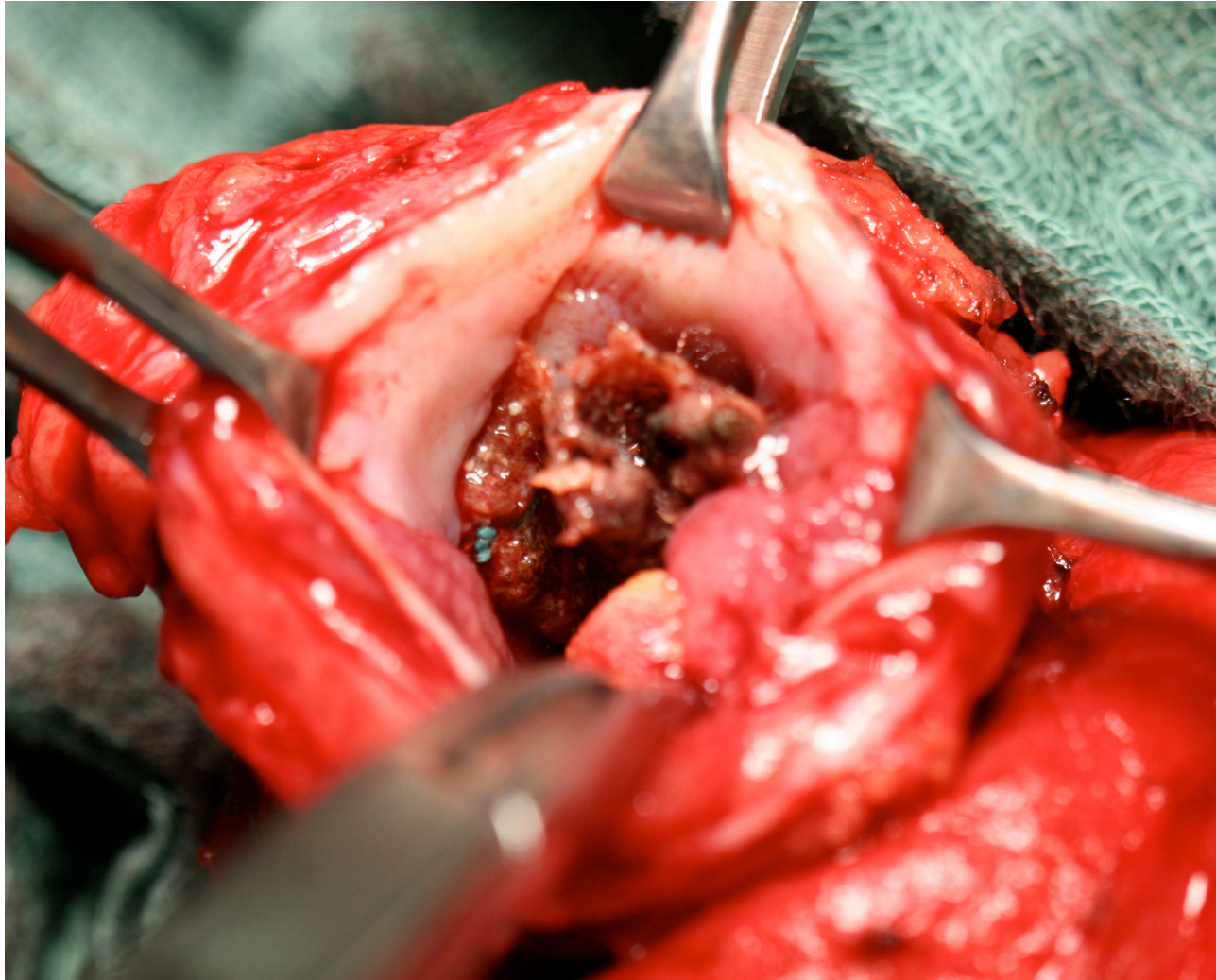
RCT: QoL after Hiatal approx. with suture vs resorb.Mesh vs TiMesh



