GASTROESOPHAGEAL REFLUX DISEASE AND HIATAL HERNIAS – OLD PRINCIPLES STILL MATTER

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GASTROESOPHAGEAL REFLUX DISEASE – BASIC PRINCIPLES

• HH & GER ARE NOT SYNONYMOUS – EACH MAY OCCUR IN THE ABSENCE OF THE OTHER

• SX’S DUE TO REFLUX INTO ACID SENSITIVE ESOPHAGUS (NOT HH OR ESOPHAGITIS)

• SEVERITY OF REFLUX SX’S CORRELATES POORLY WITH DEGREE OF ESOPHAGITIS
ALL HIATUS HERNIAS ARE NOT THE SAME (TYPES OF HIATUS HERNIAS)
SYMPTOMS OF GASTROESOPHAGEAL REFLUX

PAIN*
  BURNING
  EPIGASTRIC or SUBSTERNAL
  HOT or COLD AGGRAVATION

REGURGITATION*
  BILE or ACID IN PHARYNX
  EFFORTLESS

*POSTURAL AGGRAVATION
COMPLICATIONS OF GASTROESOPHAGEAL REFLUX

PULMONARY INVOLVEMENT

COUGH
HEMOPTYSIS
INFECTION
DYSPHAGIA
SPASM
STRicture
BLEEDING
PULMONARY SYMPTOMS FROM GER - HISTORY

EARLY 4th CENTURY  A. CAESIUS – NOCTURNAL WHEEZING

12th CENTURY  MAIMONIDES – ASSOCIATION BETWEEN EATING, LYING DOWN, WHEEZING

1776  von ROSENSTEIN – “STOMATIC COUGH” OF CHILDREN

1892  OSLER – RELATED SEVERE PAROXYSMAL ASTHMA TO OVEREATING
<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
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<tbody>
<tr>
<td>1934</td>
<td>Bray</td>
<td>Link Between Dietary Indiscretions &amp; Asthma</td>
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<tr>
<td>1960</td>
<td>Belsey</td>
<td>Pulmonary Complications of Esophageal Disease</td>
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<tr>
<td>1967</td>
<td>Urschel &amp; Paulson</td>
<td>Of 636 pts. Referred for Antireflux Surgery</td>
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<tr>
<td></td>
<td></td>
<td>39% - Classic Reflux Symptoms Without Respiratory Symptoms</td>
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<tr>
<td></td>
<td></td>
<td>45% - Reflux Symptoms &amp; Respiratory Symptoms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16% - Only Respiratory Symptoms</td>
</tr>
<tr>
<td>1968</td>
<td>Cherry &amp; Margulies</td>
<td>ENT – Relation Between Laryngeal Pathology &amp; Reflux</td>
</tr>
<tr>
<td>1999</td>
<td>Sontag</td>
<td>Medline Search – 177 Publications – ’66-’97 Related GER &amp; Pulmonary Disease</td>
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ASTHMA AND GER

• **ASTHMA** = WHEEZING & REVERSIBLE AIRWAY DISEASE REQUIRING BRONCHODILATOR THERAPY

• **70% OF ADULT ASTHMATICS HAVE SOME TYPE OF GER SX’S**
  • 70% - HEARTBURN
  • 50% - AWAKING SUDDENLY FROM SLEEP WITH HEARTBURN
  • 25% - NOCTURNAL CERVICAL BURNING

• **67% OF ADULT ASTHMATICS HAVE ABNORMAL ACID REFLUX AS DEFINED BY pH REFLUX TESTING**
BRONCHODILATORS AND GER

24 hr. ESOPHAGEAL pH MONITORING IN ASTHMATICS USING BRONCHODILILATORS vs. THOSE NOT SUPPORTS THAT

GER IS AN INTRINSIC ABNORMALITY OF ASTHMA

(not due to bronchodilator – induced LES smooth muscle relaxation).
GER AND ASTHMA - SUMMARY

• MOST ASTHMATICS HAVE REFLUX
• IN SOME ASTHMATICS, REFLUX IMPORTANT
• NO CURRENT TEST RELIABLY PROVES GER – INDUCED OR EXACERBATED ASTHMA OR PREDICTS WHICH WILL RESPOND TO ANTI-REFLUX THERAPY
• NEITHER A GOOD NOR A BAD PPI RESPONSE RELIABLY PREDICTS A POOR ANTI-REFLUX SURGERY RESPONSE
• ANTI-REFLUX SURGERY IN ASTHMATICS – REQUIRES CLINICAL JUDGEMENT
COMPLICATIONS OF GASTROESOPHAGEAL REFLUX

