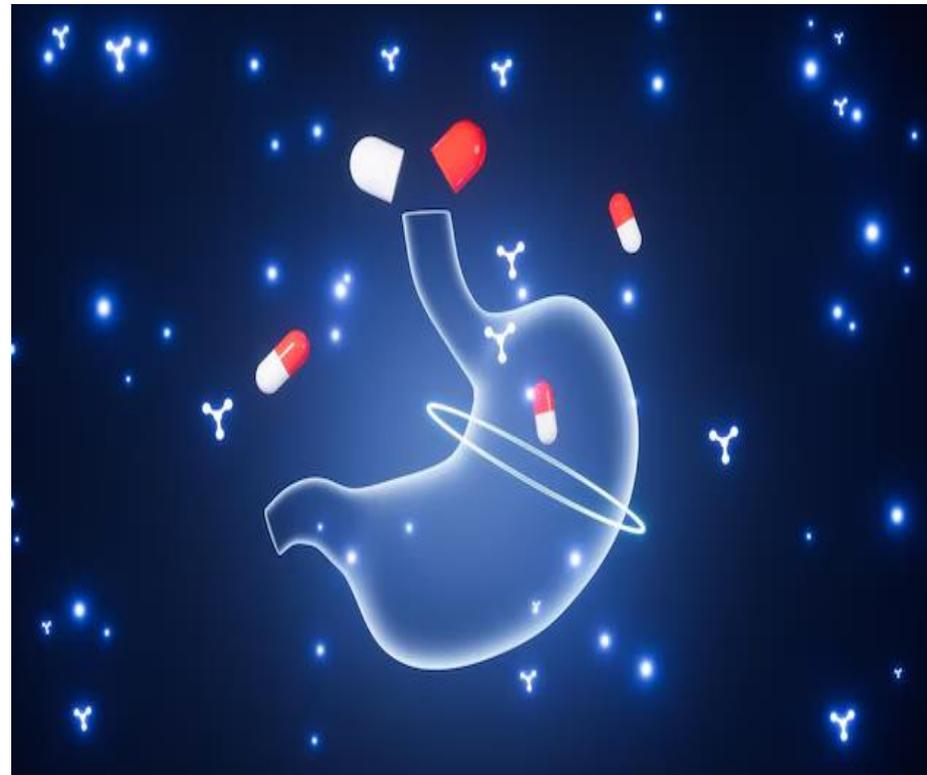


BARIATRIC SURGERY COMPLICATIONS

Supervised by Dr .Mohammed Nofal

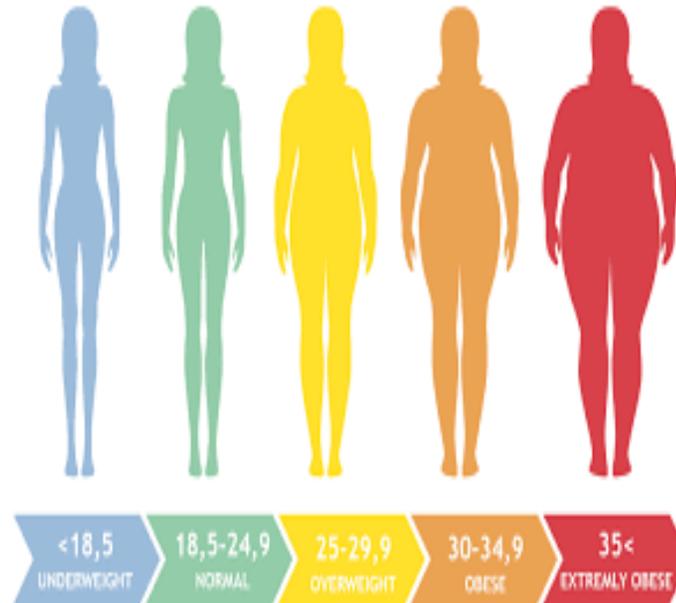
Presented BY:
Dana salameen
Yaqeen farajat
Adel Alhanbali



What is obesity?

- Obesity means excess accumulation of fat in the body ,It is diagnosed on the basis of calculation of **BMI**

$$\text{BMI} = \frac{\text{Weight in kilogram}}{(\text{Height in meter})^2}$$

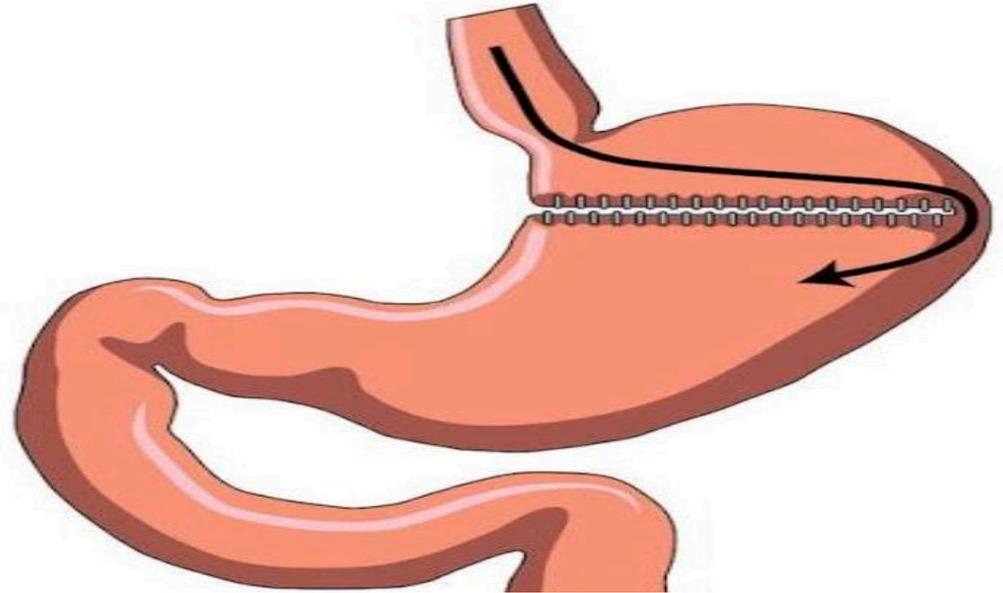


Classification of Bariatric Surgery

Restrictive	Malabsorptive
Horizontal gastroplasty	Jejunioileal bypass
Vertical banded gastroplasty (VBG)	Biliopancreatic diversion (Scopinaro)
Adjustable gastric band	Biliopancreatic diversion w/ duodenal switch
Sleeve gastrectomy	
Roux-en-Y gastric bypass	

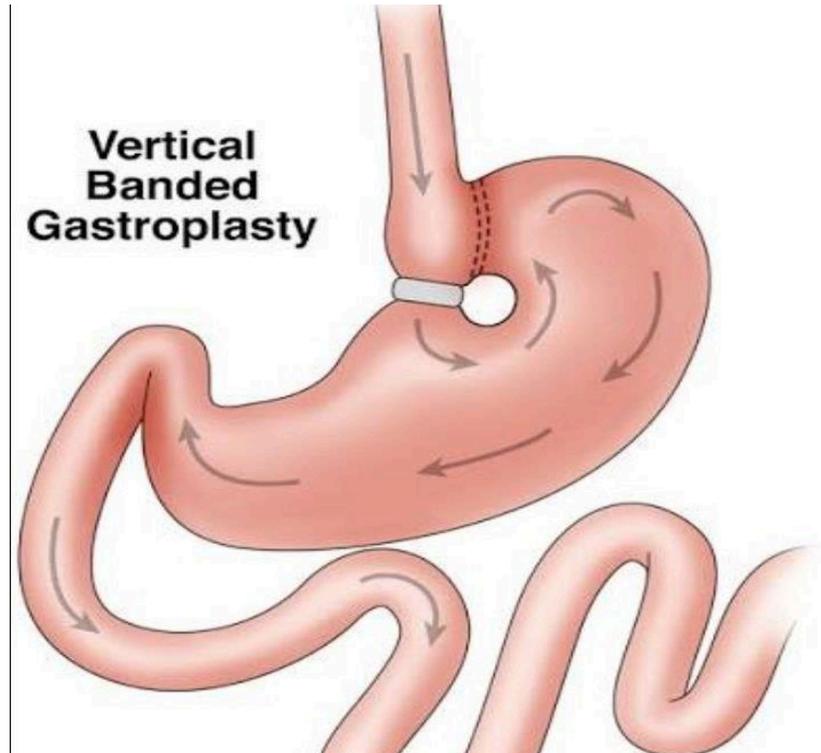
Horizontal Gastroplasty

- The stomach was stapled horizontally to create a small pouch, a narrow outlet was created at the greater curvature using a band or mesh to slow emptying. ALMOST, never performed today due to high failure rate in the long term.



