



SURGICAL ASPECTS OF PEPTIC ULCER DISEASE

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INDICATIONS AND TECHNIQUES FOR SURGICAL TREATMENT OF UNCOMPLICATED PEPTIC ULCER

- **Duodenal ulcers**
- **Gastric Ulcers**

DUODENAL ULCERS (1)

- These have a natural tendency to heal – and to recur- in a cyclical fashion.
- Eradication of Helicobacter pylori is the main medical treatment.
- Relapse after medical treatment with significant problems in relation to work or social life.
- The feature common to all methods of treatment that prolong the healing phase is **reduction to the amount of acid** secreted by the stomach.

DUODENAL ULCERS (2)

The rate of acid secretion is a function of the:

1. **Number of parietal cells**
2. **Magnitude of vagal stimulation of parietal cells (cephalic phase)**
3. **Gastrin stimulation of parietal cells (humoral phase)**

DUODENAL ULCERS (3)

- Pharmacologic agents can accelerate the healing process by **reducing vagus-mediated acid secretion (anticholinergics)**, or by **buffering** the acid entering the duodenum (**antacids**)
- Surgical procedures have the potential to permanently cure duodenal ulcers by virtually **abolishing gastric acid secretion**
- The various standard operations incorporate per-mutations of vagal section (**cephalic phase**), excision of the gastric antrum (**humoral phase**), and excision of part of the body of the stomach (**parietal cells**)

DUODENAL ULCERS (4)

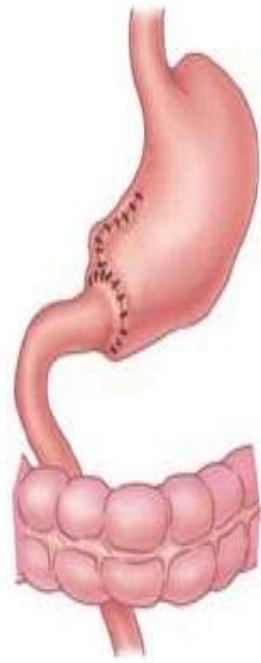
- Surgical procedures effect cure only at the price of some side effects, and with some small risk to life.
- Their use is therefore **elective** in the case of recurrent ulceration, and **obligatory** only when there are life-threatening complications.
- Surgery has evolved from **partial gastrectomy** to **highly selective vagotomy** but all the various operations remain in use
- Operations available:

PARTIAL GASTRECTOMY (1)

- The **antrum** which produces **gastrin** and about half of the acid secreting portion of the stomach are removed.
- Continuity is restored by gastrojejunral anastomosis, which has the advantage that the residual stomach is bathed in **alkaline** juice.
- It may have the disadvantage that the **atrophic gastritis** which follows can lead to **malignancy**.
- The recurrence rate is low (< 1%) but post-gastrectomy sequelae may be severe.
- For practical purposes the antrum is the soul source of gastrin. Hence the humoral phase can be abolished by excision of the antrum, either as a specific procedure (antrectomy), or as an inevitable consequence of subtotal gastrectomy.

PARTIAL GASTRECTOMY (2)

- The stimulation of gastrin secretion can be reduced by procedures which partly by-pass the antrum (gastroenterostomy) or which accelerate gastric emptying (pyloroplasty)
- It has been found that resection of the distal three-quarters of the stomach removes enough parietal cells – and hence enough acid secretion – to cure most duodenal ulcers
- When gastric resection is the sole surgical maneuver, either a gastrojejunal (polya) or a gastroduodenal (Billroth) anastomosis can be used to complete the operation
- From the nutritional point of view the patient with a Billroth anastomosis has a better digestive life than the patient with a polya anastomosis.