PULMONARY INVOLVEMENT
COUGH
HEMOPTYSIS
INFECTION

DYSPHAGIA
SPASM
STRUCTURE

BLEEDING
DOCUMENTING GER

DIRECT EVIDENCE

• SHORT DURATION ESOPH pH REFLUX TESTING
• LONG DURATION (24-48 HR.) TESTING
• ESOPHAGOSCOPY
• CINE BARIUM SWALLOW
• SCINTIGRAPHY

INDIRECT EVIDENCE

• REFLUX SX’S
• ESOPHAGEAL MANOMETRY/MOTILITY
• HH ON BARIUM SWALLOW
MECHANICALLY DEFECTIVE LES - DEFINITION

- SPHINCTER PRESSURE < 6 mmHg
- SPHINCTER LENGTH < 1 cm. BELOW RESP. INVERSION POINT
- OVERALL SPHINCTER LENGTH < 2 cm.
24 HR. DISTAL ESOPHAGEAL pH MONITORING

- pH PROBE 5 cm. ABOVE HPZ
- NO H₂ BLOCKERS OR PPI’s FOR 48-72 HRS.
- 6 COMPONENTS RECORDED
  1. % TOTAL TIME pH <4
  2. % UPRIGHT TIME pH <4
  3. % SUPINE TIME pH <4
  4. # REFLUX EPISODES
  5. # EPISODES ≥ 5 MINUTES
  6. LONGEST EPISODE (MINUTES)
- COMPOSITE (DeMEESTER) SCORE > 14.7, or
  % TOTAL TIME pH <4 = >4% REPRESENT ABNORMAL ESOPHAGEAL ACID EXPOSURE
BRAVO pH Monitoring System
ESOPHAGITIS

- IS NOT SYNONYMOUS WITH REFLUX
- COMMONEST CAUSE IS CHEMICAL IRRITATION FROM PILLS
ESOPHAGEAL STRicture - CRITICAL QUESTIONS

? BENIGN or MALIGNANT

? DILATABLE
EVALUATION OF PROGRESSIVE DYSPHAGIA

BARIUM SWALLOW

and

ESOPHAGOSCOPY & BIOPSY (with brushings) -

Establish diagnosis of carcinoma in 95%
MEDICAL TREATMENT OF REFLUX

WEIGHT REDUCTION

ELEVATION OF HEAD OF BED - 6-8” BLOCKS

ANTACIDS - AFTER MEALS AND AT BEDTIME

N.P.O. - 2-3 HOURS BEFORE BEDTIME

SMALL FREQUENT MEALS

NO ALCOHOL OR TOBACCO

NO TIGHT GARMENTS

H₂ BLOCKERS, PPIs

PROKINETICS
SURGERY FOR GERD

INDICATIONS

• PERSISTENT ULCERATIVE ESOPHAGITIS
• REFRACTORY REFLUX SYMPTOMS
• PERSISTENT ATYPICAL SYMPTOMS (chest or abdominal pain, dysphagia, aspiration, bleeding)
• REFRACTORY STRicture
• BARRETT’S ULCER
FDA-APPROVED ENDOLUMINAL THERAPIES FOR GER

• ENDOLUMINAL SUTURING = VALVULOPLASTY OR GASTROPLASTY
  (ENDOCINCH – BARD & ESD – WILSON-COOK)

• RADIOFREQUENCY ENERGY APPLICATION AT GEJ
  (STRETTA – CURON MEDICAL)

• INTRAMURAL INJECTION OF POLYMER MATERIALS AT GEJ
Fig. 1. The Endoscopic sewing machine. (From Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)
Fig. 2. A vacuum is applied and tissue is drawn into the capsule by suction, and a hollow needle with a suture tag is passed through the tissue. (*From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)
Fig. 3. Suction is released and the capsule is withdrawn from the esophagus. The suture is reloaded and the process is repeated at the same level. *(From Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)*
Fig. 4. After the suture ends are loaded into the anchor, the anchoring system is passed down the esophagus. Traction on the sutures and pressure on the endoscope tightens the plication. *(From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. *Current surgical therapy*. 8th edition. St. Louis: Mosby; 1984; with permission.*)
Fig. 5. After the system is engaged, the anchor holds the sutures together and the plication is complete. (From Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)
Fig. 6. Circumferential configuration of plications.

