GASTROESOPHAGEAL REFLUX DISEASE AND HIATAL HERNIAS – OLD PRINCIPLES STILL MATTER

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GASTROESOPHAGEAL REFLUX DISEASE – BASIC PRINCIPLES

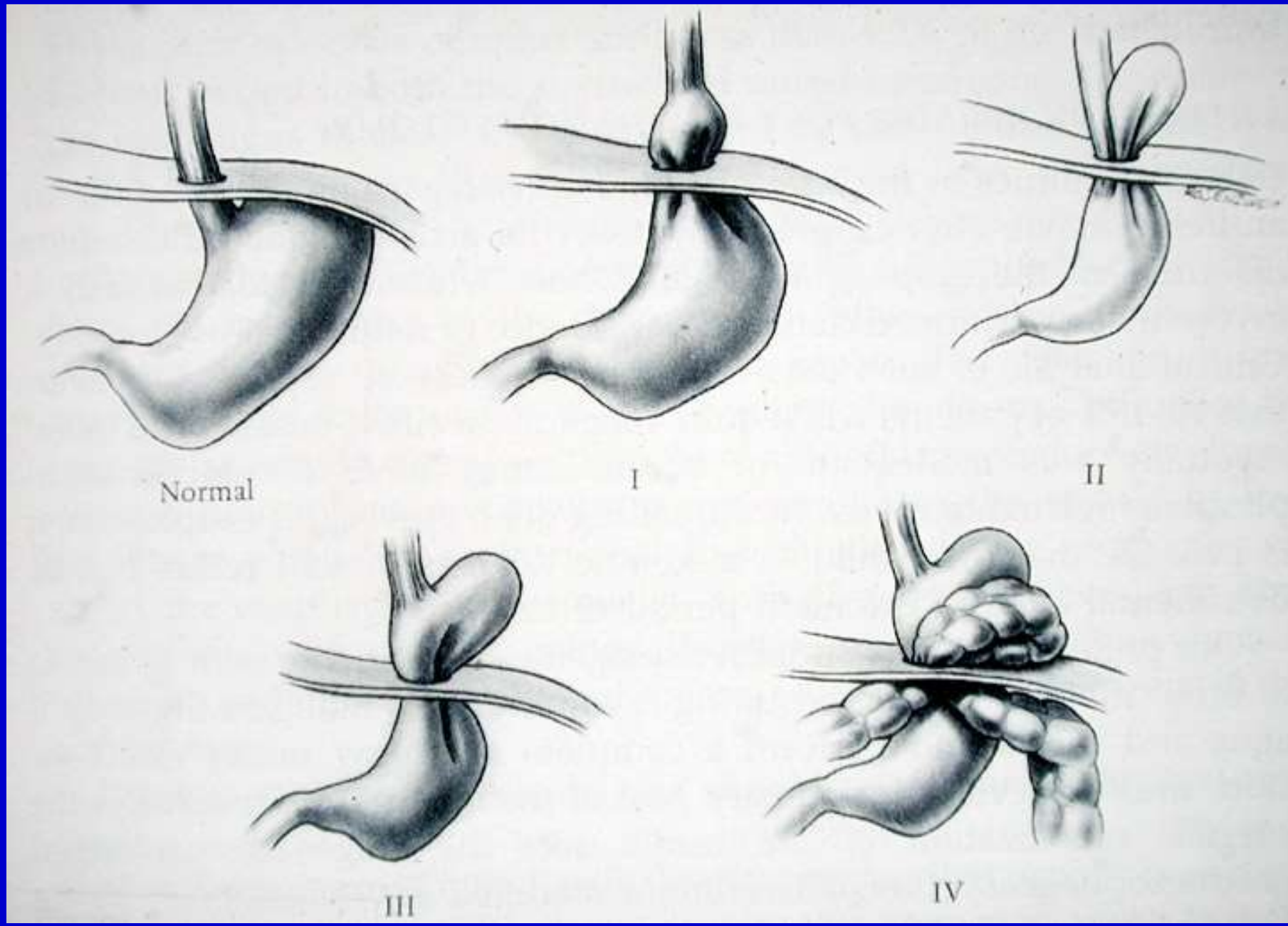
- HH & GER ARE NOT SYNONYMOUS – EACH MAY OCCUR IN THE ABSENCE OF THE OTHER
- SX'S DUE TO REFLUX INTO ACID SENSITIVE ESOPHAGUS (NOT HH OR ESOPHAGITIS)
- SEVERITY OF REFLUX SX'S CORRELATES POORLY WITH DEGREE OF ESOPHAGITIS

ALL HIATUS HERNIAS

ARE NOT

THE SAME

(TYPES OF HIATUS HERNIAS)


Normal
I
II
III
IV

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

PULMONARY SYMPTOMS FROM GER – HISTORY (cont'd)

20th Century

1934-BRAY — LINK BETWEEN DIETARY INDISCRETIONS & ASTHMA

1960-BELSEY — PULMONARY COMPLICATIONS OF ESOPHAGEAL DISEASE

1967-URSCHEL & PAULSON — OF 636 PTS. REFERRED FOR ANTIREFLUX SURGERY

- 39% - CLASSIC REFLUX SX'S WITHOUT RESPIRATORY SX'S
- 61%
  - 45% - REFLUX SX'S & RESPIRATORY SX'S
  - 16% - ONLY RESPIRATORY SX'S

1968-CHERRY & MARGULIES — ENT – RELATION BETWEEN LARYNGEAL PATHOLOGY & REFLUX

1999-SONTAG — MEDLINE SEARCH – 177 PUBLICATIONS – '66-'97 RELATED GER & PULMONARY DISEASE

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 BRONCHODILATORS 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

