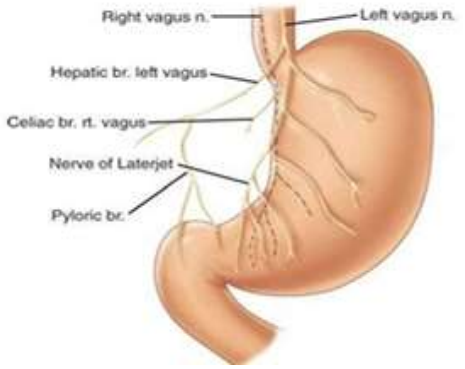
Lec. 3 | Stomach

Anatomy, Histology & Physiology of Stomach

Stomach is composed of 5 parts:

- Cardia.
- Fundus
- Body.
- Antrum.
- Pylorus.



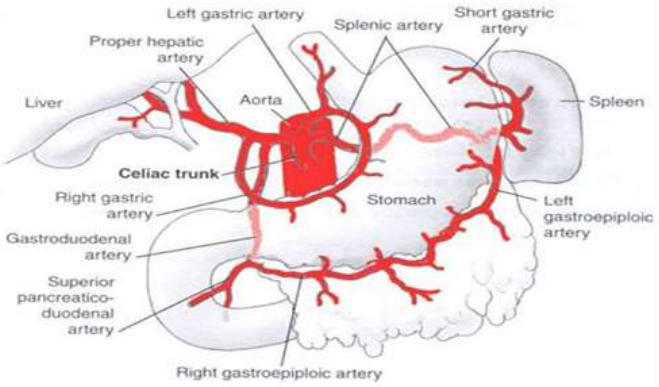
Blood supply of the stomach:

Lesser curvature:

- **Right gastric artery**: from hepatic artery.
- **Left gastric artery:** from celiac trunk.

Greater curvature:

- **Right gastroepiploic artery:** from gastroduodenal artery.
- **Left gastroepiploic artery:** from splenic artery.



Pylorus: gastroduodenal artery.

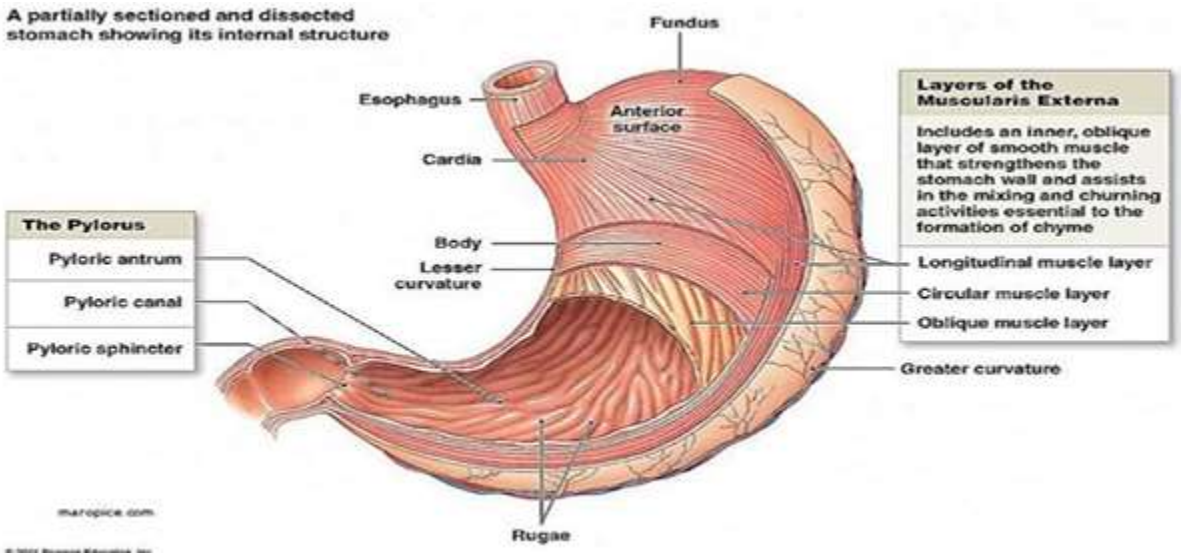
Fundus: short gastric arteries.

Innervation of the stomach:

Sympathetic: T5-T10.

Parasympathetic:

- **Anterior gastric wall:** left vagus nerve (gives hepatic branch).
- **Posterior gastric wall:** right vagus nerve (gives celiac branch).



Acute gastric dilatation

- This is a condition where the stomach loses its tone and rapidly dilates to reach an enormous size. The stomach becomes filled with air and fluid which is dark and foul. The source of the fluid is mainly from intravascular compartment which is depleted and the patient passes into hypovolaemic shock.
- This condition can occur postoperatively especially after pelvic operations, splenectomy, and cholecystectomy, but very rarely after gastric surgery. A few cases have been reported during labour and in patients immobilized in plaster casts.

Clinical features

2-3 days after surgery

- Hiccough
- Upper abdominal discomfort and distension
- Tachycardia.
- Effortless vomiting of dark foul-smelling fluid.
- Succession splash.

The condition should be diagnosed at this stage and gastric decompression by nasogastric tube instituted.

Complications

- Dehydration and hypovolaemic shock.
- Metabolic alkalosis and electolytes embalance.
- Respiratory distress and aspiration pneumonia may occur.

Investigations

1. Blood chemistry
2. Never Barium meal as it worsens the condition.

Treatment

Prophylactic:

The placement of a nasogastric tube after major abdominal surgery prevents acute gastric dilatation.

Curative:

- Stop feeding.
- Insertion of a nasogastric tube and continuous aspiration.
- Correction of fluid, electrolytes, and acid-base balance.
- Oxygen inhalation

Trichobezoar and phytobezoar

Trichobezoar (hair balls)

- are unusual and are virtually exclusively found in female psychiatric patients, often young. It is caused by the pathological ingestion of hair, which remains undigested in the stomach.
- The hair ball can lead to ulceration and gastrointestinal bleeding, perforation or obstruction.
- **The diagnosis** is made easily at endoscopy or, indeed, from a plain radiograph.
- **Treatment** consists of removal of the bezoar, which may require open surgical treatment.

Trichobezoar of the stomach in a girl aged 15 years

Phytobezoars

Phytobezoars are made of vegetable matter and found principally in patients who have gastric stasis. Often this follows gastric surgery.

Foreign bodies in the stomach

- A variety of ingested foreign bodies reach the stomach, and very often these can be seen on a plain radiograph.
- If possible, they should be removed endoscopically but, if not, most can be left to pass normally. Even objects such as needles, with which there is understandable anxiety, will seldom cause harm. In general, an object which leaves the stomach will pass spontaneously.
- The treatment should therefore be expectant and intervention reserved for patients with symptoms in whom the foreign body is failing to progress.