Several plication configurations are used. Plications are formed at 3-, 6-, and 9-o’clock positions just below the squamocolumnar junction for the circumferential pattern (Fig. 6) and at the 2-o’clock position 3, 2, and 1 cm below the gastroesophageal junction for the linear configuration. Four to 6 plications are placed for a length of 3 to 4 cm below and up to gastroesophageal junction in the helical pattern (Fig. 7). The overtube then is removed over an endoscope and the esophagus is examined for overtube-related mucosal injury [12].
Fig. 7. Helical configuration of plications. *(From Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)*
ENDOLUMINAL GASTROPLASTY (EndoCinch) - RESULTS

- COMPLICATION RATES LOW
- **2 yr F.U. DATA**: 64 PTS
  - HEARTBURN SEVERITY SCORES IMPROVED (64 vs 44, p=0.006), BUT
  - SYMPTOM CONTROL DETERIORATES COMPARED WITH 6 MOS DATA
  - REGURGITATION SCORE NOT IMPROVED AT 2 YRS.
- **2ND US MULTICENTER STUDY** – 85 PTS
  - ACID EXPOSURE ↓‘D AT 6 MOS.
  - AT 24 MOS., 41% OFF ALL MEDS
    - 60% USING PPI’S <50% OF BASELINE
- SIGNIFICANT IMPROVEMENT IN HEARTBURN & REGURGITATION SCORES & 24 HR. pH MONITORING SCORES
- LONG TERM FOLLOW-UP LACKING!
STRETTA PROCEDURE
(RADIOFREQUENCY BURN OF GEJ)

• LOW POWER, TEMP CONTROLLED RF ENERGY THROUGH ENDOLUMINAL CATHETER TO GEJ MUSCLE

• CIRCUMFERENTIAL THERMAL LESION → COLLAGEN DEPOSITION
Fig. 1. The Stretta RF energy control module (A) and catheter (B). (Courtesy of Curon Medical, Inc, Fremont, CA; with permission.)
Fig. 2. (A) The Stretta catheter is delivered endoluminally and positioned at the gastroesophageal junction. Temperature-controlled RF energy is delivered to the muscle while cooling the mucosa. (B) Six rings of thermal lesions are created from above the Z line to the cardia.
STRETTA PROCEDURE RESULTS

AT 2 YRS. SUSTAINED IMPROVEMENT IN

• GERD – SPECIFIC QOL
• HEARTBURN
• SATISFACTION
• MEDICATION USE
HILL REPAIR

A

B
LAPAROSCOPIC FUNDOPPLICATIONS

NISSEN – 360°
DOR – 240° (ANTERIOR)
TOUPET – 240° (POSTERIOR)
COMPLICATIONS OF HIATUS HERNIA SURGERY

INTRAOPERATIVE

PERFORATION
  • ENDOSCOPIC
  • DURING DILATATION

VAGUS NERVE INJURY

HEMORRHAGE
  • SPLENIC INJURY
  • SHORT GASTRIC VESSEL
COMPLICATIONS OF HIATUS HERNIA SURGERY

POSTOPERATIVE

PERFORATION
  • STRicture DILATATION
  • ESOPHAGEAL SUTURE
  • GASTRIC SUTURE

DYSPHAGIA
  • TRANSIENT - “DENERVATION”, EDEMA
  • MECHANICAL - FUNDOPICATION, GASTROPLASTY TUBE, OR HIATUS TOO TIGHT
COMPLICATIONS OF HIATUS HERNIA SURGERY

POSTOPERATIVE (continued)

“GAS BLOATS”
GASTRIC ATONY - PLYOROFPASM
CRURAL REPAIR DISRUPTION
POST-VAGOTOMY DIARRHEA
CHYLOTHORAX
INCISIONAL PAIN
RECURRENCE RISK FACTORS