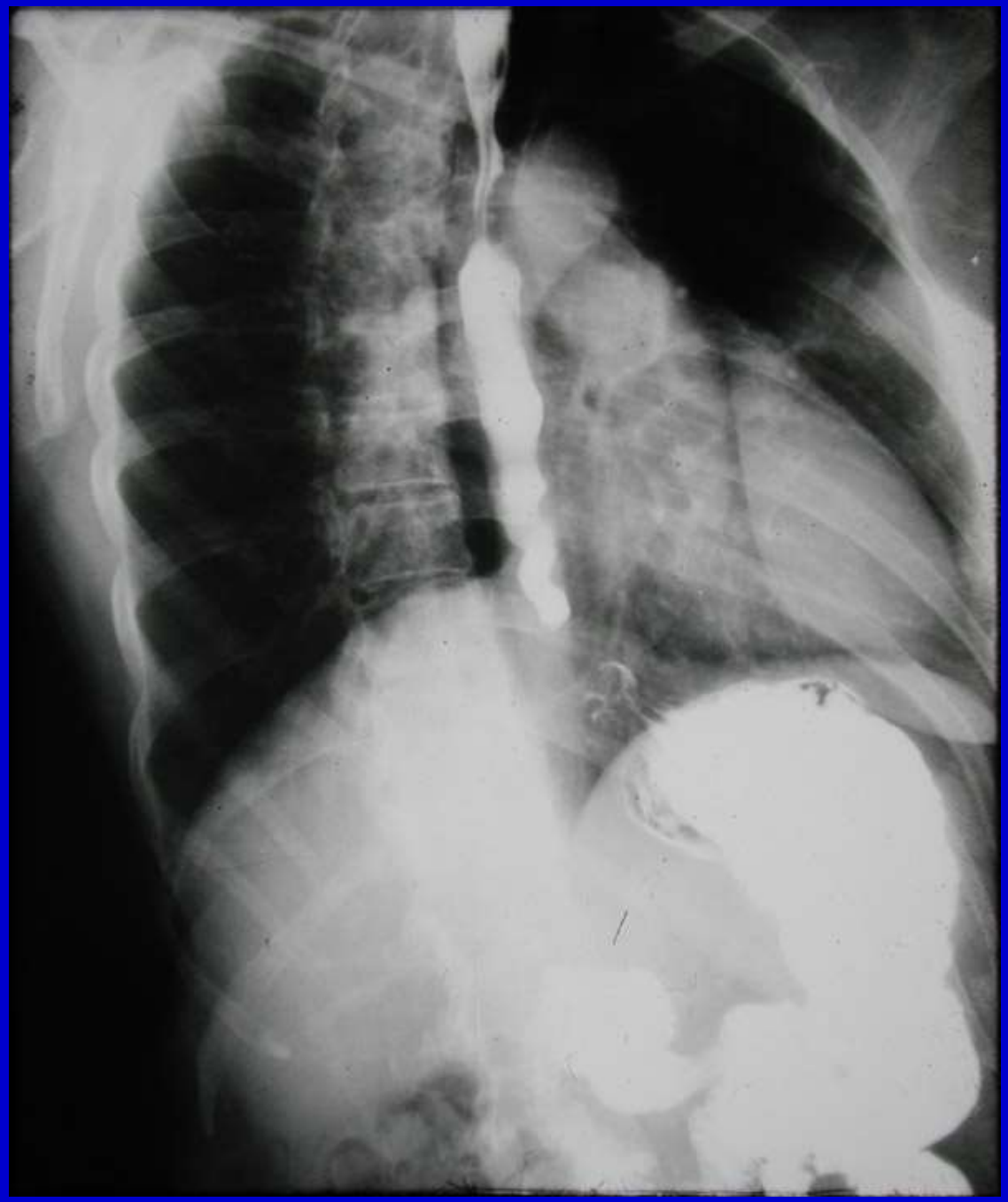
- COUGH
- HEMOPTYSIS
- INFECTION

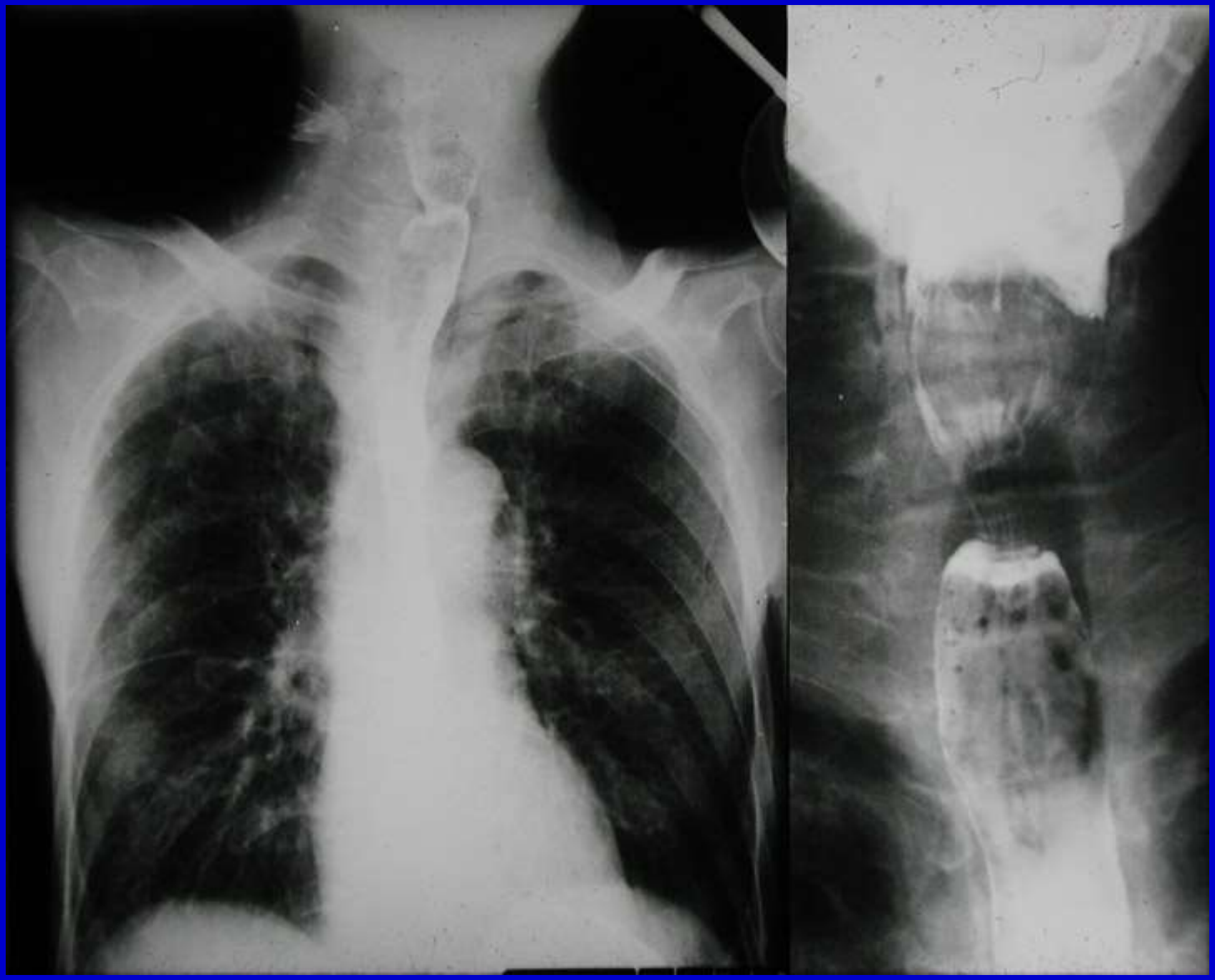
DYSPHAGIA

- SPASM
- STRICTURE

BLEEDING


MICH U 17





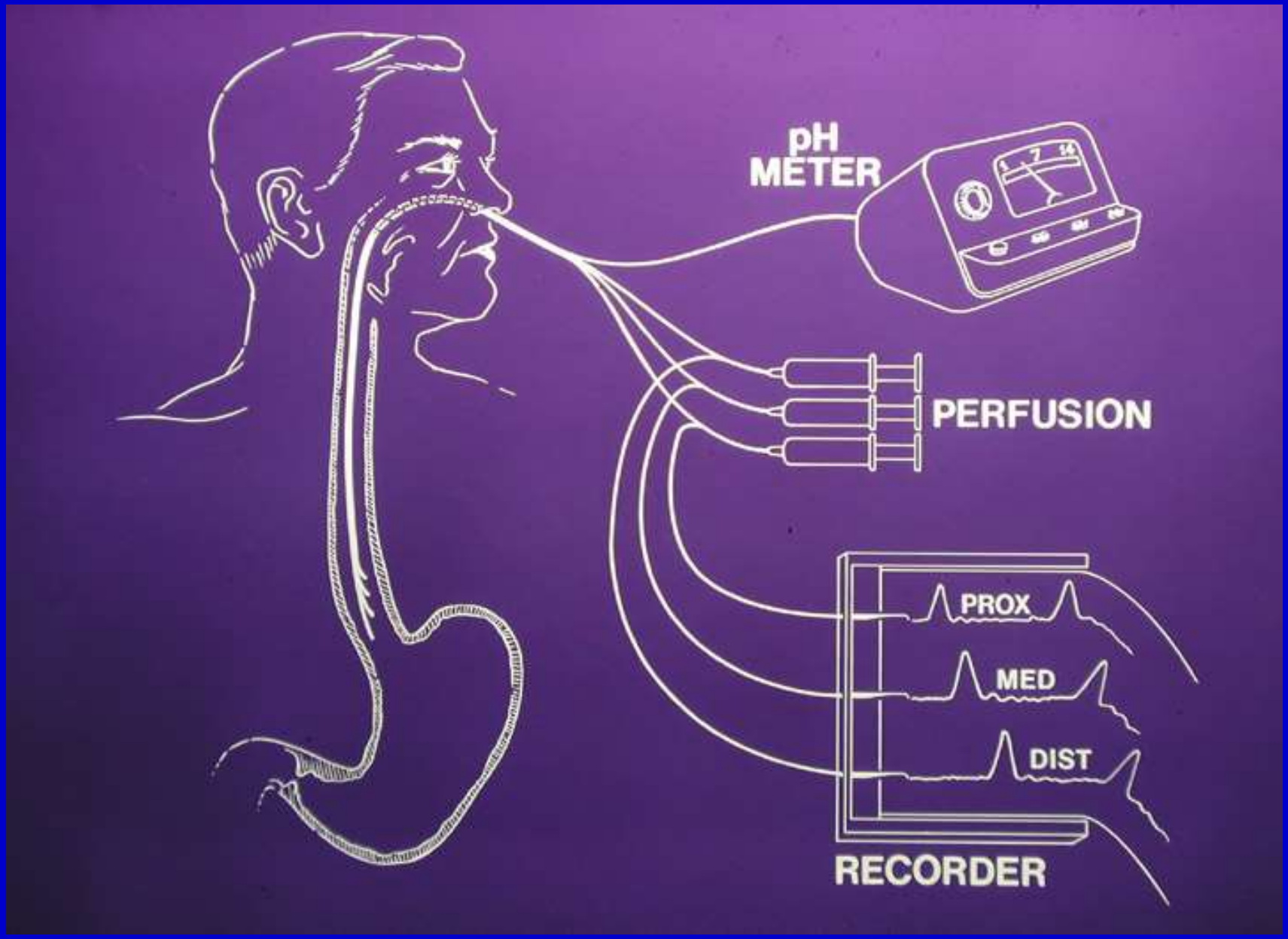
DOCUMENTING GER

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


pH
METER
PERFUSION
PROX
MED
DIST
RECORDER

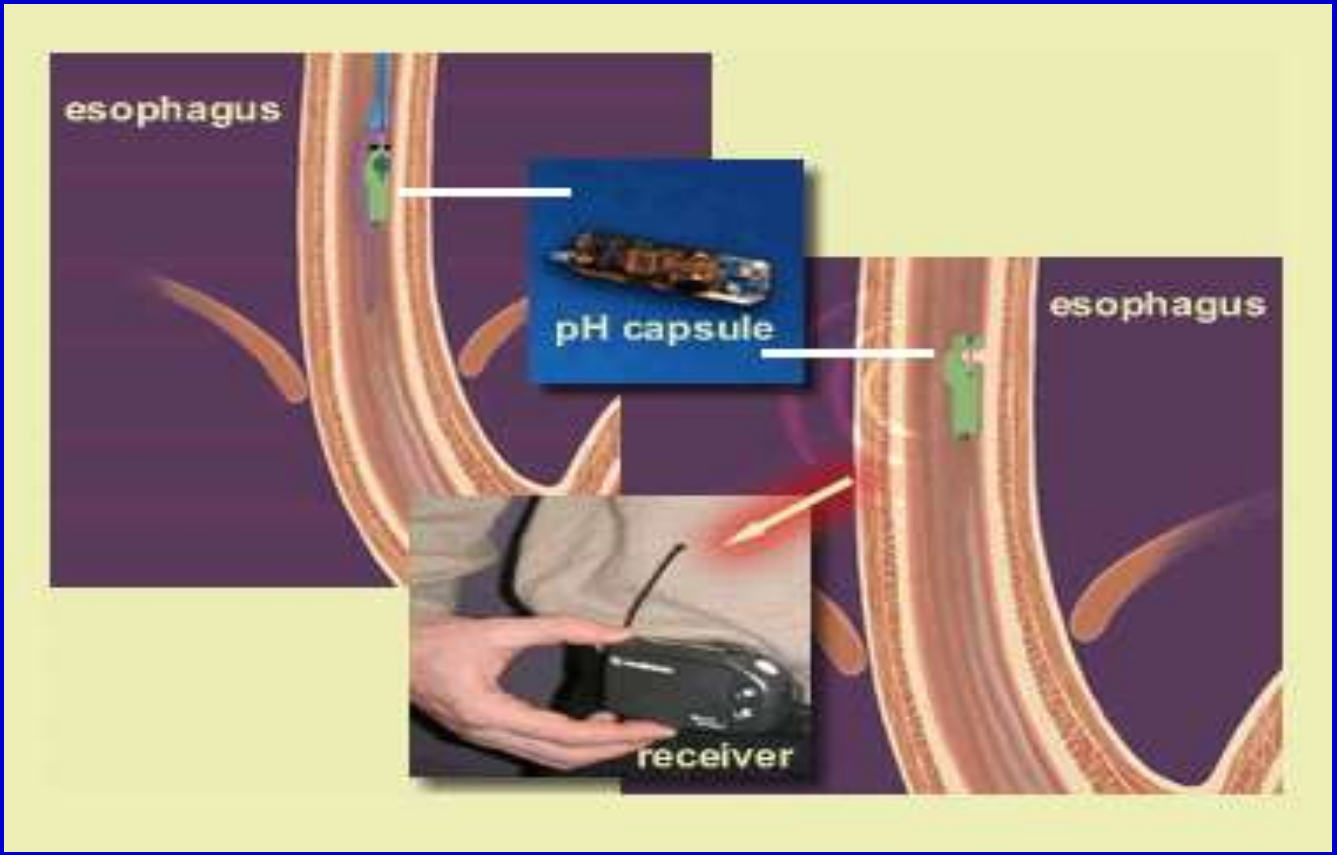
MECHANICALLY DEFECTIVE LES - DEFINITION

- SPHINCTER PRESSURE < 6 mmHg
- SPHINCTER LENGH < 1 cm. BELOW RESP. INVERSION POINT
- OVERALL SPHINCTER LENGTH < 2 cm.

24 HR. DISTAL ESOPHAGEAL pH MONITORING

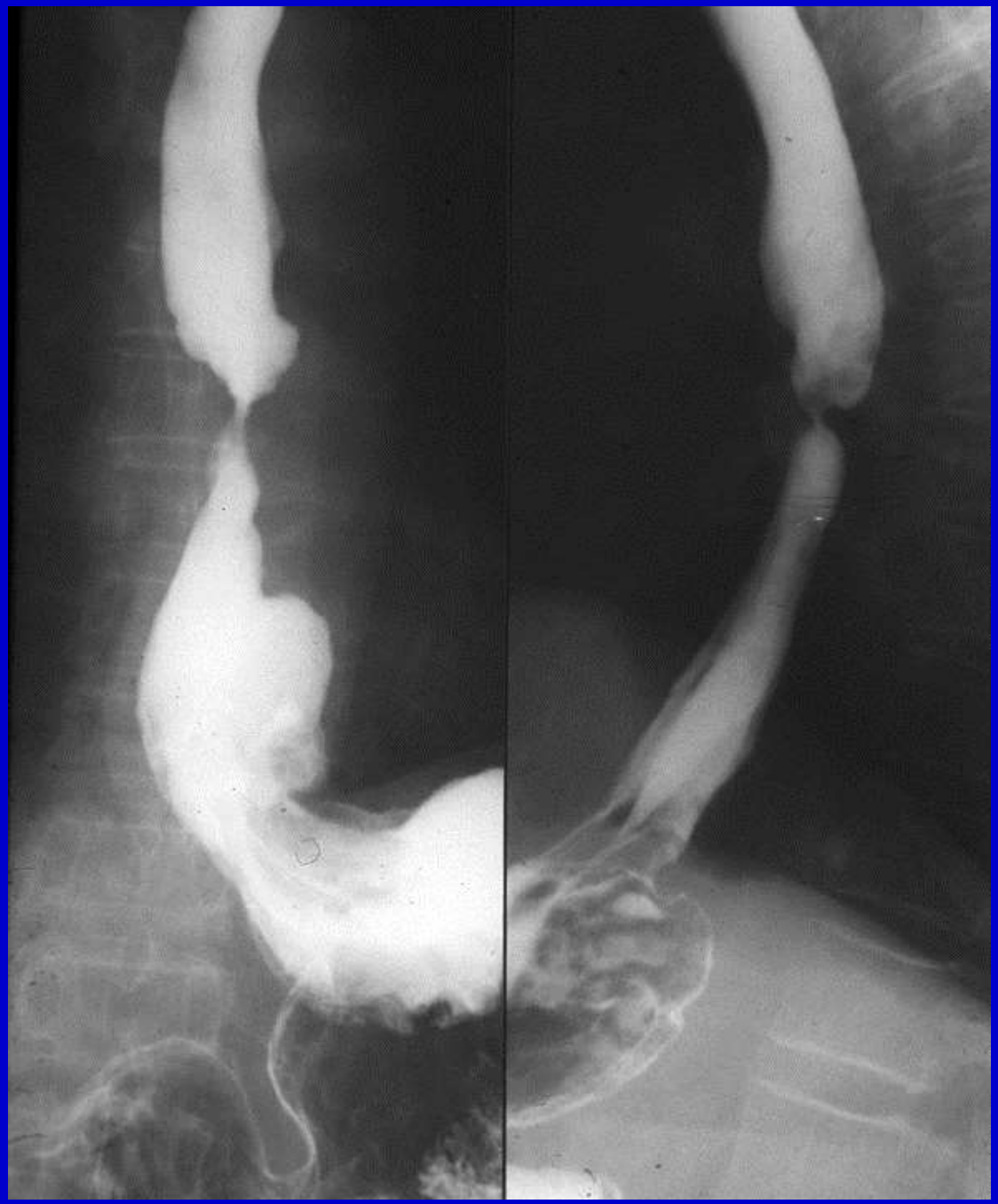
- pH PROBE 5 cm. ABOVE HPZ
- NO H_2 BLOCKERS OR PPI's FOR 48-72 HRS.
- 6 COMPONENTS RECORDED
    1. % TOTAL TIME pH <4
    2. % UPRIGHT TIME pH <4
    3. % SUPINE TIME pH <4
    4. # REFLUX EPISODES
    5. # EPISODES $\geq$ 5 MINUTES
    6. LONGEST EPISODE (MINUTES)
- COMPOSITE (DeMEESTER) SCORE > 14.7, or % TOTAL TIME pH <4 = >4% REPRESENT ABNORMAL ESOPHAGEAL ACID EXPOSURE

BRAVO pH Monitoring System



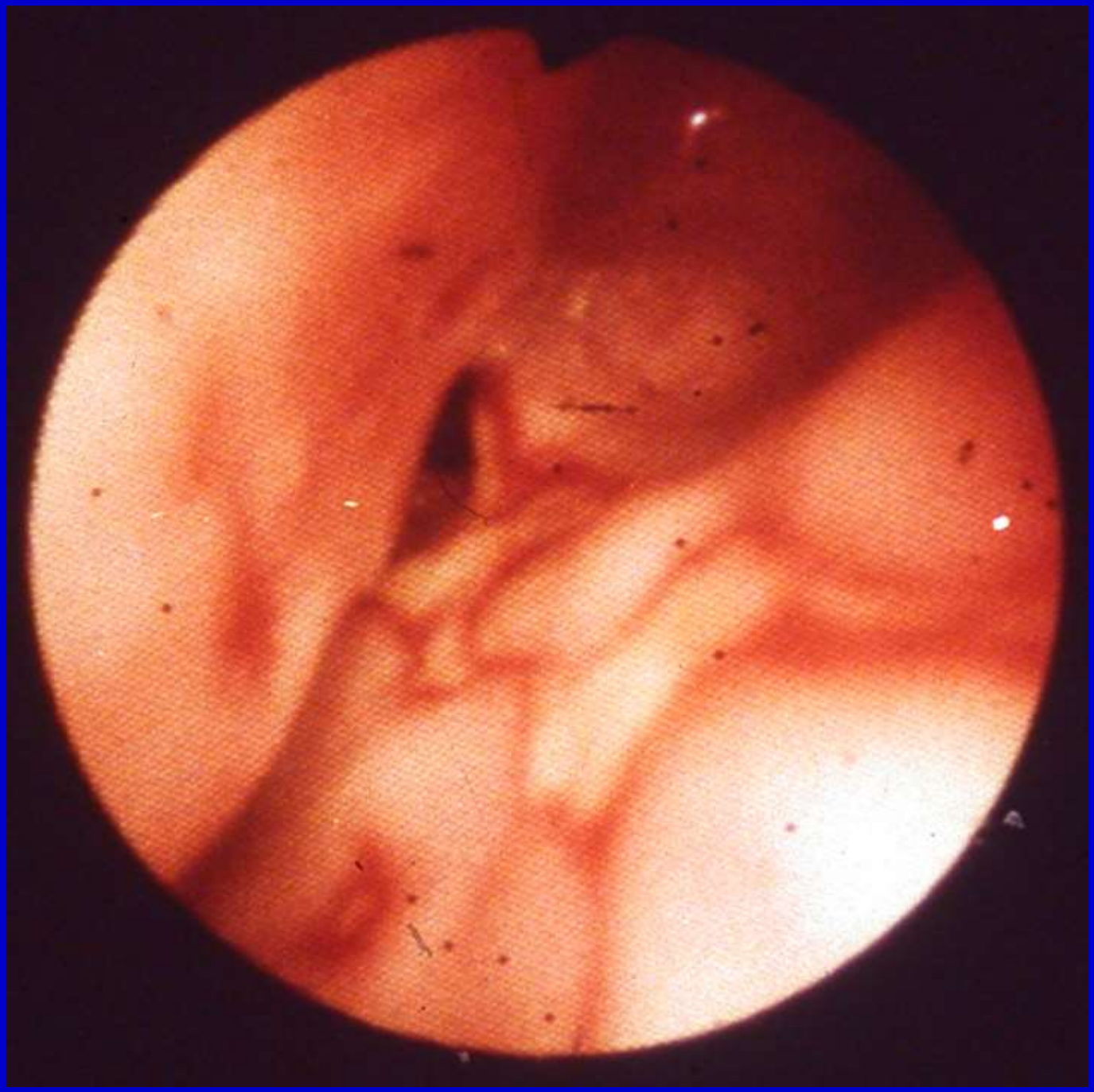
ESOPHAGITIS

- 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

H_2 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

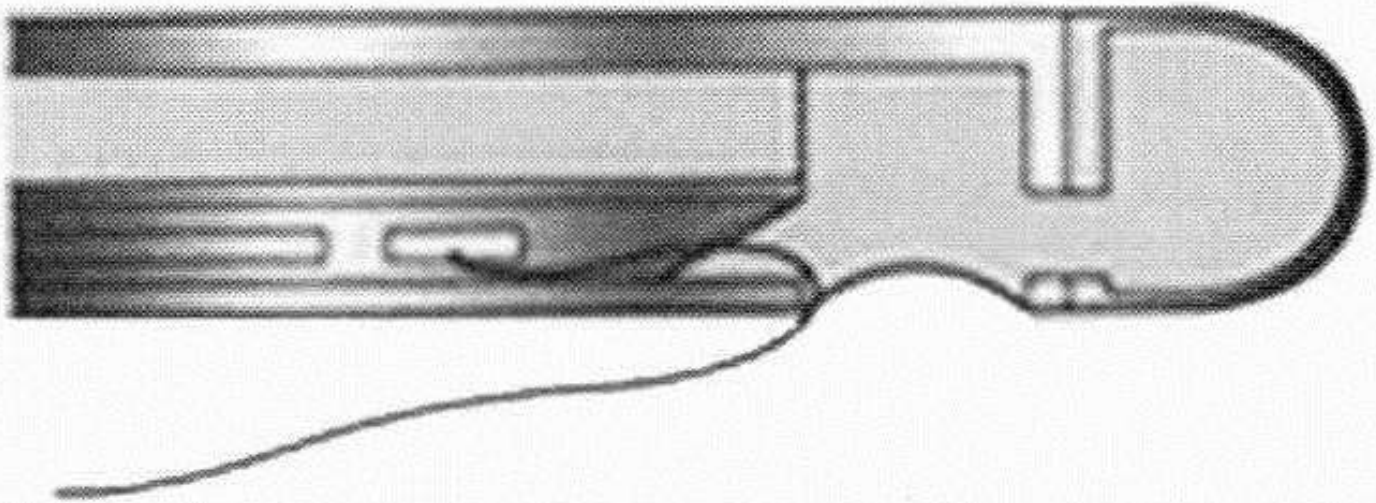


Fig. 1. The Endoscopic sewing machine. (*From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)