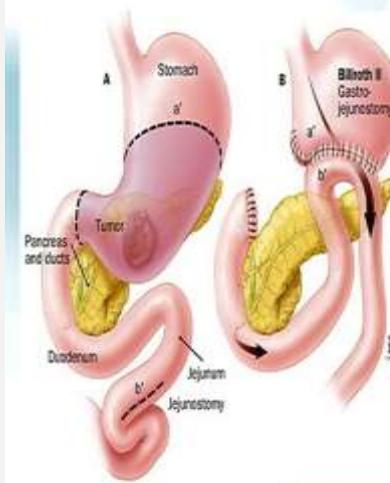


Billroth I

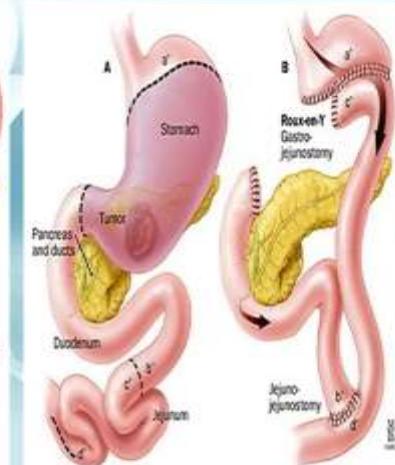


Billroth II

Anastomosis



Billroth II anastomosis



Roux-en-Y anastomosis

VAGAL SECTION

- If the vagi are divided acid secretion is reduced
- However, the vagus is **motor** to the gut and its adnexae as a whole so that certain disadvantages must follow. There may be:
 - (i) Changes in gastro-intestinal motility
 - (ii) Impaired emptying of the gallbladder

[1] TRUNKAL VAGOTOMY

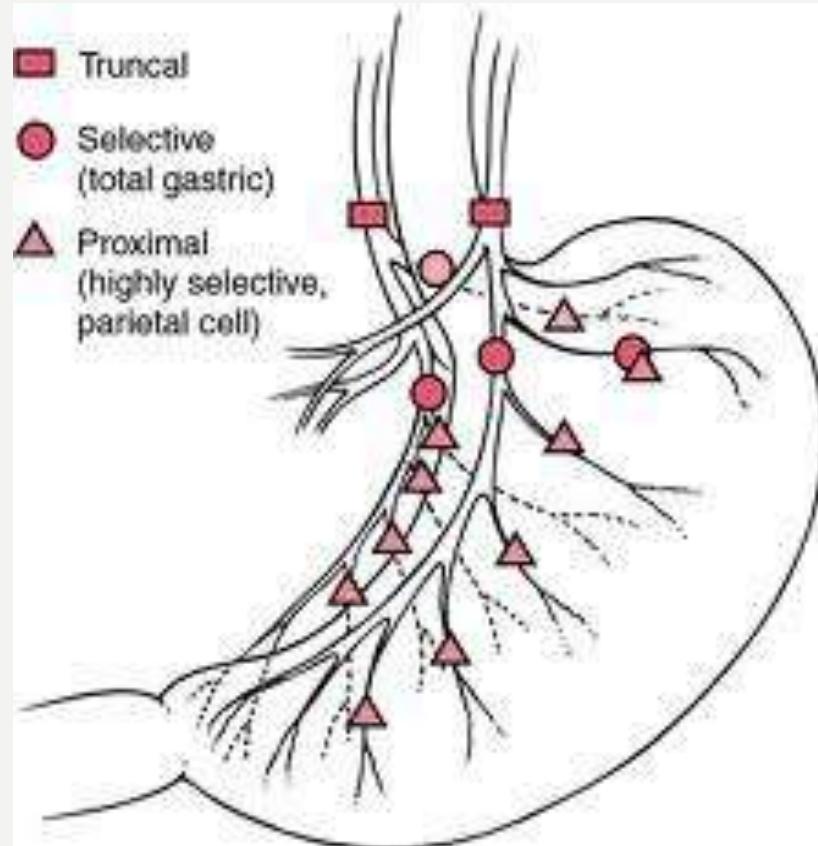
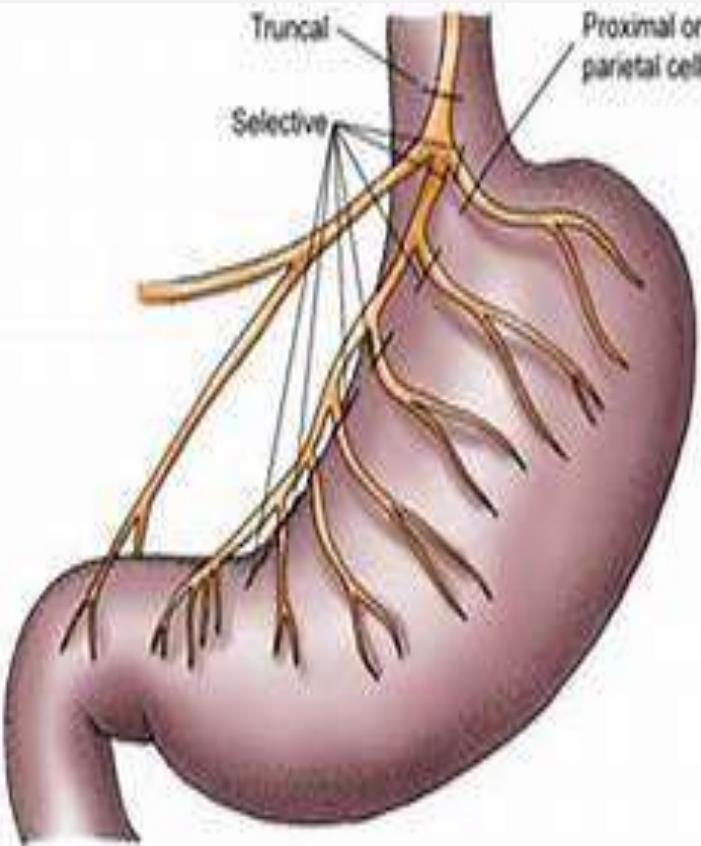
- Is performed by dividing both vagal trunks at the esophageal hiatus.
- It is very effective in curing DU provided denervation of the stomach is complete.
- However, it results in the pylorus failing to open and therefore in gastric stasis. Consequently, the pyloric ring must be destroyed (**pyloroplasty**) or bypassed (**gastroenterostomy**).
- These necessary secondary procedures also expose the patient to the risks of post gastric surgery sequelae and though the operation is safer than partial gastrectomy, it is often associated with approximately the same incidence of satisfactory results.

