

Post Gastrectomy Syndromes

Dr. Manish Madnani

Ω Definition

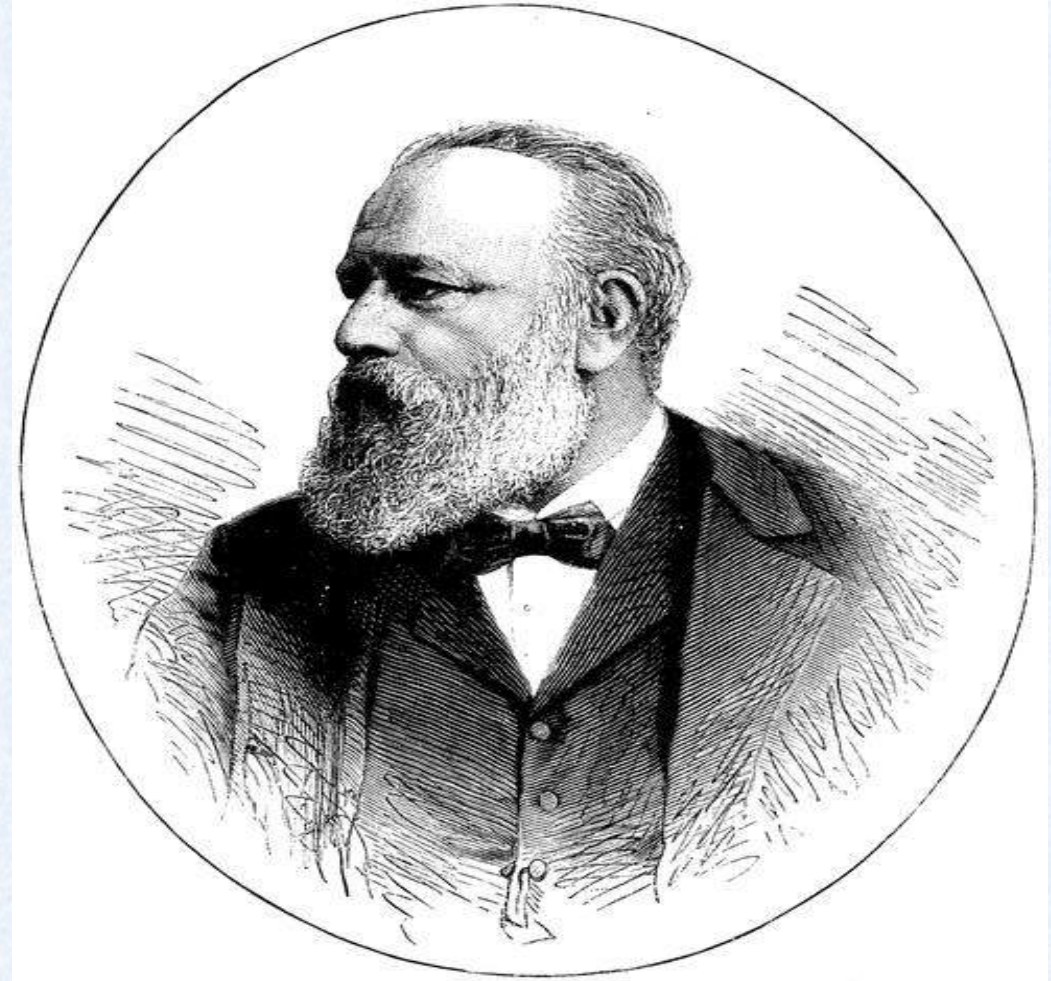
Ω Mechanism

Ω Different syndromes

- Etiopathogenesis
- Symptoms and Diagnosis
- Management

Introduction

- Theodor Billroth (1829-1894)
 - German born, Austrian surgeon
 - Amateur musician
 - Played piano and violin



Billroth



- First esophagectomy (1871)
- First Laryngectomy (1873)
- Best known for first successful gastrectomy for cancer (1881)

In general

- Many studies and attempts to improve gastric resection and reconstruction since Billroth
- 25% of patients have postgastrectomy symptoms
 - Most are minor, 2 – 4% are debilitating
 - Due to loss of reservoir function, denervation, disruption of pylorus, and mechanics of reconstruction

In general

- Shift in management of these syndromes
 - Was focused on acid and gastric hypersecretion
 - Now focused on gastric function and emptying
- Disruption of the mechanics of emptying and peristalsis - cause of most of the current syndromes

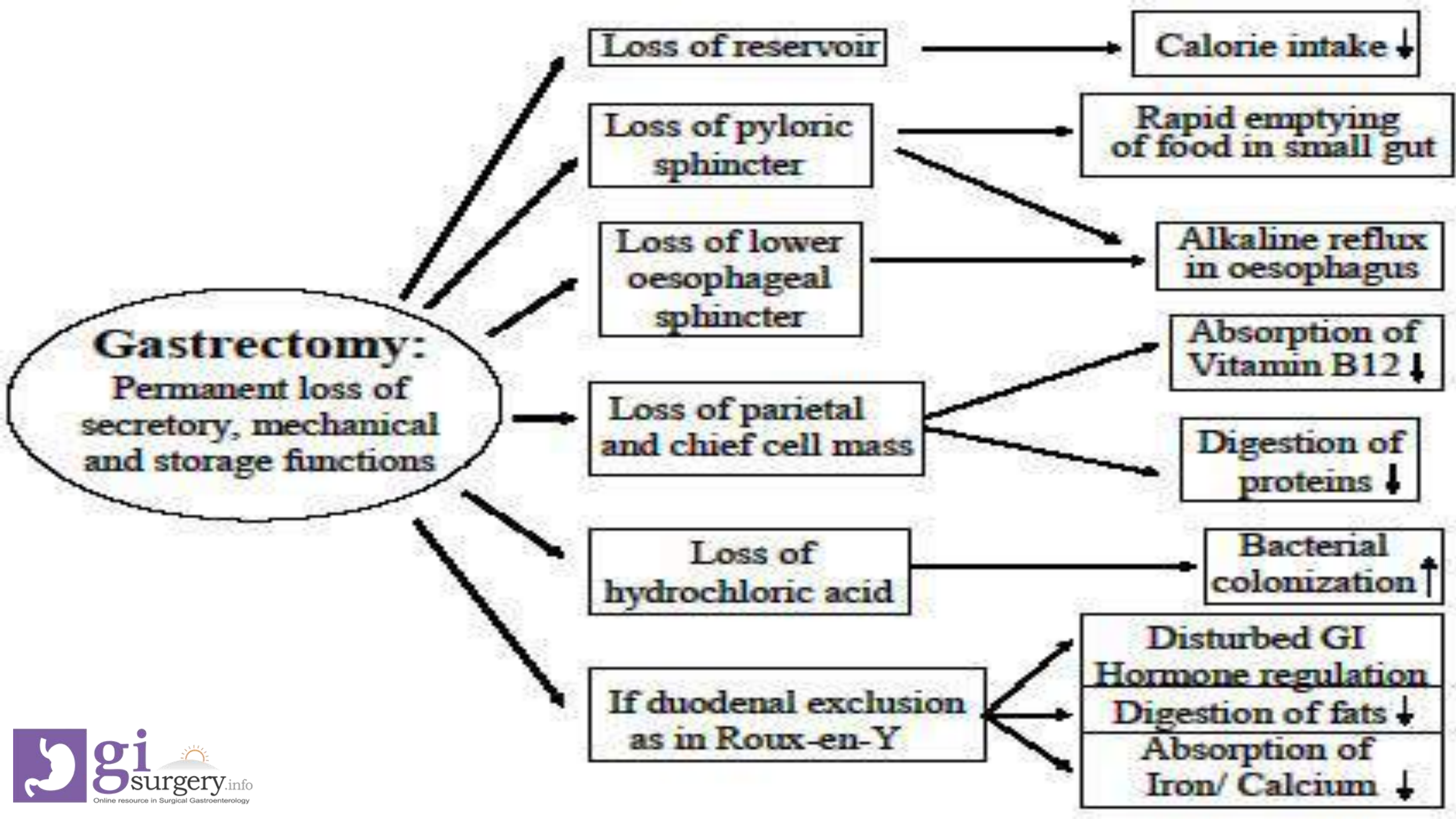
Definition

The **derangements in gastric function** induced by **various operations** performed for acid-peptic disease of stomach and duodenum in early 1970's were associated with a variety of **postoperative sequelae** that have collectively been called the *postgastrectomy syndromes*.

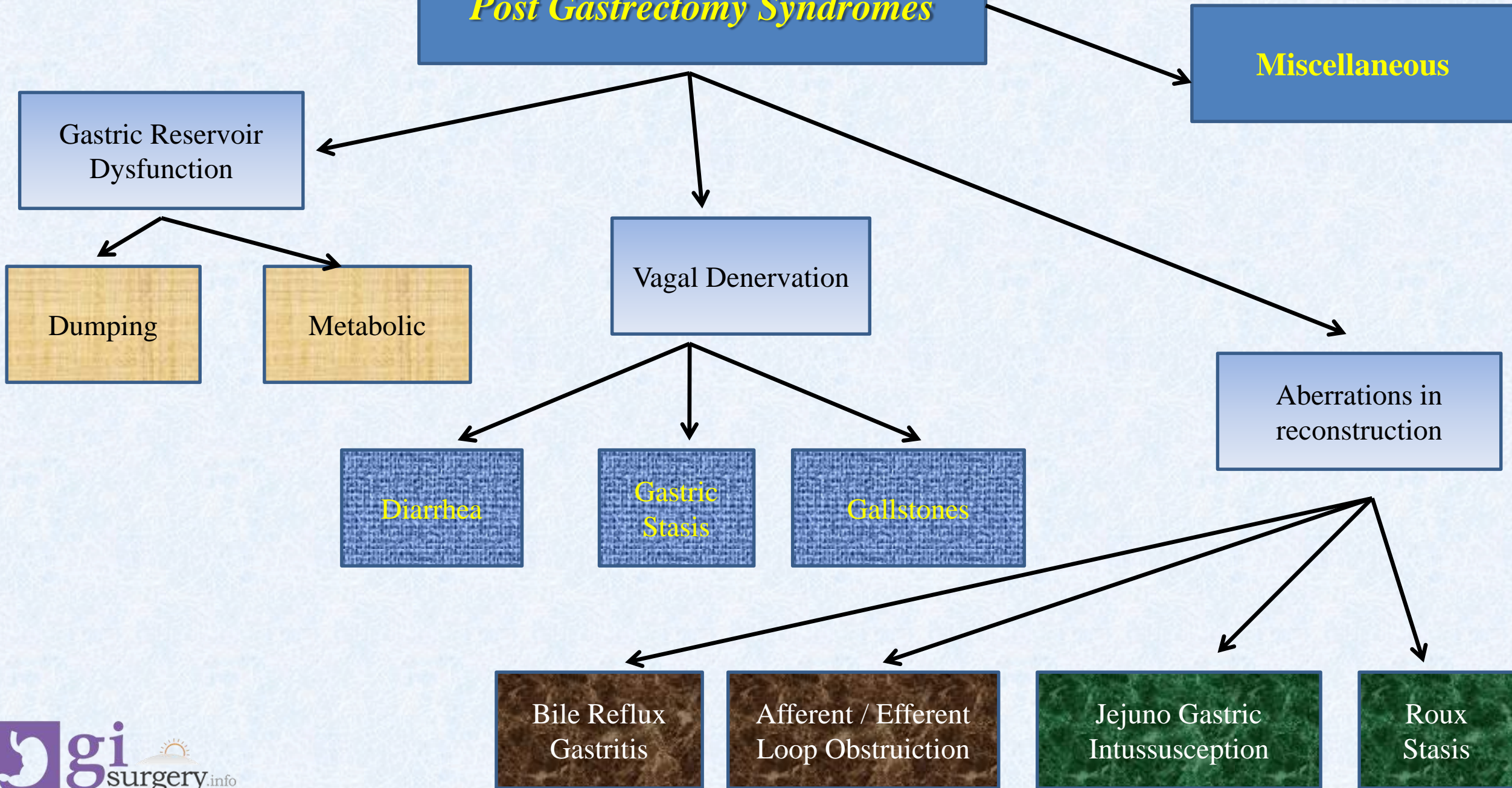
- Historically 1881-Theodor Billroth-1st resection, Roux reconstruction
- 1900-Mix coined term Dumping syndrome
- 1930-Pyloroplasty
- 1950-Henley loop