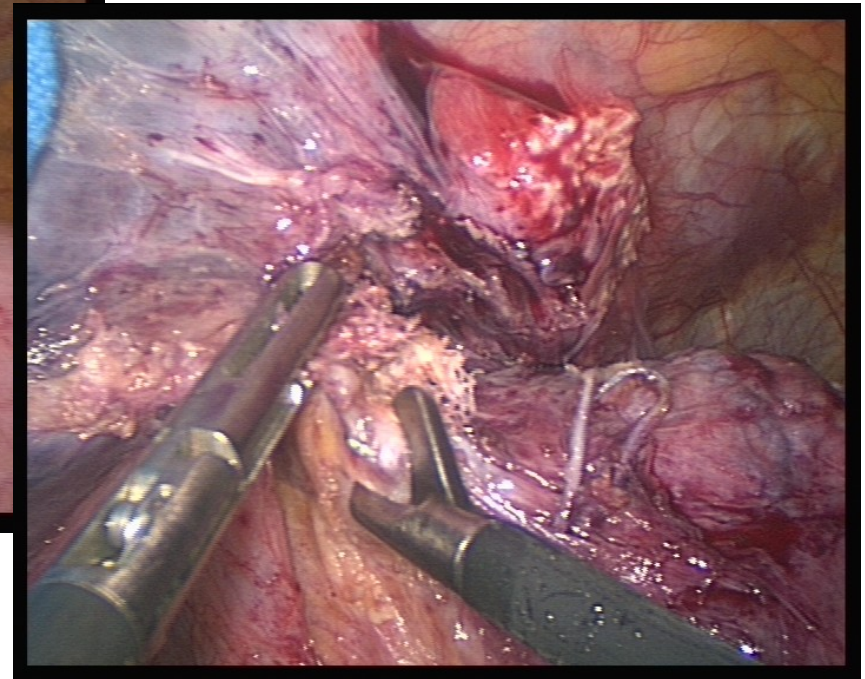
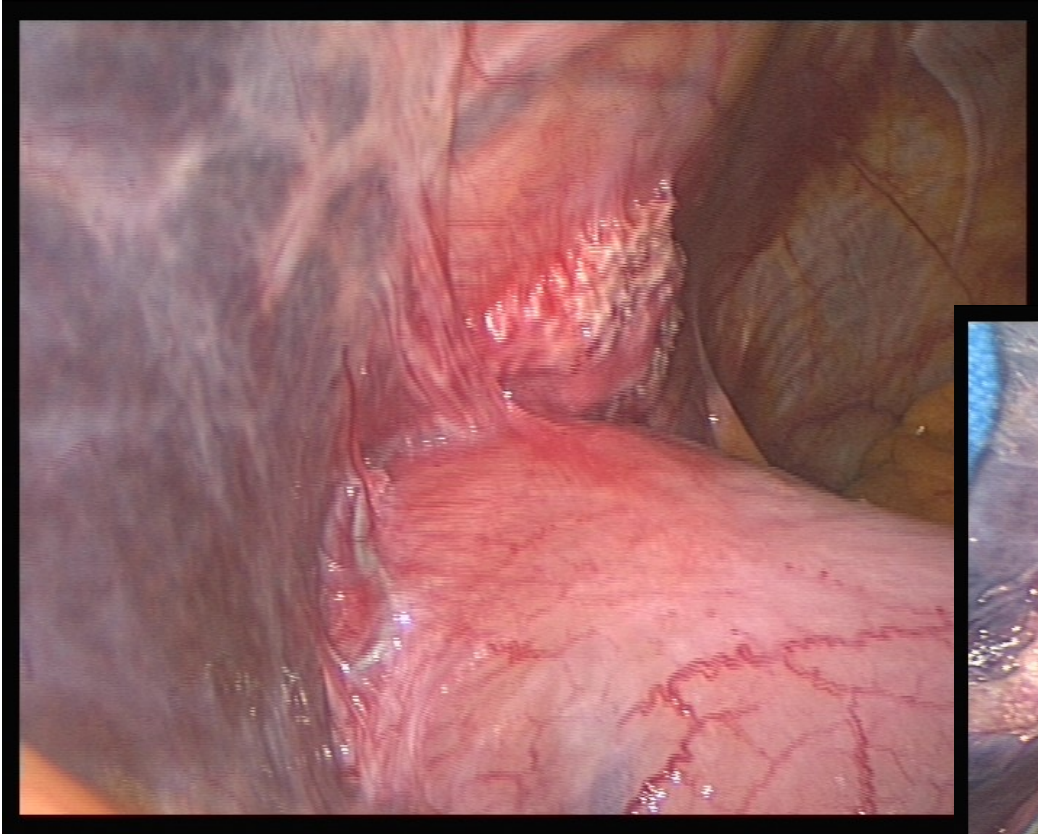
Mesh : dysphagia and pain