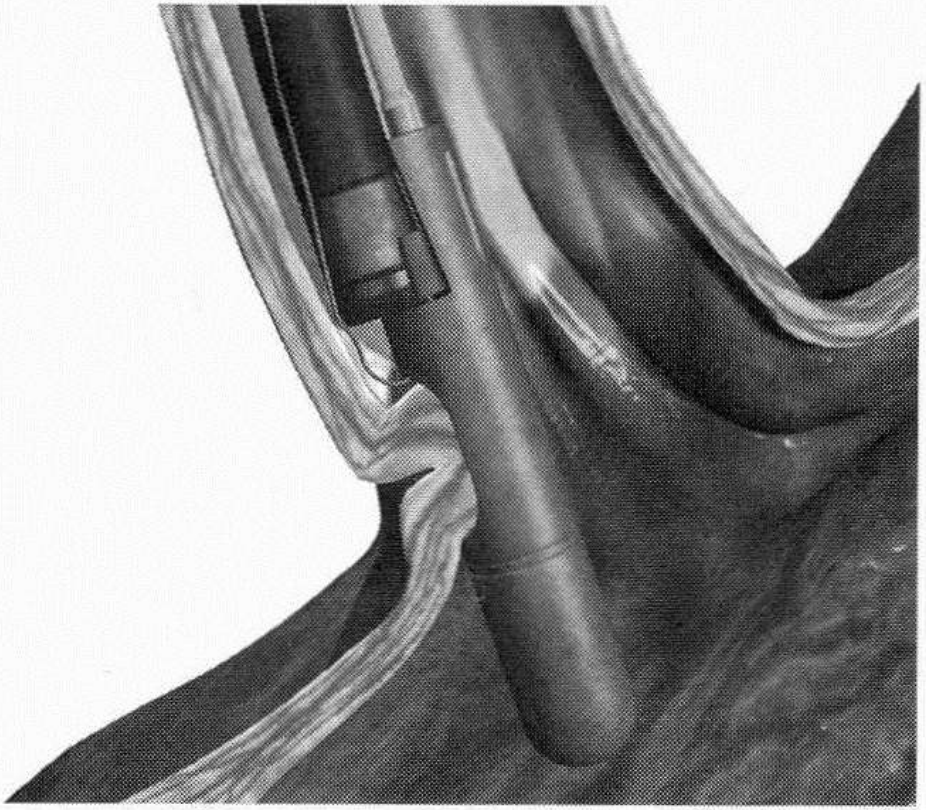


Fig. 2. A vacuum is applied and tissue is drawn into the capsule by suction, and a hollow needle with a suture tag is passed through the tissue. (*From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)

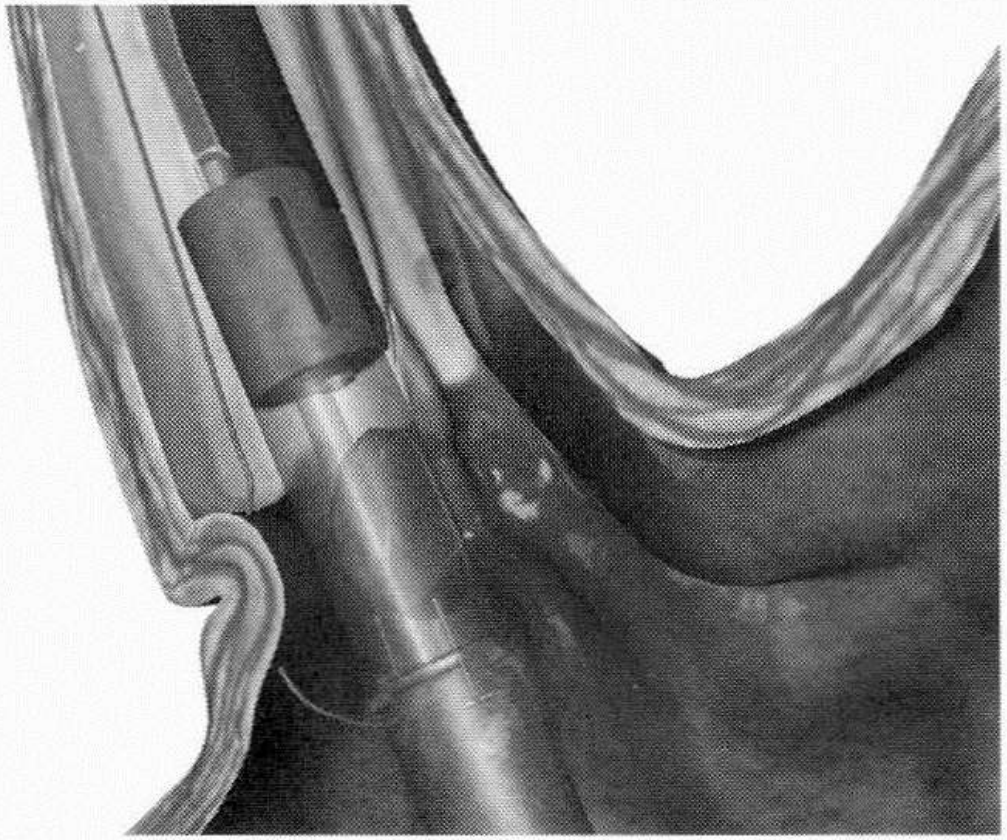


Fig. 3. Suction is released and the capsule is withdrawn from the esophagus. The suture is reloaded and the process is repeated at the same level. (*From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)

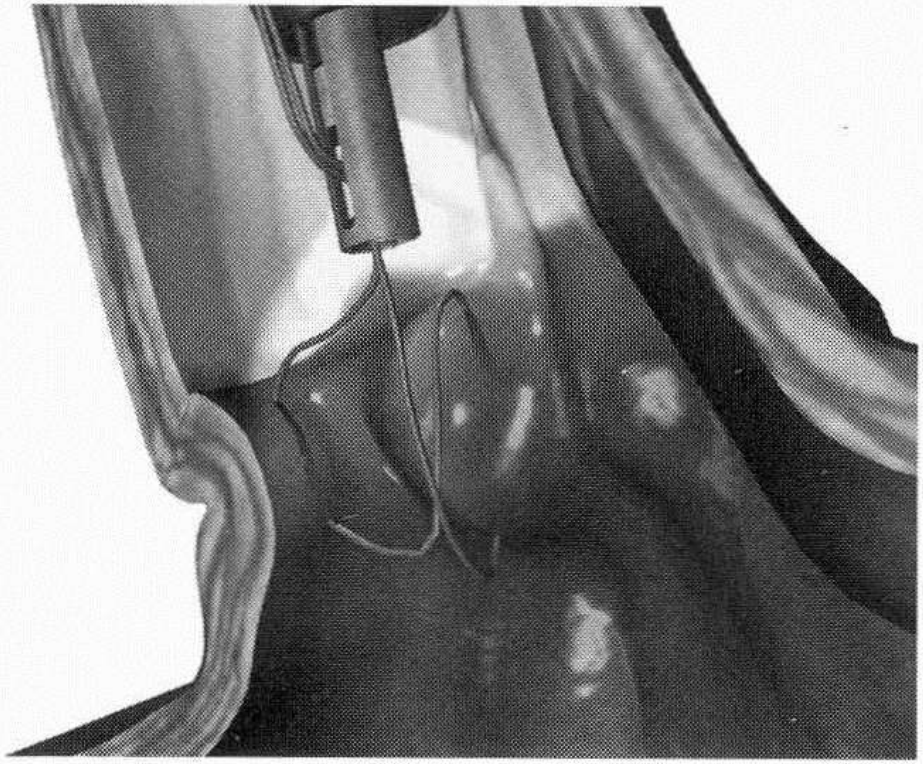


Fig. 4. After the suture ends are loaded into the anchor, the anchoring system is passed down the esophagus. Traction on the sutures and pressure on the endoscope tightens the plication. (*From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. 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 gastro-esophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)

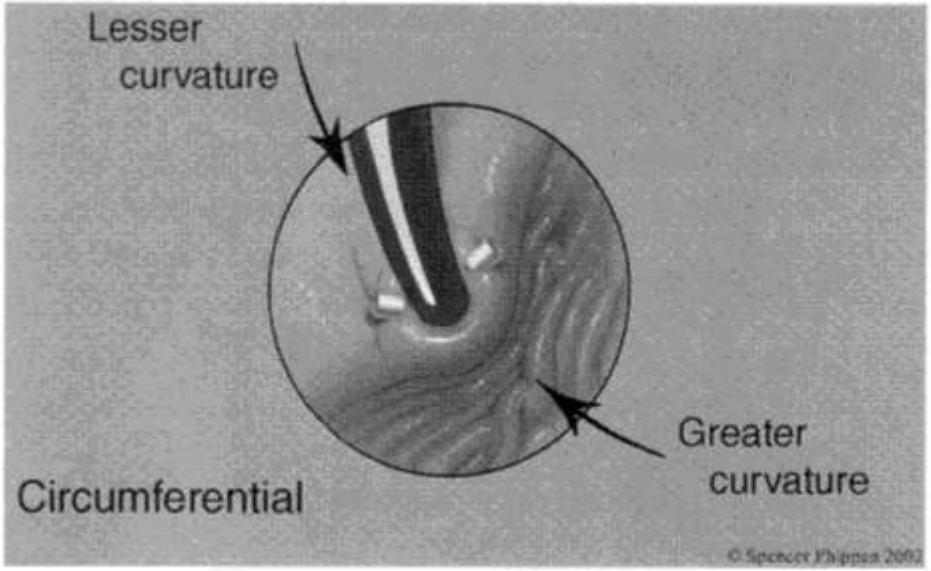


Fig. 6. Circumferential configuration of plications.

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].

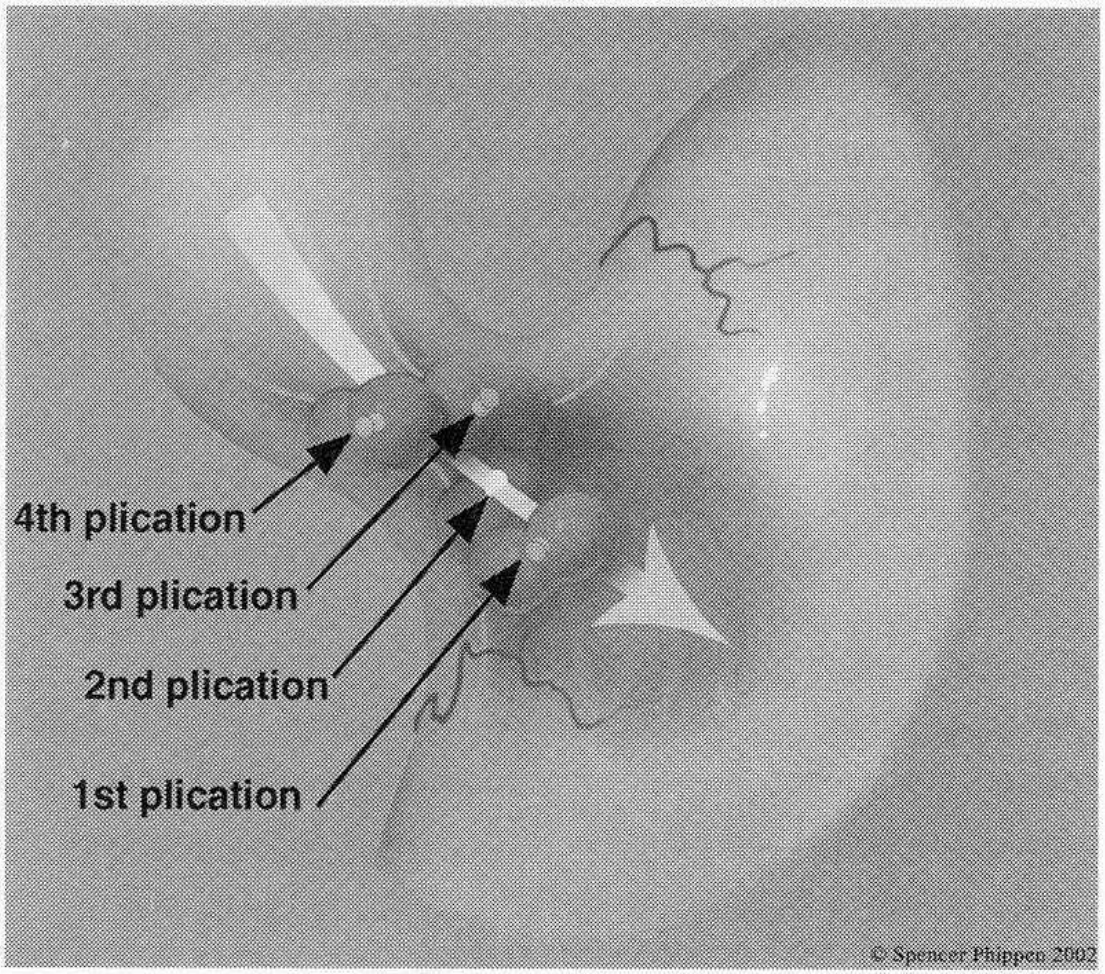


Fig. 7. Helical configuration of plications. (*From* Davis RE, Filipi CJ. New intraluminal approaches to gastroesophageal reflux disease. In: Cameron JL, editor. Current surgical therapy. 8th edition. St. Louis: Mosby; 1984; with permission.)