(2) SELECTIVE VAGOTOMY

- Only the vagal fibers to the stomach are divided; those supplying the **pancreas**, **biliary tree** and **small bowel** are spared.
- However vagal denervation of the stomach renders it atonic and excessively slow to empty. This undesirable consequence must be avoided either by dividing the pyloric circular muscle fibers (**pyloroplasty**) or by providing an additional exit from the stomach (**gastroenterostomy**).

(3) HIGHLY SELECTIVE VAGOTOMY

- In this operation only the nerves to the parietal cell mass are sectioned. **The vagal fibers which supply the pylorus are also spared** so the stomach empties normally eliminating the need for supplementary pyloroplasty, gastroenterostomy, or gastric resection.
- This is done by mobilizing the lesser curvature from the antrum to the esophagus and dividing all blood vessels and nerves. **The pyloric innervation is left intact so that pyloroplasty or gastrojejunostomy are unnecessary.**
- This seems the best procedure with a low rate of recurrence (less than 5%) and an equally low rate of unsatisfactory results from post gastric surgery disturbances.



The **nerve of Latarjet** or the **posterior nerve of the lesser curvature** is a branch of the anterior vagal trunk which supplies the pylorus. It is cut in selective vagotomy and preserved in highly selective vagotomy. It functions by increasing peristalsis and relaxing the sphincter, thus draining the contents of the stomach into the first part of duodenum. If damage occurs to this nerve, it can cause "Retention syndrome".

GASTRIC ULCER

- Many gastric ulcers will heal. However, a residuum do not.
- An unhealed ulcer has a 5-10 % chance of being malignant.
- Though there are a number of operations available, the most satisfactory treatment is a Billroth I partial gastrectomy.
- The most commonly performed operation, subtotal gastrectomy, does nothing more subtle than remove the ulcer and the ulcer-prone area of the stomach.
- There is no clear association between gastric ulceration and acid secretion, but it has been suggested that enhancing gastric drainage (by pyloroplasty) will promote healing.

LIFE-THREATENING COMPLICATIONS

- Exsanguinating **hemorrhage**, **perforation**, and **stenosis** from scarring, make operation for gastric or duodenal ulcer mandatory.
- **Perforation** is usually dealt with by simple **oversewing of the ulcer**.
- In the case of **hemorrhage** and **stenosis**, removal of the immediate threat to life is combined with one of the procedures described above that will remove the risk of further ulceration.

SPECIFIC COMPLICATIONS OF SURGERY FOR PEPTIC ULCER

EARLY COMPLICATIONS (1)

I. Failure of the stomach or stomach remnant to empty occurs after any procedure. It was formerly common after vagotomy and drainage. Causes are:

- A. Prolonged paralysis of stomach (doubtful)
- B. Edema at a stoma
- C. Fluid and electrolyte disorder, especially **hypokalemia**.