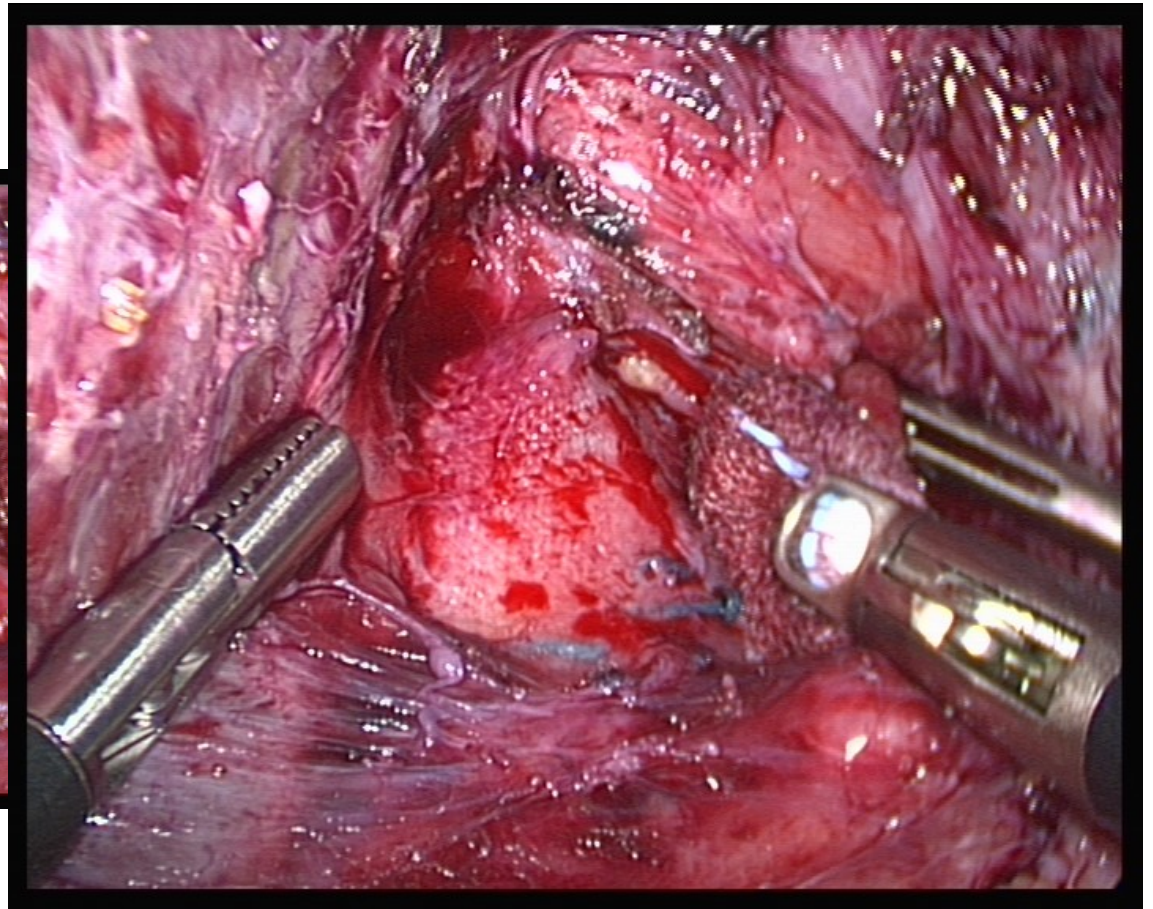
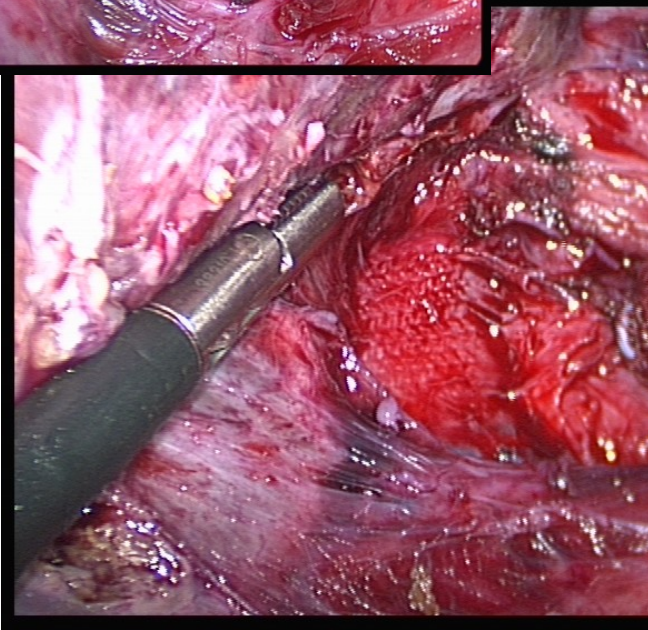
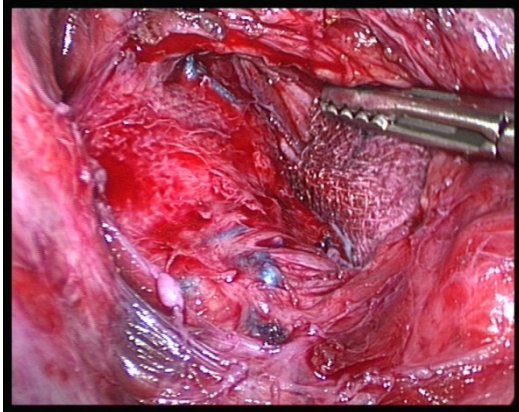
Transmural Mesh-Migration