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

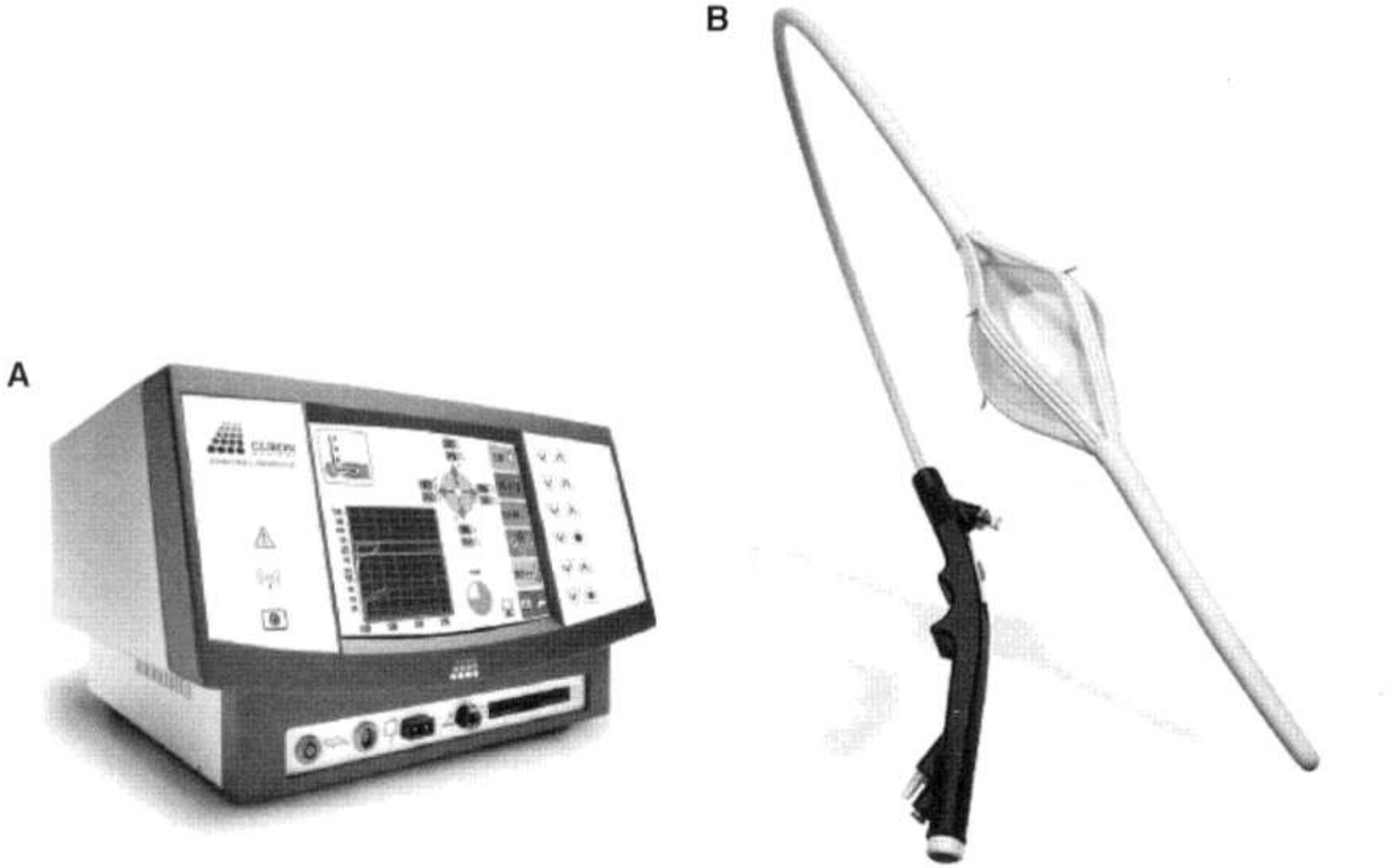
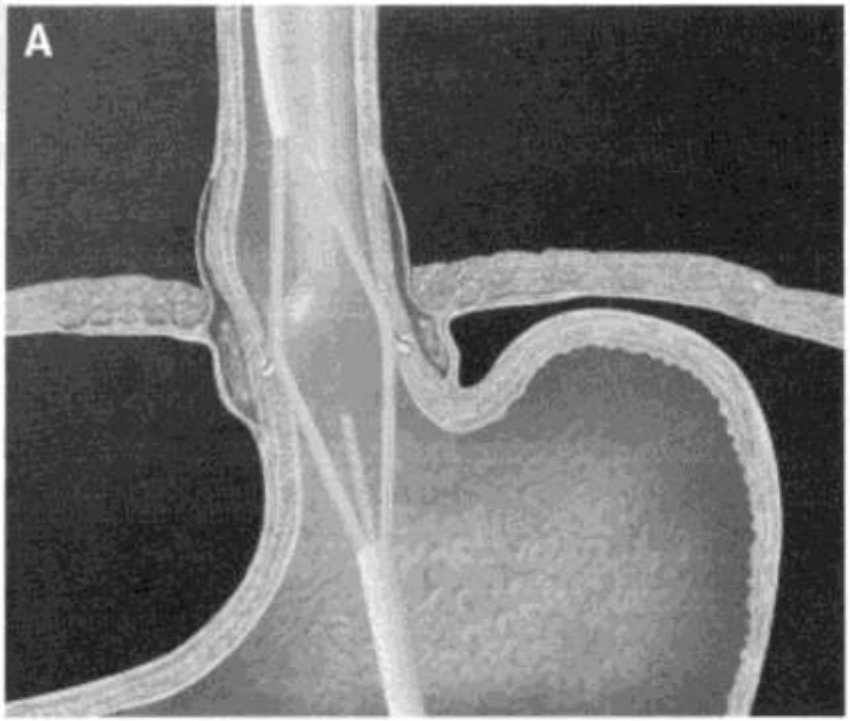


Fig. 1. The Stretta RF energy control module (*A*) and catheter (*B*). (Courtesy of Curon Medical, Inc, Fremont, CA; with permission.)



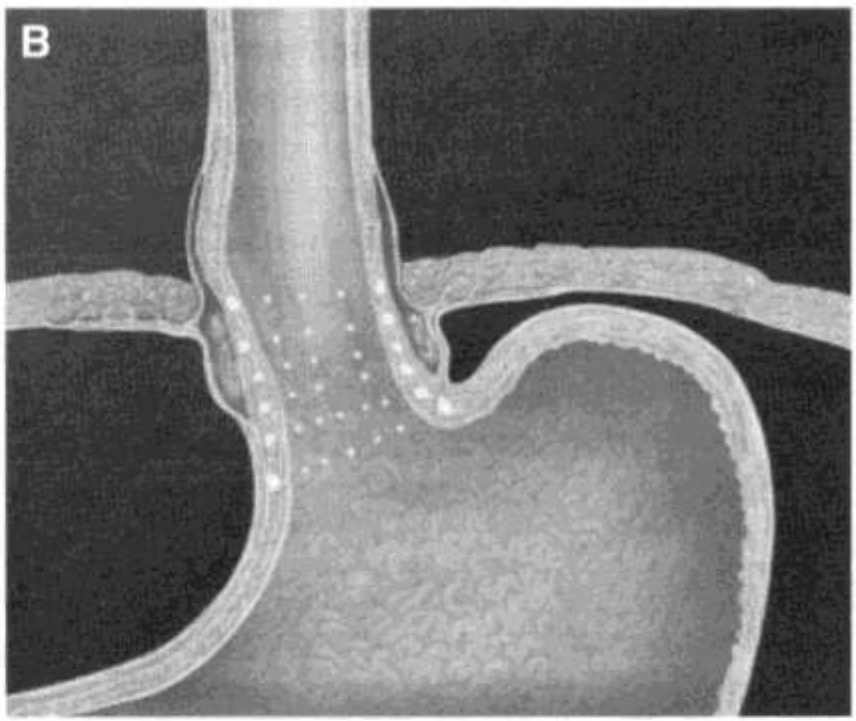


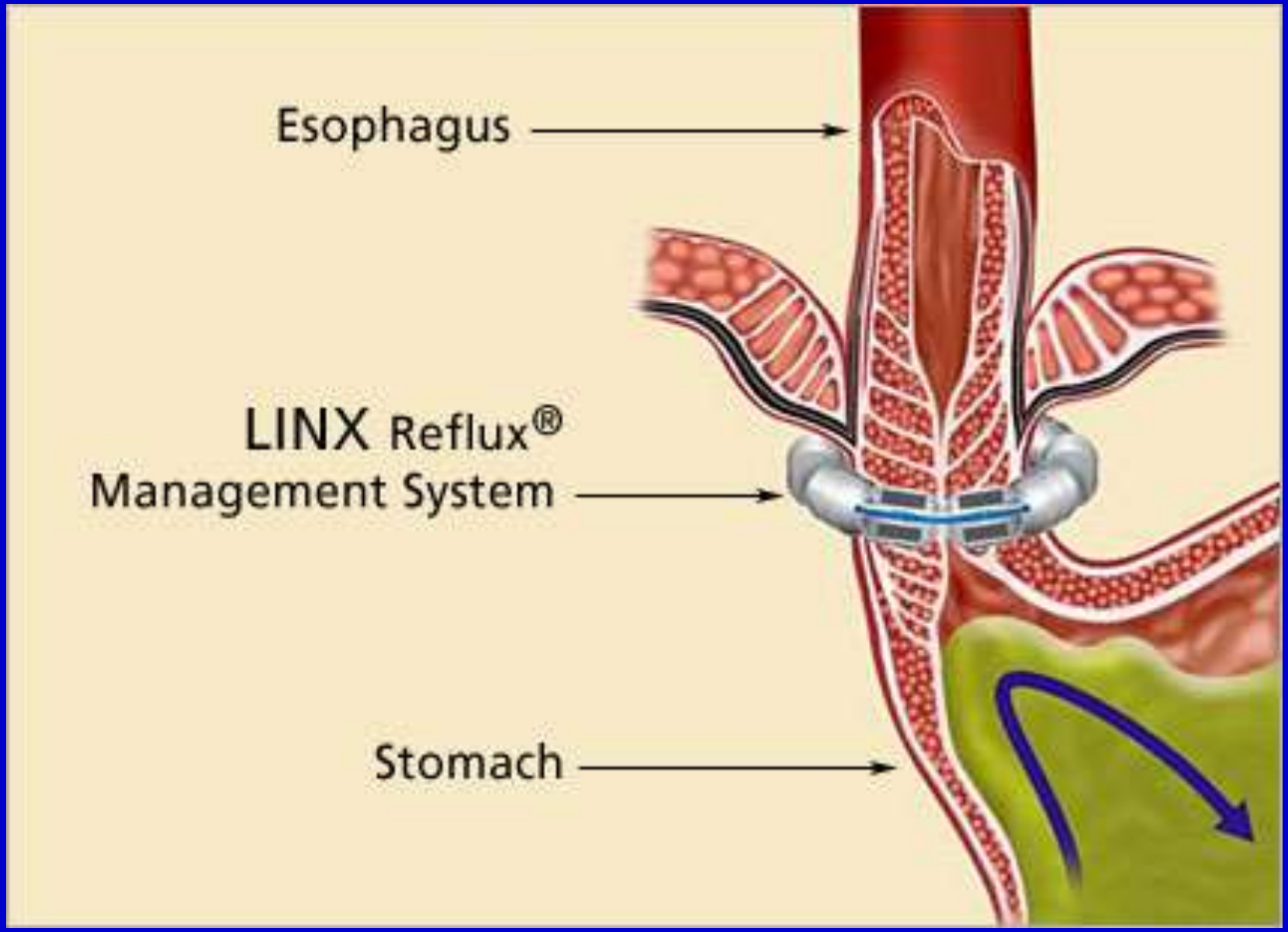
Fig. 2. (*A*) The Stretta catheter is delivered endoluminally and positioned at the gastroesophageal junction. Temperature-controlled RF energy is delivered to the muscle while cooling the mucosa. (*B*) Six rings of thermal lesions are created from above the Z line to the cardia.