Vertical Banded Gastroplasty

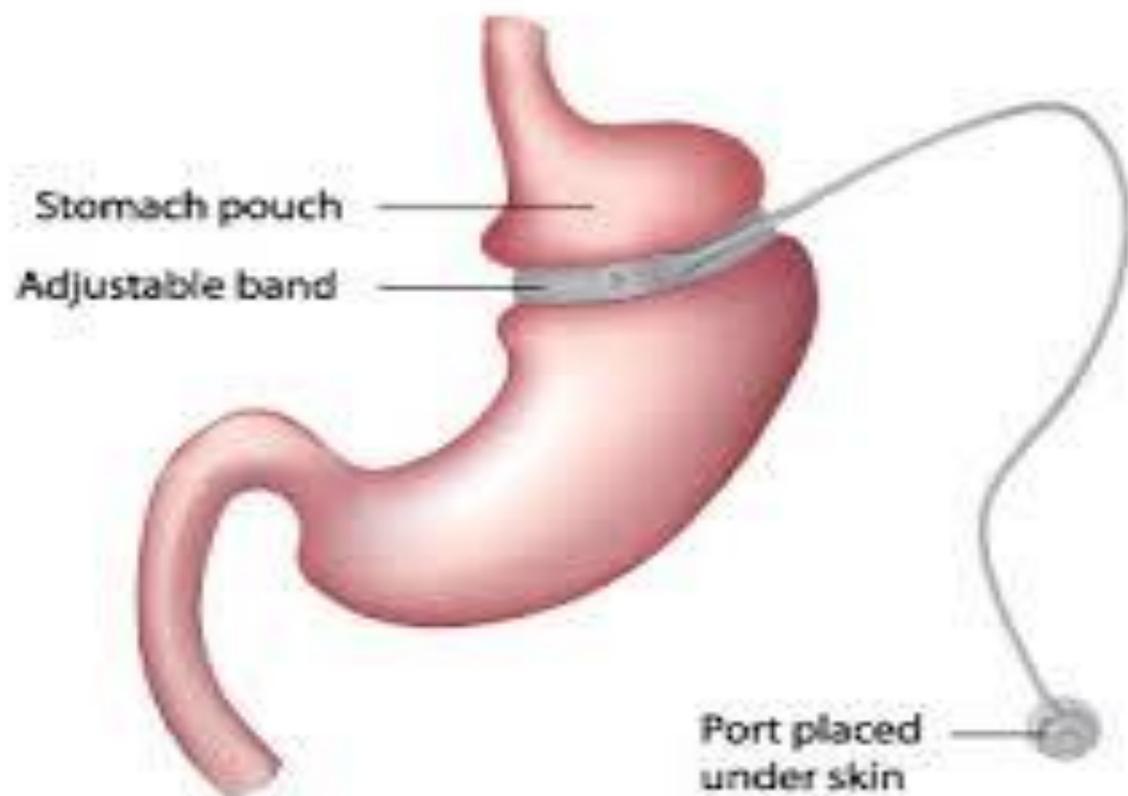
- Done by stapled upper part of stomach near esophagus vertically to create a small pouch a long inner curve of the stomach . The outlet of pouch is restricted by band .Band erosion, staple line breakdown ,or pouch dilation can occur.



Laparoscopic Adjustable Gastric Banding

- It is minimally invasive adjustable and reversible laparoscopic procedure, done by small incision in upper abdomen then inserted adjustable band around the top part of the stomach to create a small pouch .The band can be adjusted , this is done by adding or removing fluid in a balloon around band through port under skin of abdomen.

Adjustable Gastric Band (Lap Band)



Laparoscopic Adjustable Gastric Banding

- **SPECIFIC COMPLICATIONS INCLUDE:**
- PROLAPS
- SLIPPAGE
- BAND EROSION
- PORT AND TUBING PROBLEMS



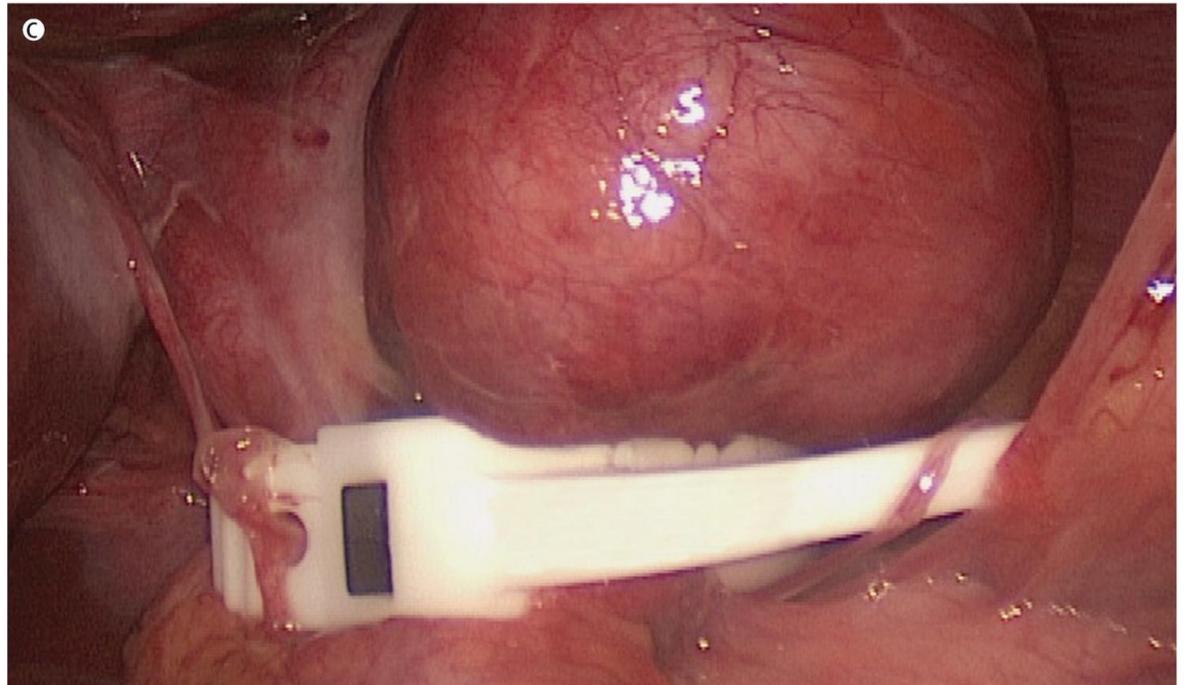
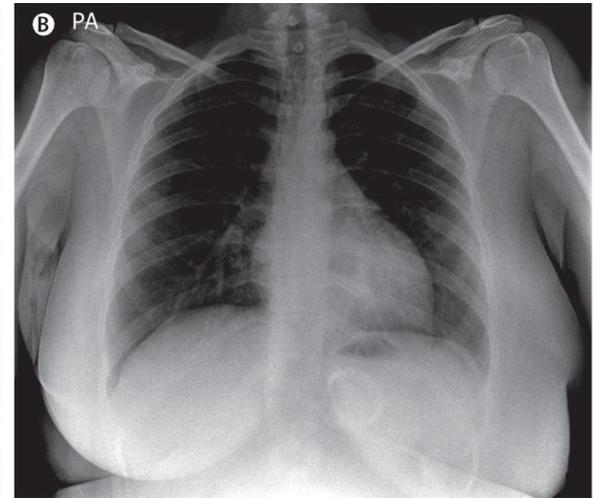
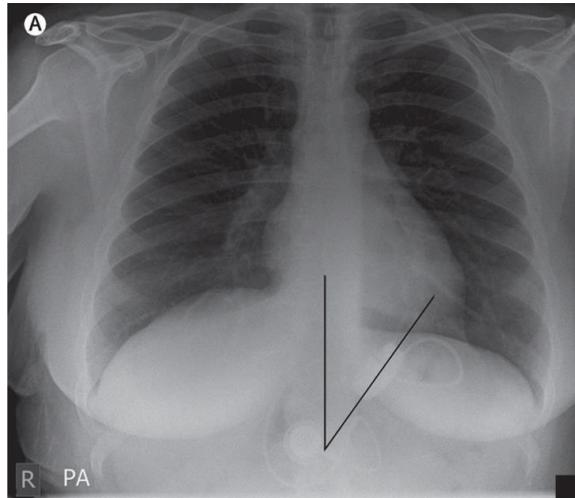
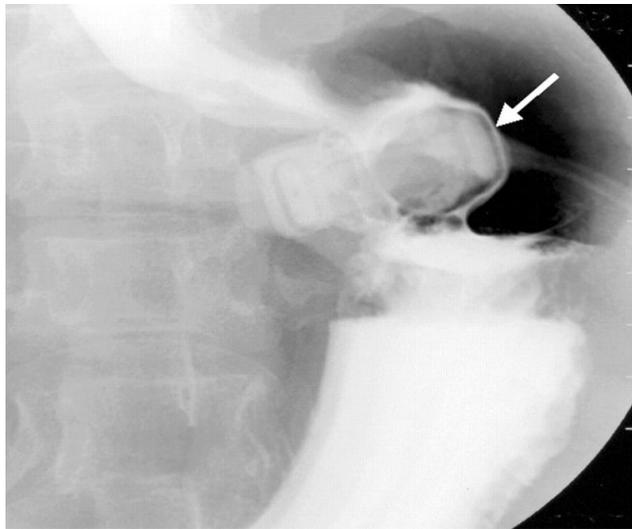
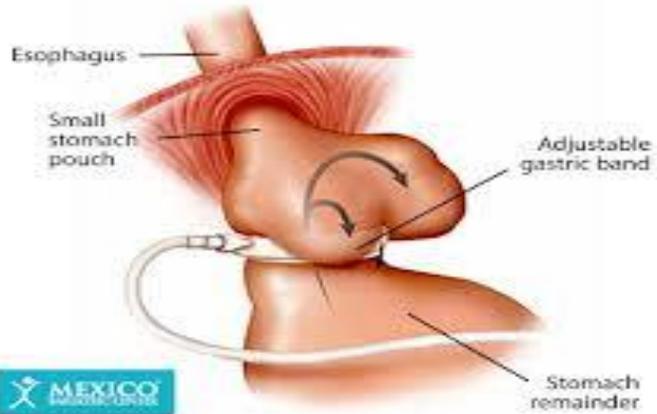
1. PROLAPS:

- The lower stomach is pushed upward and trapped within the lumen of the band. Most common emergent complication that requires reoperation after LAGB, with the incidence generally being 3% approx. postoperative vomiting predisposes to this problem. Symptoms include immediate dysphagia , vomiting , and inability to take oral food or liquid. The initial evaluation for prolapse involves obtaining a plain film radiograph . If the band is in horizontal position, prolapse must be strongly suspected.

2.SLIPPAGE

- May present with vomiting due to pouch outlet distortion .Diagnosis confirmed using plain abdominal film , upprt GI series, or abdominal CT scan.
TREATMENT initially involves fluid removal from band to relieve symptoms , followed by surgical revision of band . SLIPPAGE has been greatly reduced by the pars flaccida technique . Longer term follow up rates may show higher rates of prolapse .

GASTRIC BAND SLIPPAGE



3. BAND EROSION

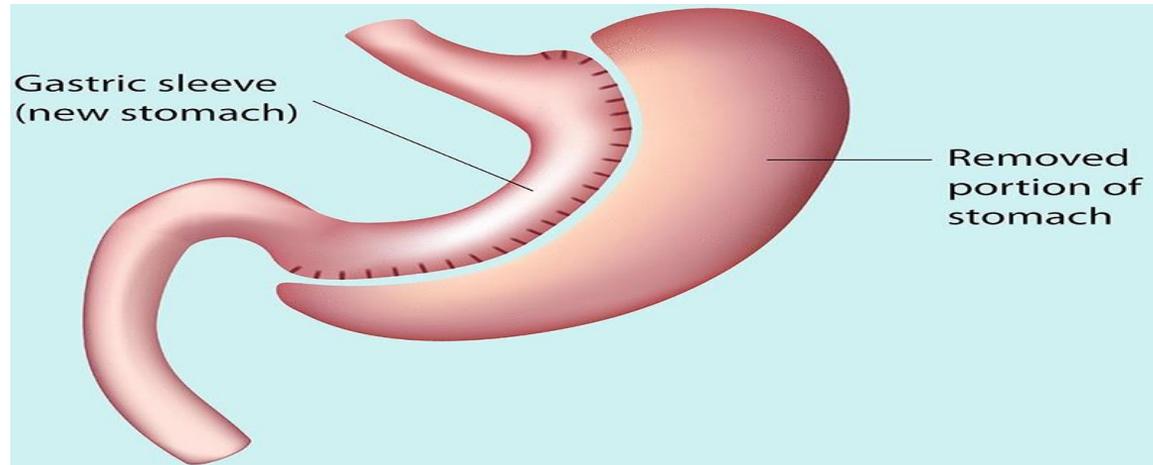
- Is uncommon ,patient usually looks ill, developing either a port side infection or systemic fever and low grade abdominal inflammatory sepsis. Endoscopy can be diagnostic .Unexplained free air on CT should alert us to the diagnosis .laparoscopic removal of the band is indicated , with repair of any gastric perforation . The perforation is usually sealed by the inflammatory process , if not the proper measures should be taken to seal it.

4. Port and tubing problems

- Occur in approximately 5% of patients undergoing to LAGB. These require revision of port /tubing system due to perforation , leaking or kinking of the tube . Usually done under local anesthesia , to repair or realign the tubing or port.

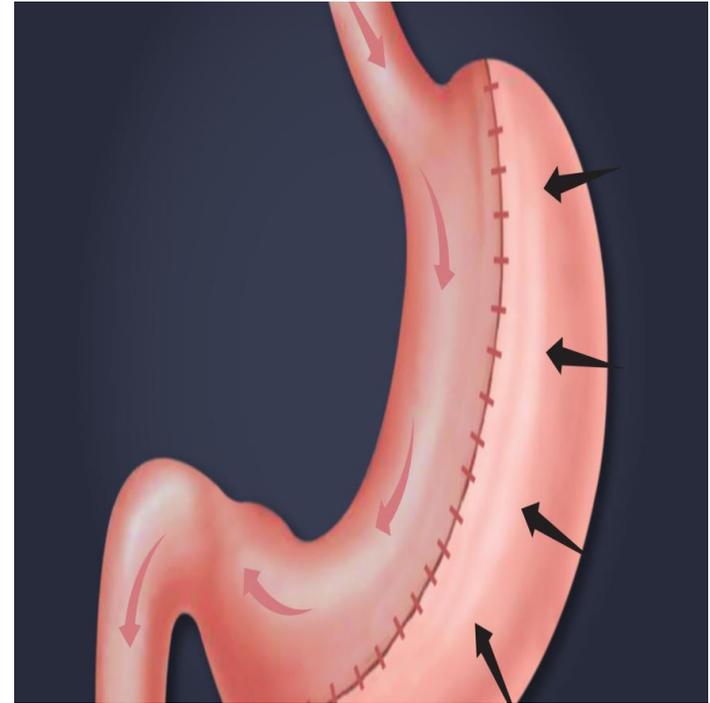
Sleeve Gastrectomy

- Restrictive bariatric procedure in which stomach is removed and open edges are then attached together to form narrow, tube-shaped stomach “sleeve” with banana shape, performed laparoscopically. It's relatively contraindicated in severe GERD or Barrett's esophagus. Permanently reduces the size of the stomach.



Sleeve Gastrectomy

- **SPECIFIC COMPLICATIONS INCLUDE;**
- **EARLY :**
- **1. BLEEDING**
- **2. STAPLE LINE LEAK**
- **LATE:**
- **1. GASTRIC SLEEVE STRICTURE**



1. Bleeding

- Usually occurs in the first 24-48hrs, incidence less than 1%.
- Can be defined by the presence of hematemesis or melena, and persistent large bloody output from a surgical drain, with or without the presence of tachycardia, hypotension, oliguria, and a decreasing hemoglobin and haematocrit.
- Postoperative bleeding can be classified based on bleeding site into intraluminal bleeding or intra-abdominal bleeding.
- In gastric sleeve patients, bleeding is mainly related to the long staple line closure where the stomach has been divided, short gastric vessel pedicles, or trocar sites.

1. Bleeding

- Initial therapy:

1. May include resuscitation with fluids and blood products and monitoring of urinary output.

- Definitive treatment:

1. Intraluminal bleeding:
Controlled using endoscopic techniques; surgical exploration is reserved for failed endoscopic therapy.

2. Intraperitoneal bleeding:
requires surgical exploration to control haemorrhage site.

2. Staple Line Leak

- It occurs when a hole or gap develops somewhere along the staple line closure allowing stomach juice to escape into the abdominal cavity,
 - Leakage usually appears as an acute complication (within 7 days).
 - Causing tachycardia, tachypnea, and fever very early on.
- Diagnosis:
 1. Physical examination (abdominal): Unreliable; peritonitis is a late finding.
 2. Abdominal CT: best diagnostic modality for stable patients.
 3. Surgical exploration: definitive diagnostic tool and mandatory for diffuse peritonitis.
-

2. Staple Line Leak

- Treatment:

1. Fluid resuscitation, broad-spectrum antibiotics.

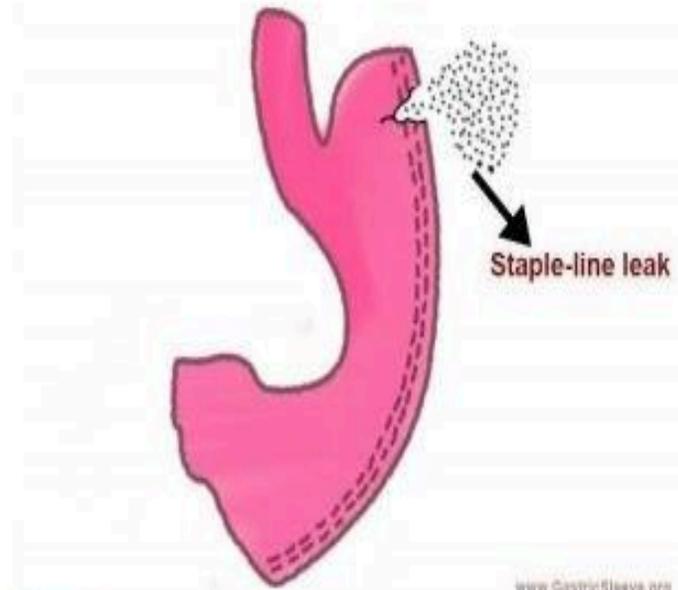
2. Wide peritoneal drainage of the leak site: surgically or percutaneously with image guidance; first-line treatment.