Circular Mesh and Migration

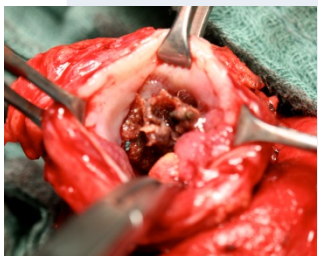


„Frozen hiatal area“

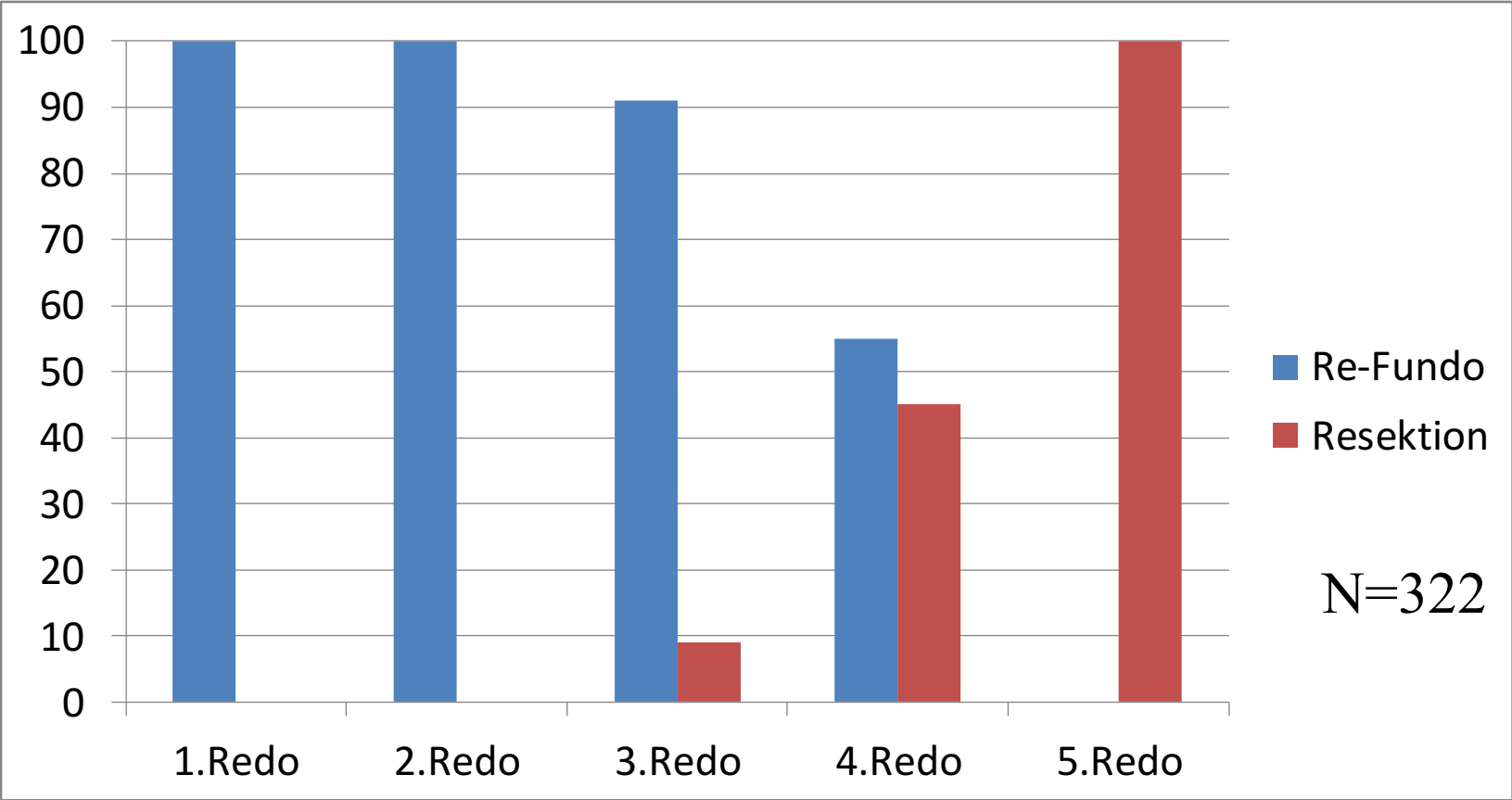


Revisions and Resections

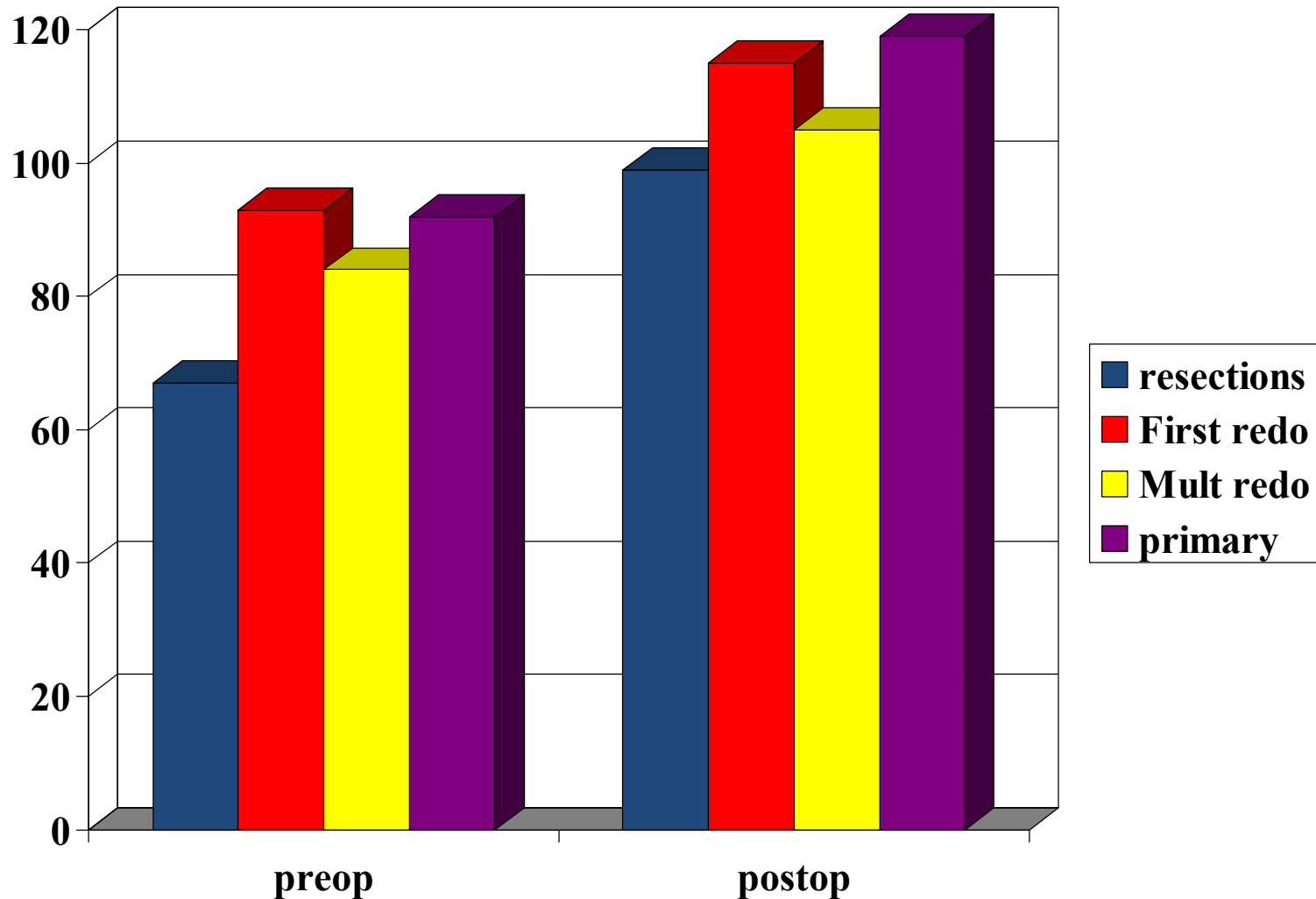
Author / year	n	Operationstyp	Resections
Parker 2010	69	69 Redo 10 after mesh 59 wout mesh	40% with mesh 6% wout mesh
Nandipasti 2013	26	26 Redo after mesh 56% Dysphagia 70 % Hernia Recurr	41 % after mesh 22% gastric 19% esophageal
Frankfurt 2014	322	322 Redo 42 after mesh (13%)	43% with mesh 8% wout mesh