Pathophysiology

- Gastric reservoir dysfunction
- Vagal denervation
- Aberration in reconstruction



Post Gastrectomy Syndromes



Gastric reservoir dysfunction

- Dumping Syndrome
- Metabolic Aberrations

Dumping Syndrome

- Frequently spoken of, yet hardly seen
 - Easily recognized, but surprisingly difficult to define
 - Surgical problem that rarely requires operation
-
- Receptive relaxation

Early Dumping

- 10 to 30 minutes
- Rapid passage / High osmolarity / Fluid shift
- GI symptoms
- Cardiovascular symptoms
- **Abdominal pain**

- Pylorus / distal gastric resection
 - 20 to 25% / 1 to 2 %
 - Type of reconstruction
 - Neurohumoral changes
-
- Diagnosis
 - Clinical + Provocation+ Scintigraphy

- Diet pattern
- Pectin
- Acarbose
- Octerotide-MMC
- <1% Surgery—after complete evaluation
 - Pyloric reconstruction
 - Billroth II—I
 - Jejunal interposition
 - Roux-en-Y GJ

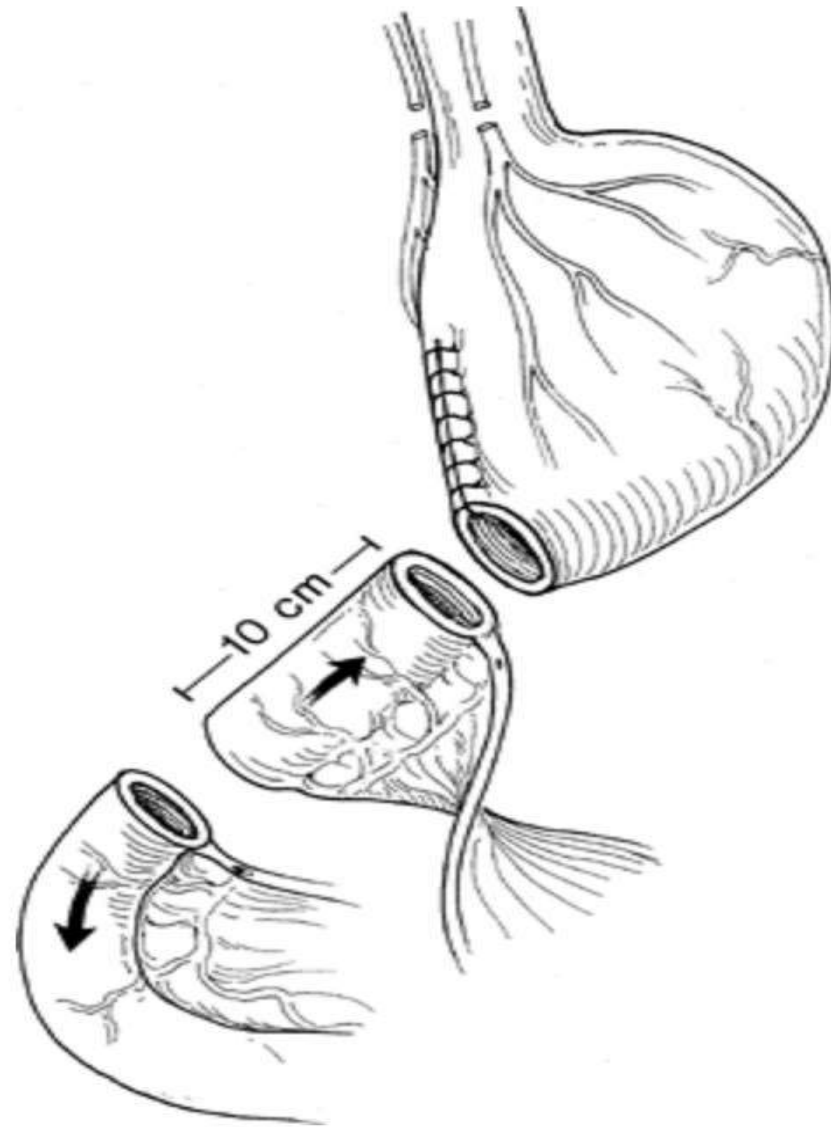


Fig. 10. Construction of an antiperistaltic loop interposed between the gastric remnant and duodenum. (Modified from

Late Dumping

- 2 to 3 hours
- Hyperglycemia—overshooting—Hypoglycemia
- Hormones / catecholamines
- Type of surgery
- Duration
- Associated co-morbidity
- D/D
- Mx

Metabolic Aberrations

- Anemia
- Bone disease
- Weight loss

Anemia

- Billroth II > Billroth I > Vagotomy
- Decreased acid—Iron Deficiency—50 %
- B12 Deficiency—injections
- Folate—decreased intake

Bone disease

- Fat malabsorption—Vit D Deficiency
- Symptoms
- Duration
- Management

Weight loss

- Temporary
- Type of gastrectomy
- Preop nutrition
- Gender
- R/O Malabsorption
- Diet pattern—chronic—Surgery

Vagal denervation

- Diarrhea
- Gastric Stasis
- Gallstones

Diarrhea

- 30%
- 5 to 10 %
- 1%
- Type of vagotomy
- Pathogenesis
 - Intestinal dysmotility
 - Accelerated transit
 - Bile acid malabsorption,
 - Rapid gastric emptying
 - Bacterial overgrowth

- Diet modifications
- Cholestyramine
- Codeine
- Loperamide
- Reverse jejunal segment interposition