3. Direct repair of the leak site: occasionally successful and used in conjunction with wide drainage.

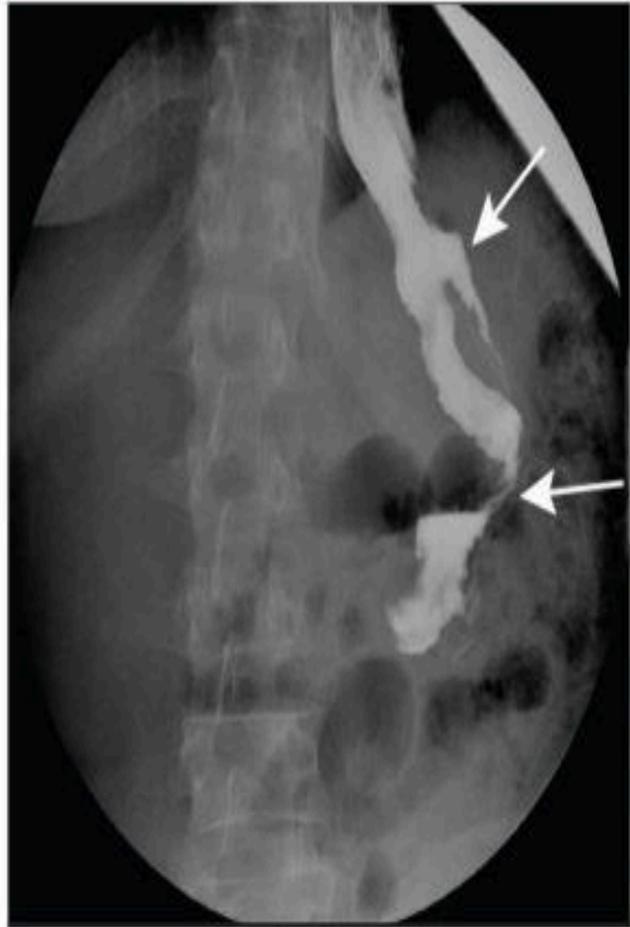
4. Endoscopic techniques: used to seal leaks, typically in conjunction with drainage.

3. Stricture

- Most common symptoms are nausea and vomiting
- Patient was initially able to tolerate solid foods, but after a few weeks he starts to vomit solids but could handle liquids.
- Diagnosis:
 1. Physical examination: Usually unremarkable. Epigastric pain, if present, is mild.
 2. Radiologic evaluation: abdominal CT , upper GI series, and upper endoscopy.
- Treatment:
 1. Endoscopic stenting and surgical stricturoplasty: successful in some cases.
 2. Conversion to gastric bypass: usually the best option.



www.GastricSleeve.org



OTHER COMPLICATIONS

- **1. CHOLELITHIASIS**
- **2. VENOUS THROMBOEMBOLISM**

Cholelithiasis

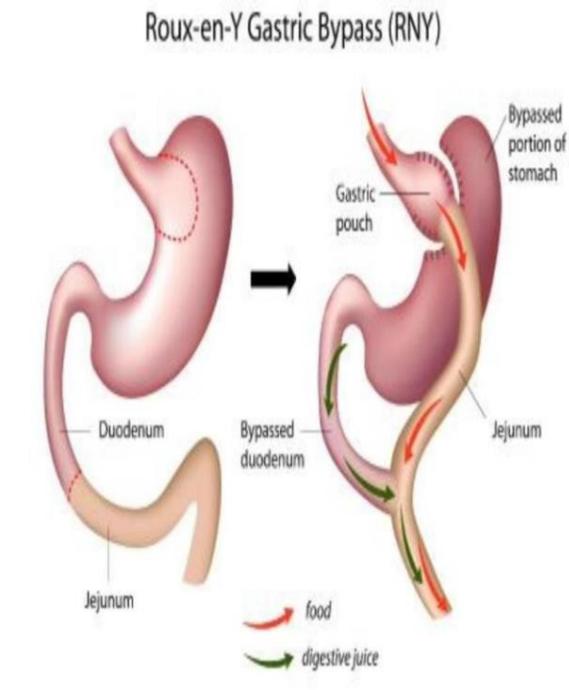
- Cholelithiasis occurs in about one-third of patients who undergo bariatric surgery.
- The rapid post-surgical weight loss is a significant contributor to the development of gallstones as is the pre-surgical obesity.
- Patients usually do not have any symptoms unless there is acute inflammation of the gallbladder or impaction of a stone within the biliary system.
- Patients present with nausea, vomiting, and biliary colic localized to the epigastrium and right upper quadrant.
- Diagnosis is confirmed with ultrasound or CT imaging

Venous Thromboembolism (VTE)

- Includes DVT & its complication, Pulmonary Embolism
- Common cause of morbidity and mortality after bariatric surgery.
- The most used pharmacological prophylaxis for VTE prevention after bariatric surgery was Enoxaparin 40 mg subcutaneously
- Given twice daily for 10–14 days after hospital discharge
- Consider an IVC FILTER for any patient with prior history of DVT/PE.
- There were no reported cases of bleeding or VTE related mortality after 3 months.

◆ ROUX EN Y GASTRIC BYPASS

Roux-en-Y gastric bypass (RYGB) is a form of bariatric surgery that involves creating a small stomach pouch and attaching it directly to the small intestine, bypassing a large part of the stomach and the first section of the small intestine (the duodenum). This



procedure limits food intake, reduces nutrient absorption.

Major complication as small bowel obstruction, major leak, abscess, anastomotic stricture, fistulae.

Minor complication : marginal ulcer, pancreatitis, esophagitis, splenic abscess, cholelithiasis • Early complication less than one month. • Late

**complication more than one
month**

1 . ANASTOMOTIC OR STAPLE LINE LEAKS

- ◆ Potential sites: gastrojejunostomy (most common site), gastric pouch staple line, gastric remnantstaple line, Roux limb staple lineand jejunojejunal anastomosis.
- ◆ • The diagnosis of ASL is based on a high clinical suspicion
- ◆ • Symptoms are nonspecific and variable including tachycardia, fever, abdominal pain, nausea, and vomiting and purulent drine output.

- ◆ Radiographic studies are occasionally helpful and may show fluid collection adjacent to the pouch, diffuse abdominal fluid or rarely, intraperitoneal air
- ◆ Definitive investigation is made via CT scan with contrast

1. ANASTOMOTIC OR STAPLE LINE LEAKS•

- ◆ 1. Conservative Management
- ◆ For non-septic, hemodynamically stable patients with contained leaks.
- ◆ Includes:
 - ◆ • Intravenous antibiotics
 - ◆ • Monitoring of secretions through drains

- ♦ • parenteral nutrition
- ♦
- ♦ **2. Operative Management**
- ♦ **Mandatory if the patient is:**
 - ♦ • Hemodynamically unstable
 - ♦ • Has a complicated leak
 - ♦ • Shows signs Of sepsis
- ♦
- ♦ **Operative goals:**
- ♦ **Confirm and repair the leak**
- ♦ **Remove gastrointestinal contents from the abdominal cavity**

1. ANASTOMOTIC OR STAPLE LINE LEAKS

1. Summary : STAPLE LINE LEAKS Repair is ideal, but suturing may be difficult due to acutely inflamed tissues.
2. Drains may be placed after removing GI contents as a safer option
3. Maintaining nutrition is essential for tissue healing.
4. Feeding gastrostomy or jejunostomy allows enteral nutrition while keeping the leak site at rest.