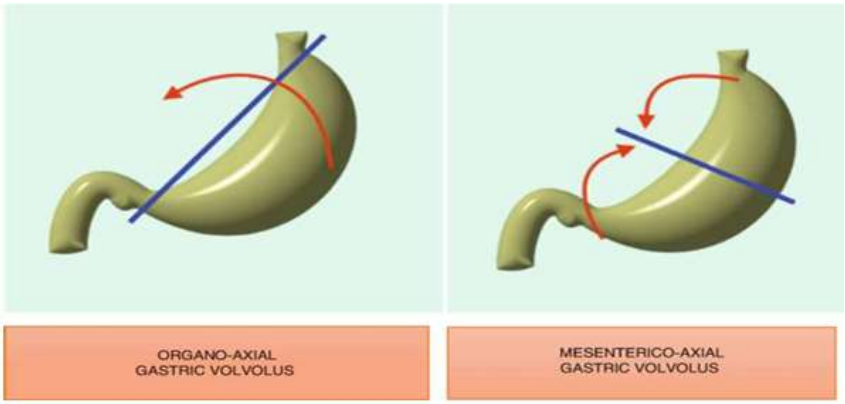
Volvulus of the stomach

Definition

Rotation of the stomach usually occurs around the axis and between its two fixed points, i.e. the cardia and the pylorus.

Types

Horizontal (organoaxial)	» **65%** » Usually associated with a large diaphragmatic defect around the oesophagus (paraoesophageal herniation). » Around a line from pylorus to cardia
Vertical (mesenteroaxial)	» **35%** » Idiopathic » Around axis from center of greater curvature to porta hepatis



Clinical picture

***Chronic* (more common)**

- Asymptomatic
- Distress or bloating after meals followed by inability to retch or vomit.
- The condition is eased when the patient lies supine.

Acute

- Severe epigastric pain
- Vomiting followed by inability to vomit.
- Inability to pass nasogastric tube.

Complications

Gangrene, bleeding, respiratory distress, and shock

Treatment

Chronic

- **If idiopathic:** Gastropexy by stitching the anterior gastric wall to parietal peritoneum.
- **If secondary:** Correction of the cause

Acute: Emergent operation

- **Viable:** as chronic
- **Gangrenous:** Excision up to total gastrectomy

Peptic Ulcer Disease

- **In the past**, peptic ulcer disease (PUD) was the most common indication for gastric surgery.
- **In more recent times**, the recognition that PUD is caused by Helicobacter pylori and the development of highly effective acid suppressing medications (H2 blockers and PPIs) has dramatically decreased the need for surgical treatment of this condition.
- **Surgical management** of uncomplicated peptic ulcers is rarely necessary because they usually respond well to medical treatment.

Indications *(consider after thorough evaluation)*

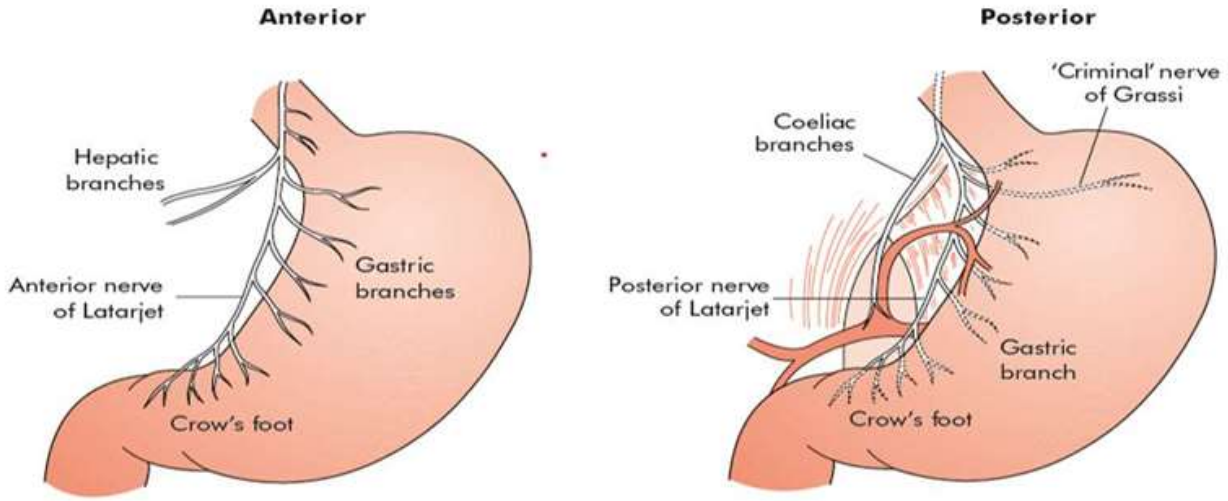
1. Refractory symptoms or recurrence of disease despite appropriate medical treatment
2. Diseases that require the continuation of NSAIDs
3. Inability to tolerate medical treatment.
4. Complicated peptic ulcers

Surgical procedures

Vagotomy

- surgical division of the anterior and posterior vagal trunk of the vagus nerve (truncal vagotomy), both located along the lower esophagus. Denervation through truncal vagotomy results in ~ 70% reduction of acid production.
- ***As a side effect***, delayed gastric emptying occurs.
- To improve results, truncal vagotomy is combined with one of the following ***Drainage procedures:***
  - Pyloroplasty
  - Antrectomy
  - Subtotal gastrectomy

> The anterior and posterior branches of the vagus nerve (CN X) are also known as nerves of Latarjet, which divide into terminal branches that innervate the stomach and the pylorus. The terminal branches on the antropyloric area are sometimes referred to as "crow's foot."
>
> Selective vagotomy means division of these terminal branches to avoid truncal vagotomy and drainage procedures complications.



Partial gastrectomy (Billroth) and reconstruction

» **Billroth I:** distal gastrectomy with end-to-end or side-to-end gastroduodenostomy
» **Billroth II:** resection of the distal two-thirds of the stomach with a blind-ending duodenal stump and end-to-side gastrojejunostomy

Complications of peptic ulcer

1. Bleeding
2. Perforation
3. Penetration and fistula
4. Malignant transformation (Gastric ulcers)
5. Fibrosis → Gastric outlet obstruction or Hour Glass stomach
6. Recurrence 10%

1. Perforated Peptic Ulcer

» More common with DU
» More common in males
» usually, the anterior wall of the first part of the duodenum
» Predisposed by NSAIDS, heavy meal, stress

Pathology (stages)

1. Stage of chemical peritonitis
2. Stage of illusion
3. Stage of septic peritonitis

Clinical Picture:

- History of dyspepsia
- Epigastric pain then generalized. (may be Rt. iliac pain mimic appendicitis)
- Tachycardia, fever, hypotension
- Abdominal exam.→ board-like rigidity with absent bowel sounds, distension.
- Dehydration and Shock