Herrington & Sawyers

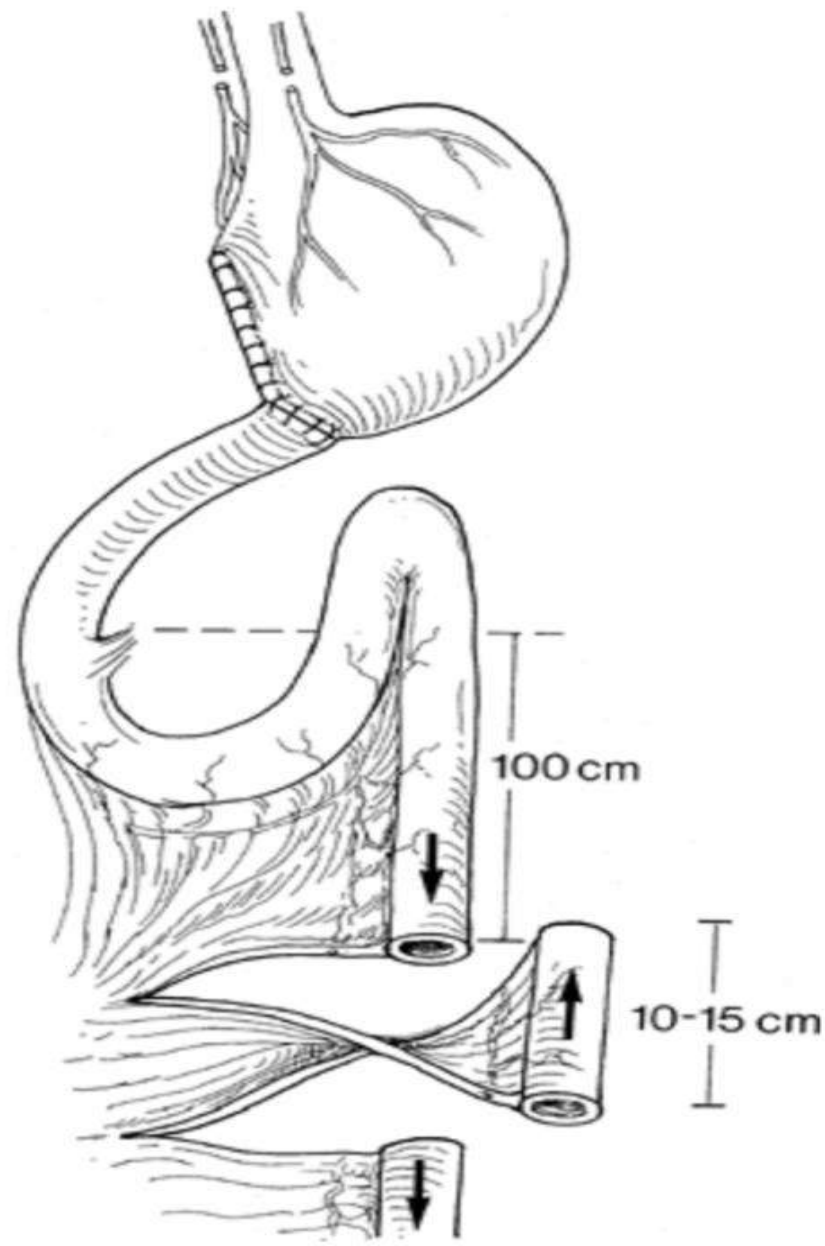


Fig. 14. Construction of an antiperistaltic

Cuscheiri

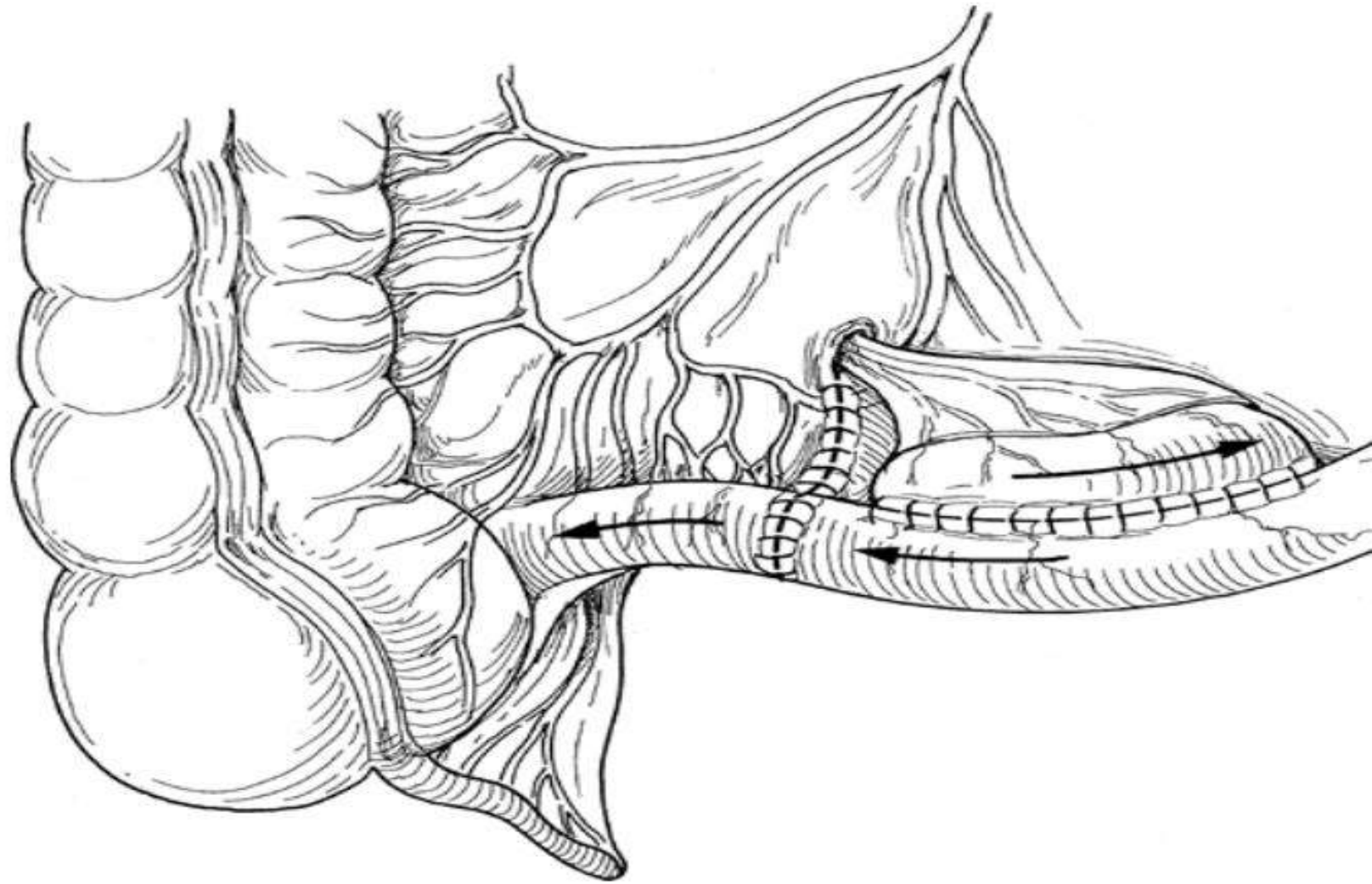


Fig. 15. Construction of the distal onlay ileal graft. (Modified from Herrington JL, Sawyers J)

Chrysopathis

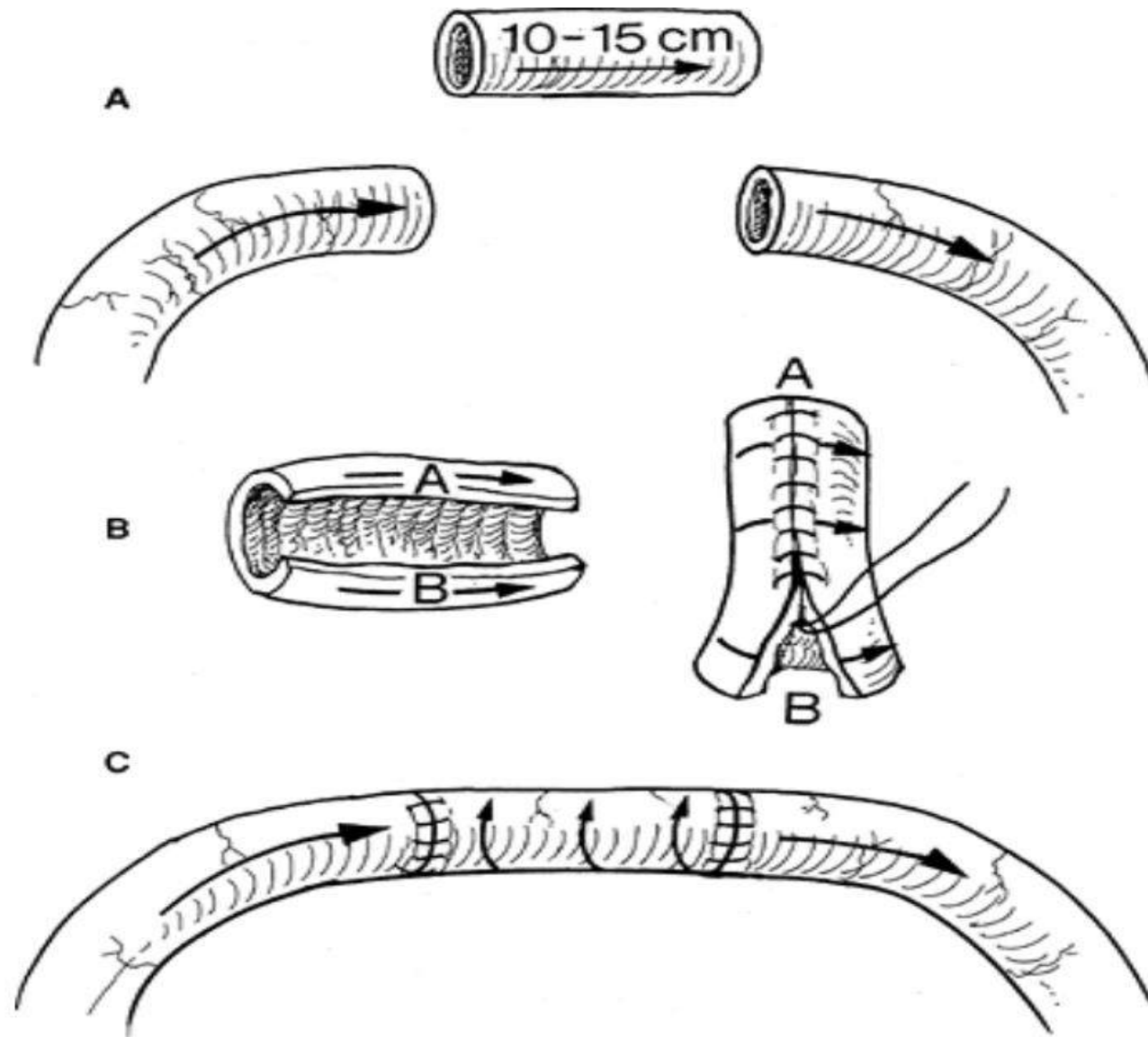


Fig. 16. Construction of a jejunal loop with circular peristalsis, thereby slowing peristalsis.

Rygick & Poth

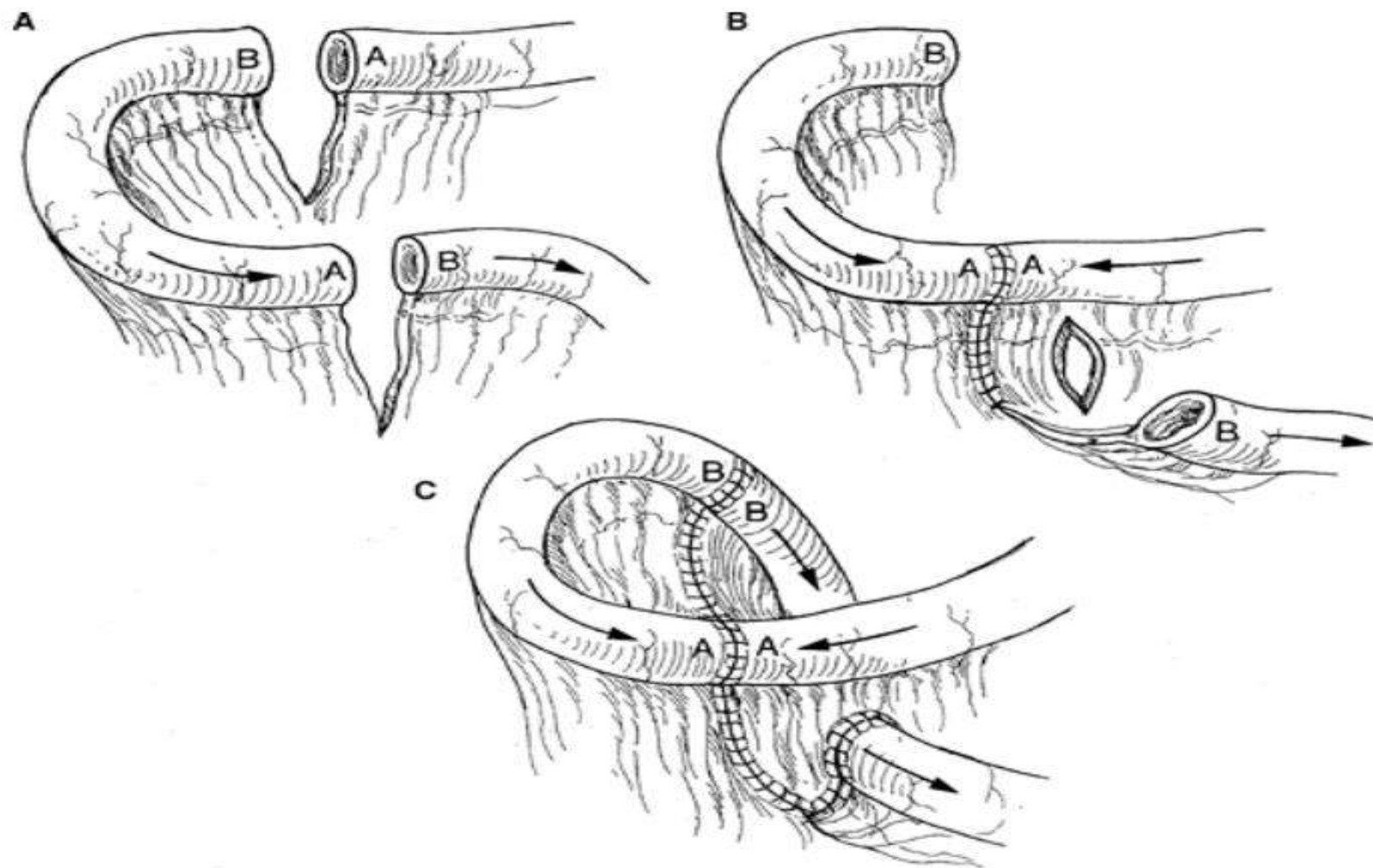


Fig. 17. Construction of a reversed jejunal segment, which avoids twisting the vascular pedicle. (Modified from Herrington JL, Sawyers

Gastric Stasis / Gastroparesis

- Acute
- Chronic

Acute gastroparesis

- 50%
- No exact definition
- Most common

- Symptoms
 - Abdominal fullness—functional GOO

Predisposing factors & D/D

- Endocrinopathy
 - Diabetes mellitus
 - Hypothyroidism
- Electrolyte imbalance(K+, Ca++, Mg++)
- Drugs
 - Anticholinergics
 - Antidepressants
 - Opiates
 - Beta agonists
- Neuromuscular diseases
- Pre-existing duodenal / GOO
- Vagotomy
- Mechanical
 - Adhesions
 - Anastomotic stricture
 - Afferent or efferent loop obstruction
 - Internal herniation
 - Stomal edema
 - Anastomotic leak

Diagnosis

- UGI endoscopy?? / 2 weeks
- Vasconez test
- Contrast study
 - Gastrograffin
 - Thin Barium
- Scintigraphy
 - Indium
 - Technetium
- EGG
- GI Manometry