2. GASTROINTESTINAL BLEEDING

- ◆ GIB after laparoscopic RYGB can be intraperitoneal (bleeding into the abdominal cavity) or intraluminal (occurs into the lumen of the digestive tract) and most commonly originates at one of the five potential staple lines mentioned earlier Can be life threatening if not recognized and treated early.
- ◆ The presence of pallor, dizziness, confusion tachycardia, hypotension, hematemesis, bright red blood per rectum, drop in the hemoglobin level, large quantity of bloody fluid from the abdominal drains and low urine output should alert the surgeon to on going postoperative bleeding

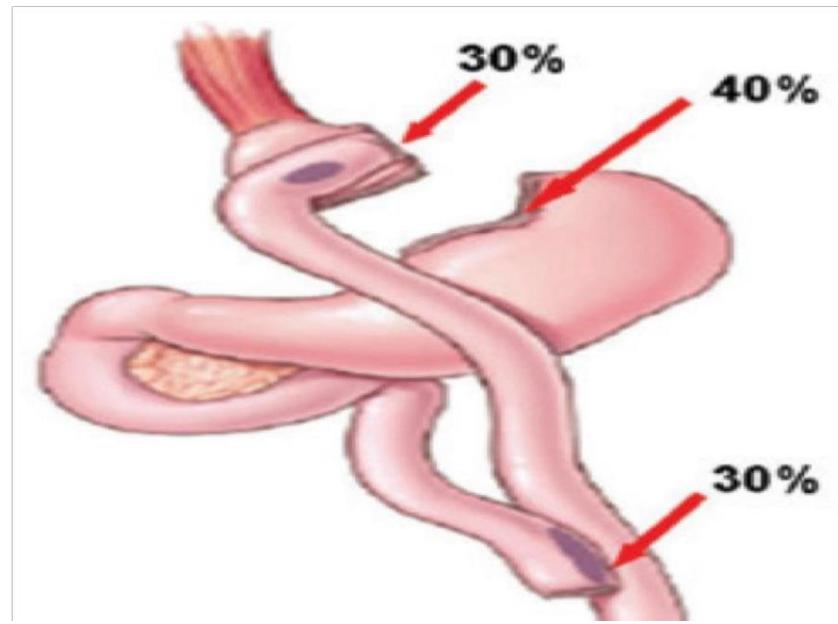
- Confirmed endoscopically or surgically.

2. GASTROINTESTINAL BLEEDING

- ◆ Management depends on timing and clinical presentation.
- ◆ Late bleeding (>48h): → Managed conservatively if no acute symptoms. → Stop DVT prophylaxis and provide supportive care
- ◆ .Early bleeding (within few hours): → Presents with hematemesis or bright red blood per rectum. → Requires urgent surgical intervention.

2. GASTROINTESTINAL BLEEDING•

- ◆ If it is suspected that the bleeding source is proximal intraluminal the best treatment option is an endoscopic intervention, which is invaluable in controlling bleeding from the gastric pouch or gastrojejunostomy.



- ◆ Thermal coagulation, injection of vasoconstrictors, and clipping are all effective ways of controlling bleeding from these sites .

3 . GASTROJEJUNAL STRICTURE

- ◆ Stricture of the proximal anastomosis, or gastrojejunostomy, is a common Complications.
- ◆ The typical stricture patient present 4–6 weeks after surgery with solid food intolerance progressing to liquid intolerance as the stricture narrows.

- ◆ Symptoms of a gastrojejunal stenosis are usually acute onset nausea, vomiting, dysphagia to solid and liquid and abdominal pain, meanwhile in stenosis developing more distally, the symptoms may be more gradual in onset.

3. GASTROJEJUNAL STRICTURE

- ◆ The diagnosis of stricture can usually be made based on history alone and confirmed with upper endoscopy
- ◆ Upper endoscopy is the primary diagnostic modality of choice, as it allows both rapid diagnosis and therapeutic intervention via balloon dilatation

- ◆ **When the stenosis is at the gastrojejunal anastomosis, balloon dilation with an EGD can be used**
- ◆ **In cases of a stenosis at the jejunojejunal anastomosis a single balloon enteroscope can be used to dilate the stenotic area.**

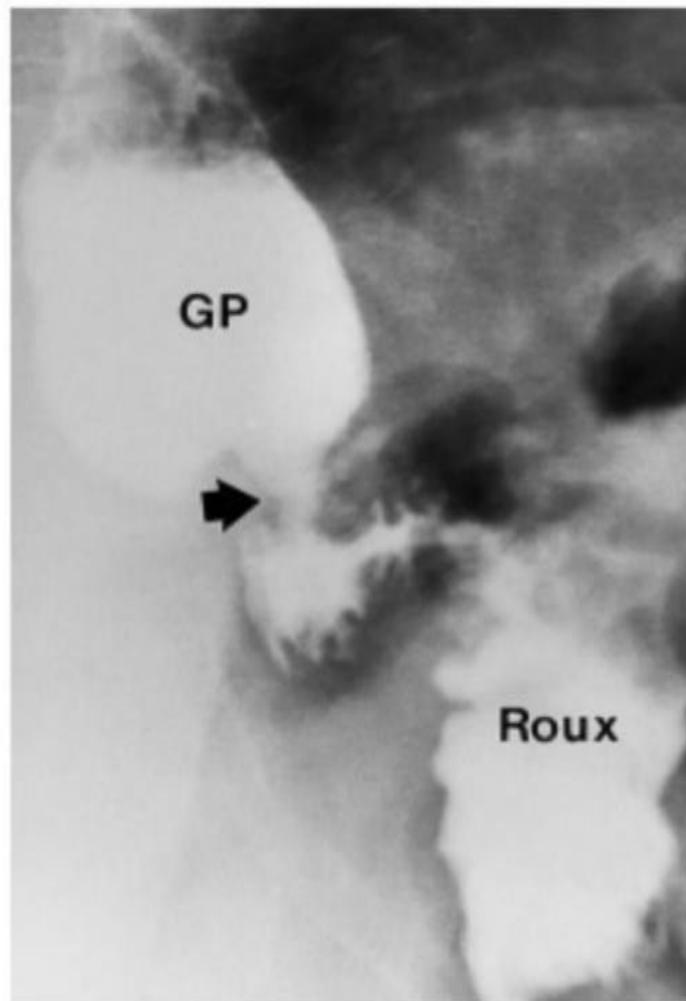
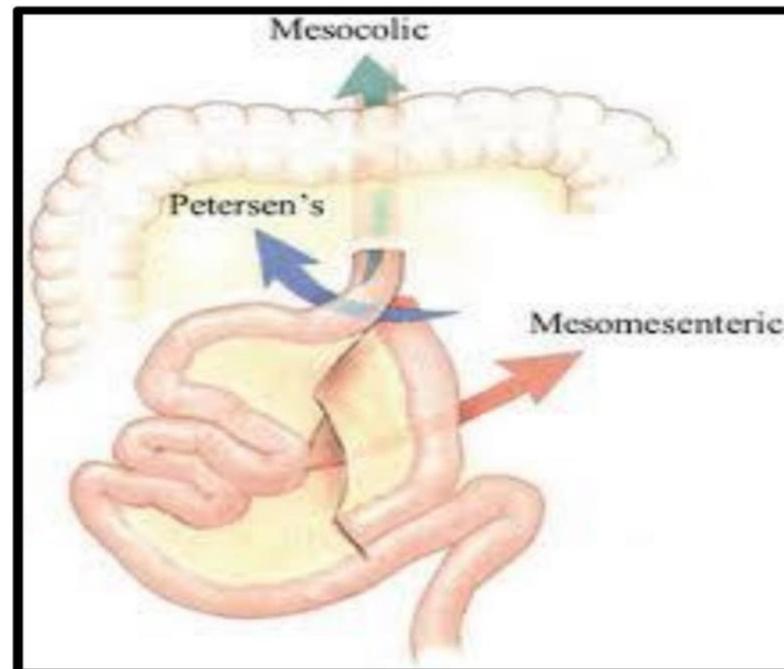


Figure 5. Image from upper GI series in a 52-year-old woman with anastomotic stricture. The gastric pouch (*GP*) is distended and rounded. The opening (arrow) into the Roux-en-Y limb (*Roux*) is narrowed to less than 10 mm. The stricture was dilated successfully with one endoscopic balloon dilation.

4. HERNIA

- ◆ Internal hernias are relatively common after gastric bypass and may result in bowel obstruction, intestinal ischemia, or both.
- ◆ Petersen hernia—the space between the mesentery of the Roux limb and the mesocolon/colon.



