Antireflux surgery
past, present, future

Borbély, Ruetsch
19 April 16
Overview

I. LOTUS trial

II. antireflux surgery:
   – past and present
     • fundoplication, (TIF/EsophyX)
   – future developments
     • linx, stretta, endostim

I. clinical vignettes
Symptomatic reflux disease: the present, the past and the future

Guy Boeckxstaens,¹ Hashem B El-Serag,² André J P M Smout,³ Peter J Kahrilas⁴

simplifications. From the beginning, it was evident that GORD was multifactorial, but after stating that, there was a persistent tendency among clinicians to explain GORD in one-dimensional concepts. First it equated to the hernia, then to the LOS, then LOS and hiatus (TLOSR). Odysseus
question: role of gastric acid secretion

• GERD patients: acid secretion

• PPI efficacy & GERD symptoms
question: role of H. pylori

• effect on GERD symptoms
• effect on risk of Barrett’s esophagus and esophageal adenocarcinoma
• pathomechanism
question: role of obesity in GERD

- pathomechanism
question: contributing factors to GERD
question: contributing factors to GERD

• EGJ:
  – LES and crural diaphragm combined
  – compliance ↑ → volume of refluxate, more proximal, less restriction to gas

• TLESR > hypotensive LES

• prolonged acid clearance > # reflux events

• acid pocket
  – postprandial reflux

• hiatal hernia

• excessive gastric acid secretion ?
Rudolf Nissen (1896–1981)

“To Nissen my tummy, the world my tongue”

antireflux surgery: past

fundoplication

- Nissen, Nissen-Rossetti, Toupet, Dor, Thal
- Hill, Angelchick
rationale behind fundoplication

Grade I: Oral ridge of tissue approximates closely to the scope.

Grade II: Ridge is slightly less well defined and opens with respiration.

Grade III: Ridge is effaced and the hiatus is patulous.

Grade IV: Hiatus is wide open at all times and the sphincter is displaced axially.
Fundoplication

Model of GORD Pathogenesis in Adults

- **Normal OGJ**
  - LOS-CD synergy
  - Tight hiatus

- **Physiological reflux**
  - Exclusively by TLOSR
  - Selective gas venting
  - Acid reflux confined to distal oesophagus
  - Rapid acid clearance

- **Mechanically impaired OGJ**
  - Laxity of LOS-CD attachment
  - Reduced LOS-CD synergy
  - Increase OGJ distensibility
  - Increased intra-abdominal pressure

- **Pathological reflux**
  - Increased non-TLOSR reflux events
  - Poor gas/liquid reflux discrimination
  - Increased reflux volume/proximal reflux
  - Liquid regurgitation
  - Oesophageal hypersensitivity

- **Reflux symptoms**
  - Heartburn
  - Regurgitation
  - Chest pain

- **Pathological oesophageal clearance**
  - Acid pocket traverses diaphragm
  - Supine & swallow-induced reflux
  - Prolonged oesophageal acid exposure
  - Acid ‘film’ traverses SCJ

- **Mucosal disease**
  - Oesophagitis
  - Stricture
  - Metaplasia
  - Cancer

- **Instigating factors**
  - Obesity
  - Age, genetics
  - Pregnancy
  - Trauma

- **Exacerbating and perpetuating factors**
  - Obesity, diet
  - Neuromuscular dysfunction
  - Oesophageal fibrosis

- **Overt hiatal hernia**
  - LOS-CD disassociation
  - Dilated hiatus
Angelchick prosthesis

Diagram showing the esophagus and diaphragm with a prosthesis connected to the stomach.
Angelchick prosthesis: the past??

![Diagram of Angelchick prosthesis with labeled parts: Esophagus, Diaphragm, Pouch, Adjustable band, Duodenum, Stomach, Access port.](image)
antireflux surgery: present

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

• surgical intervention with the laparoscopic Nissen fundoplication remains the gold standard for reflux
antireflux surgery: the future

• fundoplication abandoned?
  – new technologies, endoscopic measures
  – new patient profiles (obesity, PPI, post-bariatric)
Stretta

Model of GORD Pathogenesis in Adults

- **Normal OGJ**
  - LOS-CD synergy
  - Tight hiatus

- **Physiological reflux**
  - Exclusively by TLOSR
  - Selective gas venting
  - Acid reflux confined to distal oesophagus
  - Rapid acid clearance

- **Mechanically impaired OGJ**
  - Laxity of LOS-CD attachment
  - Reduced LOS-CD synergy
  - Increase OGJ distensibility
  - Increased intra-abdominal pressure

- **Pathological reflux**
  - Increased non-TLOSR reflux events
  - Poor gas/liquid reflux discrimination
  - Increased reflux volume/proximal reflux
  - Liquid regurgitation
  - Oesophageal hypersensitivity

- **Overt hiatal hernia**
  - LOS-CD disassociation
  - Dilated hiatus

- **Pathological oesophageal clearance**
  - Acid pocket traverses diaphragm
  - Supine & swallow-induced reflux
  - Prolonged oesophageal acid exposure
  - Acid film traverses SCJ