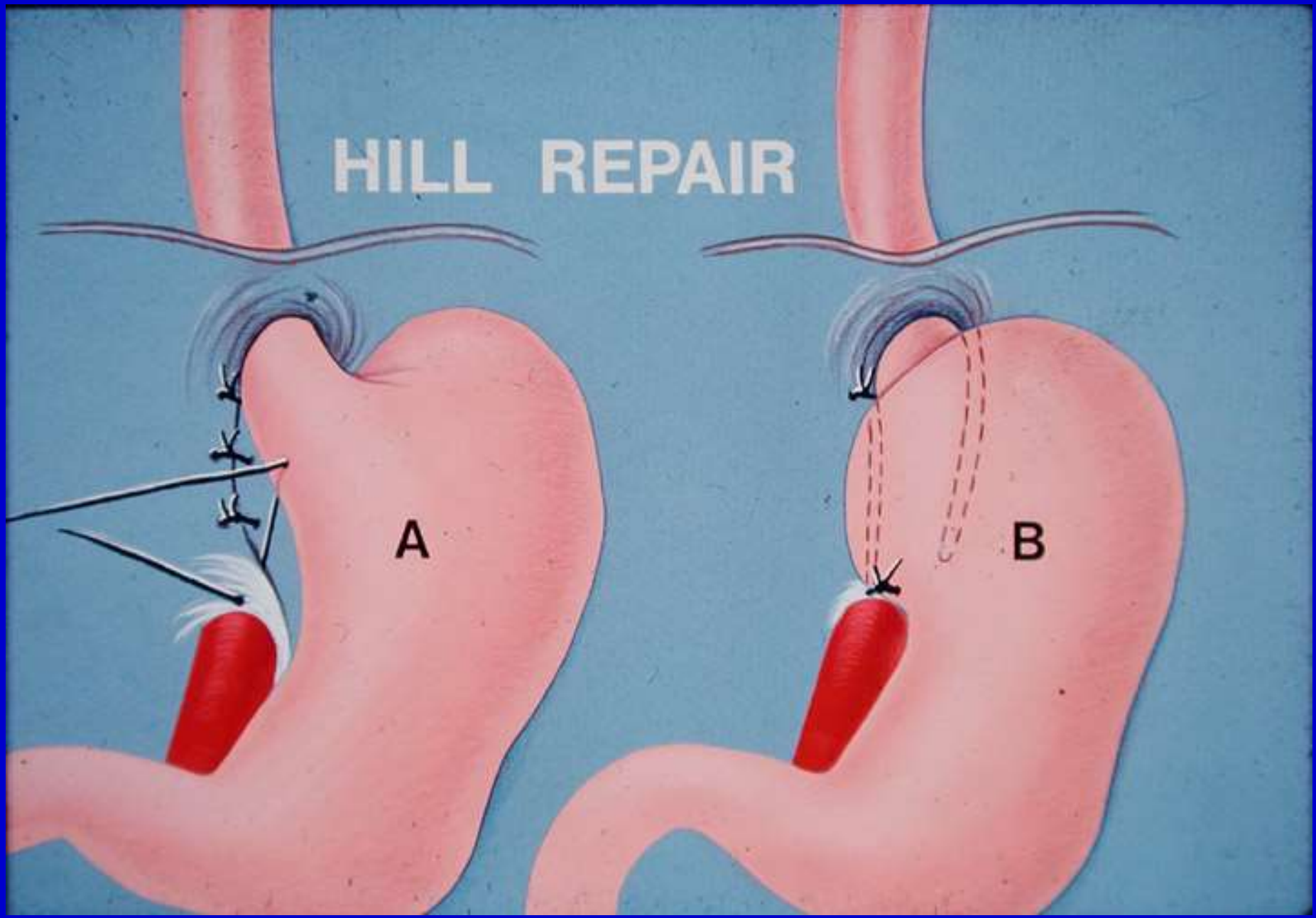
STRETTA PROCEDURE RESULTS

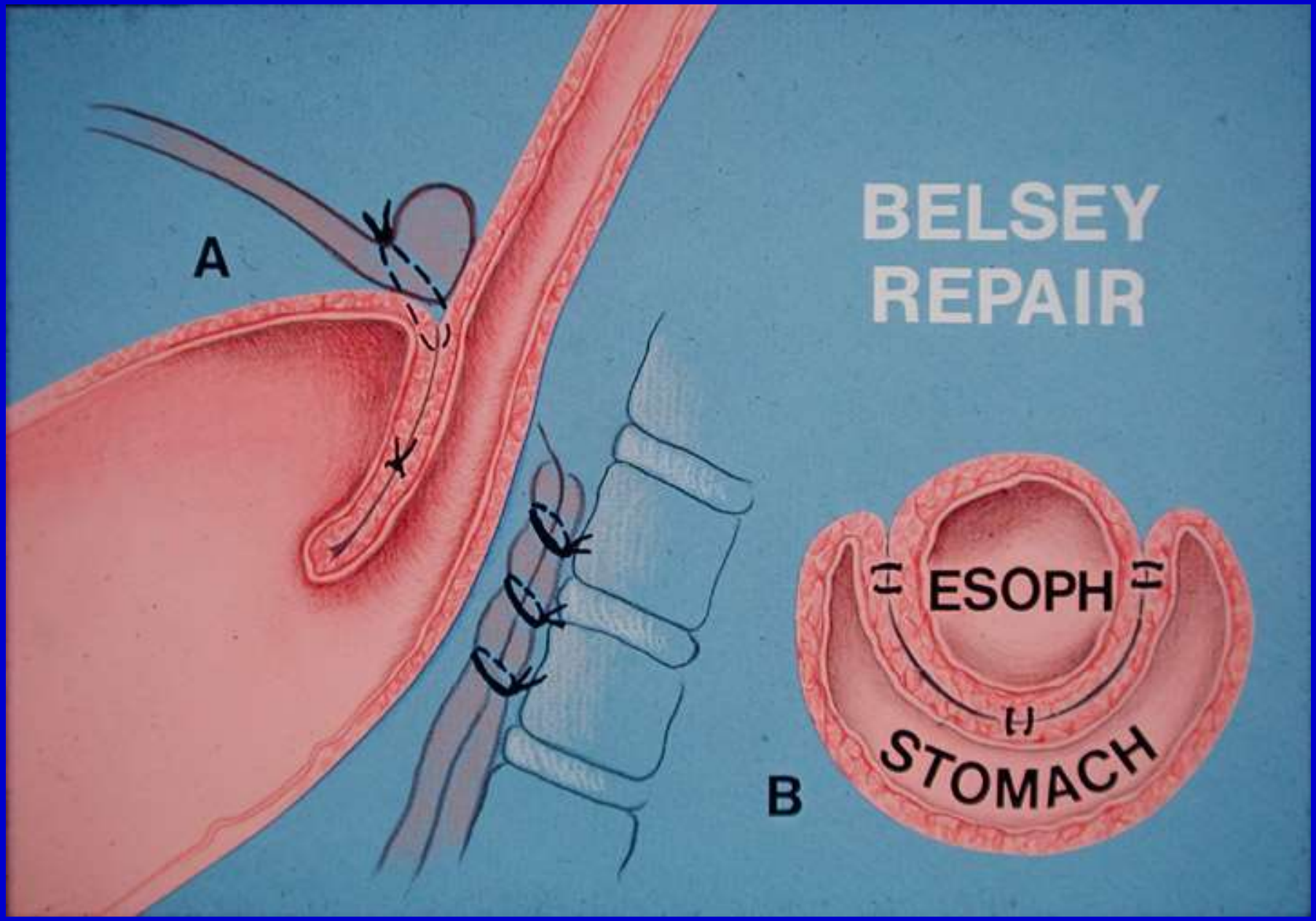
AT 2 YRS. SUSTAINED IMPROVEMENT IN

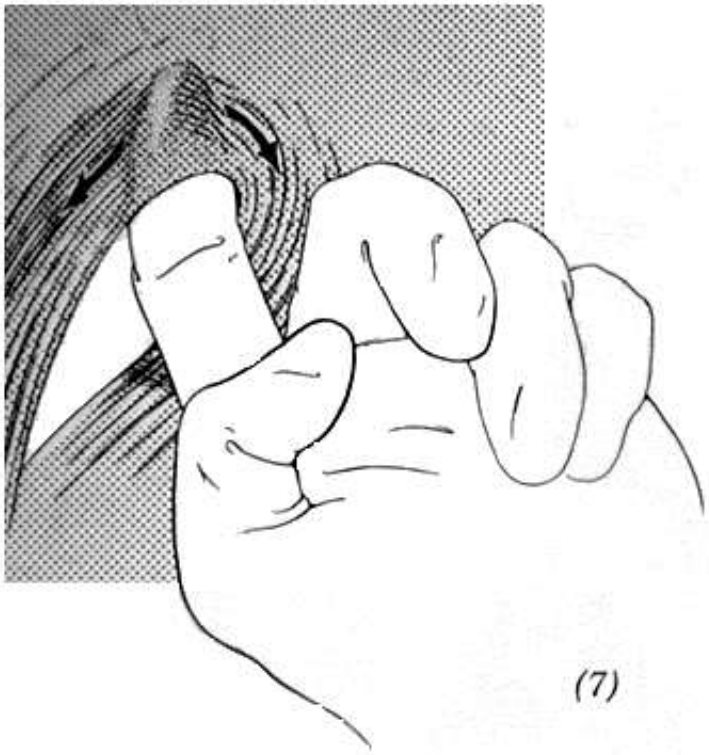
- GERD – SPECIFIC QOL
- HEARTBURN
- SATISFACTION
- MEDICATION USE


Keck Medical
Center of USC

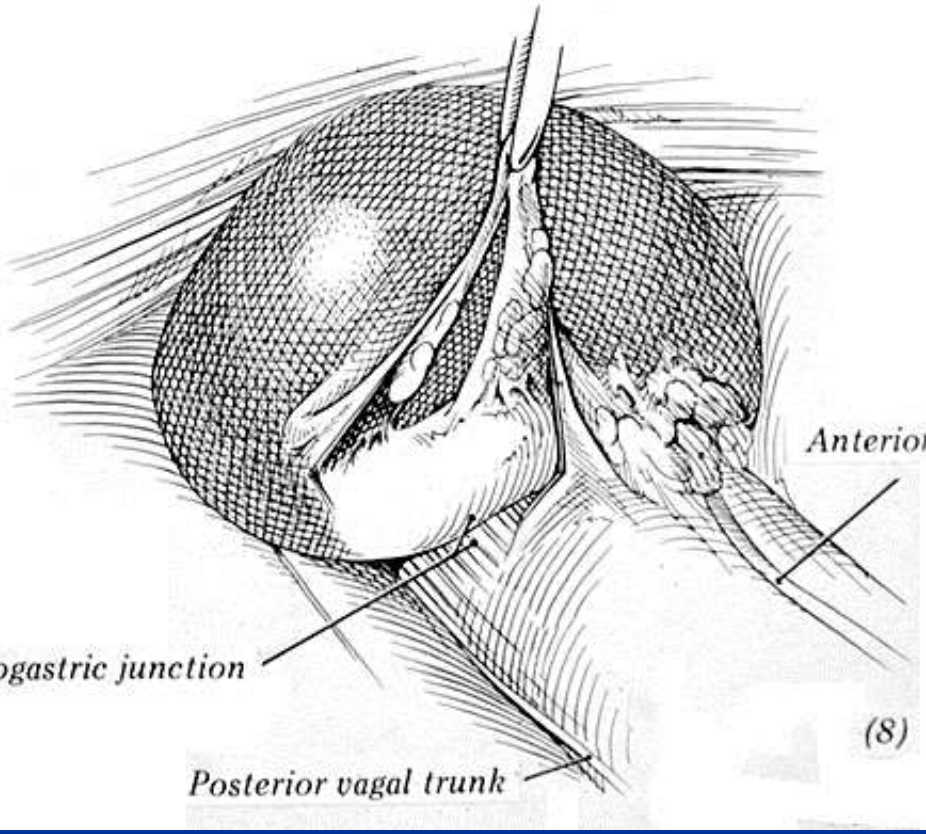

Esophagus
LINX Reflux®
Management System
Stomach


HILL REPAIR
A
B

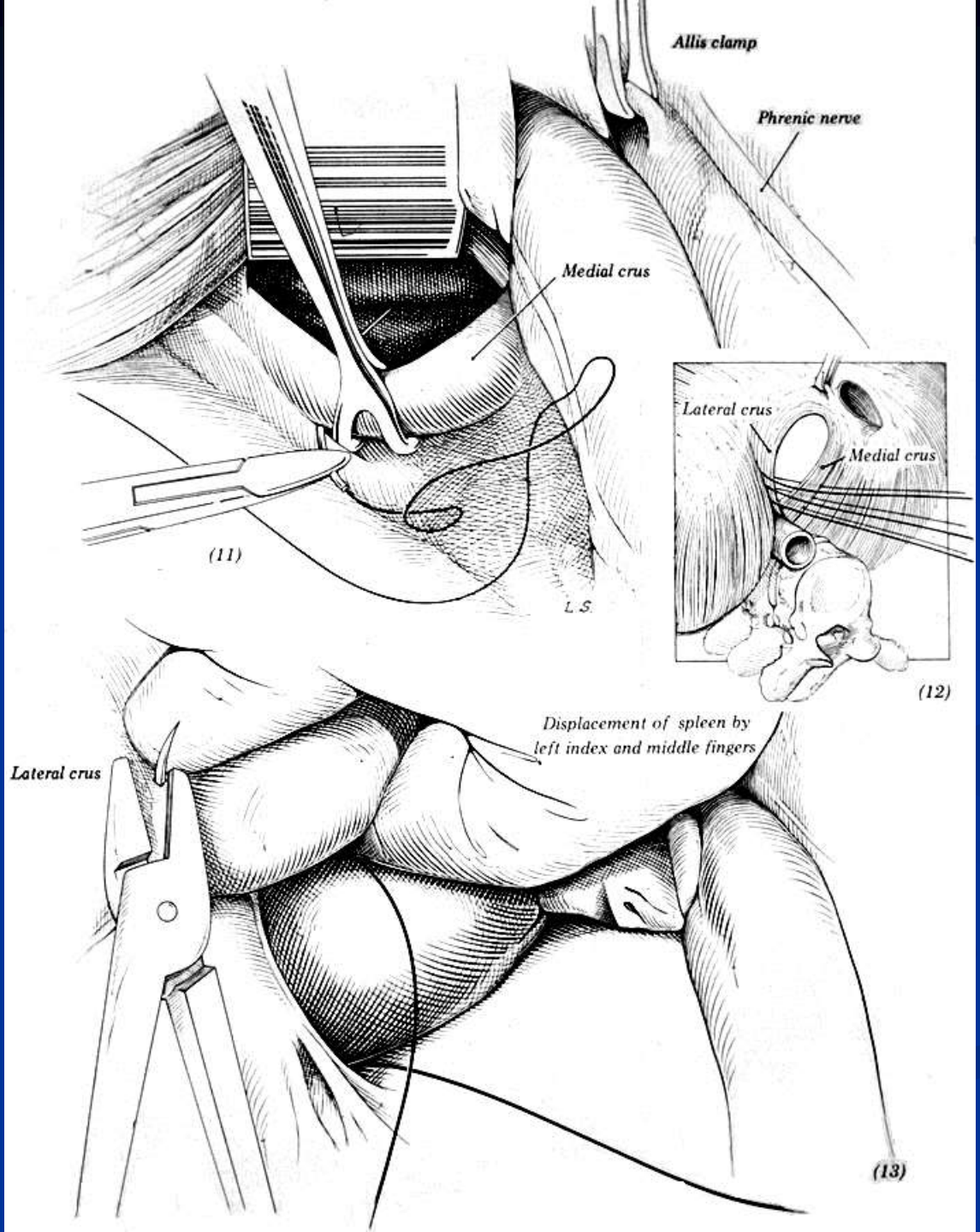

BELSEY
REPAIR
A
ESOPH
STOMACH
B

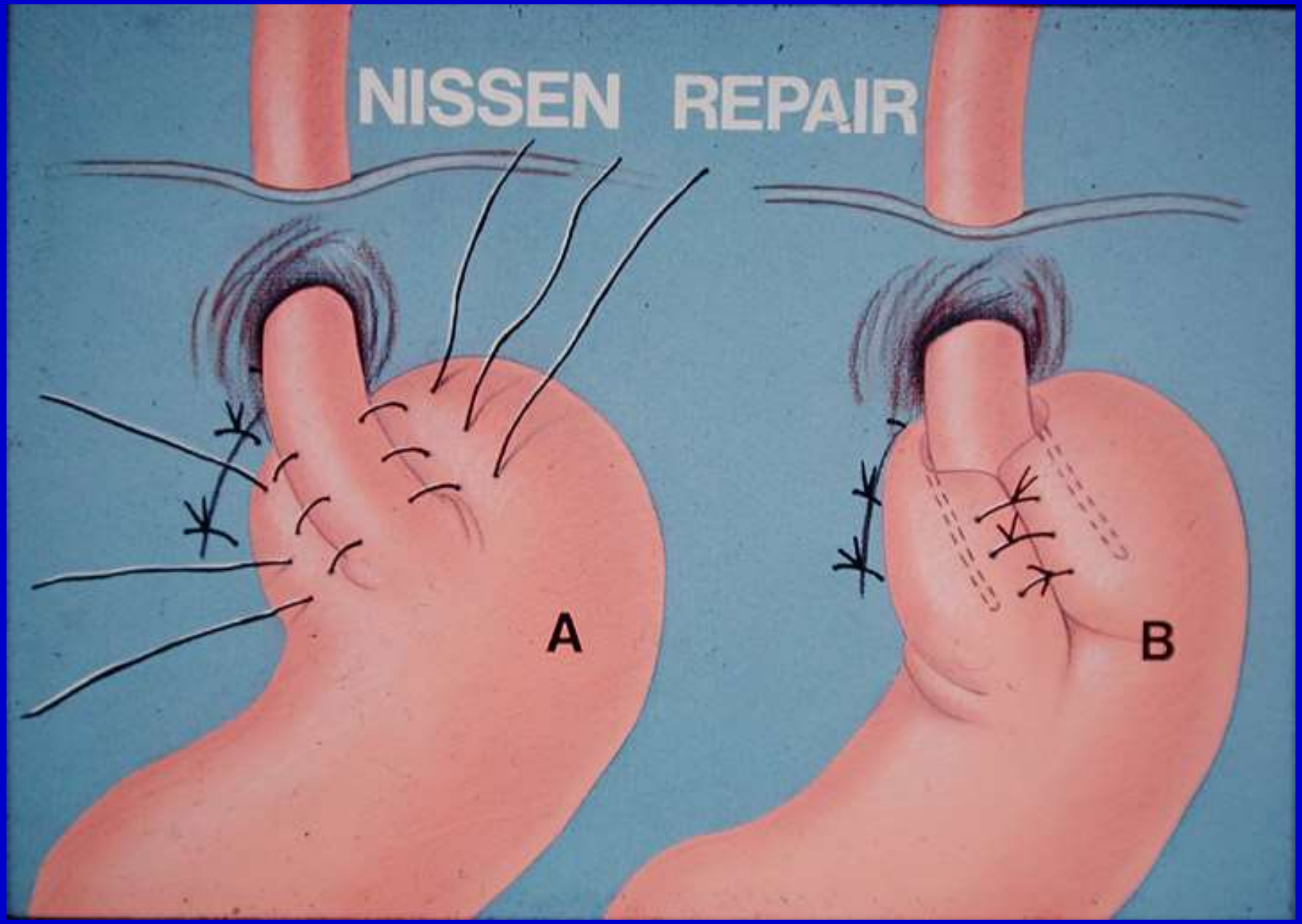


(7)


Anterior vagal trunk
Esophagogastric junction
Posterior vagal trunk

(8)


Allis clamp
Phrenic nerve
Medial crus
(11)
L.S.
Lateral crus
Medial crus
(12)
Displacement of spleen by
left index and middle fingers
Lateral crus
(13)


NISSEN REPAIR
A
B

LAPAROSCOPIC FUNDOPLICATIONS

NISSEN – 360^{o}

DOR – 240^{o} (ANTERIOR)

TOUPET – 240^{o} (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 - FUNDOPLICATION, GASTROPLASTY TUBE, OR HIATUS TOO TIGHT

COMPLICATIONS OF HIATUS HERNIA SURGERY

POSTOPERATIVE (continued)

- "GAS BLOATS"
- GASTRIC ATONY - PLYOROSPASM
- 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