- **DISTAL ANASTOMOSIS
MESENTERIC HERNIA**

- ◆ this space is bordered by the divided mesentery of the biliopancreatic limb and the mesentery of the Roux limb at the distal anastomosis.
- ◆ Typically, patients complain of intense pain in the mid epigastrium, often radiating to the back. The pain may occasionally be relieved by leaning forward or getting “down on all fours”

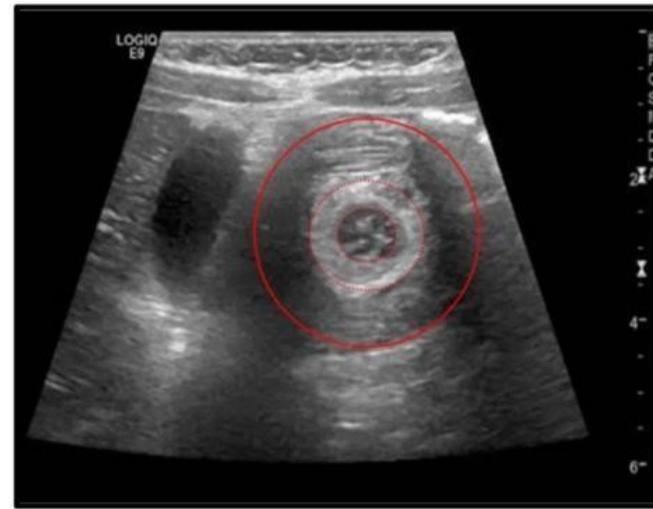
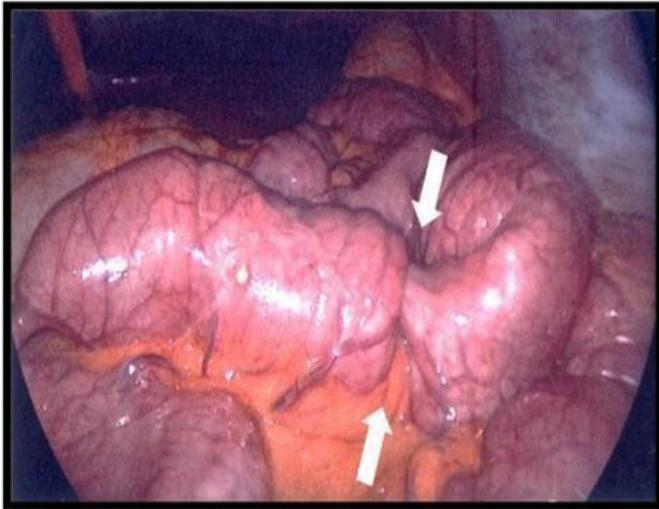
- ◆ Computed tomography (CT) scan may demonstrate findings such as the “swirl sign,” a spiraling of the mesentery
- ◆ Definitive diagnosis of internal hernia can only be achieved through surgical exploration



5 . INTUSSUSCEPTION

- ◆ Small bowel intussusceptions may be transient or fixed and may result in an SBO after gastric bypass surgery.
- ◆ They typically occur at or near the jejunojejunal anastomosis, with the staple line at the anastomosis presumably acting as the lead point for the intussusception.
- ◆ Intussusception may occur months or years after gastric bypass and is associated with nausea, persistent vomiting, abdominal pain, and bowel obstruction

- CTscan may reveal a “target sign” or dilated excluded stomach



6. FISTULAS

A gastro-gastric fistula (GGF) is an abnormal communication between the gastric pouch and the excluded stomach

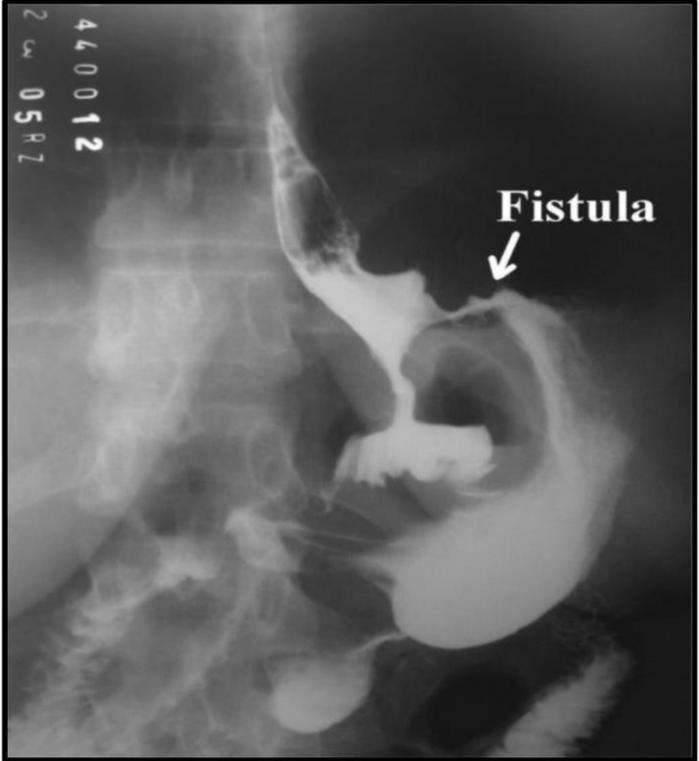
The most common cause is secondary to incomplete gastric transection at the original surgery.

The most common symptom is inadequate weight loss or weight gain.

Patients may also present with epigastric pain and/or worsening acid reflux secondary to the new connection with the remnant stomach

Diagnosis is made via endoscopy of the fistulous tract or via imaging with oral contrast.

- ◆ Asymptomatic fistulous tracts are usually not a concern. However, symptomatic fistulous tracts can be closed endo-scopically using specialized large Endo clips to approximate the tissue surrounding the fistula.

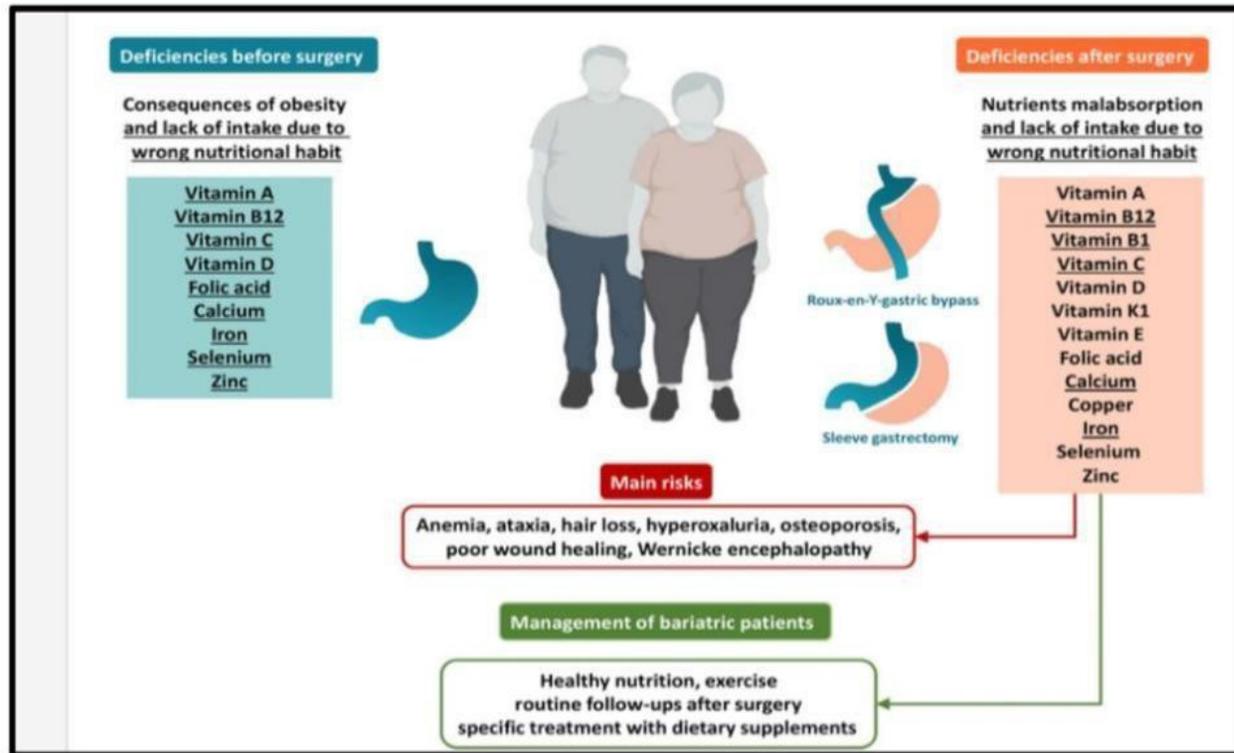


7 .NUTRITIONAL DEFICIENCIES

Patients may be asymptomatic or present with symptoms manifesting a particular nutritional deficiency. Patients with anaemia may present with dyspnea, fatigue and inability to concentrate.