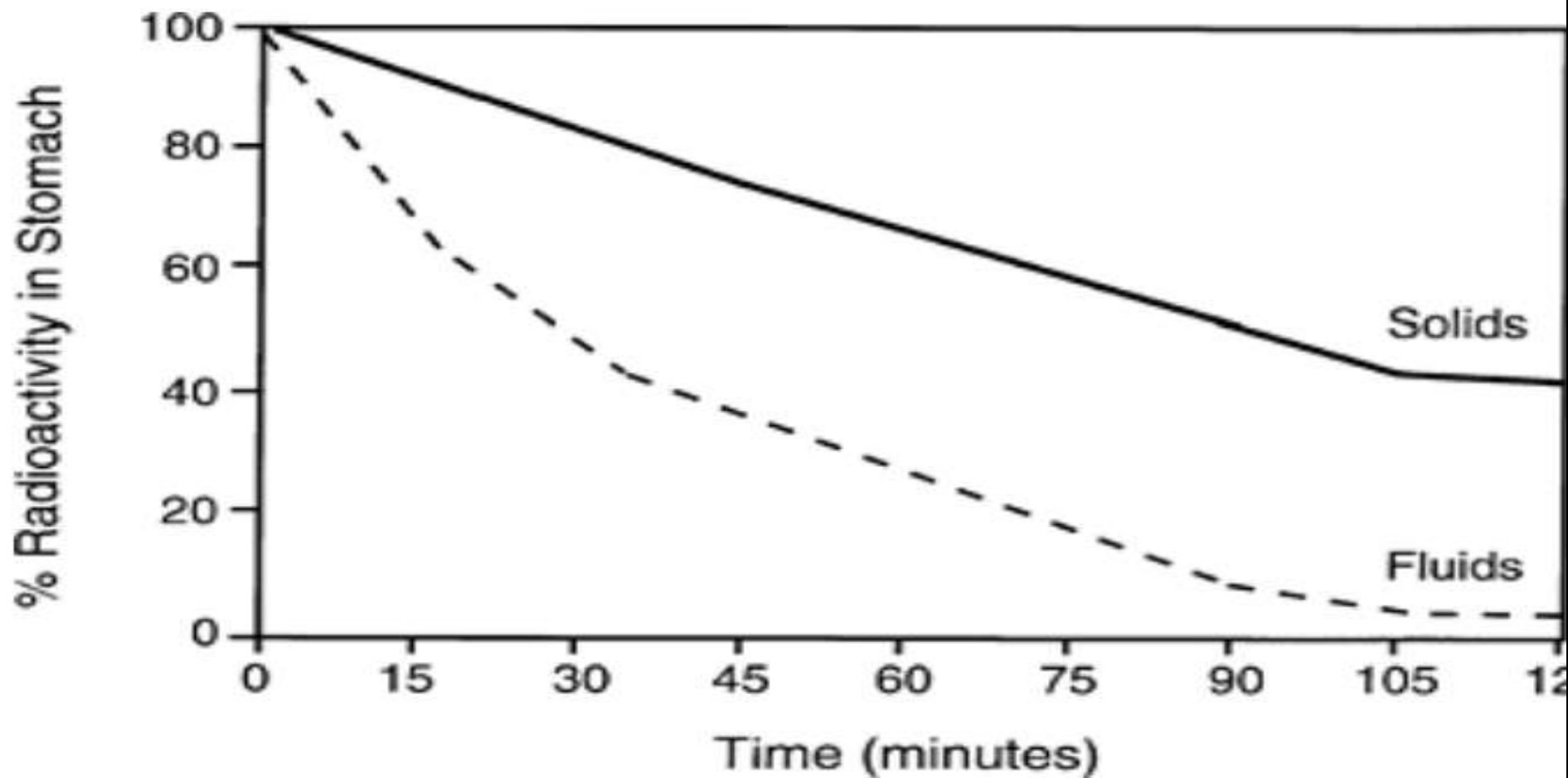
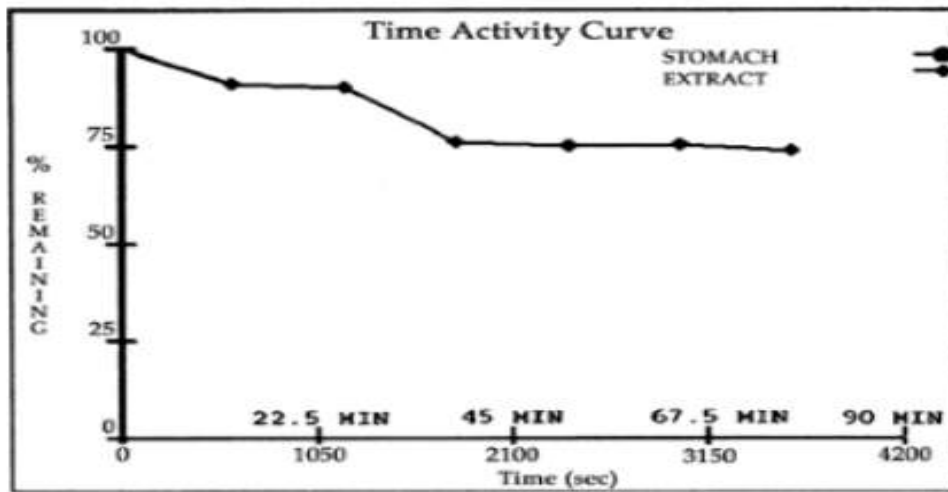


Fig. 5. A stylized normal nuclear gastric emptying study. (Modified from Herrington JL,



MAX COUNTS

TIME TO PEAK (min) : 0.000000

T1/2 (min) : 120.00000

Fig. 6. A nuclear gastric emptying study in a patient who has severe gastroparesis. The plotted temporal curve is on the left; the nuclear image is at the right. Note the persistence of nuclear material in the stomach.

- NG decompression
- Electrolyte correction
- Nutrition support
- Drugs
 - Bethanechol
 - Cisapride
 - Metoclopramide
 - Domperidone
 - Erythromycin
- Neurostimulation
- Reexploration-3 weeks/months

Chronic Gastroparesis

- Nonmechanical prolonged gastroparesis
- 2 %
- TV
- Delayed presentation
- Symptoms
 - Early satiety
 - Nausea
 - Intermittent vomiting
 - Epigastric pain
 - Postprandial bloating
 - Hiccups
 - Belching
 - Anorexia
 - Worsening in evening
 - Bezoars

Diagnosis & Management

- Upper GI series—false normal
 - Endoscopy
 - Tests to rule out mechanical cause
 - Radionuclide studies
-
- Trial of Medical management
 - Surgery-depending on previous surgery

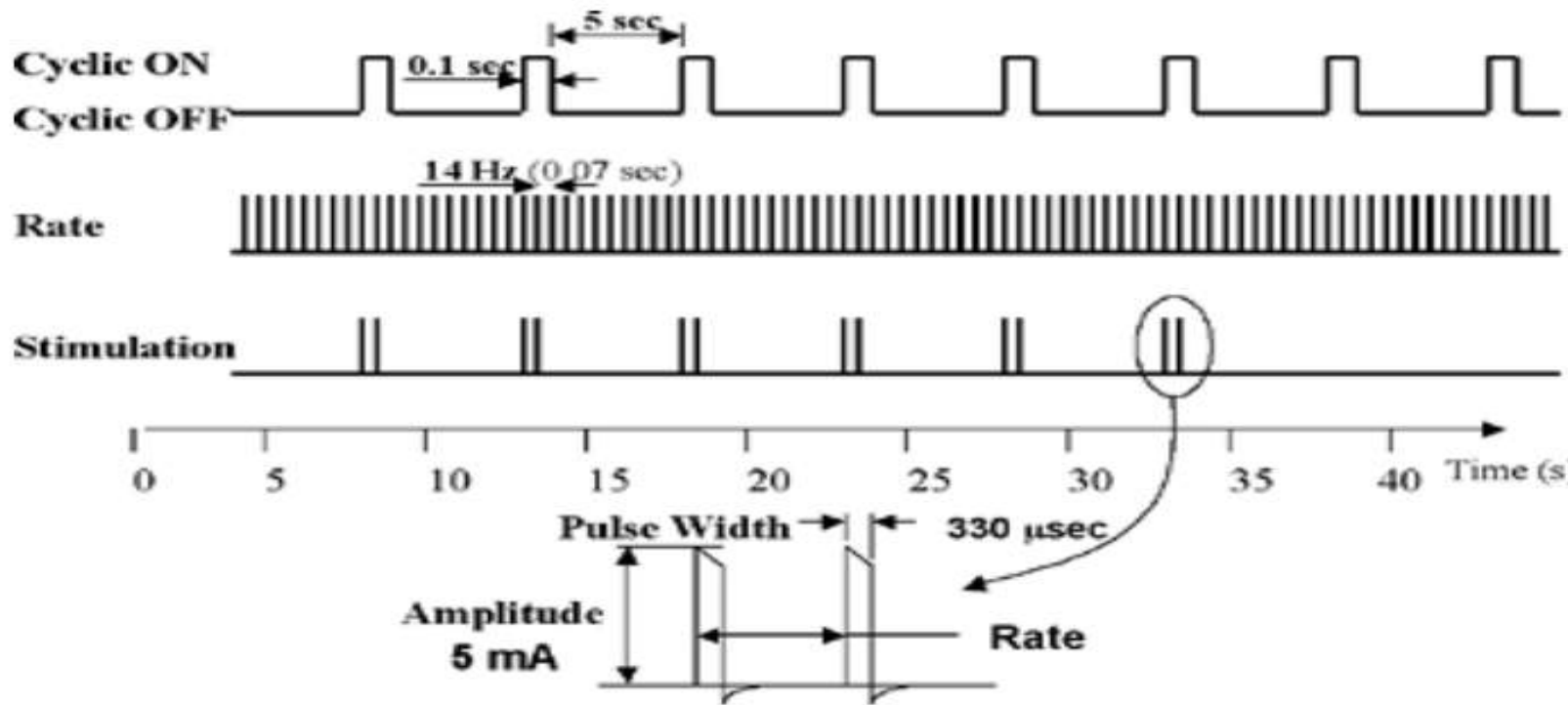


Fig. 7. Timing of gastric electrical stimulation. The device is programmed to an impedance of 200 to 800 mΩ, amplitude of 5 mA, pulse width of 0.3 second, rate of 14 Hz, and a cycle of 4 of 0.1 second on and 5 second off.