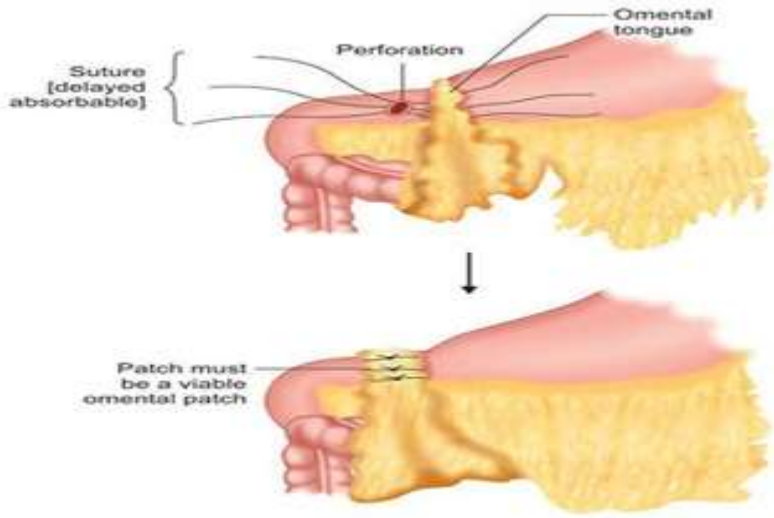
Investigation:

- Leucocytosis, increased serum amylase
- Plain X-ray erect position-→ Gas under Diaphragm
- US→Fluid collection
- Gastrografin meal is indicated only in doubtful cases.

Management

1. Resuscitation: Ryle, I.V fluid, urinary catheter, Antibiotics
2. Emergent exploration (peritoneal lavage + simple closure of the perforation by omental patch)

N.B. Conservative therapy, with percutaneous drain insertion is only indicated in patients with localized / sealed perforation and those too ill for those too ill for surgical intervention.



2.Gastric Outlet Obstruction

Etiology

» Cicatrized (healed by fibrosis) duodenal ulcer
» Other causes: malignancy, strictures , foreign bodies

Pathology

» With the slow onset of benign stenosis, compensatory muscular hypertrophy occurs. Ultimately decompensation sets in with gastric dilatation and stasis
» Vomiting→ loss of electrolytes Cl, Ca, metabolic alkalosis →Na+ loss in urine,
» In advanced cases, as compensatory mechanism→ loss of H+, K+ in urine → Acidosis

Clinical picture

» Long-standing history of dyspepsia and loss of weight.
» Anorexia, nausea and vomiting of undigested food - usually non bile stained.
» On examination: Dehydration, Upper abdominal distension, Visible peristalsis (left to right), Succussion splash

Investigations:

» Laboratory: decreased serum electrolytes
» Barium meal:
» Dilated stomach (often reaching the pelvis).
» Soup Dish appearance
» upper endoscopy: to exclude malignancy

Treatment

Correction of the general condition then surgery (truncal vagotomy + gastrojejunostomy)

TUMORS OF STOMACH

1. Benign

- Gastrointestinal stromal tumors (Formely Leiomyoma)
- Neurofibroma & schwannoma.
- Adenomatous polyps:
  a) Multiple polypi are PREMALIGNANT & treated by partial gastrectomy.
  b) Single polyps are excised locally.

2. Malignant

Gastric Cancer

- High in some Asian countries, most notably Japan, South Korea, and Mongolia.
- Adenocarcinoma accounts for 95% of gastric cancer. Less frequent gastric cancers include gastric lymphomas, GIST, and neuroendocrine tumors.
- prognosis of gastric cancer has remained very bad. The overall 5 years survival rate is about 5%.

Sex: ♂ > ♀

Predisposing factors:

Exogenous risk factors	○ Diet rich in nitrates and/or salts. ○ H. pylori infection ○ Nicotine use ○ Low socioeconomic status ○ Obesity
Endogenous risk factors	**Gastric conditions** • Chronic atrophic gastritis and associated pernicious anemia. • Gastric ulcers • Partial gastrectomy • Adenomatous gastric polyps • GERD **Hereditary factors** • Positive family history • Blood type A • Hereditary nonpolyposis colorectal cancer

Pathology

Adenocarcinoma

- Accounts for ~ 95% of cases
- Arises from glandular cells in the stomach.
- Most tumours (60%) occur in the pyloric antrum and least of all is type that affects the stomach diffusely.

Macroscopic types (Japanese classification)

- **Early gastric cancer,** only mucosa or submucosa is infiltrated (protruding, superficial or excavating).
- **Advanced gastric cancer** (common) it may be:
  - A fungating cauliflower mass (body & fundus).
  - ulcer with raised everted edge (pylorus or lesser curve).
  - Colloid carcinoma.
  - Linitis plastica (thickened wall with intact mucosa).

Microscopically

- Adenocarcinoma (95 %)
- Colloid carcinoma (bad prognosis)
- Squamous cell carcinoma (4%) (cardia & fundus)
- Anaplastic carcinoma (1%).

Spread

1. **Direct spread** To the surrounding organs.
2. **Lymphatic spread** by permiation or embolization:
   - The proximal stomach drains to the left gastric and to the splenic LNs
   - The antrum to the right gastric and subpyloric LNs
   - The greater curvature drains to gastro-epiploic LNs
   - Then drainage to celiac or superior mesenteric LNs
3. **Blood spread** to the liver and rarely to bones.
4. **Trans-coelomic spread** Either seeding or implantation in ovary (Krukenberg's tumor) or Douglas pouch (Blumer's shelf).

Clinical features (5 groups)

1. Dyspepsia group. Male patient over 40 years with dyspepsia, anorexia and abdominal pain after meal not responding to treatment.

2. Cachexia group (Anemia, unexplained weight loss).

3. Mass group. Epigastric mass (about 30 % of patients are advanced).

4. Obstructive group. Mass in the cardia (dysphagia), Mass in the pylorus (vomiting).

5. Metastatic group.

- liver secondaries, jaundice, malignant ascites
- Enlarged Virchow's LNs (Troisier's sign)..

Staging

TNM	Stage	
T	T1a	Tumor invades lamina propria or muscularis mucosae
	T1b	Tumor invades submucosa
	T2	Tumor invades muscularis propria
	T3	Tumor penetrates subserosal connective tissue without invasion of visceral peritoneum or adjacent structures
	T4a	Tumor invades serosa (visceral peritoneum)
	T4b	Tumor invades adjacent structures
N	N0	No regional lymph node metastasis
	N1	Metastasis in 1 - 2 regional lymph nodes
	N2	Metastasis in 3 - 6 regional lymph nodes
	N3	Metastasis in seven or more regional lymph nodes
M	M0	Distant metastasis absent
	M1	Distant metastasis present

Diagnostic approach

- **Diagnostic confirmation:** EGD with biopsy (test of choice)
- **Staging:** evaluate for lymph node involvement and metastatic disease.
  - All patients: Obtain CT abdomen, pelvis, and thorax.
  - Potentially resectable disease (Mo): Consider endoscopic ultrasound (EUS)the most accurate for assessment of invasion
  - Diagnostic laparoscopy for peritoneal metastasis
- **Additional modalities** include upper GI series and PET-CT.
- **Laboratory studies; :** e.g., to identify anemia and biomarkers: e.g. CEA, HER2; , TNF-α

Treatment

Inoperable cases

- **resectable:** palliative gastrectomy
- **irresectable:**
  1. cardiac obstruction (stent)
  2. pyloric obstruction (stent or palliative GJ)

Operable cases

- **Upper 1/3:** oesophago-gastrectomy+ OJ
- **middle 1/3:** Total gastrectomy + OJ
- **lower 1/3:** Partial gastrectomy+ GJ

N.B. Stage 0 or IA can be endoscopically resected with excellent 5 years survival rate 80-90%.