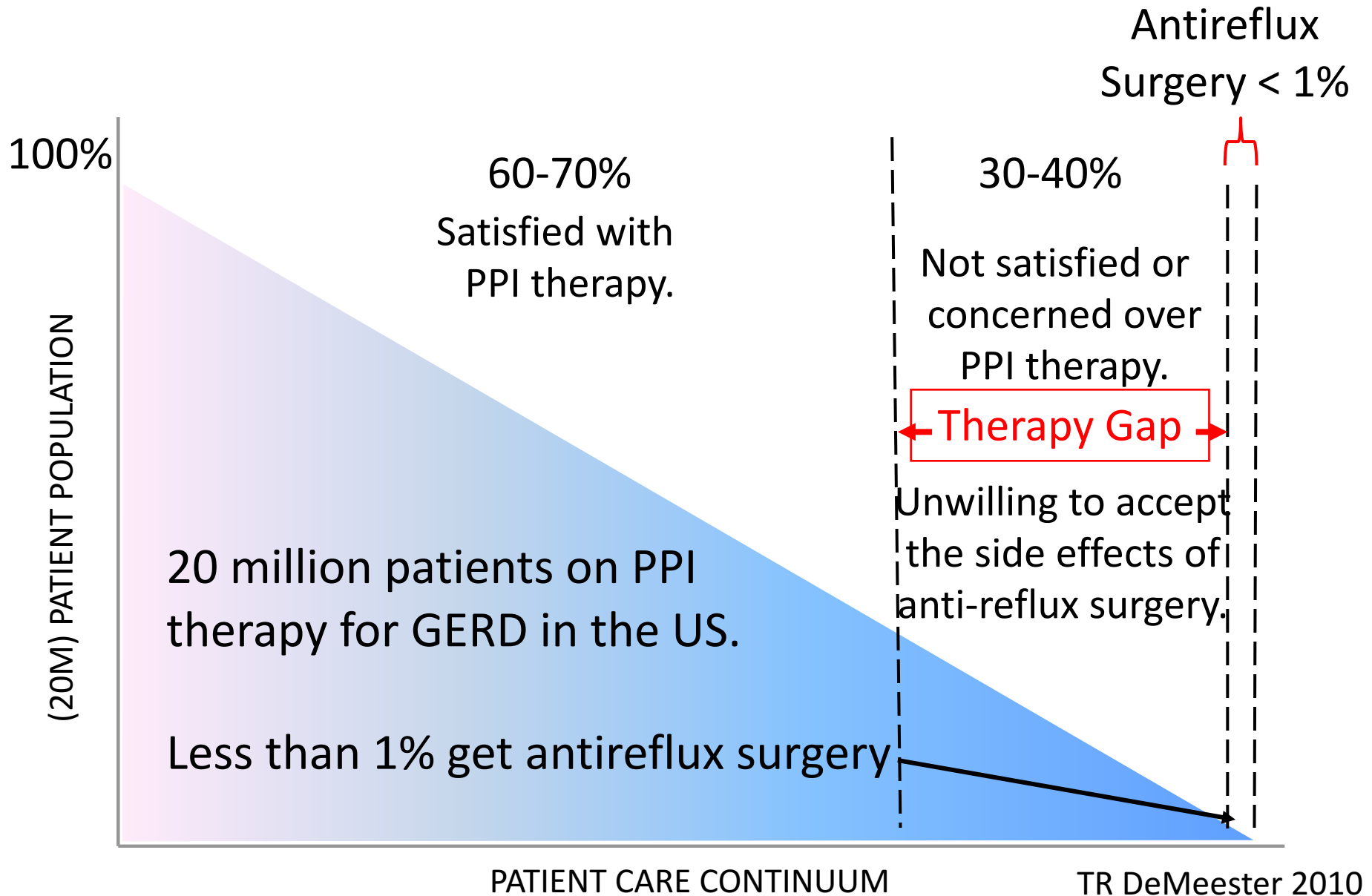
Probability of Resection after previous Antireflux Surgery



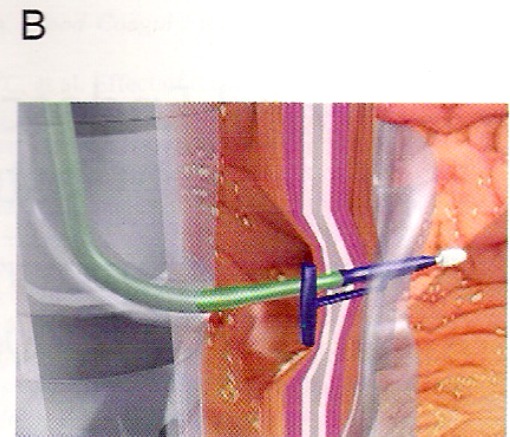
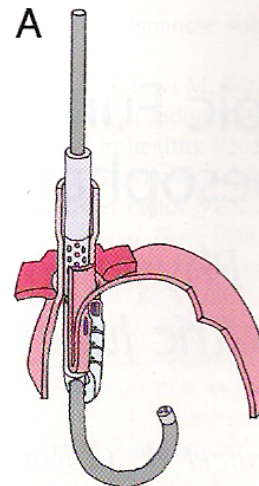
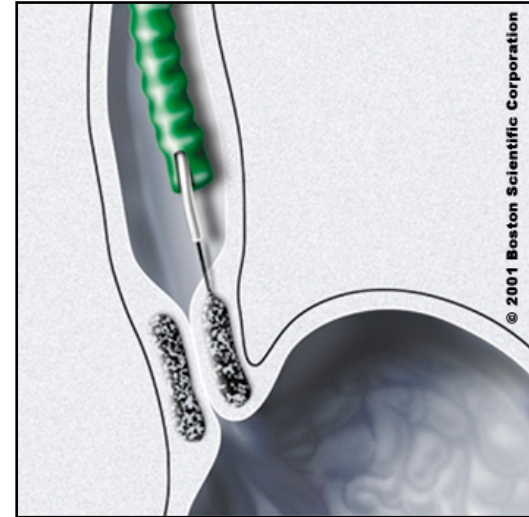
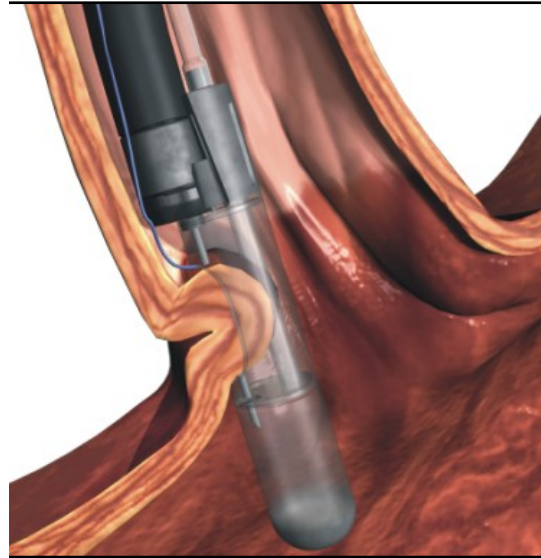
Gastrointestinal Quality of Life Index pre- and postop multiple Antireflux Surgery