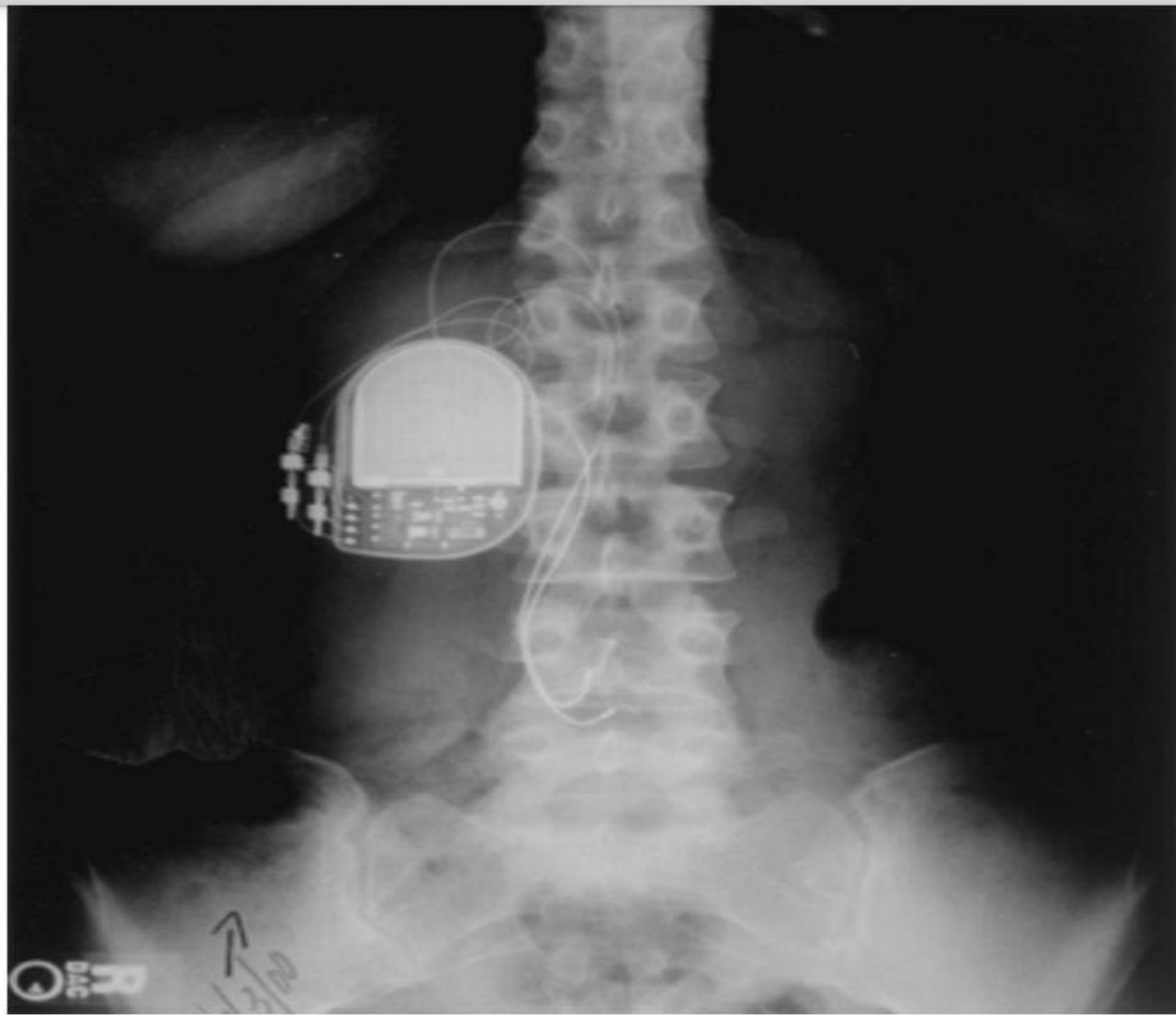


Fig. 8. Radiograph demonstrating the position of the electrodes and implanted gastroelectrical stimulator. (Reproduced from

Gallstones

- Pro / Ante
- Prophylactic Cholecystectomy
- Pre-existing condition of GB
- Future surgery difficult
- Type of gastric surgery

Aberration in reconstruction

- Bile reflux gastritis
- Afferent and Efferent loop obstruction
- Jejunogastric intussusception
- Roux Syndrome

Bile reflux gastritis

- Bile in stomach = Bile reflux gastritis??
- 1 to 2 %
- Normal duodenogastric reflux=20%
- Cholelithiasis and cholecystectomy
- Type of surgery
- Etio-Pathogenesis-Gastric mucosal injury
 - Quantity and quality of refluxate
 - Dysmotility
 - Mucosal barrier dysfunction
- Delayed presentation

Various symptoms

- Constant burning epigastric pain radiating to back, aggravated by meals, may or may not be relieved by vomiting
- Bilious vomiting
- Weightloss
- IDA
- Achlorhydria

D/D

- Pancreatic
- Biliary pathology
- Peptic ulcer disease
- Gastroparesis
- Afferent loop syndrome
- Mechanical causes of delayed gastric emptying

Diagnosis & Work up

- Diagnosis of exclusion
- UGI endoscopy-Beefy red mucosa
- HPE-Cork screw vessels
- Reproduction
 - Bernstein test
- Quantification
 - Scintigraphy
 - Gastric analysis / Gastric pH
 - Gastric reflux index + HIDA(5 , 45 , 60)
 - Associated Esophageal reflux-Impedence Manometry

Management

- Diet
- Drugs
 - H2 antagonis/ PPI
 - Mucosal preotectors
 - Sucralfate
 - Prostaglandin
 - Prokinetic
 - Aluminium Hydroxide
 - Cholestyramine
 - **UDCA**
 - **TPN**

Surgical Management

- Pyloric reconstruction
- Conversion of Billroth II to I
- Original / Modified Braun enteroenterostomy
- Henley loop
- Roux-en-y / Tanner 19 modification
- Duodenal switch

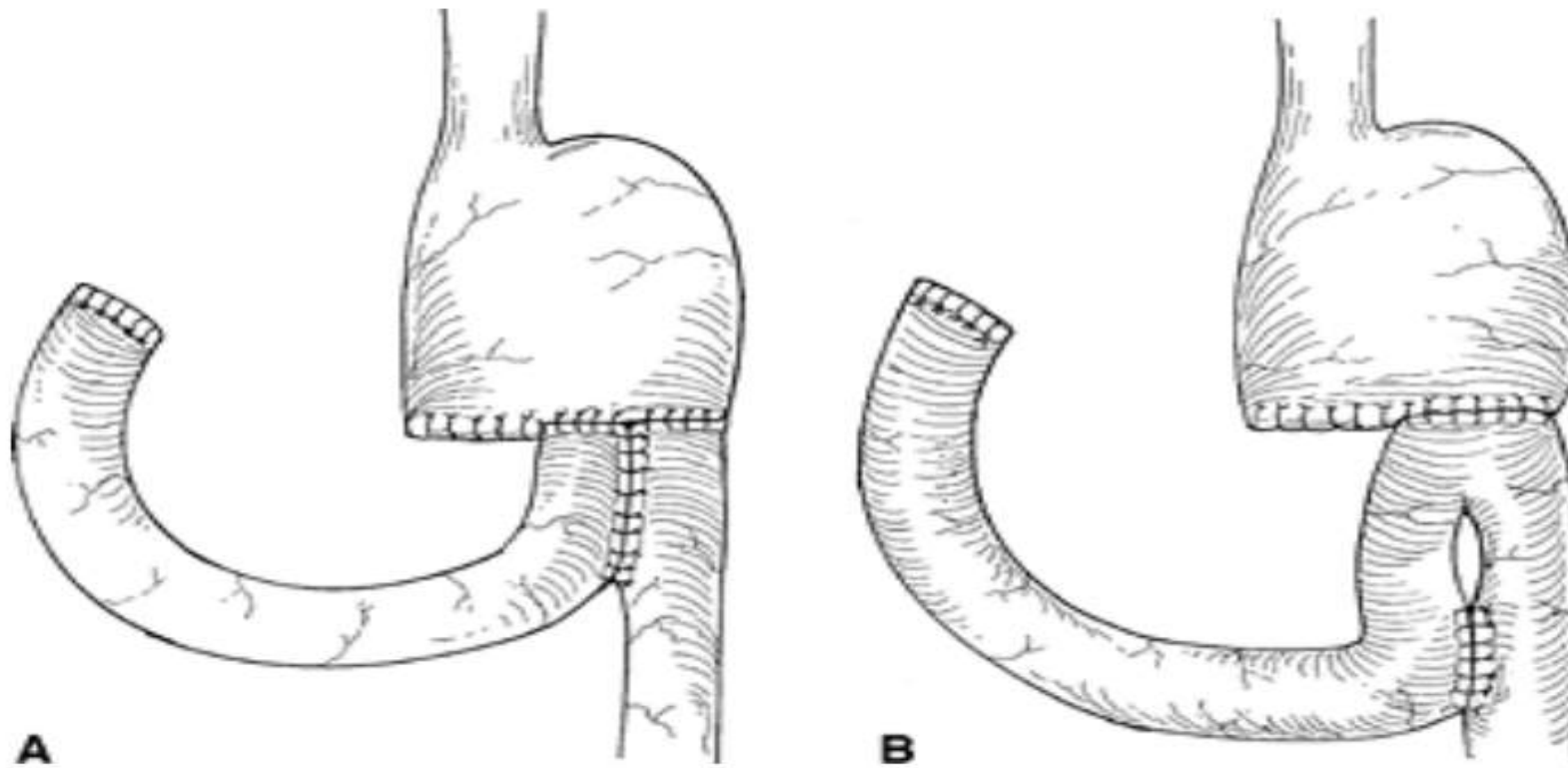


Fig. 1. Two forms of jejunojejunostomy to direct bile away from the stomach after Billroth II reconstruction. **A:** The original Braun procedure. **B:** A more distal anastomosis, not contiguous with the gastric remnant.

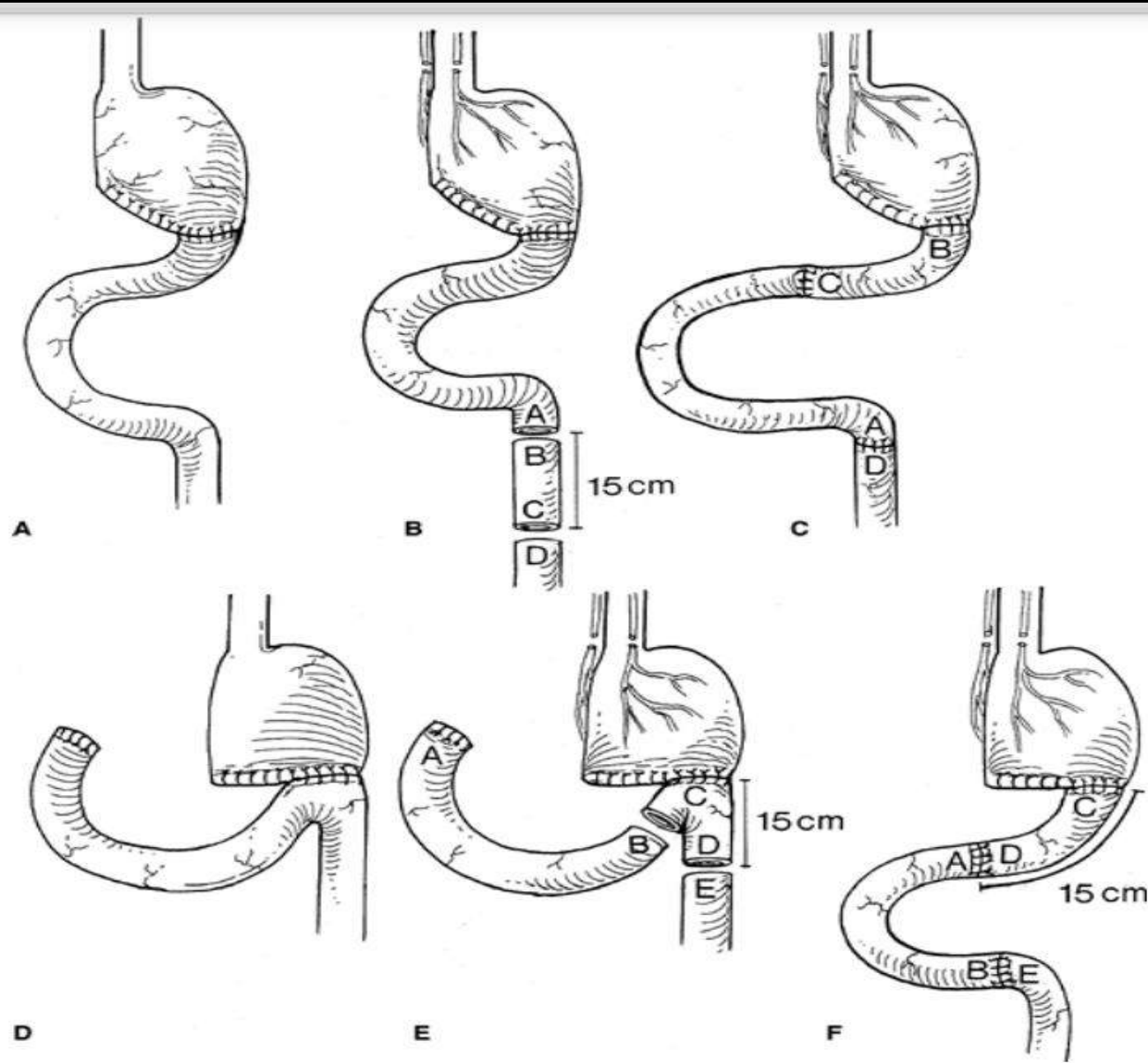


Fig. 2. Construction of an isoperistaltic jejunal loop interposition (Henley loop). **A**–**C**: The