Gastrointestinal stromal tumor (GIST)

Originated from the interstitial cell of cajal.

Epidemiology

- Age of onset: >40 years of age
- Males = Females

Etiology

- associated with c-KIT gene mutations (tyrosine kinase receptor).

Localization

- Stomach (60%)
- Small intestine (35%)
- Colon, rectum, esophagus, or omentum (5%)

Clinical features

- Small tumors (< 2 cm): often asymptomatic
- Large tumors (> 2 cm) : Ulceration, bleeding → anemia, melena, and hematemesis, Obstruction

Diagnostics: by Imaging CT, MRI. And Endoscopy with biopsy

Treatment

Treatment involves surgical removal and treatment with tyrosine kinase inhibitors such as imatinib (Gleevec).

Gastric Operations

Gastrostomy

A gastrostomy is an opening (stoma-mouth) of the stomach on the skin.

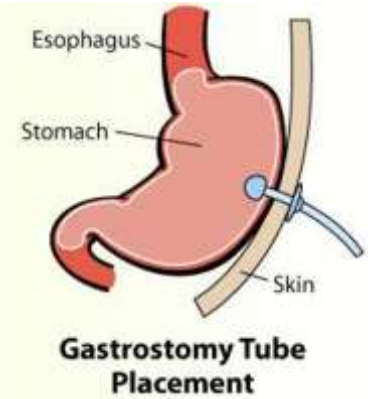
A. Temporary gastrostomy

Indications

1) To feed patients who are undergoing a series of operations on the mouth and pharynx and cannot ingest food orally for weeks or months.
2) To decompress the bowel as an alternative to postoperative nasogastric intubation

B. Permanent gastrostomy

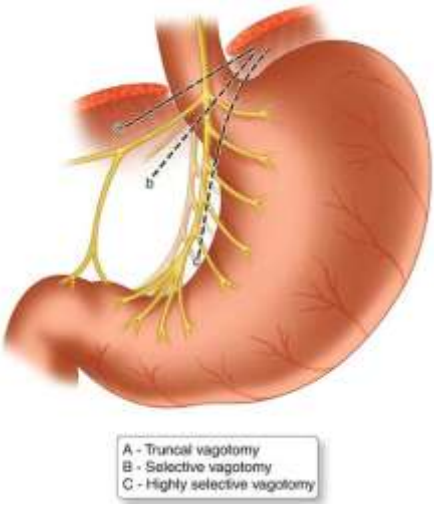
with advanced oesophageal carcinoma



Gastrostomy Tube Placement

Vagotomy

1. Trunckal vagotomy (+ drainage op.)
2. selective vagotomy
3. highly selective vagotomy
4. Seromyotomy


A - Truncal vagotomy
B - Selective vagotomy
C - Highly selective vagotomy

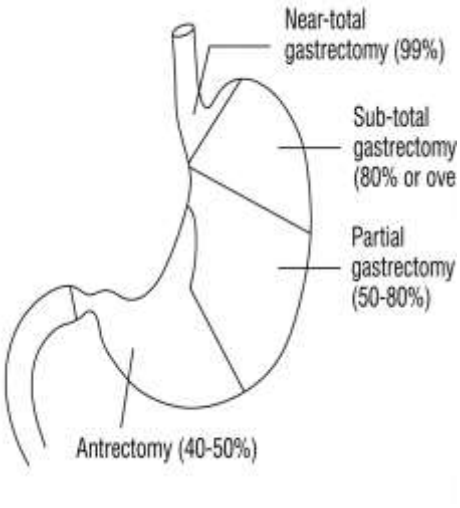
Complications of Vagotomy (Post-Vagotomy Syndromes):

- **Distention:** Due to division of the coeliac branch to the intestines.
- **Diarrhea:** Due to reduced gastric acidity, the intestinal flora will be overpopulated, lack of mixing food with bile and pancreatic secretions. Cholestyramine improves the post vagotomy diarrhea.

- **Dysphagia:** Due to reflux esophagitis from disturbance of the cardio-esophageal junction.
- **Recurrence of ulcer:** Due to:
  a) Incomplete vagotomy.
  b) Very high pre-operative acidity: Zollinger-Ellison's syndrome.
  c) Inadequate drainage with antral stasis.
- **Damage of important structures at operation:** Pleura, diaphragm etc.

Gastrectomy

Types of gastrectomies:



1. **Total gastrectomy**

   Indications for total gastrectomy in stomach
   - For proximal gastric carcinoma
   - For extensive tumors (eg. Linitis plastica)
   - To obtain negative margins for distal gastric carcinoma
   - Roux-en-Y esophagojejunostomy needs to be done if total gastrectomy is done
2. **Subtotal gastrectomy**
3. **Partial gastrectomy**
4. **Antrectomy (hemigastrectomy) (50%)**

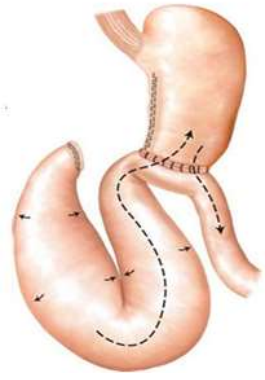
Post Gastrectomy Complications

A) Early complications:

1. Hemorrhage: from the anastomotic line
2. Stomal obstruction (edema or jej-gastric intussuception)
3. Duodenal blow-out (4th day)
4. Leakage from the anastomosis:
5. Paralytic ileus, pancreatits
6. Burst abdomen
7. Pulmonary complications

B) Late complications:

1. Post gastrectomy Syndromes:



» **Nutritional Syndrome** (weight loss, anemia, steatorrhea & hypocalcemia)

» **Afferent Loop Syndrome (Bilious vomiting)**
It is periodic vomiting of large quantities of bile & pancreatic secretion free of food with sudden relief of epigastric pain & distention due to transient mechanical obstructionTreated by conversion to Roux en Y

» **Postcibal Syndrome (Dumping Syndrome)**

1. early dumping
2. late dumping

Early dumping	Late dumping
Hypovolemia	Hypoglycemia
½ hour after meal	2-3 hours after meal
rapid passage of hypertonic chyme into small intestine (shift of extracellular fluid into the intestinal lumen) causes depletion of the blood volume	Large CHO diet causes hyperglycemia (increase insulin)
Clinical picture: Abdominal fullness followed by colic and Diarrhea and weakness, flushing, palpitation	Clinical picture: Sweating, hunger and tremors
Prevention & reatment: Small frequent meals, Polya to Raux - en -Y	Prevention & reatment: Small frequent meals , low CHO diet Oral glucose

2. Recurrent ulcer (at the stoma site, gastric remnant)

3. Gastro-jejuno-colic fistula

4. Internal herniation and Intestinal Obstruction

5. Biliary Gastritis

6. Diarrhea

7. Gall bladder stones

8. High risk for gastric cancer

Lec. 4 | Bariatric and Metabolic Surgery

Introduction

- **Bariatric = Baros:** heaviness, and pressure.
- It is the field of medicine encompassing the study of obesity, its causes, prevention, and treatment.
- **Obesity:** it is ≥ 20% than the ideal weight or Body Mass Index (BMI) ≥ 30 kg/m²
- **BMI** is calculated as weight (Kg) / Height (m²)

Classification of Obesity

A BMI of	Classifies one as
< 18.5	Underweight
18.5 - 24.9	Normal weight
25 - 29.9	Overweight
30 - 34.9	Obesity Class I
35 - 39.9	Obesity Class II
40 - 49.9	Obesity Class III
50 and above	Super Obesity

What Is Morbid Obesity?