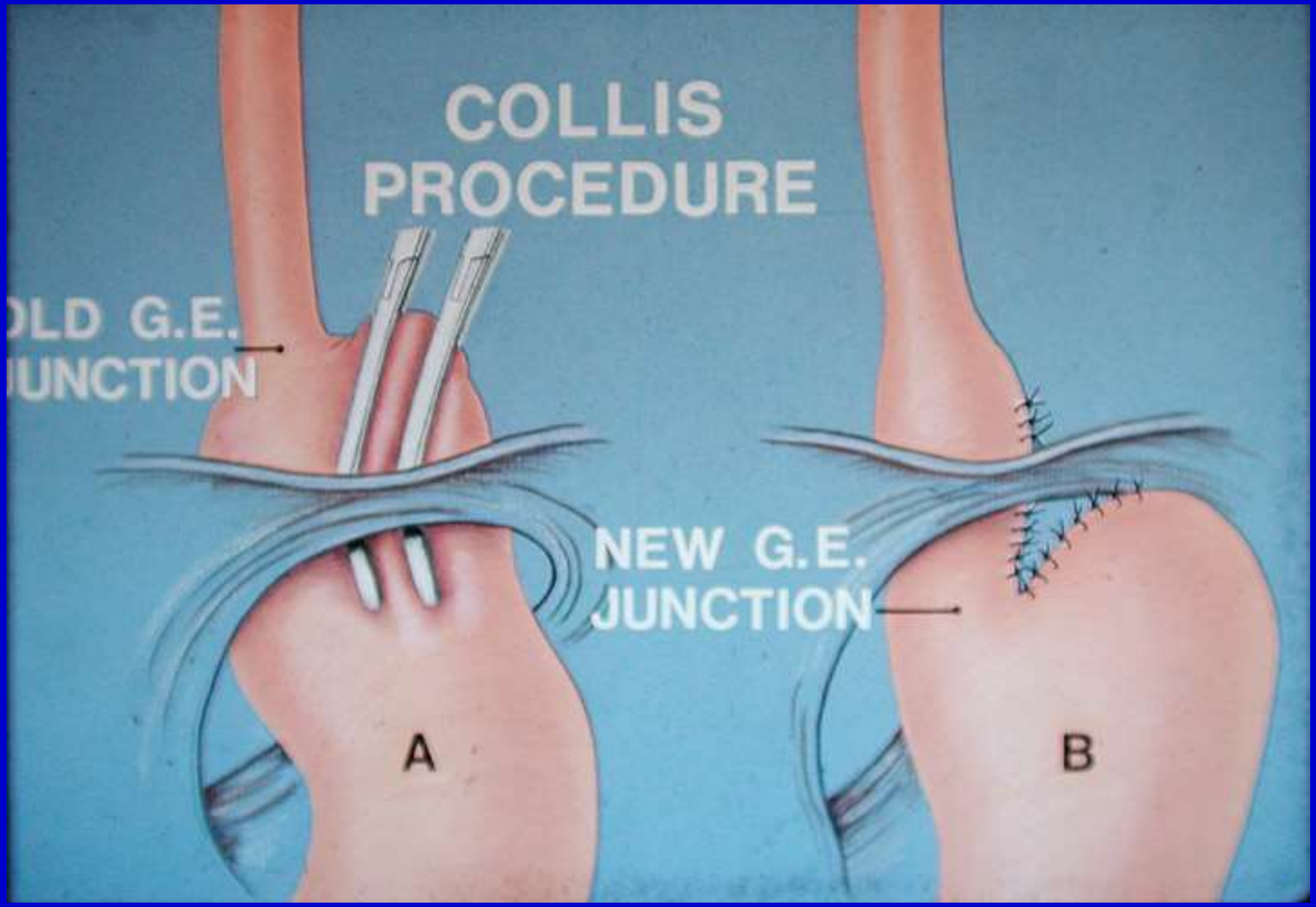
- OBESITY
- CHRONIC COUGH/COPD
- REPETITIVE VALSALVAS

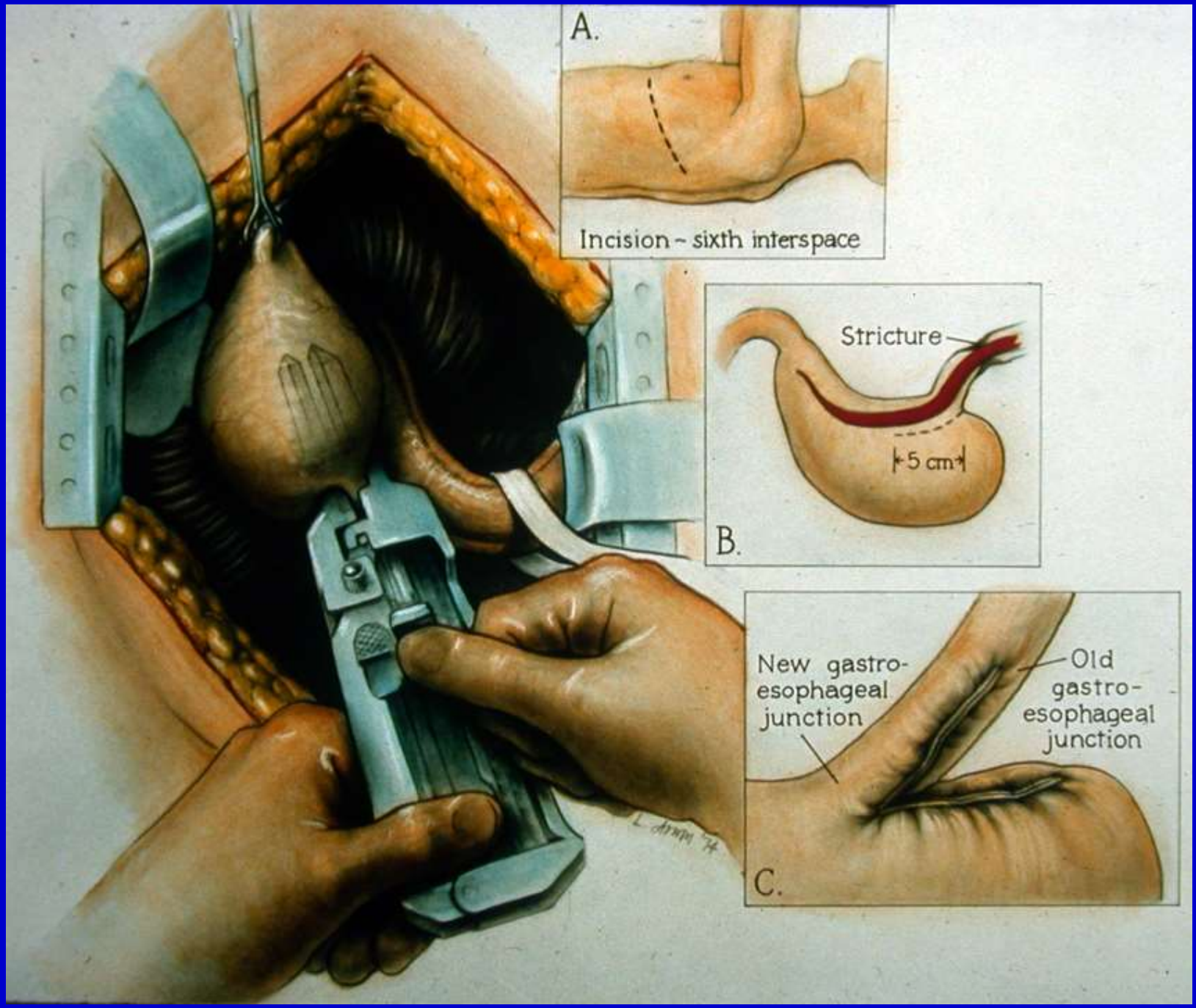
  HEAVY LIFTING

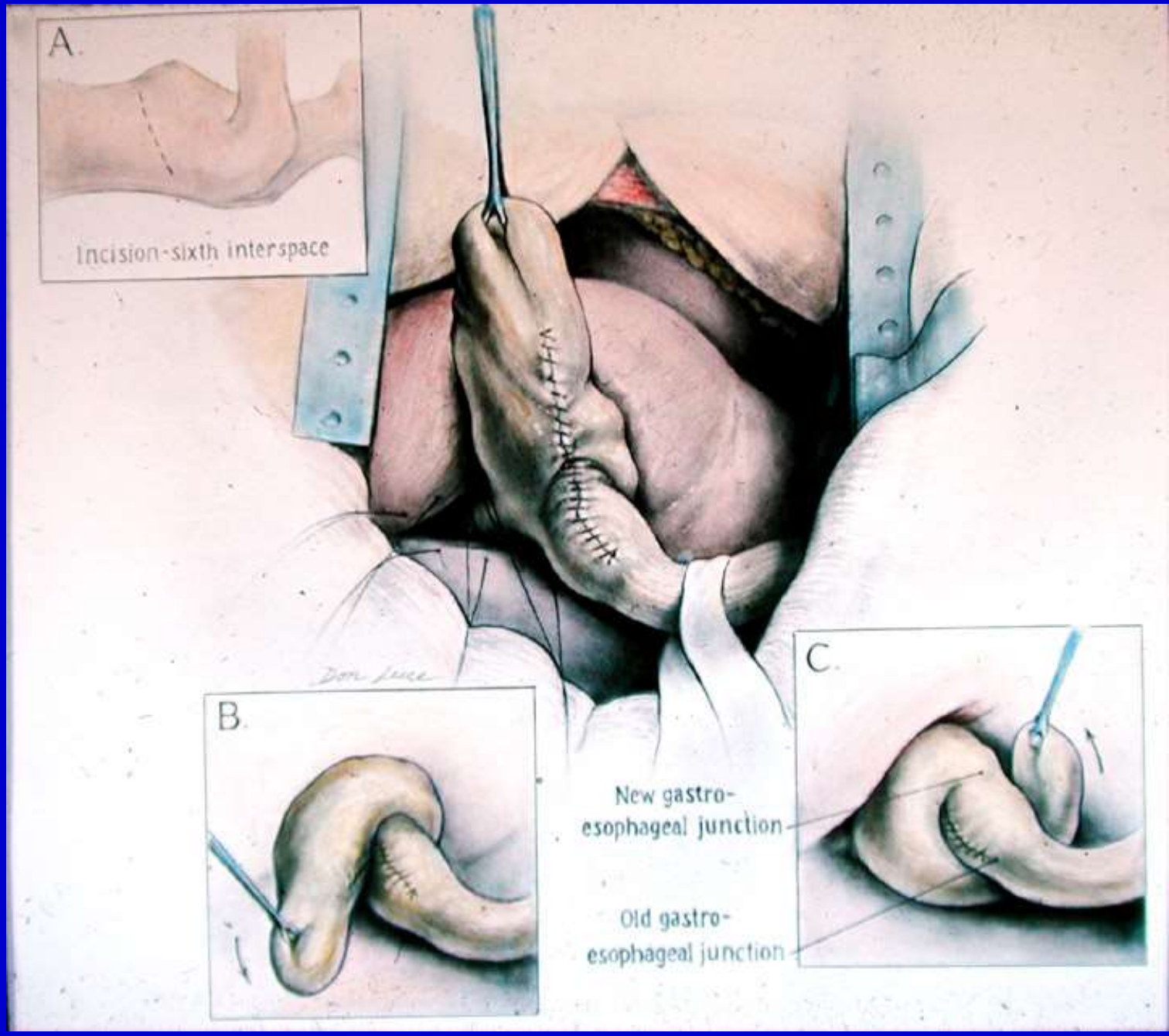
  SPASTIC DISORDERS

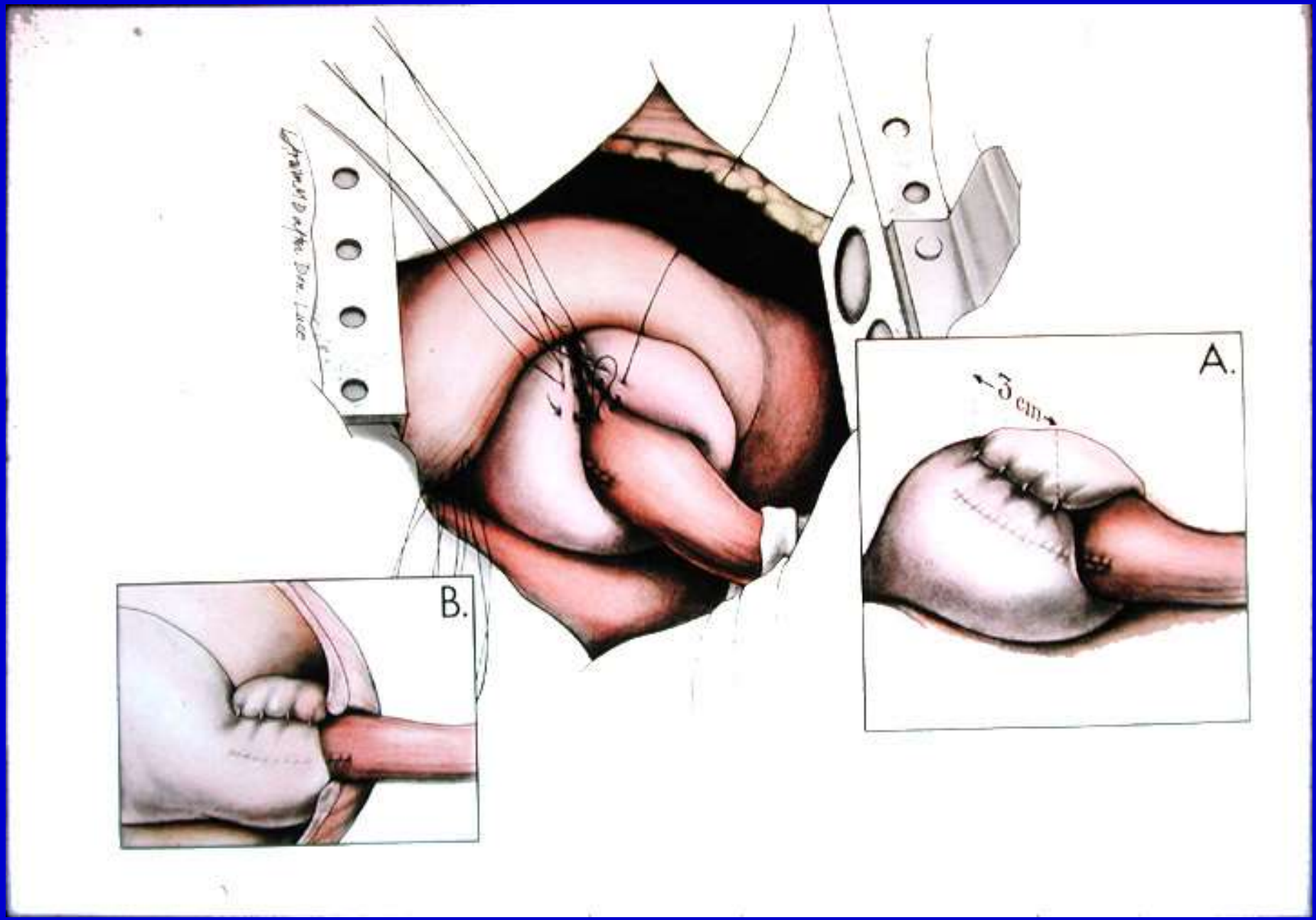
ESOPHAGITIS AND RECURRENCE RATE AFTER BELSEY REPAIR

	ORRINGER, et al-1971		DONNELLY, et al -1973	
	NO.	RECURRENCE RATE	NO.	RECURRENCE RATE
NO STRICTURE	799	10%	43	20%
STRICTURE - PERIESOPHAGITIS	20	45%	16	75%


COLLIS
PROCEDURE
LD G.E.
UNCTION
NEW G.E.
JUNCTION
A
B


A.
Incision – sixth interspace
Stricture
5 cm
B.
New gastro-esophageal junction
Old gastro-esophageal junction
C.


A.
Incision - sixth interspace
B.
C.
New gastro-esophageal junction
Old gastro-esophageal junction


A.
3 cm
B.

COMPLICATIONS OF PARAESOPHAGEAL HERNIAS