Management is conservative with NG suction, fluid, electrolyte and nutritional replacement.

EARLY COMPLICATIONS (2)

2. Intestinal obstruction.

Causes are:

- A. Adhesive.
- B. As a consequences:
 - I. Twisting of the loop of a gastrojejunostomy after polygastrectomy.
 - 2. Herniation of loops through a mesenteric defect.
 - 3. Retrograde intussusception of the efferent loop of a gastrojejunostomy (rare).

Prophylaxis: avoid causes – such as mesenteric cul de sacs or holes

Treatment: operative

EARLY COMPLICATIONS (3)

3. **Fistulae.** Can occur after any operation, which involves a suture line.
Most usual sites are:
 - I. After polya gastrectomy
 - A. Duodenal stump
 - B. Pancreases from trying to dissect out a difficult ulcer
 2. Occasionally at a Pyloroplasty
4. **Acute pancreatitis.** May follow any procedure. Its etiology is unknown, but some cases are traumatic

LATE COMPLICATIONS (1)

I. **Anastomotic and recurrent ulceration**

Causes:

- a. Inadequate resection of parietal cell mass.
- b. Isolated antrum left after polya gastrectomy.
- c. Zollinger – Ellison syndrome.
- d. Incomplete vagotomy.
- e. Persistent suture in the anastomosis. More usually this is merely a suture exposed as a consequence of ulceration from another cause.

Prophylaxis: adequate primary treatment.

Management is related to cause and requires investigation to ascertain the level of acid secretion or the completeness of vagotomy. Recurrence after vagotomy is best managed by polya gastrectomy.

LATE COMPLICATIONS (1)

2. Gastrojejunocolic fistulae.

Occurs when a recurrent ulcer after gastrojejunostomy penetrates into the colon. It should arouse the suspicion of Zollinger-Ellison syndrome.

Clinical features: Severe diarrhea occurs due to enteritis caused by colonic contents passing directly into the small bowel and acidosis, dehydration, potassium loss, anemia and cachexia will result in death if the fistula is not interrupted surgically.

Treatment:

1. Good risk patient. Excision of the gastric, jejunal and colonic components and the construction of a higher gastrectomy.
2. Poor risk patient. A staged procedure:
 - (a) **Stage 1:** Proximal colostomy which, diverts the fecal stream from the fistula and thus stops the enteritis.
 - (b) **Stage 2:** Excision of fistula and its visceral components and the construction of a higher gastrectomy and colonic anastomosis.
 - (c) **Stage 3:** Closure of colostomy.

POST-GASTRIC SURGERY SYMPTOMS AND SYNDROMES

LATE EFFECTS OF ABLATION OR BYPASS OF THE PYLORUS

DUMPING SYNDROME

- The stomach is a reservoir and the pylorus ‘meters’ food rendered **isotonic** with plasma into the small bowel for further digestion and absorption.
- Consequently, ablation of gastric areas plus, as is always the case, loss or bypass of the pylorus allows the entry of **hyperosmolal**, large volume loads into the jejunum. Two things follow:
 - I. The bulk stimulates peristalsis and results in pain, rapid transit and thus occasionally diarrhea.
 2. The hyperosmolality draws fluid into the gut lumen which aggravates the bulk problem and may also reduce blood volume so creating vasomotor instability-the patient feels faint and tremulous after a meal.
- These features constitute the ‘dumping syndrome’ which is aptly named because it does result from dumping a large volume of hypertonic liquid into the jejunum.

DUMPING SYNDROME

- Occurs when food, especially sugar, moves too quickly from the stomach to the duodenum. This condition is also called **rapid gastric emptying**. It is mostly associated with conditions following gastric or esophageal surgery, though it can also arise secondary to diabetes or to the use of certain medications; it is caused by an absent or insufficiently functioning pyloric sphincter.
- **Dumping syndrome has two forms, based on when symptoms occur:**
 - **Early dumping syndrome** occurs **10 to 30 minutes after a meal**. It results from rapid movement of fluid into the intestine following a sudden addition of a large amount of food from the stomach. The small intestine expands rapidly due to the presence of hypertonic/hyperosmolar contents from the stomach, especially sweet foods. This causes symptoms due to the shift of fluid into the intestinal lumen, with plasma volume contraction and acute intestinal distention. Osmotic diarrhea, distension of the small bowel leading to crampy abdominal pain, and reduced blood volume can result.
 - **Late dumping syndrome** occurs **2 to 3 hours after a meal**. It results from excessive movement of sugar into the intestine, which raises the body's blood glucose level and causes the pancreas to increase its release of the insulin. The increased release of insulin causes a rapid drop in blood glucose levels, a condition known as **alimentary hypoglycemia**.