- **Clinically severe obesity** at which point serious medical conditions occur as a direct result of obesity.
- Defined as **Body mass index of ≥40 or ≥35 associated with co-morbidities**
- **Obesity is associated with a rise in many comorbid conditions, including:**
  - Type 2 Diabetes
  - Hyperlipidemia
  - Hypertension
  - Obstructive Sleep Apnea
  - Heart Disease
  - Stroke

  - Asthma
  - Back and lower extremity weight bearing degenerative problems
  - Cancer
  - Depression
  - AND MORE!

- **Non-medical problems**
  - » Physical
  - » Economic
  - » Psychological
  - » Social
- Obesity is the 2nd most common cause of death from a modifiable behavioral risk factor.

Different Perceptions of Society

In the Past:

- Obesity was seen as a weakness or failure of individual
- Diet and exercise were prescribed treatments
- Weight loss surgery was viewed as dangerous and extreme

Now in the Present

- Obesity is considered a disease and the cause of many serious health conditions
- Surgery has gained acceptance as the only proven method to treat this disease

Why Surgery?

- Diet and exercise are not effective long term in the morbidly obese.
- Surgery is an accepted and effective approach.
- Medical co-morbidities are improved or resolved.
- Surgical risk is acceptable vs. risk of long term obesity.
- **Medical Co-Morbidities Resolved after Bariatric Surgery** *(Source: Wittgrove AC, Clark GW. Laparoscopic Gastric bypass roux-n-y-500 patients. Obes Surg 2000. And others.)* (NO pic attached)

The National Institute of Health (NIH) Consensus Conference 1991
✓ "Surgery is an accepted and effective approach that provides consistent, permanent weight loss for morbidly obese patients."
✓ **Surgery indicated in patients with:**
» BMI of 40 or over
» BMI of 35-40 with significant co-morbidity
» Previous failed dietary attempts

Who Is a Surgical Candidate?

- ✓ Meets NIH criteria
- ✓ Age 18-65
- ✓ No endocrine cause of obesity
- ✓ Acceptable operative risk
- ✓ Understands surgery and risks
- ✓ Absence of drug or alcohol addiction
- ✓ No uncontrolled psychological conditions Non pregnant female or not going to be pregnant for 18 months
- ✓ Dedicated to life-style change and follow-up

How surgery can treat obesity

The mechanism by which weight loss surgery improves weight:

- ✓ Reduce food intake,
- ✓ Rapid gastric emptying
- ✓ Modifications of the enteroinsular axis
- ✓ Reduce certain GI hormonal level

Types of Bariatric Surgery

Purely Malabsoptive: Jejunoilieal bypass

Purely Restrictive

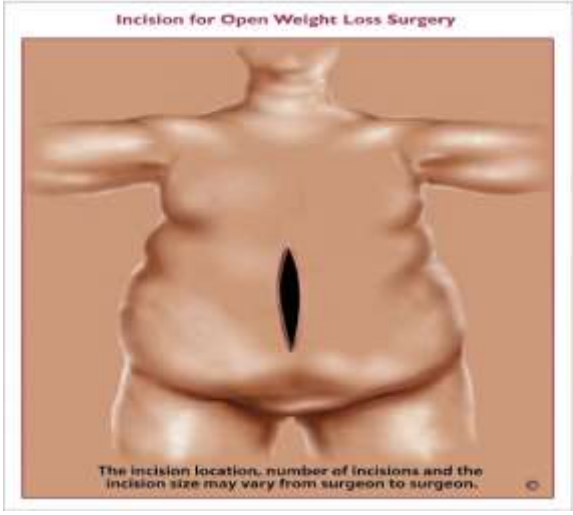
- » Gastric Balloons
- » Vertical-banded gastroplasty
- » Gastric adjustable banding (BWH)
- » Sleeve Gastrectomy
- » Greater Cuvature plication

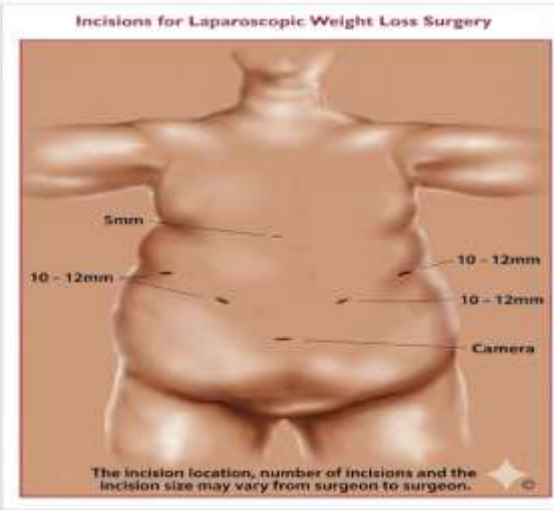
Mixed

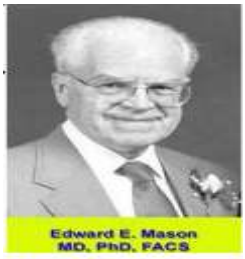
- » Roux-en-Y gastric bypass (BWH)
- » Mini-gastric bypass
- » Biliopancreatic diversion (BPD)
- » BPD with duodenal switch
- » SADI, SASI (New operations)

A Brief History of Bariatric Surgery

- Intestinal bypass (1950s) by Drs. Kremen and Linner
- Gastric bypass surgery pioneered in 1966 by Edward E. Mason
- With the advent of laparoscopy in the 1980s, bariatric surgery began to be performed through minimally invasive techniques thus gaining more popularity



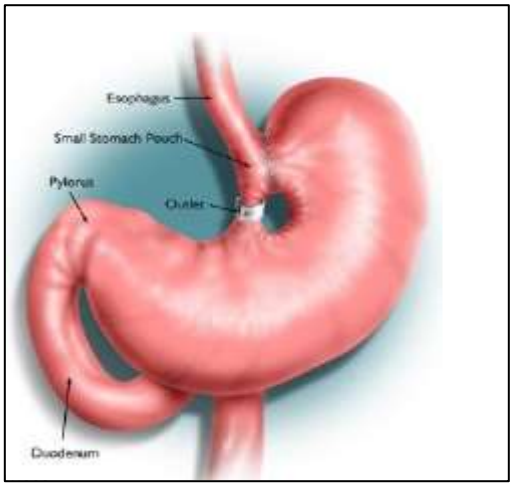




The main advantages of laparoscopy compared to traditional open surgery are

- ✓ Less trauma and adhesions
- ✓ Better visualization
- ✓ Reduced postoperative pain,
- ✓ Lower incidence of abdominal wall infections and incisional hernia,
- ✓ And reduced hospital stay