29% MORTALITY (6/21)-WITH MEDICAL TREATMENT

(STRANGULATION, PERFORATION, HEMORRHAGE,

ACUTE DILATION)-SKINNER & BELSEY-(1967)

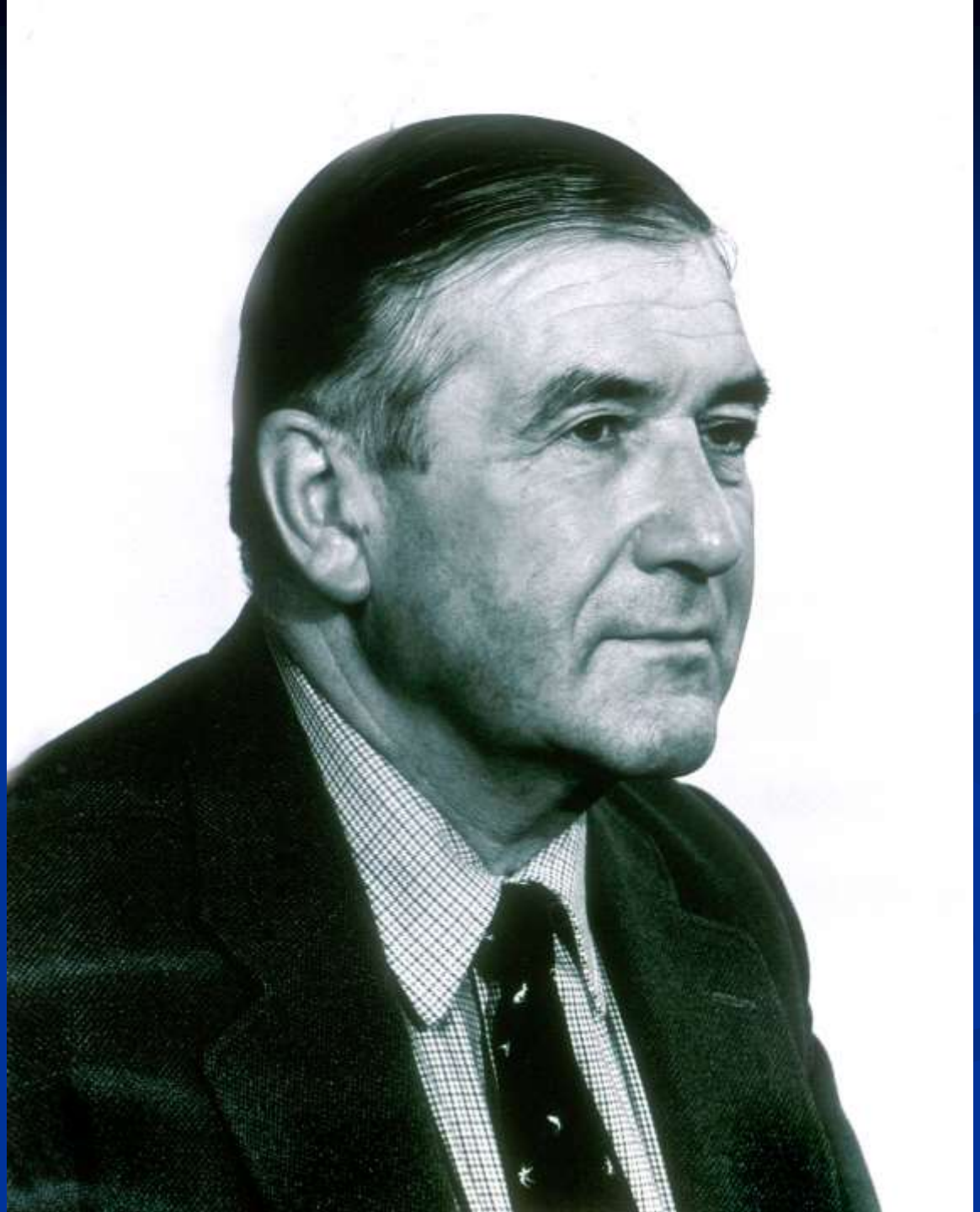
68% MAJOR COMPLICATION RATE (21/31)-OZDEMIR (1973)

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!

J American Coll Surgeons
1997;184:399-400

The Surgeon at Work

Laparoscopic Mesh Repair of the Esophageal Hiatus

Thomas R. Huntington, M.D.

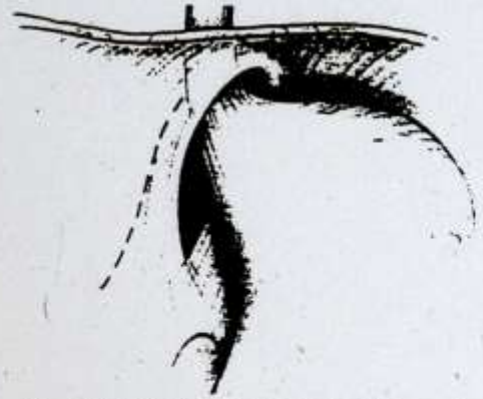
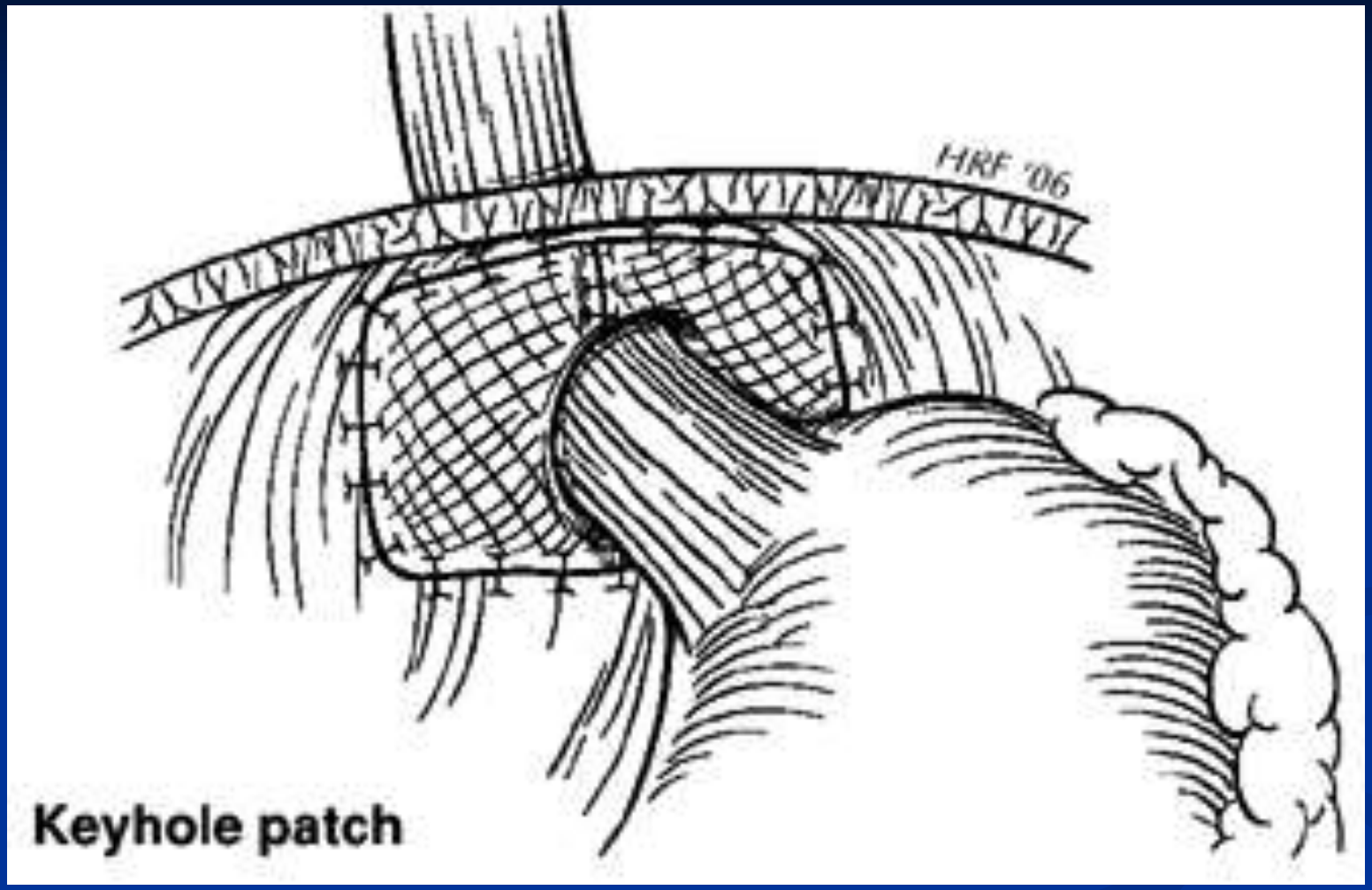


FIG. 1. Esophageal hiatus showing the relaxing incision into the right diaphragmatic crus (*dashed line*).

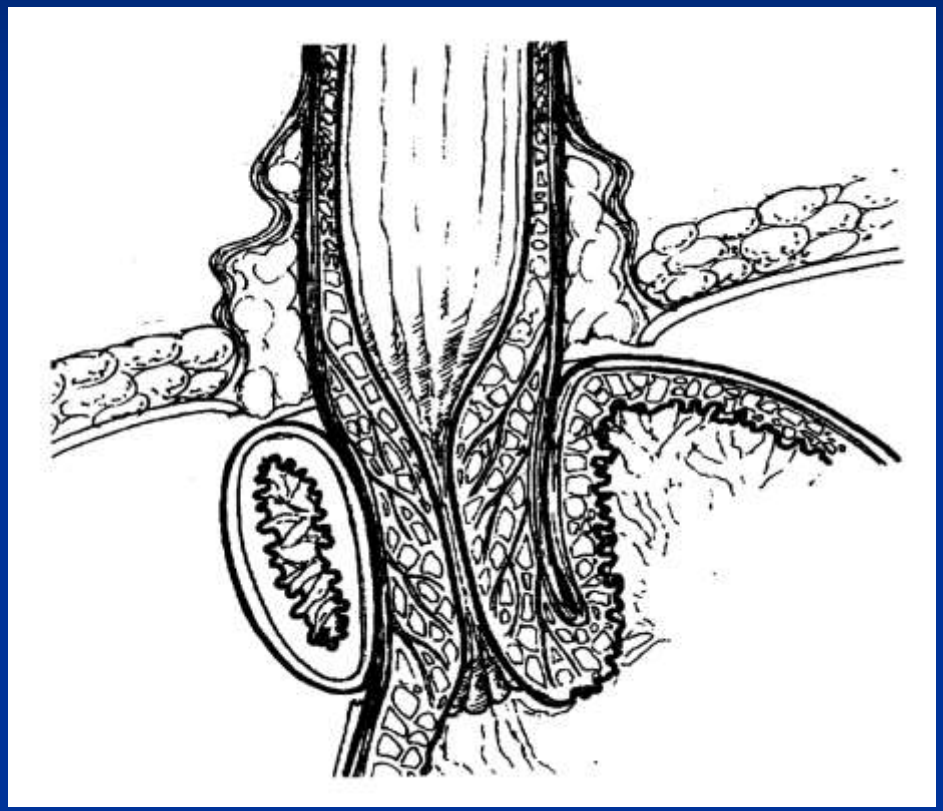
FIG. 2. Closure of the hiatus anterior and posterior to esophagus showing the defect resulting from the relaxing incision into the right diaphragmatic crus (*arrows*).