Van Heerden	1981	92	Good 95 %
Kennedy	1981	27	Excellent 85%
Fiore	1982	23	Good 90%
Vogel	1983	97	Fair to excellent 77%
Melagelada	1985	16	Good to excellent 85%
Ritchie	1994	65	Good 70%

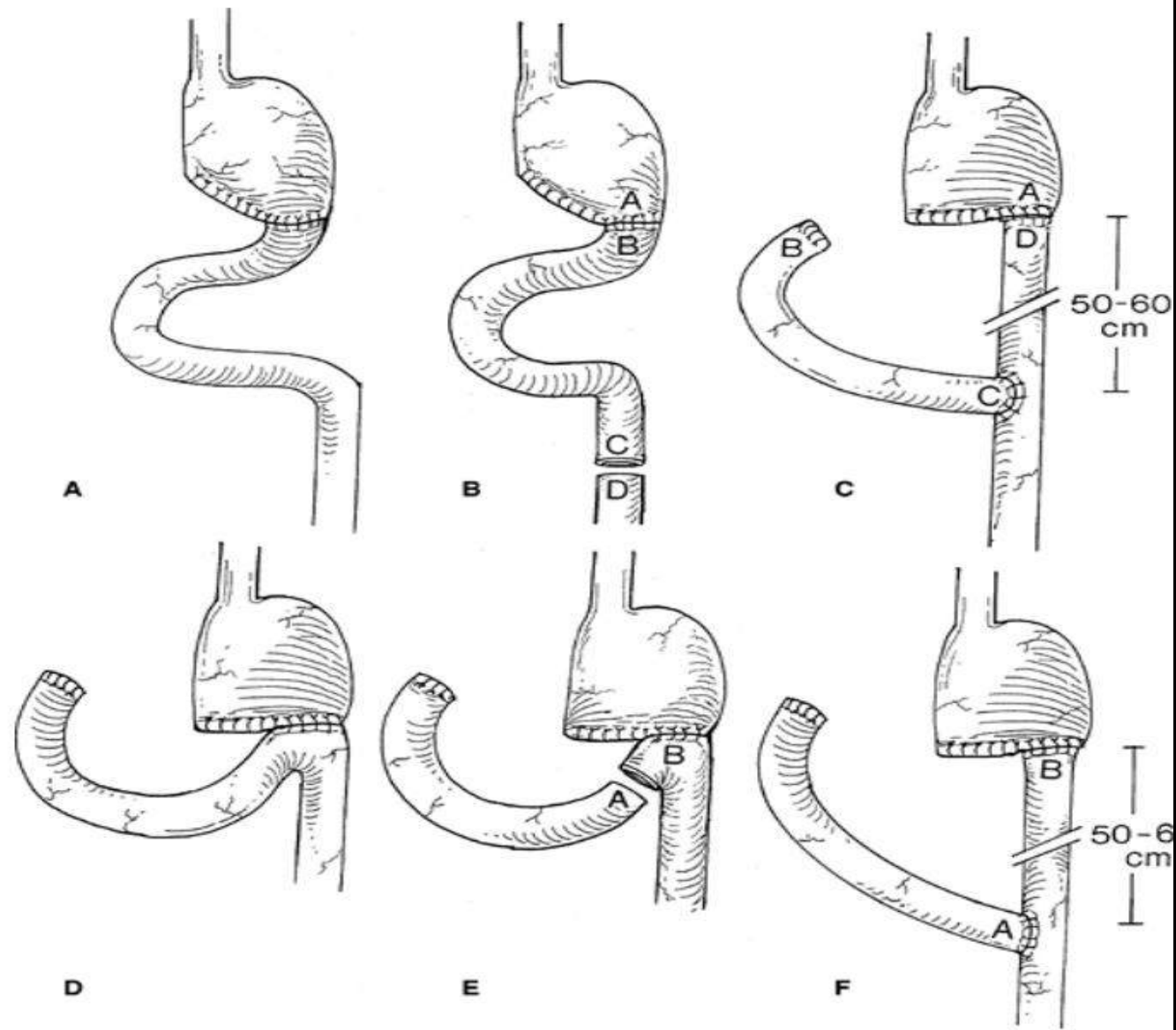


Fig. 3. Construction of a Roux-en-Y gastrojejunostomy. **A**–**C**: The technique of

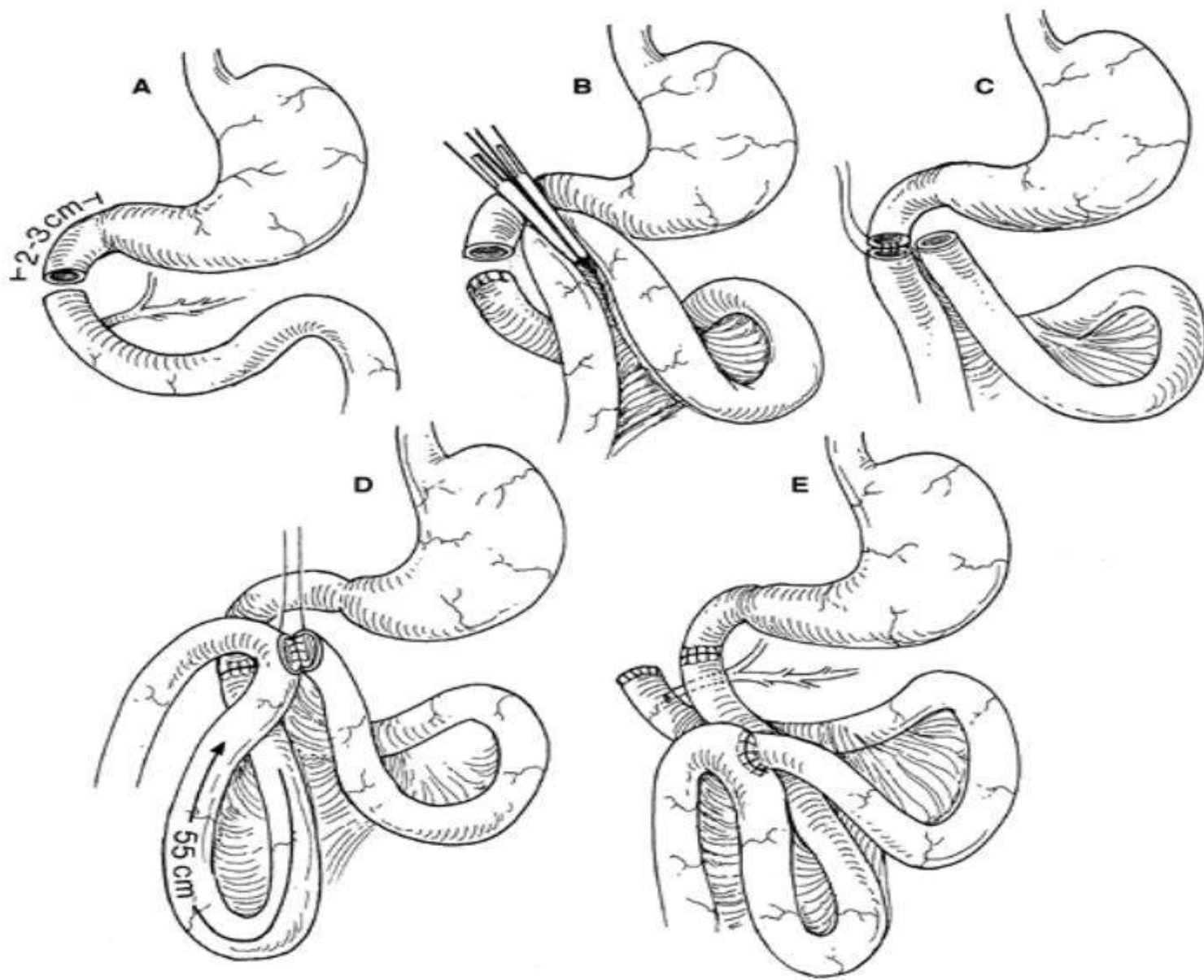
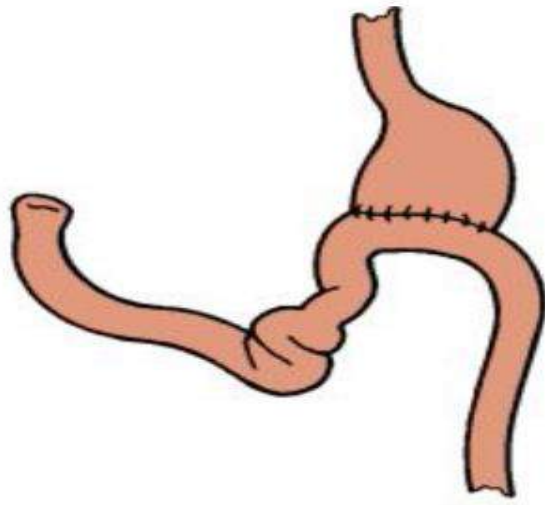


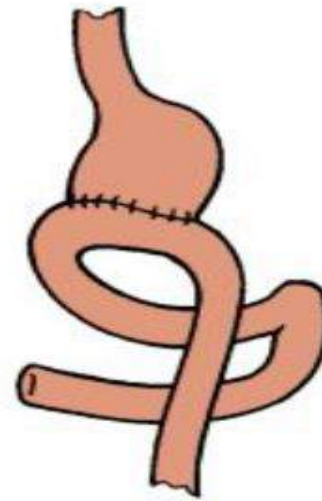
Fig. 4. The duodenal switch procedure. **A:** The

Afferent loop obstruction

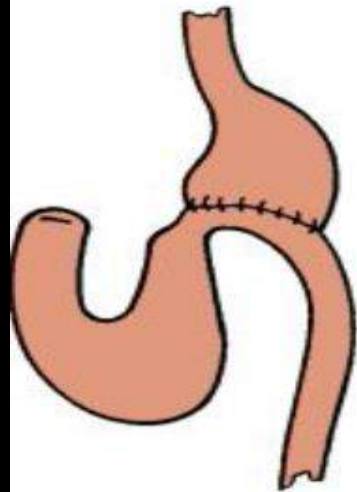
- Cause
 - Kinking
 - Length
 - Adhesions
 - Volvulus
 - Stenosis
 - Herniation



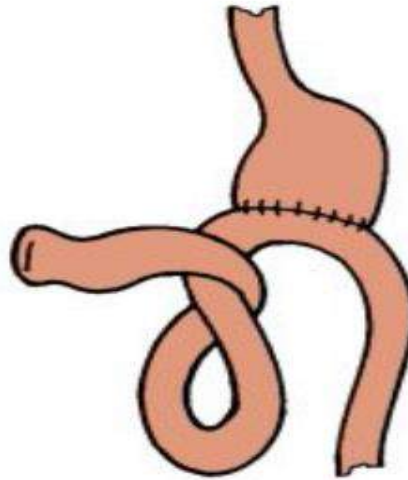
Kinking and angulation



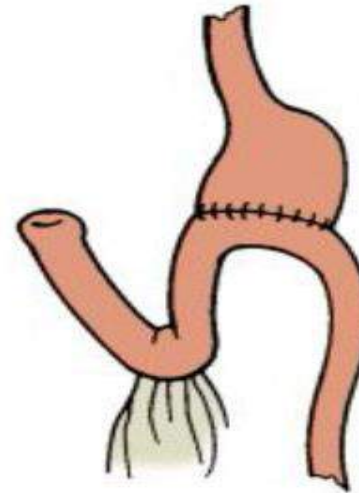
Internal herniation behind afferent limb



Stenosis of gastrojejunal anastomosis



Redundant twisted afferent limb (volvulus)



Adhesions involving afferent limb

- Acute Complete vs Chronic intermittent
- Pain with eating—vomiting—relief of pain
- Closed loop obstruction
- Diarrhea/ steatorrhea
- Marginal ulcers

Symptoms

**Chronic
Afferent
Limb
Syndrome**

**Alkaline
Reflux
Gastritis**

Pain

After meals

**Unrelated to
meals**

Vomitus

Bile

Bile and food

**Relieves
pain**

**No changes
in pain**

Projectile

Nonprojectile

**Occult
bleeding**

Rare

Common

Cause

**Limb
obstruction**

**Enterogastric
reflux (no
obstruction)**



Fig. 11. Upper gastrointestinal series documenting a markedly dilated afferent limb in a patient who had undergone gastrectomy with Billroth II reconstruction.