Vertical banded gastroplasty



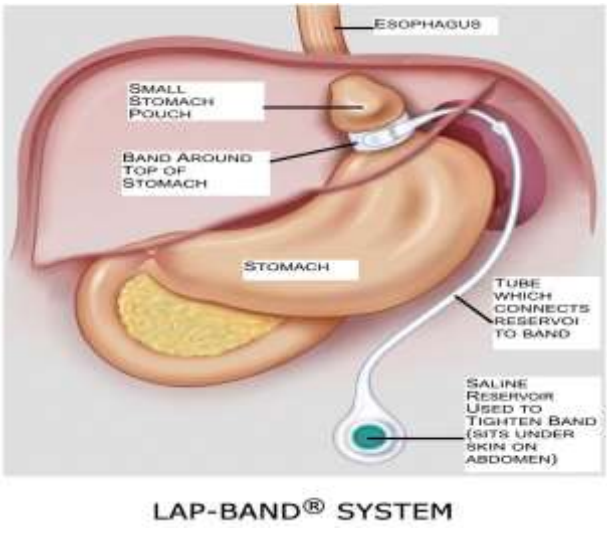
- ▶ Popular in 80's and 90's
- ▶ Open (Obsolete)
- ▶ Purely restrictive
  - Rapid sense of satiety
  - Reduced calorie intake
- ▶ Pouch creation
  - Hole through anterior and posterior wall
  - Staple line to angle of His
  - Non-distensible band around distal neo-pouch

VBG Complications

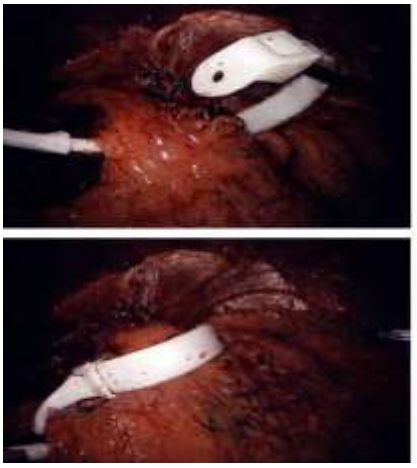
- ○ Stomal narrowing with persistent vomiting
- ○ Staple line leak or disruption
- ○ Band erosion
- ○ Wound infection or hernia
- ○ Death 0.1%
- ○ Overall re-operation rate 43 %

Adjustable gastric banding

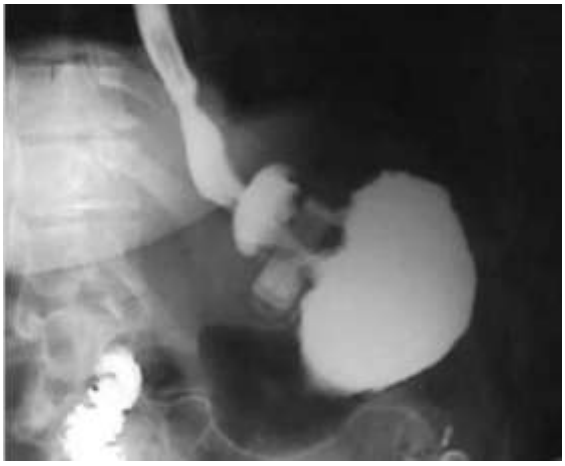
- ▶ Sep/1993= first laparoscopic AGB (Belachew M)
- ▶ **Types of Adjustable Bands:**
  1. Bioenterics = Lap-Band=Silicone
  2. Swedish adjustable gastric band



AGB surgical steps



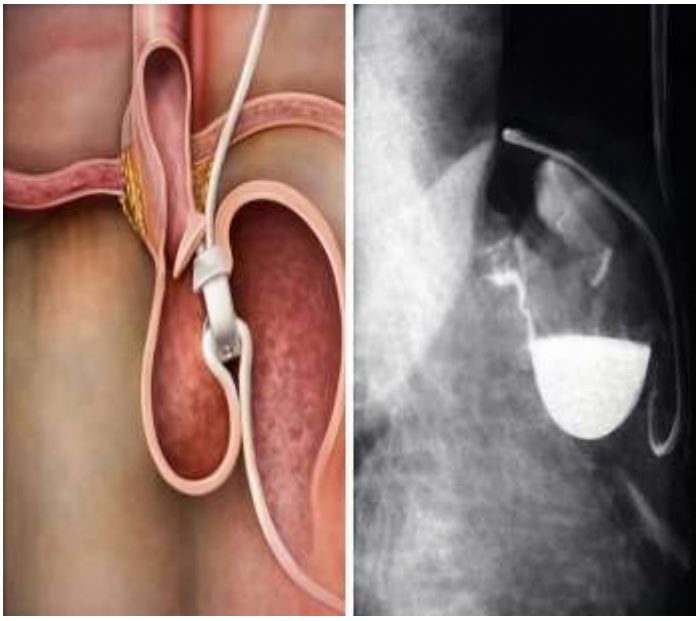
Normal position of AGB



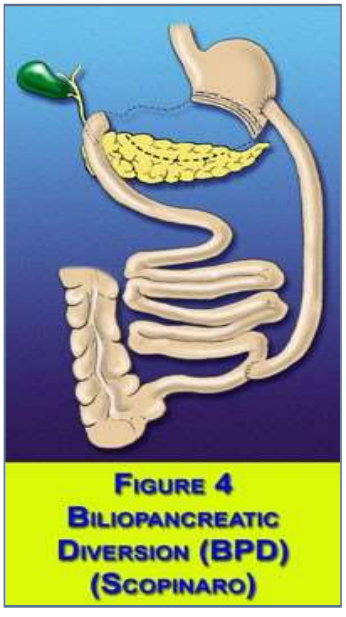
Complications of LAGB

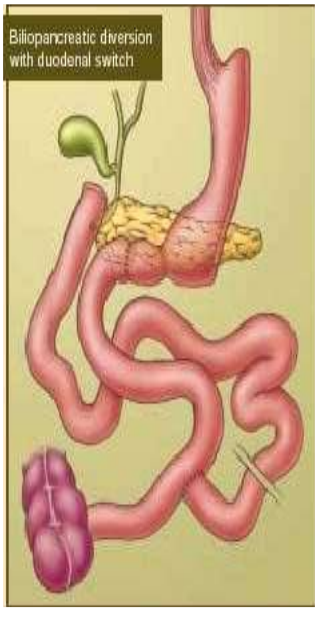
- Gastric prolapse (2.2% to 24%)
- Reflux esophagitis
- Dysphagia
- Stoma obstruction
- Esophageal and pouch dilatation (10%)
- Erosion (1%)
- Gastric necrosis (0.25%)
- Symptomatic gallstone disease (5%)
- Psychological intolerance