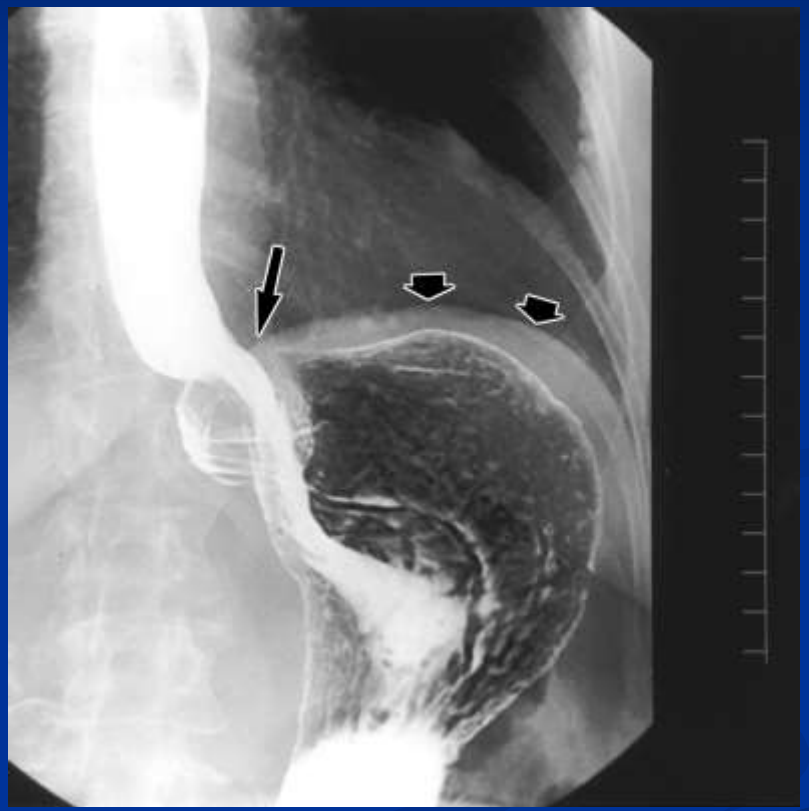
FIG. 3. Mesh is stapled over the relaxing incision defect. Staples are kept away from the esophagus and pericardium.



From Critchlow J. "Paraesophageal herniation" in: Fischer JE (ed.). *Mastery of Surgery, 5th ed.* Lippincott Williams & Wilkins, Philadelphia PA, 2007.

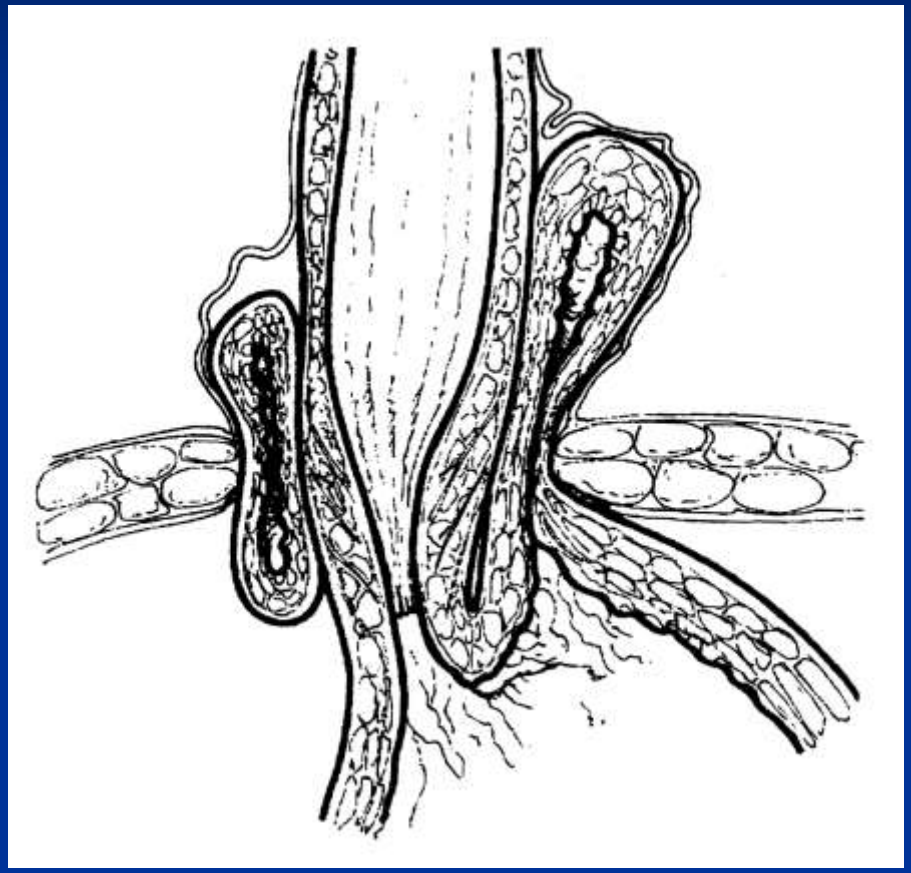
Normal laparoscopic Nissen fundoplication

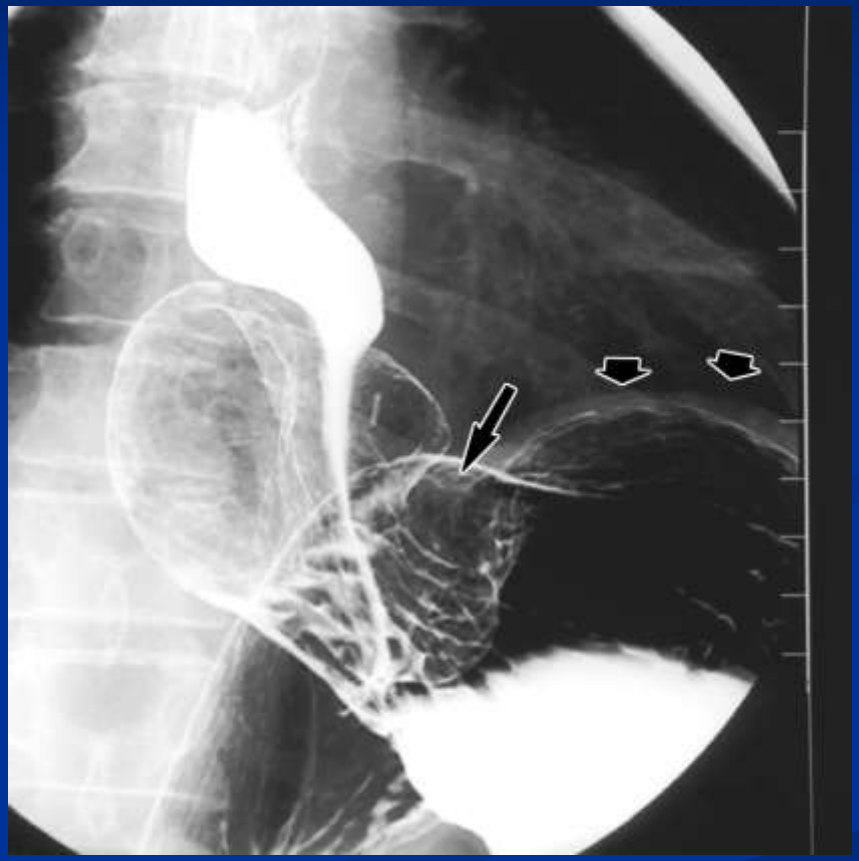




Hainaux B, et al. AJR 2002;178:859-862

Type I intrathoracic migration of Nissen fundoplication





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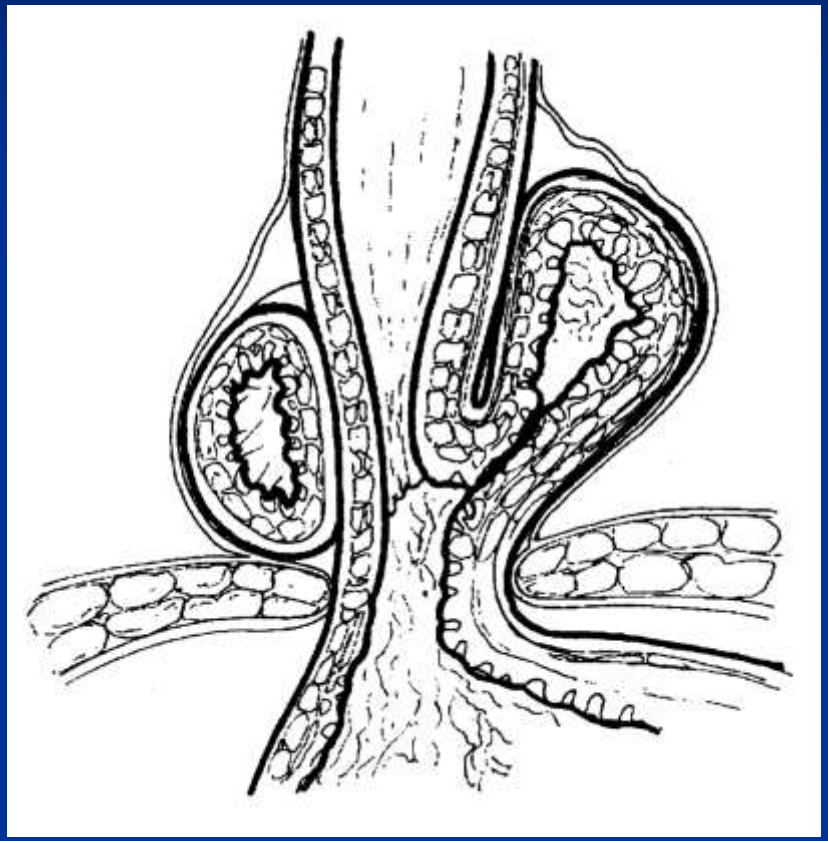
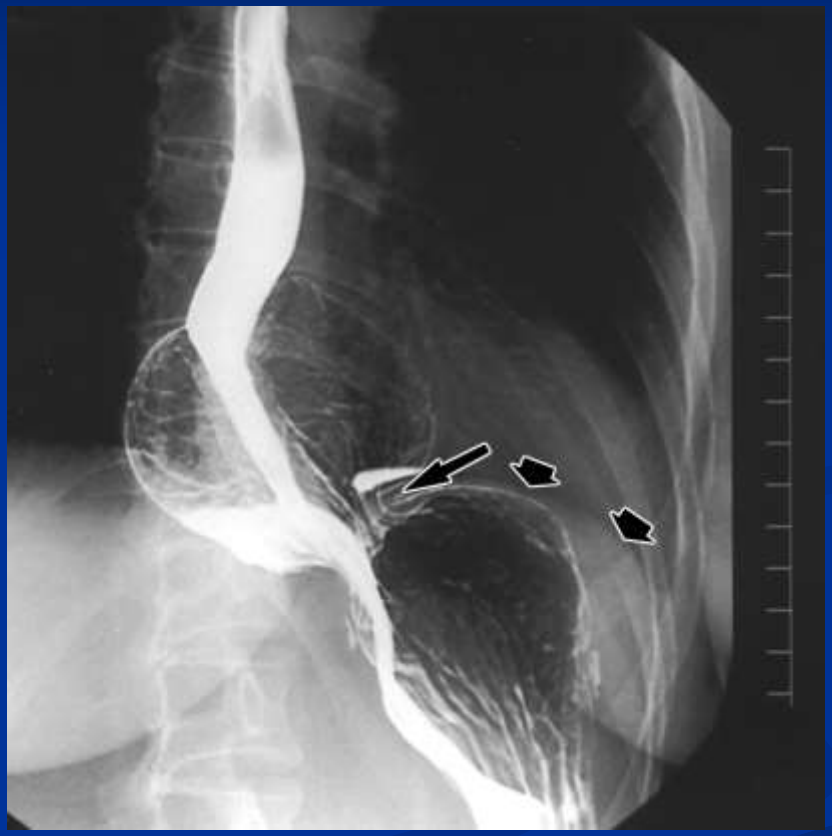
Type II intrathoracic migration of Nissen fundoplication





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THORACIC SURGERY PRINCIPLES

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

PARAESOPHAGEAL HIATAL HERNIAS

University of Michigan

Thoracic Surgery Service

1977-2001

240 Patients

PARAESOPHAGEAL HIATAL HERNIAS 240 PTS.

PRE-OP ASSESSMENT

Barium Swallow		235	(98%)
Type III hernia	220	(92%)	
Type IV hernia	20	(8%)	
EFT's		77	(32%)
Dysmotility	19	(25%)	
Abnormal reflux	66	(86%)	
EGD Results		218	(91%)
Esophagitis	35	(16%)	
Barrett's mucosa	11	(5%)	
Stricture	6	(3%)	

EGJ location - 33.6 cm. (avg) (range 25-42 cm.)

PARAESOPHAGEAL HIATAL HERNIAS 240 PTS.

SURGICAL APPROACH

Left thoracotomy – 6th ICS

Esophageal lengthening Collis gastroplasty for shortening

Antireflux procedure in all

Collis-Nissen	231	(96%)
Nissen	8	(3%)
Belsey Mark IV	1	

PARAESOPHAGEAL HIATAL HERNIAS 240 PTS.

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 HIATAL 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

PARAESOPHAGEAL HIATAL HERNIAS- 237 PTS.

RESULTS - F.U. – 222 pts (94%) 1 mo – 17 yrs (avg. 42 mos)

Symptoms at last follow-up		
Occ., intermittent		
Dysphagia	45	(19%)
Reflux	11	(5%)
Early satiety	17	(7%)
Thoracotomy pain	34	(14%)
Severe (Persistent)		
Dysphagia	4	
Reflux	1	
Dumping	3	
Early satiety	2	
Thoracotomy pain	1	
Satisfaction with operation	192	(85%)
Any post-op esophageal dilatation	69	(31%)
Multiple (>2 dilatations)	19	(2%)

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 $\rightarrow$ 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