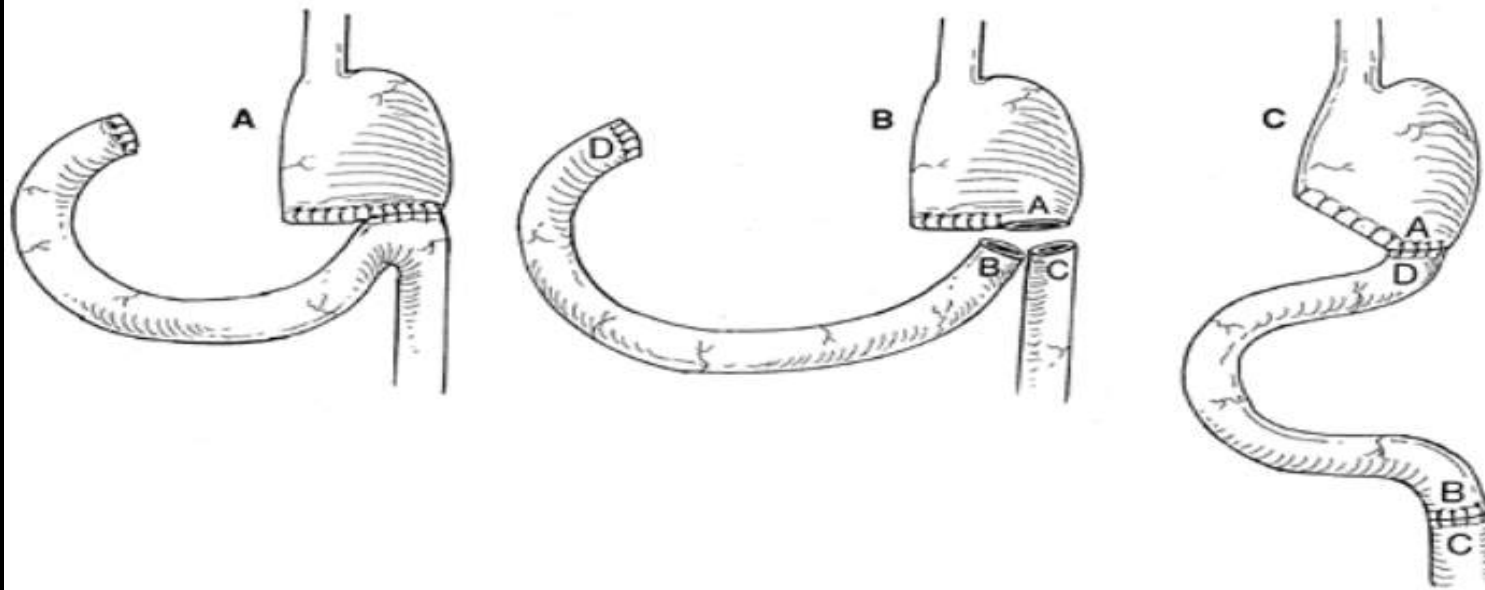


Fig. 12. Conversion of a Billroth II to a Billroth I reconstruction. The gastrojejunostomy is disassembled, and jejunal continuity is reestablished. The end of the gastric remnant may be sutured to the side of the duodenum (below D).

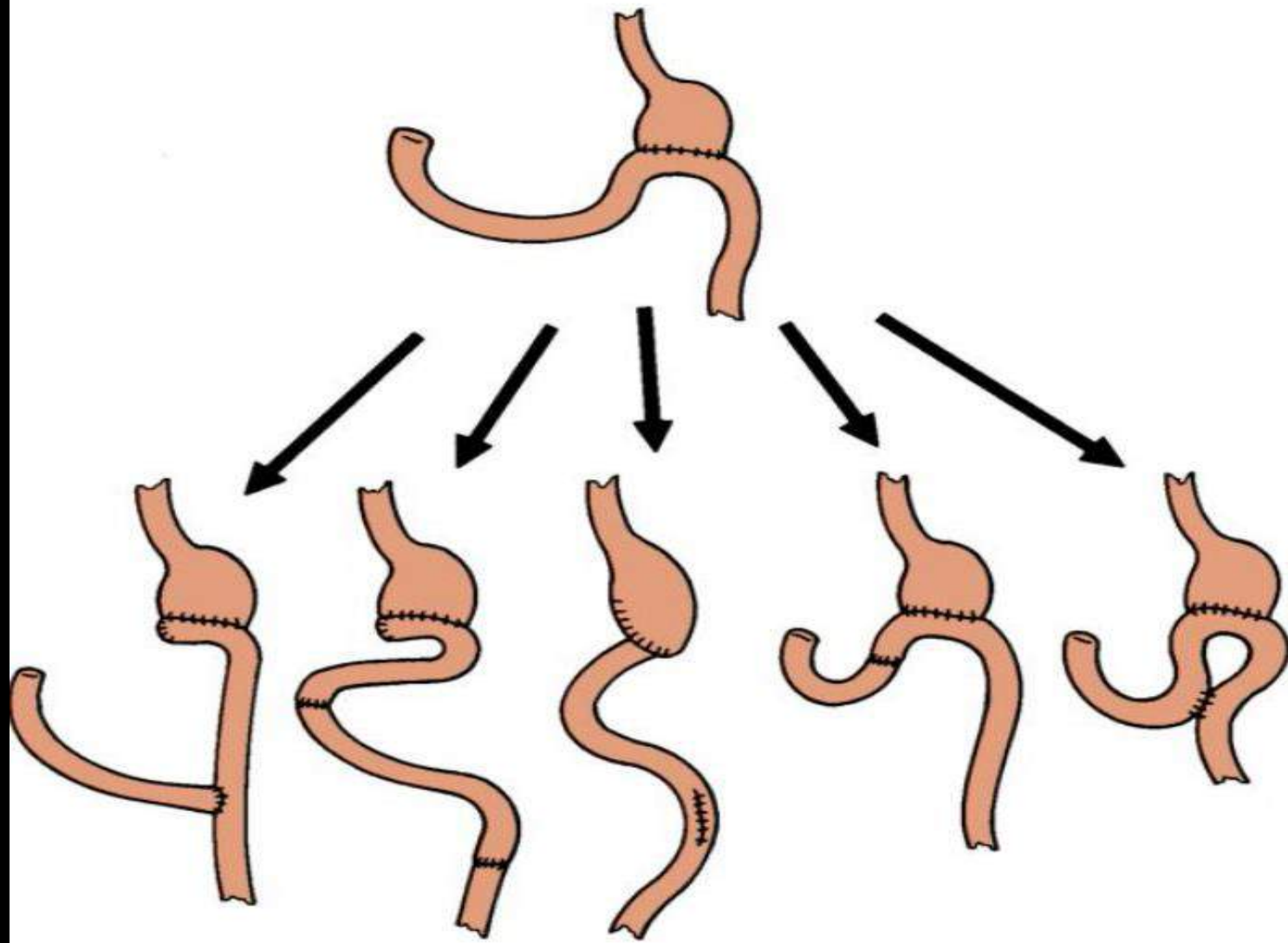


Figure 59-7 Surgical management of afferent loop syndrome. (From Miller TA, Mercer DW: *Derangements in gastric function secondary to previous surgery*. In Miller TA [ed]: *Modern Surgical Care: Physiologic Foundations and Clinical Applications*, 2nd ed. St Louis, Quality Medical, 1998, p 404.)

Efferent loop obstruction

- Mimics small bowel obstruction
- Adhesions
- Internal right to left herniation
- Diagnosis
 - UGI endoscopy
 - CECT scan
 - HIDA scan
 - Upper GI series
- Rx—Sx



Jejunogastric intussusception

- Billroth II / Simple GJ
- Pain/vomiting/hemetemesis
- Acute/chronic
- Rx—Sx
 - RA
 - Enteroenterostomy
 - Fixation
 - BillrothI

Roux Syndrome

- Acute Vs. Chronic
- Delayed gastric emptying
 - Gastric vomiting
 - Epigastric pain
 - Weight loss

- ✕ UGI endoscopy
- ✕ CECT scan abdomen
- ✕ Upper GI series
- ✕ GES

- Dysmotility
- Large gastric remnant
- Truncal vagotomy

- Rx—Mx—Sx
- Braun with Billroth II
- 95% resection
- Roux resection
- Isoperistaltic J loop interposition

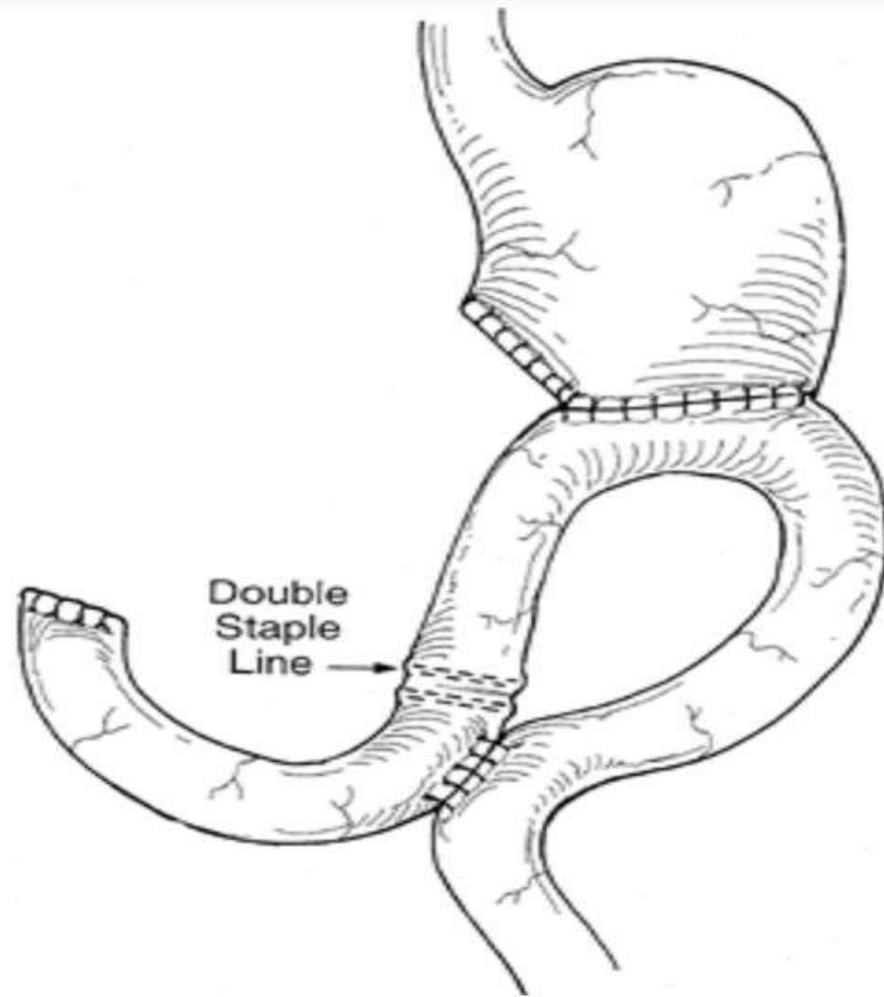


Fig. 9. The uncut Roux-en-Y gastrojejunostomy. Closure of the afferent limb with a double staple line forces the duodenal contents into the more distal jejunum through the jejunojejunostomy.