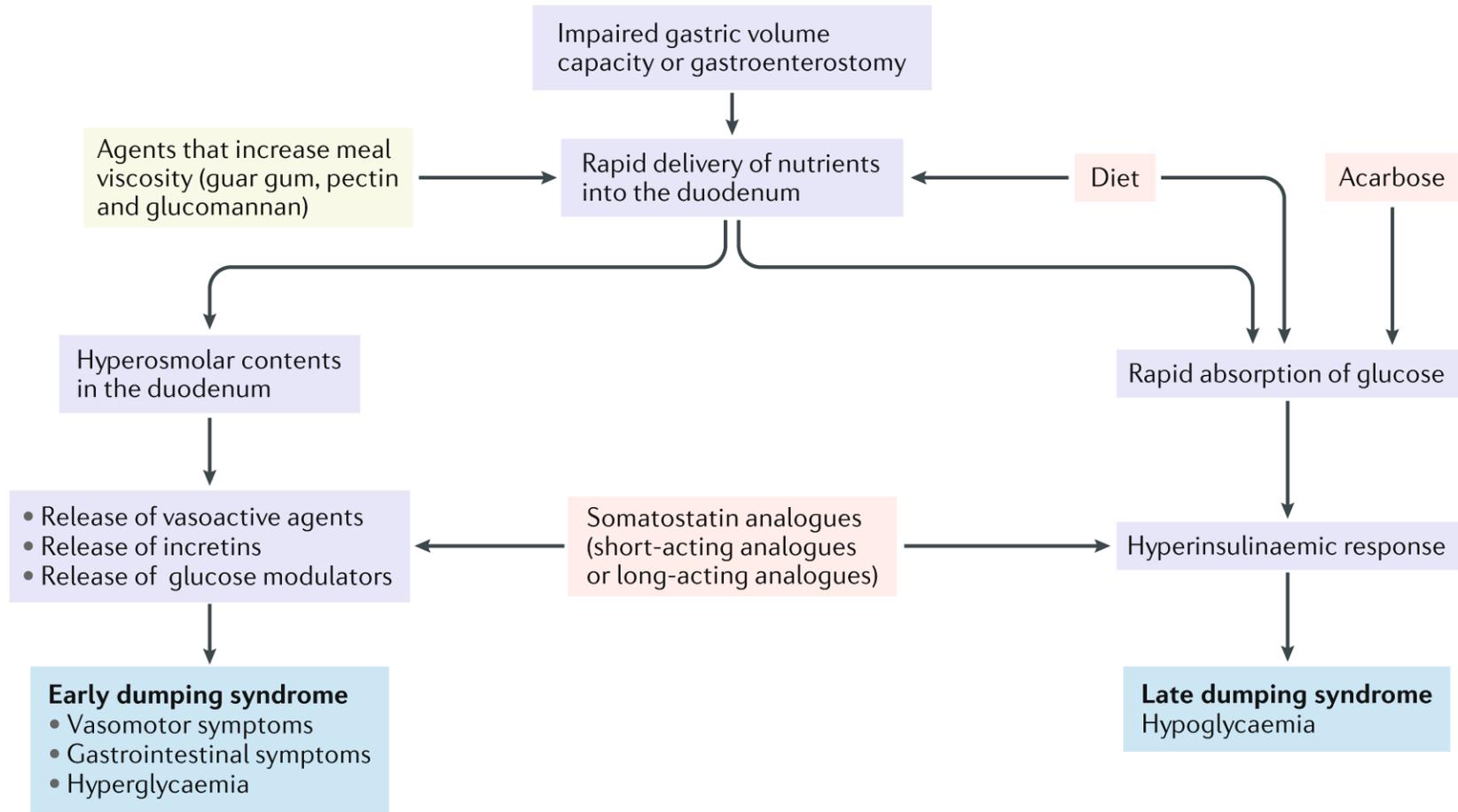
Zinc deficiency can result in hair loss and low calcium levels can result in osteoporosis and fractures.

- ◆ Blood work is recommended to detect and monitor vitamin and mineral deficiencies. Patients who undergo gastric bypass require a referral to a registered dietician



8. Dumping Syndrome

- Effect of altered gastric reservoir function, abnormal postoperative gastric motor function, and pyloric emptying mechanism.
 - which causes a combination of gastrointestinal and vasomotor symptoms after eating.
 - Up to 40% of patients develop DS after Roux-en-Y gastric bypass (RYGB).
 - Most patients experience mild symptoms, while about 10% develop persistent or severe DS.
- Includes:
 1. Early Dumping: occurs 10–30 minutes after eating.
 2. Late Dumping Late Dumping: occurs 1–3 hours after eating due to reactive hypoglycemia.



Early Dumping Syndrome

- caused by rapid transit of hyperosmolar food to the small intestine → fluid shifts from blood to the gut → bloating, hypotension, diarrhea, tachycardia.
- Anxiety, extreme weakness, tachycardia, diaphoresis, palpitations, and desire to lie down. Osmotic Diarrhea is common.
- As simple sugars are absorbed, and dilution of hypertonic solution occurs the symptoms decreased and disappear gradually.

Late Dumping Syndrome

- due to excessive insulin secretion following a quick rise in blood glucose.
- Triggered by GLP-1 and GIP; may lead to postprandial hypoglycemia.
- This causes high levels of serum glucose shortly after meal and causes a big released of insulin.
- Insulin response exceeds what is necessary to clear glucose from blood and hypoglycemia symptoms happens.
- sweating, tremor, hunger, fatigue, confusion, fainting.

Dumping Syndrome

Management

- **1. Dietary and Lifestyle Modifications**
- Eat small, frequent meals (5–6/day).
- Avoid liquids during meals; wait 30 minutes after eating.
- Reduce simple sugars, increase protein and fiber.
- Add viscous agents (e.g., guar gum, pectin) to slow gastric emptying.
- Lie down for 20–30 minutes after meals to delay transit.

2. Medications

- Acarbose: slows carbohydrate absorption, prevents late hypoglycemia.
- Octreotide (Somatostatin analog): suppresses insulin and GI hormones; used in severe or refractory cases.

3. Modern Approaches

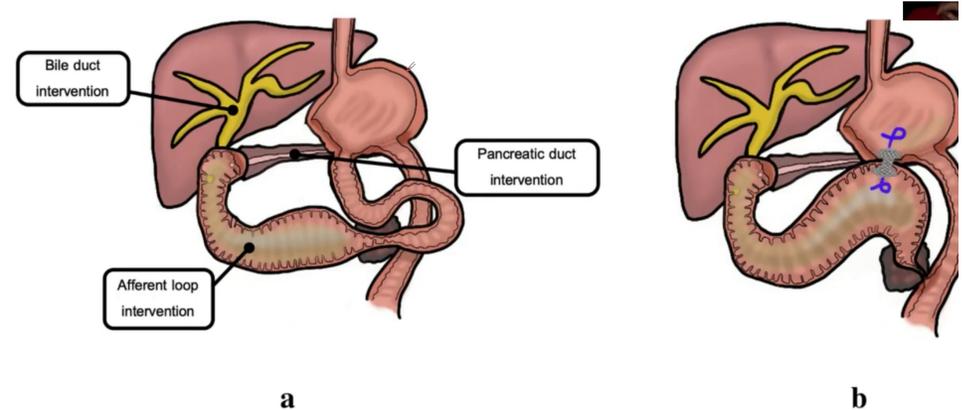
- Digital monitoring (CGM, smart apps, AI-assisted tracking) can improve symptom control and patient awareness.

9. Blind Loop Syndrome

- Associated with bacterial overgrowth in the limb of the intestine excluded (not functioning) from the flow of chyme.
- This limb has bacteria that proliferate and interfere with folate and Vit B12 metabolism.
- This causes malabsorption of bile salts, also as a result, no absorption the fat-soluble vitamins A, D, E and K and Ca.
- B12 deficiency leads to megaloblastic anemia
- Abdominal pain, distention, diarrhea, weight loss, weakness, anemia .

9. Blind Loop Syndrome

- Empirical antibiotic.
- surgical management is reserved for fixing anatomical causes of bowel obstruction that interfere with normal function once they are amenable to such intervention.
- These conditions include:
 1. Strictures
 2. Fistulae
 3. Diverticula