• UNRELIABLE ESOPHAGEAL SUTURES
• TENSION ON THE REPAIR
I. UNRELIABLE ESOPHAGEAL SUTURES

- REFLUX ESOPHAGITIS
- PERIESOPHAGITIS
- REFLUX ESOPHAGITIS
- PREVIOUS OPERATION
- INTRINSICALLY POOR TISSUE
- PARAESOPHAGEAL HERNIA
- RHEUMATOID ARTHRITIS
- SCLERODERMA
II. TENSION ON THE REPAIR

• ESOPHAGEAL SHORTENING
  REFLUX ESOPHAGITIS
  COMBINED HIATAL HERNIA

• OBESITY

• CHRONIC COUGH/COPD

• REPETITIVE VALSALVAS
  HEAVY LIFTING
  SPASTIC DISORDERS
**ESOPHAGITIS AND RECURRENCE RATE AFTER BELSEY REPAIR**

<table>
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<tr>
<th></th>
<th>NO.</th>
<th>RECURRENCE RATE</th>
<th></th>
<th>NO.</th>
<th>RECURRENCE RATE</th>
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<tr>
<td>NO STRICTURE</td>
<td>799</td>
<td>10%</td>
<td></td>
<td>43</td>
<td>20%</td>
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<tr>
<td>STRICTURE -</td>
<td>20</td>
<td>45%</td>
<td></td>
<td>16</td>
<td>75%</td>
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<tr>
<td>PERIESOPHAGITIS</td>
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ORRINGER, et al -1971
DONNELLY, et al -1973
COMPLICATIONS OF PARAESOPHAGEAL HERNIAS

29% MORTALITY (6/21) - WITH MEDICAL TREATMENT
(STRANGULATION, PERFORATION, HEMORRHAGE, ACUTE DILATION) - SKINNER & BELSEY - (1967)

68% MAJOR COMPLICATION RATE (21/31) - OZDEMIR (1973)

ACUTE UPPER GI BLEED - 10
OBSTRUCTION - 9
STRANGULATION/PERFORATION - 2

12/31 (39%) - REQUIRED EMERGENCY OPERATION
PARAESOPHAGEAL HIATAL HERNIAS

REPAIR INDICATED!
Belsey-ism

“The long-term follow-up clinic, not just a post-operative barium swallow, is the true indicator of success of an operation designed to restore comfortable swallowing.” He abhored premature scientific publications (eg, “Laparoscopic fundoplication—preliminary results”—with only 14 month average follow-up). He said that surgeons who write such papers without adequate proof of the worth of the described operations reminded him of the squid, a marine animal that is constantly moving backward and squirting ink as it goes!
The Surgeon at Work
Laparoscopic Mesh Repair of the Esophageal Hiatus
Thomas R. Huntington, M.D.

Fig. 1. Esophageal hiatus showing the relaxing incision into the right diaphragmatic crus (dashed line).

Fig. 2. Closure of the hiatus anterior and posterior to esophagus showing the defect resulting from the relaxing incision into the right diaphragmatic crus (arrows).

Fig. 3. Mesh is stapled over the relaxing incision defect. Staples are kept away from the esophagus and pericardium.
Normal laparoscopic Nissen fundoplication

Type I intrathoracic migration of Nissen fundoplication

Type II intrathoracic migration of Nissen fundoplication

THORACIC SURGERY
PRINCIPLES

PARAESOPHAGEAL HERNIA REPAIRS (TYPES II-IV) ARE BEST DONE THROUGH THE CHEST (EVALUATE FOR SHORTENING) -- MOST REQUIRE A CONCOMITANT ANTI-REFLUX OPERATION
PARAESOPHAGEAL HIATAL HERNIAS

University of Michigan
Thoracic Surgery Service
1977-2001
240 Patients
PARAESOPHAGEAL HIATAL HERNIAS
240 PTS.

PRE-OP ASSESSMENT

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<tr>
<th>Test</th>
<th>Count</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Barium Swallow</td>
<td>235</td>
<td>(98%)</td>
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<tr>
<td>Type III hernia</td>
<td>220</td>
<td>(92%)</td>
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<tr>
<td>Type IV hernia</td>
<td>20</td>
<td>(8%)</td>
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<tr>
<td>EFT’s</td>
<td>77</td>
<td>(32%)</td>
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<tr>
<td>Dysmotility</td>
<td>19</td>
<td>(25%)</td>
</tr>
<tr>
<td>Abnormal reflux</td>
<td>66</td>
<td>(86%)</td>
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<tr>
<td>EGD Results</td>
<td>218</td>
<td>(91%)</td>
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<tr>
<td>Esophagitis</td>
<td>35</td>
<td>(16%)</td>
</tr>
<tr>
<td>Barrett’s mucosa</td>
<td>11</td>
<td>(5%)</td>
</tr>
<tr>
<td>Stricture</td>
<td>6</td>
<td>(3%)</td>
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EGJ location - 33.6 cm. (avg) (range 25-42 cm.)
PARAESOPHAGEAL HIATAL HERNIAS
240 PTS.