DUMPING SYNDROME: SIGNS AND SYMPTOMS

The symptoms of early and late dumping syndrome are different and vary from person to person.

Early dumping syndrome symptoms may include:

1. Nausea
2. Vomiting
3. Abdominal pain and cramping
4. Diarrhea
5. Feeling uncomfortably full or bloated after a meal
6. Sweating
7. Weakness
8. Dizziness
9. Flushing, or blushing of the face or skin
10. Rapid or irregular heartbeat

Late dumping syndrome symptoms may include:

1. Hypoglycemia
2. Flushing

About **75%** of people with dumping syndrome report symptoms of **early** dumping syndrome and about **25%** report symptoms of **late** dumping syndrome. Some people have symptoms of both types of dumping syndrome.

DUMPING SYNDROME: DIAGNOSIS

- Diagnose of dumping syndrome primarily done on the basis of symptoms. The following tests may also help confirm dumping syndrome and exclude other conditions with similar symptoms:
- **A modified oral glucose tolerance test** checks how well insulin works with tissues to absorb glucose. A health care provider often confirms dumping syndrome in people with:
 1. Low blood sugar between 120 and 180 minutes after drinking the solution
 2. An increase in hematocrit $> 3\%$ at 30 minutes
 3. A rise in pulse rate > 10 beats per minute after 30 minutes
- **A gastric emptying scintigraphy test** involves eating a bland meal that contains a small amount of radioactive material. An external camera scans the abdomen to locate the radioactive material. The radiologist measures the rate of gastric emptying at 1, 2, 3, and 4 hours after the meal. The test can help confirm a diagnosis of dumping syndrome.
- **An Upper GI endoscopy.**
- **An upper GI series** examines the small intestine.

DUMPING SYNDROME: TREATMENT

- Treatment includes changes in eating, diet, and nutrition; medication; and, in some cases, surgery.
- Many people have mild symptoms that improve over time with simple dietary changes.
- **Lifestyle changes :** The first step to minimizing symptoms involves changes in eating, diet, and nutrition, and may include:
 1. **Eating 5-6 small meals** a day instead of 3 larger meals
 2. **Delaying liquid intake** until at least 30 minutes after a meal
 3. **Increasing intake of protein, fiber, and complex carbohydrates** (found in starchy foods such as oatmeal and rice).
 4. **Avoiding simple sugars** such as table sugar, which can be found in candy, syrup, sodas, and juice beverages
 5. **Increasing the thickness of food** by adding pectin or guar gum—plant extracts used as thickening agents
- **Medication**
 - **Octreotide acetate injections.** The medication works by **slowing gastric emptying** and inhibiting the release of insulin and other GI hormones.
- **Surgery**
 - A person may need surgery if dumping syndrome is caused by previous gastric surgery or if the condition is not responsive to other treatments. For most people, the type of surgery depends on the type of gastric surgery performed previously. However, surgery to correct dumping syndrome often has unsuccessful results.

ANEMIA

- Partial gastrectomy and poly a reconstruction interferes with duodenal absorption of **iron** and a **microcytic anemia** may result
- More rarely, sufficient stomach has been removed to cause failure of release of **intrinsic factor** and thus a **macrocytic anemia**
- Malnutrition may contribute to both.

WEIGHT LOSS AND ITS COMPLICATIONS

- Particularly after partial gastrectomy when patients are unwilling to eat sufficiently, weight loss is common
- Severe malnutrition is rare, but there is an increased risk of nutrition-associated diseases such as tuberculosis.

BILIUS VOMITING

- Any operation which, destroys or bypasses the pylorus allows bile to reach the stomach.
- Not only does this produce **atrophic gastritis** but also it may be associated with **bilious vomiting**.
- This is more likely after a **polya gastrectomy** where characteristically a patient eats a meal and some to 10-20 minutes later vomits bile only.
- In severe cases, either normal anatomy should be restored or the bile diverted more distally into the intestine.

DIARRHEA

- Apart from the dumping syndrome, all vagotomies except highly selective ones seem to cause diarrhea
- Matters are made worse if cholecystectomy has been done or is subsequently done