**Instigating factors**
- Obesity
- Age, genetics
- Pregnancy
- Trauma

**Exacerbating and perpetuating factors**
- Obesity, diet
- Neuromuscular dysfunction
- Oesophageal fibrosis

**Reflux symptoms**
- Heartburn
- Regurgitation
- Chest pain

**Mucosal disease**
- Oesophagitis
- Stricture
- Metaplasia
- Cancer
LINX

Diagram showing the LINX® System in the esophagus and stomach, illustrating how food passes through without reflux.
LINX

Model of GORD Pathogenesis in Adults

Instigating factors
- Obesity
- Age, genetics
- Pregnancy
- Trauma

Normal OGJ
- LOS-CD synergy
- Tight hiatus

Mechanically impaired OGJ
- Laxity of LOS-CD attachment
- Reduced LOS-CD synergy
- Increase OJ distensibility
- Increased intra-abdominal pressure

Exacerbating and perpetuating factors
- Obesity, diet
- Neuromuscular dysfunction
- Oesophageal fibrosis

Pathological reflux
- Exclusively by TLOSR
- Selective gas venting
- Acid reflux confined to distal oesophagus
- Rapid acid clearance

Pathological oesophageal clearance
- Acid pocket traverses diaphragm
- Supine & swallow-induced reflux
- Prolonged oesophageal acid exposure
- Acid ‘film’ traverses SCJ

Physiological reflux
- Loses or by TLOSR
- Selective gas venting
- Acid reflux confined to distal oesophagus
- Rapid acid clearance

Reflux symptoms
- Heartburn
- Regurgitation
- Chest pain

Mucosal disease
- Oesophagitis
- Stricture
- Metaplasia
- Cancer

Overt hiatal hernia
- LOS-CD disassociation
- Dilated hiatus
pros and cons

Stretta
• no objective improvement
• amelioration of symptoms
• good safety profile

LINX
• good objective improvement
• good symptom improvement
• mediocre safety profile
EndoStim

Model of GORD Pathogenesis in Adults

**Normal OGJ**
- LOS-CD synergy
- Tight hiatus

**Mechanically impaired OGJ**
- Laxity of LOS-CD attachment
- Reduced LOS-CD synergy
- Increase OGJ distensibility
- Increased intra-abdominal pressure

**Overt hiatal hernia**
- LOS-CD disassociation
- Dilated hiatus

**Instigating factors**
- Obesity
- Age, genetics
- Pregnancy
- Trauma

**Physiological reflux**
- Exclusively by TLOSR
- Selective gas venting
- Acid reflux confined to distal oesophagus
- Rapid acid clearance

**Pathological reflux**
- Increased non-TLOSR reflux events
- Poor gas/liquid reflux discrimination
- Increased reflux volume/proximal reflux
- Liquid regurgitation
- Oesophageal hypersensitivity

**Pathological oesophageal clearance**
- Acid pocket traverses diaphragm
- Supine & swallow-induced reflux
- Prolonged oesophageal acid exposure
- Acid film traverses SCJ

**Reflux symptoms**
- Heartburn
- Regurgitation
- Chest pain

**Mucosal disease**
- Oesophagitis
- Stricture
- Metaplasia
- Cancer
Electrical stimulation therapy of the lower oesophageal sphincter for refractory gastro-oesophageal reflux disease – interim results of an international multicentre trial


Long-term results of electrical stimulation of the lower esophageal sphincter for the treatment of gastroesophageal reflux disease

Authors

L. Rodríguez*, P. Rodríguez*, B. Gómez†, J. C. Ayala‡, D. Oksenberg§, A. Perez-Castilla‡, M. C. Netto¶, E. Soffer‖, M. D. Crowell‖

- very good subjective and objective improvement of GERD. good safety profile, reversible
Case: male, 55y

• mild typical GERD symptoms
• wakes up at night, acidic feeling on tongue
• cough, asthma

• next steps?
evaluation

- **gastroscopy**: Barrett’s

- **24-pH-imp**: pH<4 9.8%, DM score 89.3

- **manometry**: hypotensive LES 2 mmHg, hiatal hernia, aperistalsis

- **UGI**: small hiatal hernia
Case: female, 35y

- typical GERD symptoms despite PPI
- wants no medication anymore

- next steps?
evaluation

• **gastroscopy**: LA A

• **24-pH-imp**: pH<4 6% , DM score 14, pos SA

• **manometry**: normotensive LES, normal motility

• **UGI**: normal
Case: female, 34y

• inadequate GERD symptom control despite double-dose PPI, antacids
• postprandial bloating, early satiety, typical GER symptoms

• next steps?
evaluation

• **gastroscopy**: normal

• **24-pH-imp**: normal, pH<4 2%, DM score 8.9, neg SA

• **manometry**: normal, LESP 29.4mmHg, no hiatal hernia, intact peristalsis (100%)

• **UGI**: normal
evaluation

• **abdominal US/duplex**: normal

• **gastric emptying scintigraphy**: DGE: $t^{1/2} = 68$ min (38min), contraction amplitude 6.1% (28%)