**SURGICAL APPROACH**

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<tr>
<th>Procedure</th>
<th>Patients</th>
<th>Percentage</th>
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<tr>
<td>Collis-Nissen</td>
<td>231</td>
<td>96%</td>
</tr>
<tr>
<td>Nissen</td>
<td>8</td>
<td>3%</td>
</tr>
<tr>
<td>Belsey Mark IV</td>
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Left thoracotomy – 6\textsuperscript{th} ICS

Esophageal lengthening Collis gastroplasty for shortening

Antireflux procedure in all
RESULTS

Hospital deaths  3  (1.7%)
- myocardial infarction  2
- massive CVA  1

Intraoperative complications  3  (1.7%)
- vagus nerve injury  2
- splenic capsular tear  1
PARAESOPHAGEAL HIATAL HERNIA
237 PTS.

RESULTS

Post-op barium swallow findings
- Intraabdominal fundoplication: 233
- Anatomic recurrence: 4
- Delayed esophageal emptying: 32

Median length of stay – 7 days (range 4-50 days)
PARAESOPHAGEAL HIATATAL HERNIAS
237 PTS.

RESULTS

Reoperation (Late)

Recurrence repair (13, 16, 26, 51 mos) 4
GEJ stenosis → esophagectomy 2
Barrett’s + HGD → THE (@ 46 mos) 1
<table>
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<tr>
<th>Symptoms at last follow-up</th>
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<tr>
<td>Occ., intermittent</td>
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<tr>
<td>Dysphagia</td>
<td>45 (19%)</td>
</tr>
<tr>
<td>Reflux</td>
<td>11 (5%)</td>
</tr>
<tr>
<td>Early satiety</td>
<td>17 (7%)</td>
</tr>
<tr>
<td>Thoracotomy pain</td>
<td>34 (14%)</td>
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<tr>
<td>Severe (Persistent)</td>
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<tr>
<td>Dysphagia</td>
<td>4</td>
</tr>
<tr>
<td>Reflux</td>
<td>1</td>
</tr>
<tr>
<td>Dumping</td>
<td>3</td>
</tr>
<tr>
<td>Early satiety</td>
<td>2</td>
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<tr>
<td>Thoracotomy pain</td>
<td>1</td>
</tr>
<tr>
<td><strong>Satisfaction with operation</strong></td>
<td>192 (85%)</td>
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<tr>
<td><strong>Any post-op esophageal dilatation</strong></td>
<td>69 (31%)</td>
</tr>
<tr>
<td><strong>Multiple (&gt;2 dilatations)</strong></td>
<td>19 (2%)</td>
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</table>
PARAESOPHAGEAL HIATAL HERNIA REPAIRS

Late Barium Swallow Findings – 153 pts  mean F.U. 29 mos (range 2 mos → 17 years)

- Reflux 7
- Anatomic Recurrence 19 (10%) 4 “fixed” → Re op
- Dysmotility 33
- Delayed Emptying 14 (6 with dysphagia)

pH Reflux Testing – 67 Pts (28%) mean F.U. 29 mos (range 1-63 mos)

- Abnormal Reflux 4 (6%)
- Pre & Post Op Testing 45 pts
  - Abnormal Reflux Pre-op 88%
  - Abnormal Reflux Post-op 4%
PARAESOPHAGEAL HIATAL HERNIA REPAIRS

TRADITIONAL THORACIC APPROACH

Left 6th intercostal space
Complete hernia mobilization
Collis gastroplasty-lengthening → less tension
3 cm. Nissen fundoplication
#1 silk crural sutures (no mesh!)
Subdiaphragmatic fundoplication fixation
Drilled lower rib closure (no nerve entrapment)
Paraspinous catheter anesthesia post-op