Gastric pouch dilatation



Biliopancreatic diversion ± DS

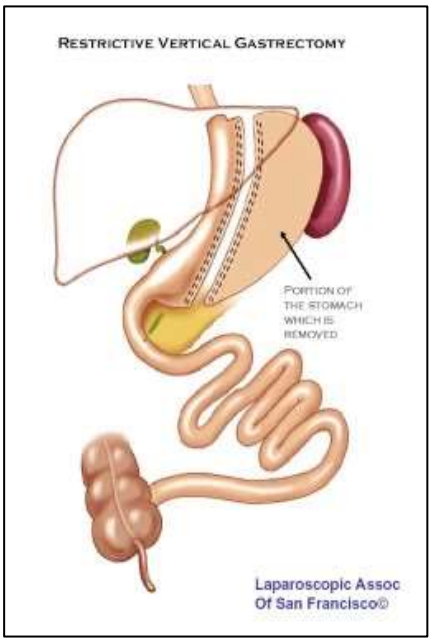




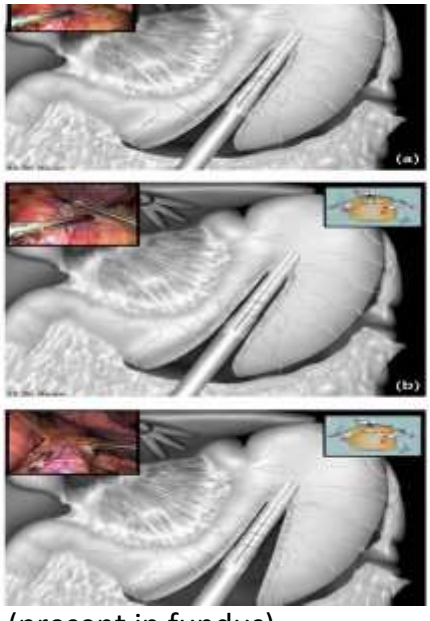
(BPD-DS) Complication

- Protein malnutrition 15%
- Anemia < 5 %
- Marginal ulcer <3 %
- Peripheral neuropathy 1.3 %
- Night Blindness 3 %
- Osteoporosis 14%
- Renal stones
- Nausea 65%
- Diarrhea 62 %
- Vitamin deficiencies: A, D, E, K, B_{12}
- Incisional hernia 10 %
- Death 1.1 %

Sleeve gastrectomy



- It was the first step when you do Biliopancreatic diversion with Duodenal switch procedure (BPD+DS)
- However, sleeve gastrectomy was subsequently found to be effective as a single procedure for the treatment of morbid obesity.
- First introduced as a single procedure by Ganger Micheal in 2002
- LSG is being performed more frequently and is currently very "trendy" among laparoscopic surgeons involved in bariatric surgery.
- SG involves removing the fundus and greater curvature portion, leaving only a lesser curvature tube about 15% of the stomach.
- OR time is 40 - 60 min
- Excess weight loss is 80%



Advantages of sleeve gastrectomy

1) Avoidance of foreign material,
2) Maintenance of normal gastro-intestinal continuity,
3) Absence of malabsorption associated with intestinal bypass,
4) Ability to be converted to multiple other operations,
5) Less technically demanding.

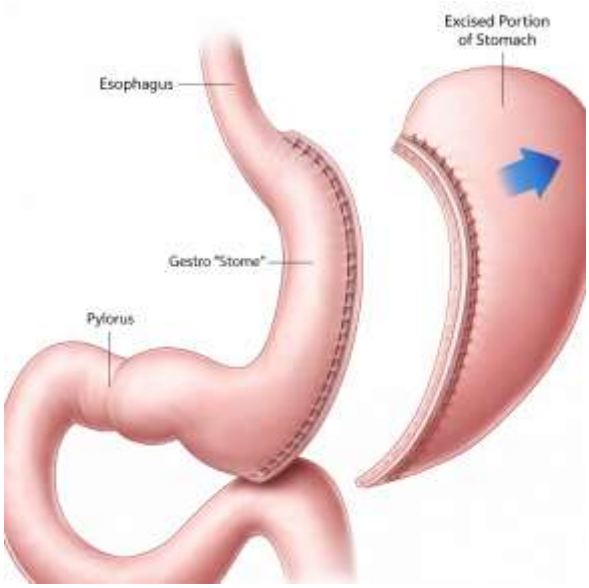
Mechanism of SG

- Dramatic reduction of the capacity of the stomach 85%.
- Rapid gastric emptying.
- The hormonal modifications induced as;
  - Reduction in Ghrelin level is responsible for control of hunger. (present in fundus)
  - Increase in glucagon-like peptide 1(GLP-1) and Peptide YY levels.

Sleeve Gastrectomy Disadvantages

1) Potential for inadequate weight loss or weight regain if the patient is not compliant.
2) Not fitting sweet eaters
3) Because the stomach is removed, it is not reversible. It can be converted to almost any other weight loss procedure.
4) Increased intragastric pressure thus increases incidence of reflux.

Complication of SG



General complications include:

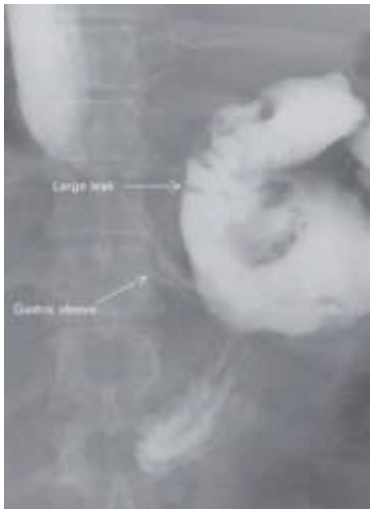
- Anaesthesia
- DVT (blood clot in leg)
- 0.5%Pulmonary Embolus (blood clot to lung)
- 0.5%Pneumonia
- Injury to liver, Spleen, or esophagus
- Wound infection

Specific complications:

1. Bleeding (1-6%)

- Intraopoerative or Postoperative
- Intraluminal → hematemsis or melena
- Extraluminal → tachycardia or hypotension or revealed in the drain.
- Sources→ Staple line, liver, spleen, or trocar sites
- Managed by resuscitation and second look laparoscopy if needed.