Prevention is better than cure!

Roux procedure is generally not the procedure of choice for primary reconstruction after gastric resection unless a near-total or total gastrectomy has been performed.

Miscellaneous

- Bezoars
- Recurrent ulceration
- Small-capacity syndrome
- Postvagotomy dysphagia
- Gastric remnant carcinoma

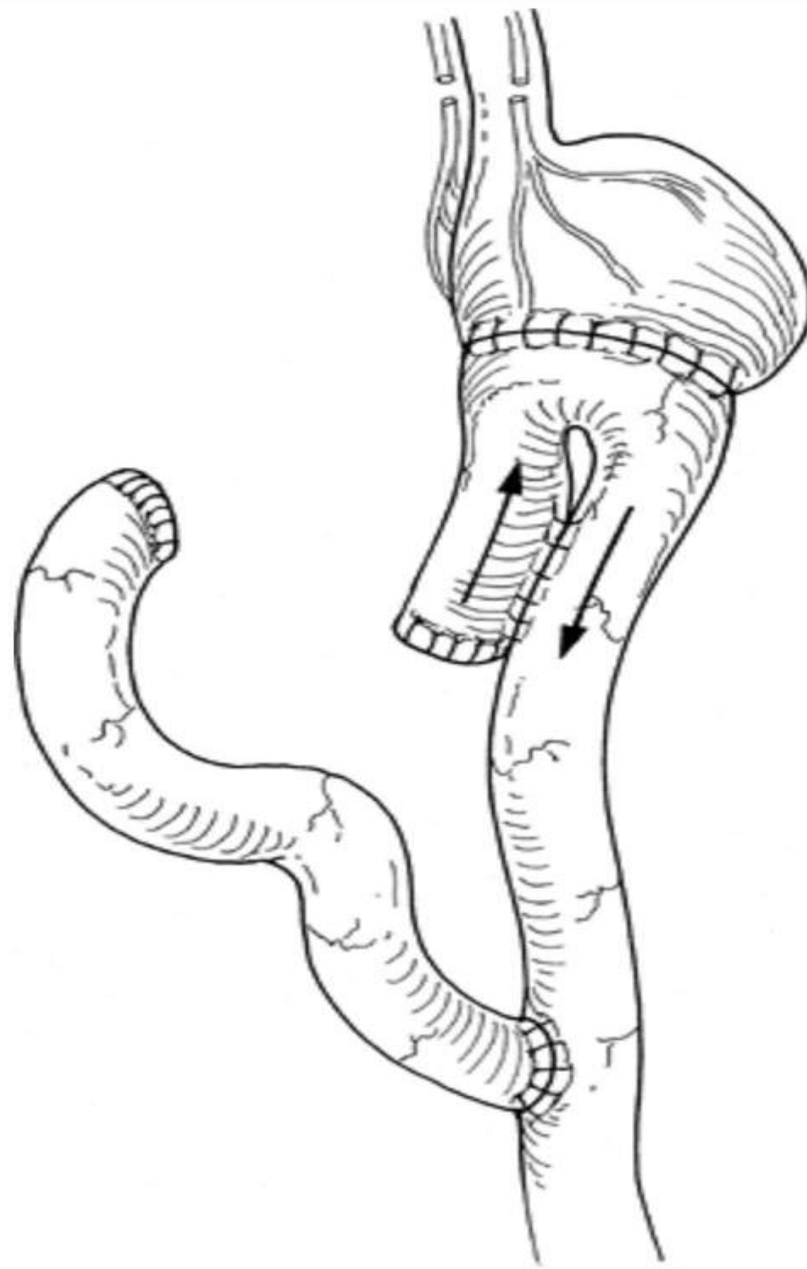


Fig. 19. Construction of a Hunt-Lawrence



Fig. 18. Upper gastrointestinal series revealing a benign gastric ulcer after gastric resection. The ulcer is penetrating into the gastrohepatic ligament and

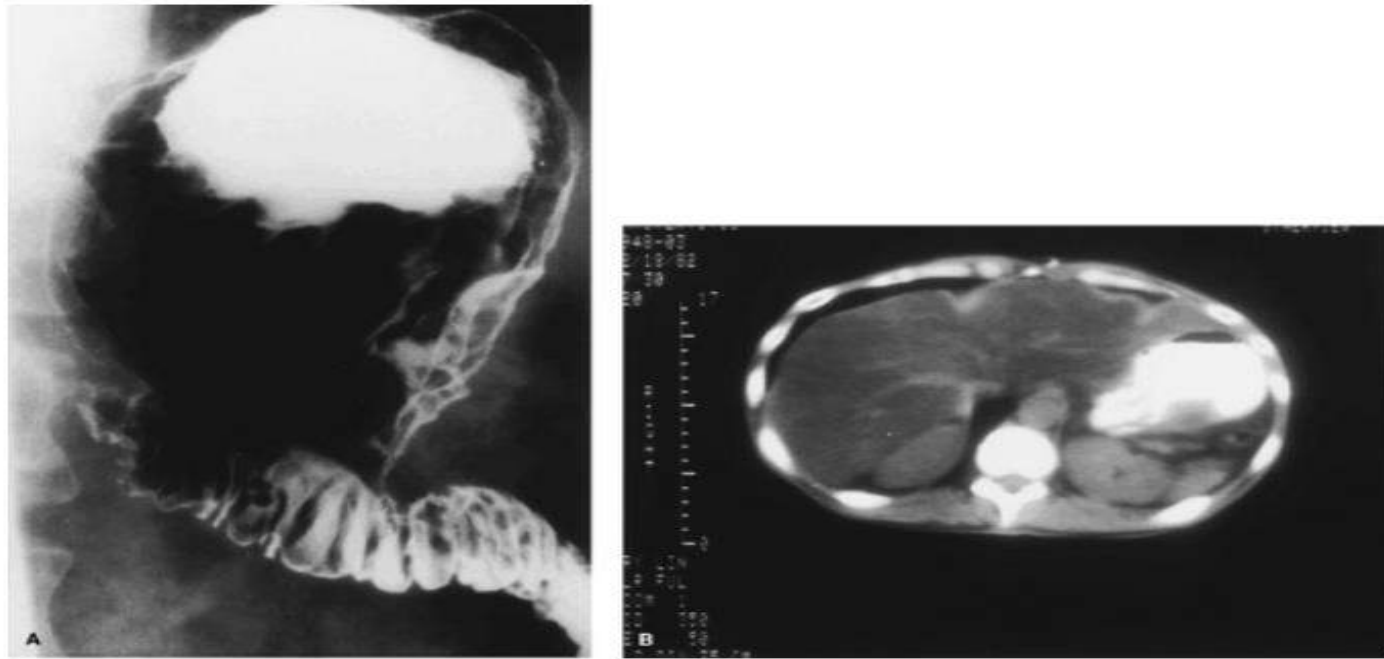


Fig. 20. Radiographic visualization of gastric carcinoma after gastrectomy and Billroth II reconstruction. **A:** Note the irregular mucosal contour of the gastric remnant as seen on barium upper gastrointestinal radiography. **B:** The tumor is clearly seen on a computed tomographic scan in the posterior gastric wall.



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Development and Validation of Pgsas-45, an Integrated Questionnaire to Assess Postgastrectomy Syndrome

*Koji Nakada^{*1,12}, Masami Ikeda^{2,12}, Masazumi Takahashi^{3,12}, Shinichi Kinami^{4,12}, Masashi Yoshida^{5,12}, Yoshikazu Uenosono^{6,12}, Yoshiyuki Kawashima^{7,12}, Atsushi Oshio⁸, Yoshimi Suzukamo⁹, Masanori Terashima^{10,12}, Yasuhiro Koderu^{11,12}*

¹Surgery, The Jikei University School of Medicine, Tokyo, Japan; ²Asama General Hospital, Saku, Japan; ³Yokohama Municipal Citizen`s Hospital, Yokohama, Japan; ⁴Kanazawa Medical School, Kanazawa, Japan; ⁵International University of Health and Welfare, Mita Hospital, Tokyo, Japan; ⁶Kagoshima University Graduate School of Medicine, Kagoshima, Japan; ⁷Saitama Cancer Center, Saitama, Japan; ⁸Waseda University, Tokyo, Japan; ⁹Tohoku University Graduate School of Medicine, Sendai, Japan; ¹⁰Shizuoka Cancer Center, Shizuoka, Japan; ¹¹Nagoya University Graduate School of Medicine, Nagoya, Japan; ¹²Japan Postgastrectomy Syndrome Working Party, Tokyo, Japan

METHODS:

PGSAS-45 is an integrated questionnaire consisting of 45 items including items selectively taken with permission from the standardized generic QOL questionnaire SF-8 (8 items) and the symptom-specific QOL questionnaire gastrointestinal symptom rating scale (GSRS; 15 items). Items selected from an item pool as being clinically relevant by 47 gastric surgeons were added to these to constitute the PGSAS-45. In the current study, 52 institutions were involved in "Postgastrectomy Syndrome Assessment Study (PGSAS)", a nationwide study to validate PGSAS-45, in which a total of 2520 PGSAS-45 questionnaires (86% of those that were originally sent out) were retrieved from the patients who received either of the six different types of gastrectomy procedures. Of these, 1516 questionnaires retrieved from the patients who received conventional gastrectomy (total with Roux-en-Y [n=393], distal with Billroth-I [n=909], distal with Roux-en-Y [n=475]) were statistically analyzed.

RESULTS:

The 23 symptom items of PGSAS-45 was composed of seven symptom subscales (SS), 'esophageal reflux SS', 'abdominal pain SS', 'meal-related distress SS', 'indigestion SS', 'diarrhea SS', 'constipation SS' and 'dumping SS' by factor analysis. The seven symptom subscales and other two domains, 'quality of ingestion SS' and 'dissatisfaction for daily life SS', had good internal consistency in terms of Cronbach's alpha (.65-.88). Multiple regression analysis demonstrated that the sum of newly added 8 symptoms had larger impact [Beta] compared to the sum of 15 symptoms of GSRS, in ingestion (.32, .02), ability for working (.35, .09), loss in body weight (.24, .07), physical component summary (PCS) (.35, .17) and dissatisfaction for daily life SS (.60, .11). The associations between patient's condition (symptoms, ingestion, ability for working) and HRQOL (PCS and mental component summary [MCS] of SF-8, dissatisfaction for daily life SS) was evident. The effect size [Beta, R²] was medium to large for all domains (.32 to .60, all p<0.0001).

CONCLUSIONS:

The results indicated that the PGSAS-45 provides a valid and reliable integrated measurement of QOL in gastrectomized patients.

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Postgastrectomy Syndrome Assessment Scale (PGSAS)-45 and Changes in Body Weight are Useful Tools for Evaluation of Reconstruction Methods Following Distal Gastrectomy

Masanori Terashima MD, PhD, FACS, Kazuaki Tanabe MD, PhD, Masashi Yoshida MD, PhD, FACS, Hiroshi Kawahira MD, PhD, Takao Inada MD, PhD, Hiroshi Okabe MD, PhD, FACS, Takashi Urushihara MD, PhD, Yoshiyuki Kawashima MD, PhD, Norimasa Fukushima MD, PhD, Koji Nakada MD

Thank You