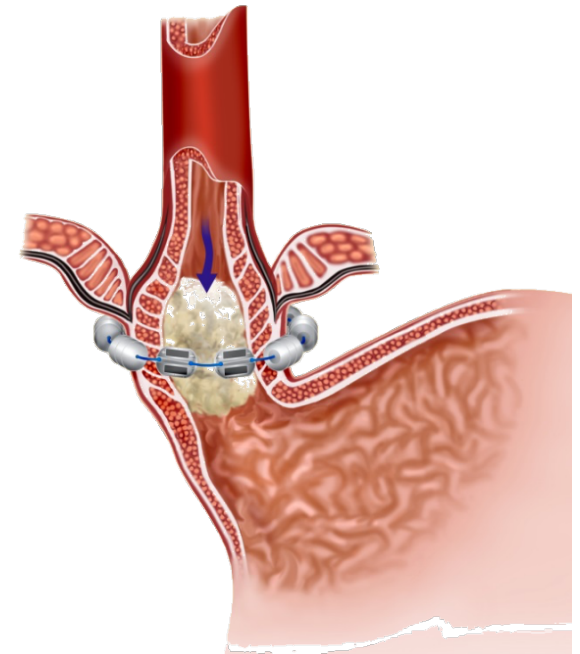
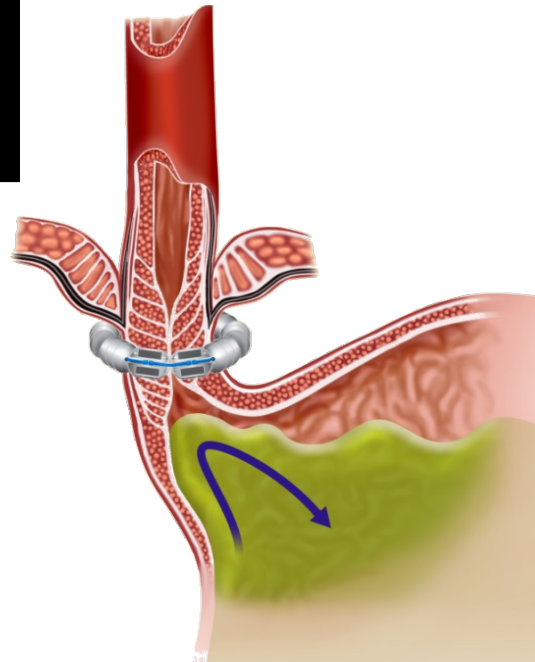
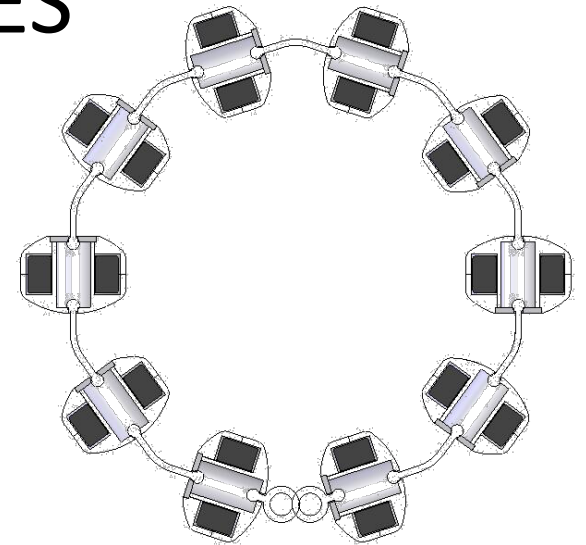
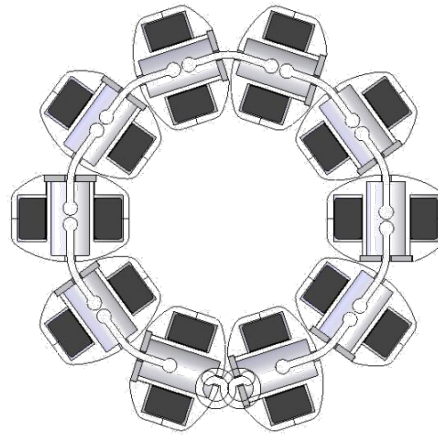
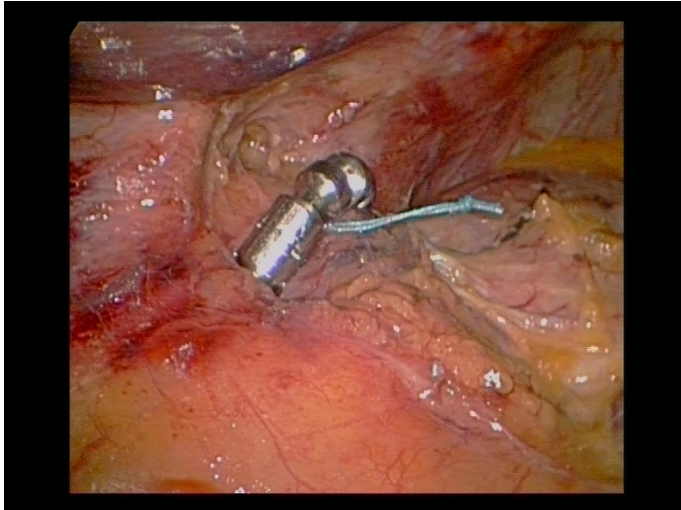
GERD Therapy