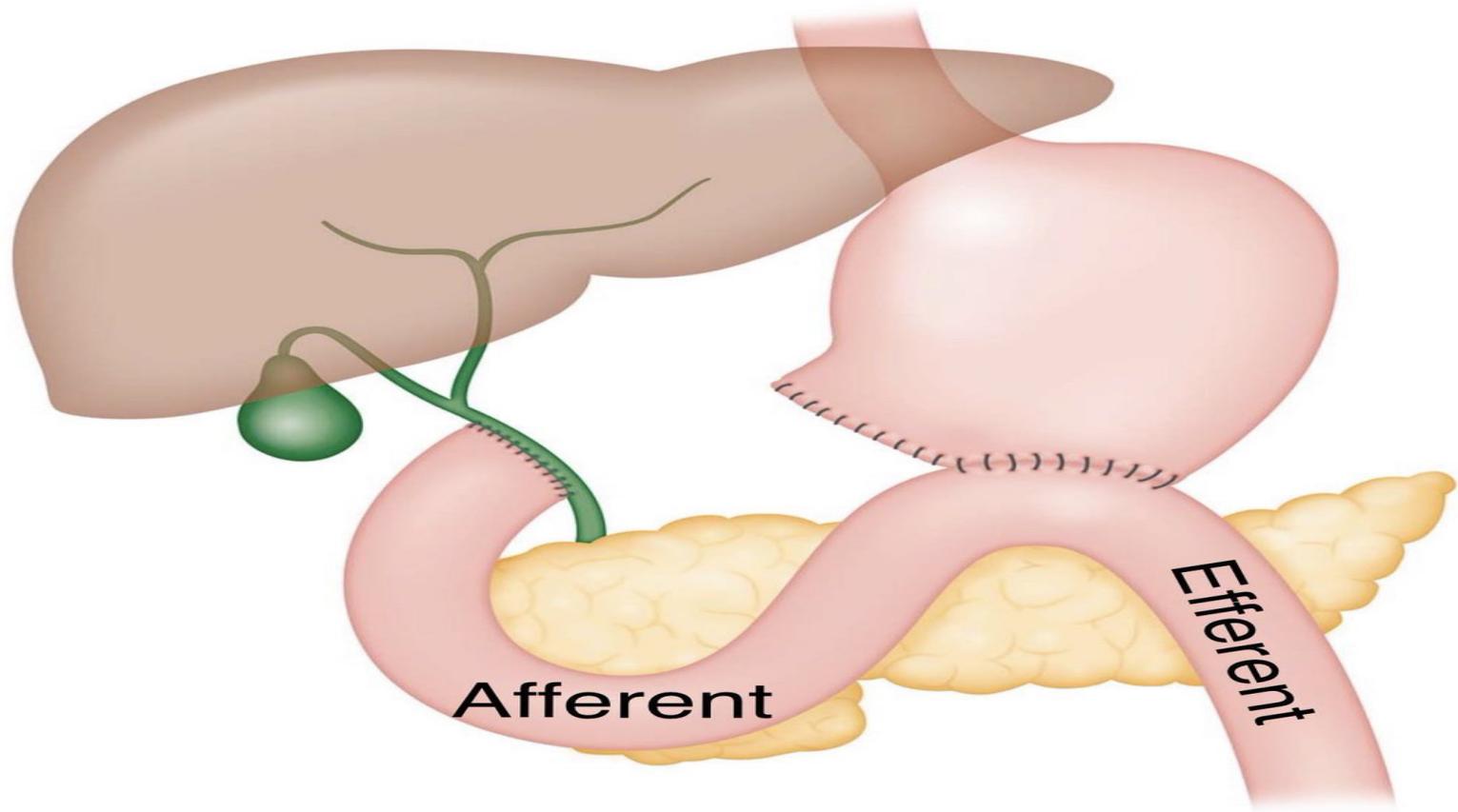


10. Afferent loop syndrome

- Blockage of the afferent limb of loop causing the bile and pancreatic secretions to collect in the afferent limb with increasing pressure these enter the stomach and become dilated.
- Causing projectile bilious vomiting not containing food and relieves symptoms .

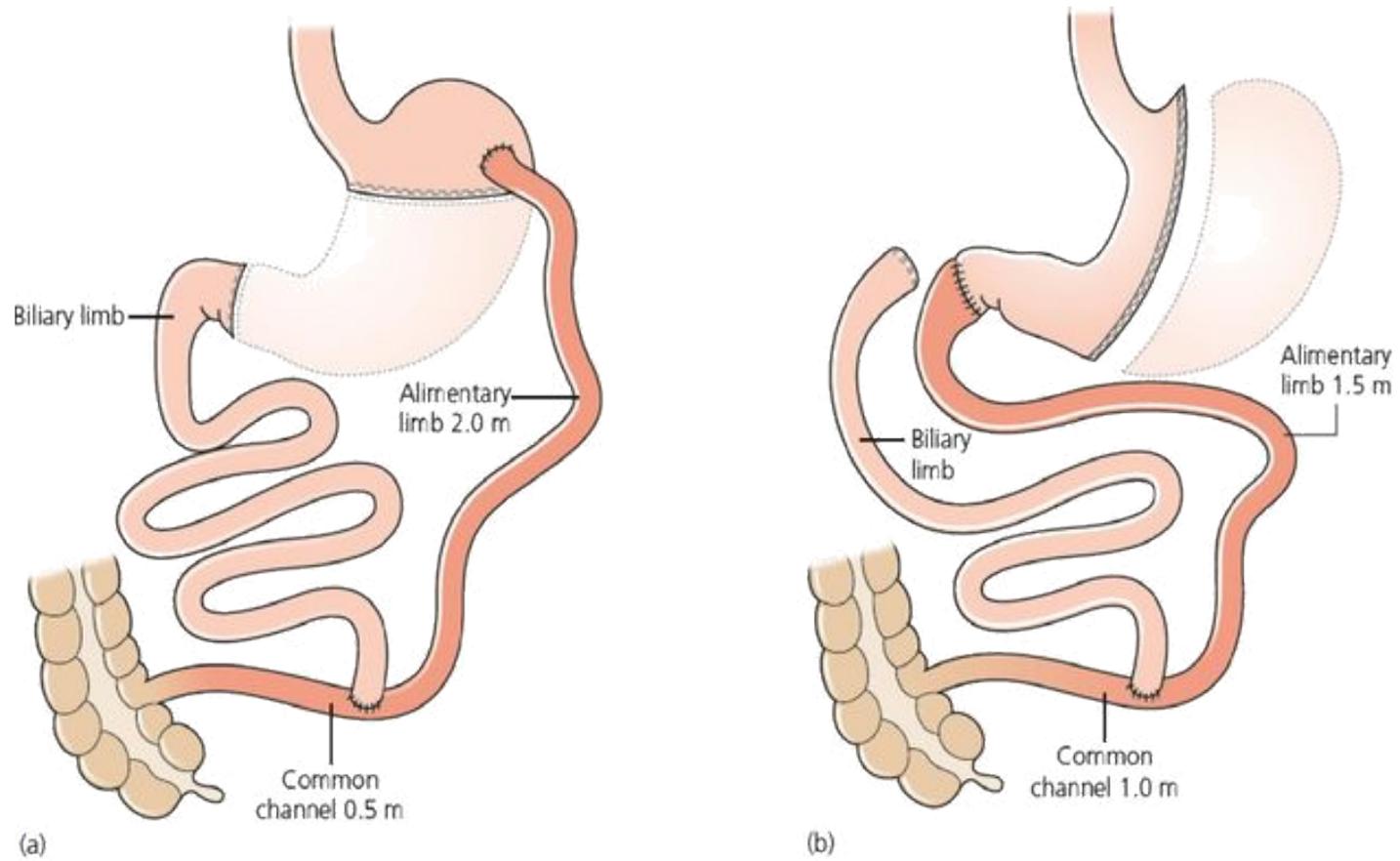
11. Efferent loop syndrome

- Efferent loop syndrome occurs when the efferent limb becomes obstructed, most often due to internal herniation or kinking behind the anastomosis.
- This leads to back pressure, distension, and bilious vomiting (may contain some food).
- Colicky & distending



Biliopancreatic Diversion

- is a malabsorptive bariatric surgery.
- It involves removing part of the stomach and rearranging the small intestine to reduce both food intake and nutrient absorption.
- Resection of the distal half to two-thirds of the stomach.
- Creation of an alimentary limb from the distal 200 cm of ileum anastomosed to the stomach.
- The biliopancreatic limb is anastomosed to the alimentary tract either 75 or 100 cm proximal to the ileocecal valve
- This procedure is the most effective with 75-85 % excess weight loss but at the expense of the highest mortality of 1-2%



4.4 (a) Standard biliopancreatic diversion (BPD); (b) BPD with duodenal switch variation.

BPD ± Duodenal Switch

- The Duodenal switch variation of the BPD was designed to reduce the need for taking Vit B12 and reduce the incidence of anastomotic stricture at the gastrojejunal anastomosis.
- In the standard BPD, approximately two-third of the distal stomach is removed while in the duodenal switch variation there is a vertical sleeve gastrectomy.
- In the duodenal switch variation, the anastomosis is made to the first part of the duodenum rather than the stomach as the standard BPD.

BPD ± Duodenal Switch

- Long term complications:

1. Internal Herniation
2. Bowel obstruction
3. Osteopenia
4. Diarrhea
5. Malodorous bowel motions and flatus

6. Marginal ulcer in 2.8% of patients.

7. Stomal ulcer .

8. Gall stones .

- Nutritional complications:

1. Iron deficiency anemia rate of less than 5%.

2. Alopecia from inadequate protein absorption

3. protein malnutrition rate of 7%

4. Night blindness from a lack of vitamin A

Malnutrition

- The most severe and life-threatening. When it is diagnosed, the treatment is parenteral nutrition.
- Two episodes of required parenteral nutrition are usually considered adequate indication to lengthen the “common channel” of ileum.
- Fat-soluble vitamins must be supplemented in parenteral form. Careful monitoring of protein intake .
- Thorough preoperative and postoperative counseling by a nutritionist versed in the operation and potential nutritional deficiencies is essential.
- Vitamins and mineral supplements must be taken regularly on follow-up, including oral supplements for iron, calcium, and vitamin B12 and a multivitamin.

References

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- The ASMBS Textbook of Bariatric Surgery
- NMS surgery 6th edition.
- Dr Mohammed Nofal's bariatric surgery lecture.

Thank You