2. Leakage from staple line



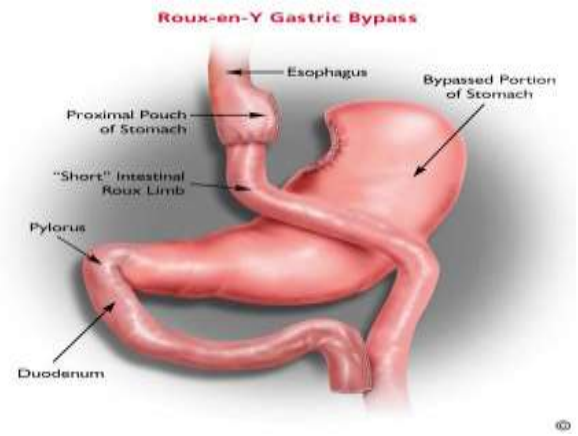
- The most serious and dreaded complication
- Occurs up to 5%.
- Most common site is at the GE junction.
- Diagnosed either clinically or by contrast radiography.
- Mostly managed by drainage and stenting,

Other complications as

- Stricture
- GERD
- Nausea and vomiting
- Gallstone formation
- Nutritional deficiencies
- Failure of weight loss.

Gastric Bypass Surgeries

Roux-en-Y Gastric Bypass



- Classic gastric
- "Gold Standard"
- 80% of bariatric proc.
- Open then Lap
- Restrictive and Malabsorptive:
  - Reduced calorie intake
  - Macronutrient malabsorption
  - Hormonal effects

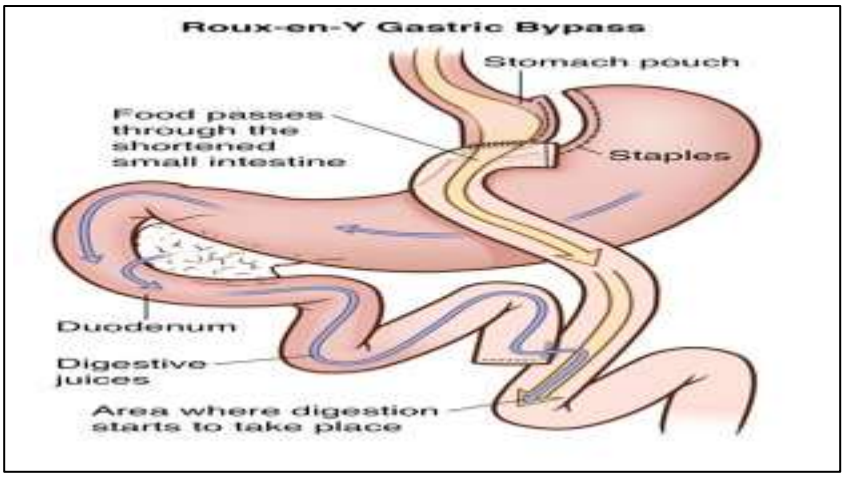
Technique

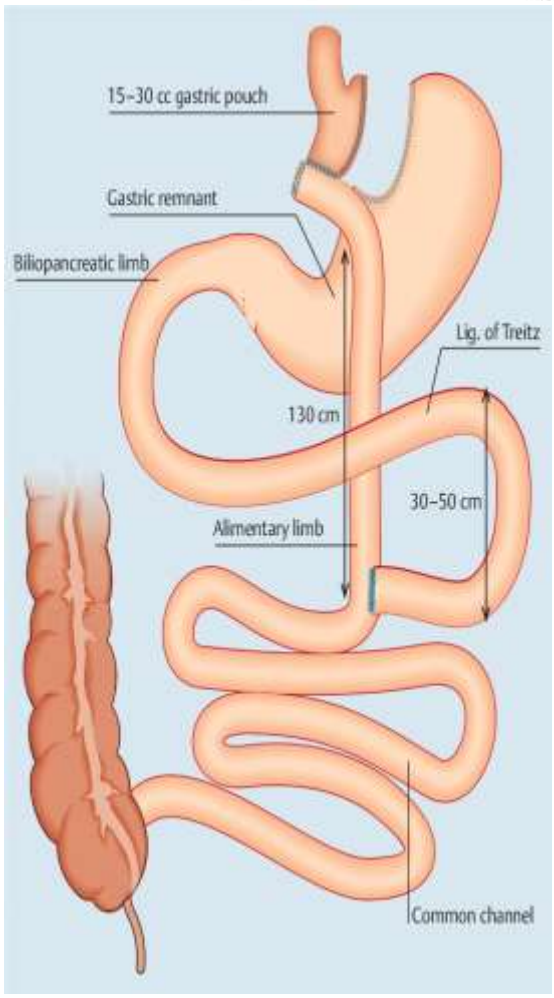
Pouch formation:

» Small gastric pouch
» 15-30 mL

Roux limb creation:

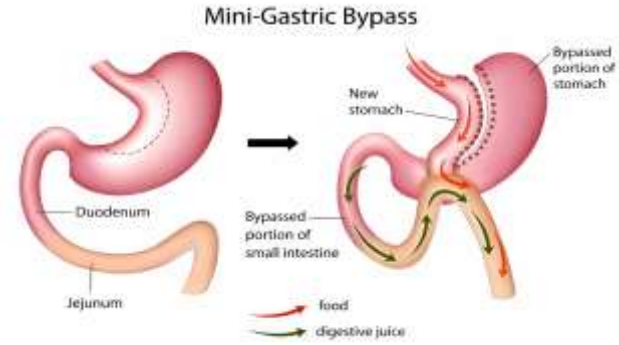
» 30-50 cm distal to Ligament of Treitz
» Jejuno-jejunostomy 150 cm From GJ down Roux limb





Disadvantages of RNYGP

1. Alters GIT anatomy.
2. More complex than SG
3. Needs replacement supplements and monitoring of vitamins and minerals.
4. Dumping syndrome
5. Internal hernia
6. Stomal ulcer



Surgical Indications

- Sweet eater
- Older patients, less activity and motivation
- Better:
  - bigger BMI (BMI ≥ 50)
  - T2DM

Complications of LRYGBP

- Anastomotic leakage (2%-5%)
- Gastro-gastric fistula (0.3%-3%)
- Bowel obstruction (3.5%-20%)
- GI bleeding (2%-4%)
- Stomal stenosis (4%-27%)
- Acute Gastric dilatation (1%)
- Marginal ulcer (1%-10%)
- cholelithiasis (2%-4%)
- Internal hernia (0.7%-3.3%)
- Biliary gastritis (MGP)

Malabsorpative complications

- Diarrhea, Nausea, and vomiting
- Hair loss
- Anemia
- Vitamins deficiency:
  - Iron, Folate, Vitamin B12, Calcium
  - Deficiency of fat soluble vitamins (D, E, A,K)
  - Thiamine (vitamin B1)
  - Zinc
  - Protein malnutrition (after long limb or distal bypass)
- Dumping syndrome

What is Dumping Syndrome?

Stomach contents move too rapidly through the small intestines following surgery

» **Early:** Transient hyperglycemia
» **Late:** Reactive hypogycemia

Symptoms:

Rapid heartbeat, Headache, Sweating, Nausea, Dizziness, Diarrhea Lightheadedness, Stomach cramping, Sleepiness

Intra-Gastric Ballon

COMPLICATIONS OF IGB

a) Pressure necrosis of gastric wall
b) Bleeding from stomach
c) Migration and intestinal obstruction or impaction.
d) Migration and aspiration
e) Intolerance needing removal

Future of obesity treatment