Endoscopic antireflux procedures

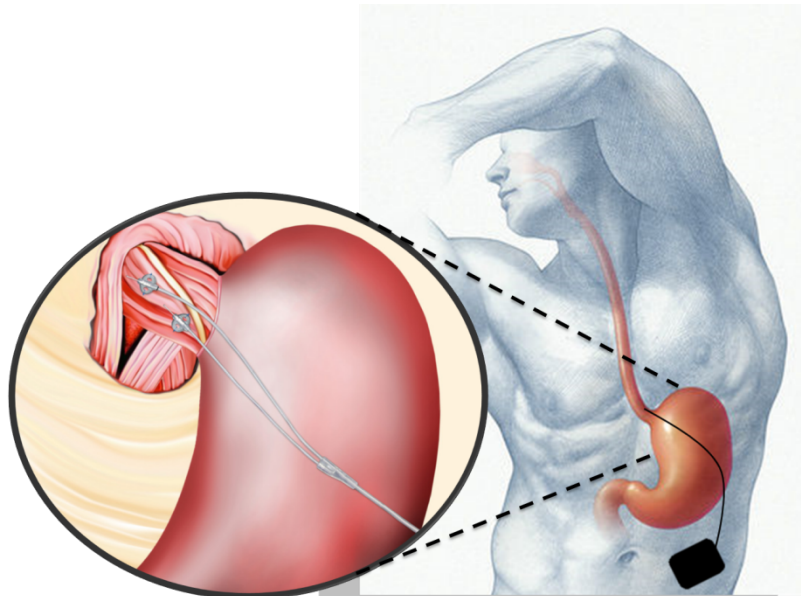


Limited Augmentation of the LES

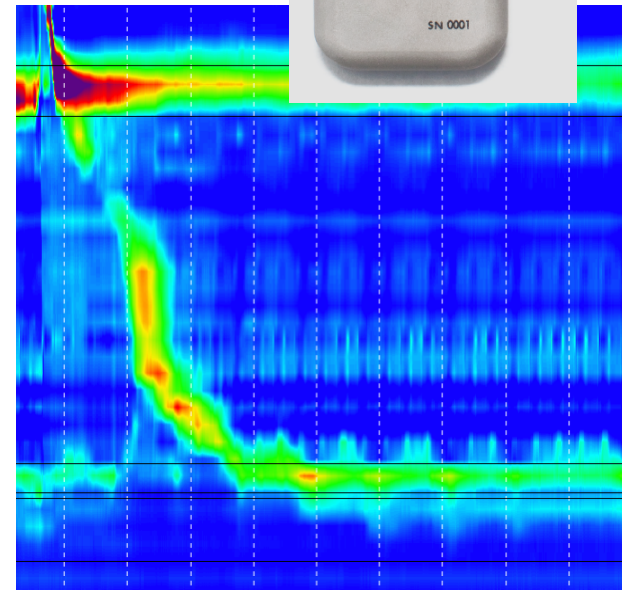
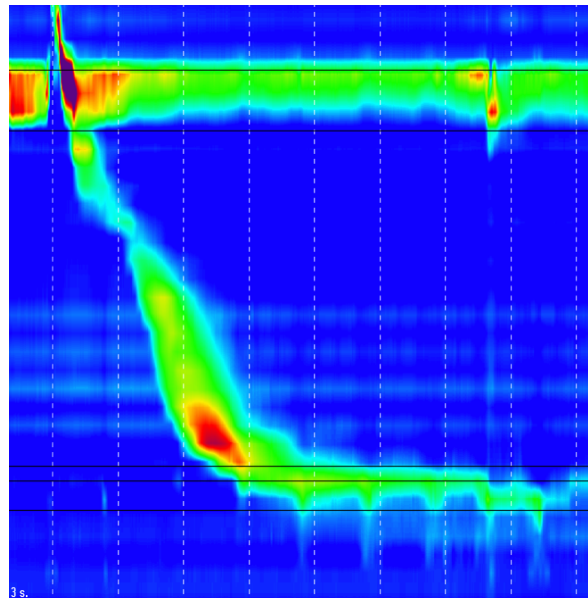


Linx™

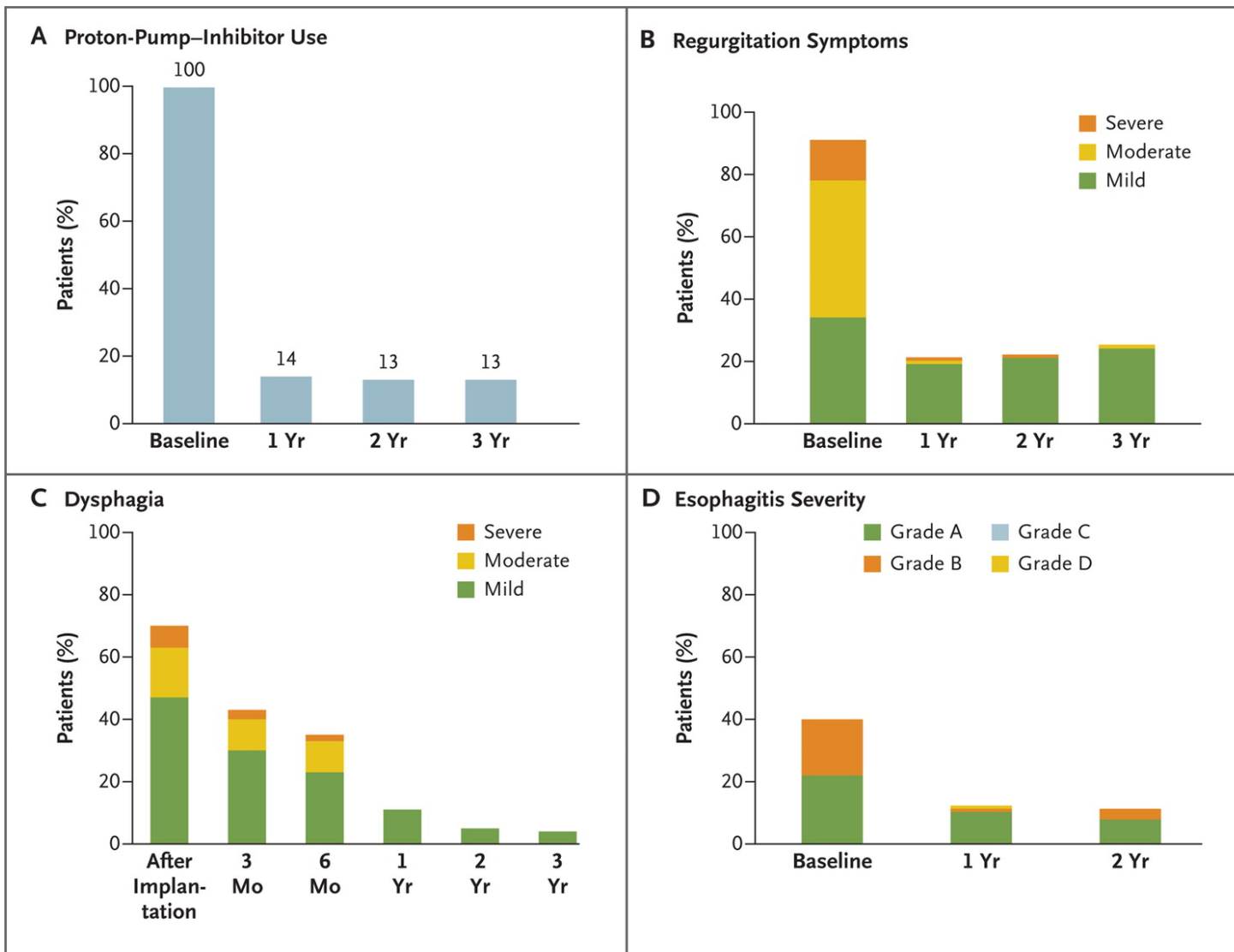
Stimulation of LES function



EndoStim device and lead placement



Proton-Pump-Inhibitor Use, Reflux Symptoms, Dysphagia, and Esophagitis over the 3-Year Period.



Ganz RA et al. N Engl J Med 2013;368:719-727.



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LINX-Implantation

Author	n	Good outcome	
Bonavina 2010	44	90% off PPI 1y	1ex
Ganz 2013	100	87% off PPI 3y	6 ex
Lipham 2014	1000	82 institutions 0.1% intraop prob	3,4% re-op
Reynolds 2014	67	77% off PPI	8 EPD
Riegler 2014	202	82 % off PPI	Re-op 4%
own	15 respiratory	13/14	1 Re-op

Management of GERD

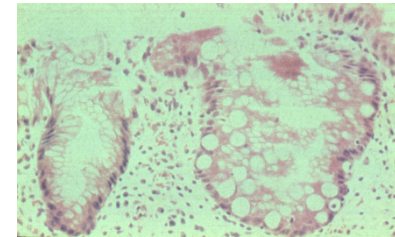
- Anatomy and Pathophysiology
- Clinical Presentation
- Decision Making for long-term Therapy
- Operative Technique
- Outcome
- Specialties and Problems

Multifactorial Causes of GERD

LES	-	-	0,02	-
Hiatushernia	-	-	0,001	-
Acid	0,05	-	0,03	0,03
Bile	-	-	-	0,03

Normal > NERD > ERD_{AB} > ERD_{CD} > Barrett

Progression-rate(%): **5,9** **12,1** **19,7**



Progression 2-16 years

Lord / DeMeester 2009

Malfertheiner et al 2012

GERD-symptoms



PPI



Responders
>>>>PPI



Partial-/non-Responders after 6-12 months



Testing: Presence and severity of disease

Endoscopy – Manometry – Impedance-pH



Hiatal Hernie >2cm
Esophagitis > LA A
Incomp LES
Pos. 24h Impedance
PPI-Dosage Increase
QL reduced



Lap. Fundoplication



HH <2cm
Esophagitis < LA B
Barrett/ Carditis pos
Borderline LES
Pos. 24h Impedance
QL reduced



Limited sphincter
augmentation



HH <=2cm
Esophagitis < LA B
Borderline LES
Borderline pH
QL fine on PPI



Continue PPI

