❖ Obesity:

- A disease of excess fat storage with multiple co-morbidities that can harm the patient.
- Obesity is BMI > 30 kg/m^2; morbid obesity is BMI > 40.
- Etiology: **Diet** (overeating "most common cause"), medications (cortisone, antidepressants, antipsychotics, insulin, OCP, sulfonylurea), genetic (ex. leptin deficiency), exercise (inactivity), psychiatric conditions (major depression, binge eating disorder, bulimia nervosa).
- Major comorbidities: DM II, HTN, OSA, Cardiovascular/stroke, dyslipidemia, degenerative joint disease, PCOS/infertility, GERD. most r cured w/ bariatric surgery.
- Hx: Age of onset of obesity, diet & exercise (how effective ?), past history (co-morbidities, surgeries), FHx (obesity, metabolic syndrome), Social (alcohol, smoking), meds (for weight loss and co-morbidities). R/O other causes of obesity (thyroid, cushing,...).
- Systemic review: GERD (heartburn, regurgitation), OSA (snoring, waking up at night), joint degeneration (back, knee pain), urinary incontinence (urine comes out during coughing or sneezing).
- BMI: 18-24.9 (ideal), 25-29.9 (overweight), 30-34.9 (obese I), 35-39.9 (Obese II), 40-49.9(ObeseIII), 50-59.9 (super obese), >60 (super-super obese).
- Other measures: waist to hip ratio → Females (>0.85), Males (>0.9), body composition measurement → Females (fat of +32%), Males (fat of +25%).
- Ix: HbA1c, blood glucose, lipid profile (cholesterol, TAGs, HDL, LDL), , TSH, CBC (hematocrit), AM cortisol, Uric acid, serum Iron.
- Pre-op (from clinic): If hx of GERD → Fluoroscopy, if Hx of H.pylori → endoscopy, If OSA → sleep apnea tests, all should undergo abdomen US (if concomitant gallstones → cholecystectomy at same surgery).
- Rx:
  - Behaviour modification: diet, exercise, avoid bad habits (eating while watching TV, eating fast).
  - Pharmacotherapy: **orlistat**, **metformin**, sibutramine.
  - Intragastric balloon:
    - Reduces volume of stomach → early satiety. For mild obesity (BMI 25-30) or super obesity (BMI>55) at risk of surgery/anesthesia.
    - Contraindications: eating disorder, previous gastric surgery, large hiatus hernia, PUD, mucosal lesions (esophagitis, gastritis), prediction of poor compliance.
    - Complications: hypersensitivity to balloon material, SBO, balloon rupture, severe N/V (expected for first 3 days).

❖ Bariatric surgery:

- Types of surgery - restrictive or malabsorptive:
  1. *Restrictive*: decreases food intake, as the patient suffers early satiety even after small meals. Overeating → upper abdominal pain, and vomiting. Ex. gastric banding[1], sleeve gastrectomy[2].
  2. *Malabsorptive*: alters digestion, leading to food intake being poorly absorbed and eliminated in the stool. Overeating → excessive diarrhoea and flatulence. Ex. duodenal switch.
  3. *Combined restrictive and malabsorptive*: this provides a combined effect of restrictive capacity with bypass of the proximal intestine. Ex. gastric bypass[3].

- Complications:
  - Obesity increases the risk of all types of surgery (chest infection, DVT and wound infection)
  - Any intestinal anastomoses:
    - leakage → sepsis and peritonitis → drainage and ICU if needed.
    - Stricture → endoscopic dilatation and stents.

- Criteria for surgical intervention:
  1. Age between 18-60 years.
  2. BMI above 40 or 35 with co-morbidity.
  3. An efficient conservative treatment strategy tried.
  4. Cooperative and willing to follow postoperative diet instructions.
  5. Psychologically stable.
  6. No endocrine cause for obesity.

- Contraindications:
  1. High risk for cardiac complications.
  2. Poor myocardial reserve (congestive heart failure).
  3. Significant COPD or respiratory dysfunction.
  4. Non-compliance with medical treatment.
  5. Significant psychological and/or eating disorders.
  6. Other relative (e.g. not fitting surgical criteria).
  7. Predictors of high mortality (Weight >200kgs, male, old age or ASA >III).

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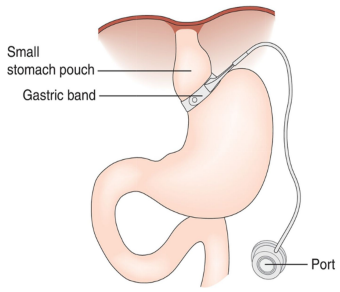
[1] A ring with an inflatable inner cuff, which is placed laparoscopically a short distance below the oesophagogastric junction, creating a small (50 mL) gastric pouch . The cuff can be inflated or deflated via injections into a port site located in the subcutaneous tissues, in order to tighten or relax the cuff around the stomach. The tighter the cuff, the longer foodstuffs entering the gastric pouch will take to exit through the ring into the remainder of the stomach and intestinal tract, prolonging the feeling of satiety.

[2] Excision of the fundus and body of the stomach while retaining the pyloric antrum, thereby converting the stomach into a narrow tube with a volume of 100–150 mL

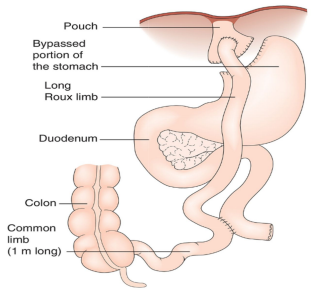
[3] Gastric bypass involves stapling the stomach closed a short distance below the oesophagogastric junction . A Roux limb is brought up and anastomosed to the small proximal gastric remnant. Depending on the size of the pouch and calibre of the anastomosis, there will be a degree of restrictive activity, as well as a major malabsorptive element, as food will enter the distal jejunum and proximal ileum without exposure to bile or pancreatic and other digestive enzymes.

- Adjustable Gastric **Banding**:
  - Reducing the volume of the stomach → early satiety (via vagal stimuli).
  - Advantages:
    a. Reduce obesity (50%) and related comorbidities (50%),
    b. No cutting or stapling of the stomach, Short hospital stay, Quick recovery.
    c. Fully reversible, Adjustable without further surgery, No malabsorption issues.



  - Complications:
    a. Band slippage/Pouch dilatation.
    b. Esophageal dilatation and dysmotility, Erosion of the band into the gastric lumen.
    c. Port site pain/infection, Port displacement.
    d. Infection of the fluid within the band.

- Gastric **Bypass** Procedure:

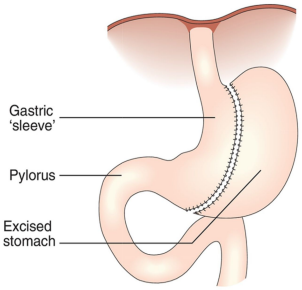


  - Advantages: The oldest bariatric procedure (Gold Standard)
    a. Both restrictive and malabsorptive.
    b. >70% reduction of Excess Body Weight (Long-term weight stability).
    c. The best for treating **co-morbid** diseases

  - Complications:
    d. Anastomotic leak (tachycardia), and related mortality.
    e. Circular stapler related anastomotic stricture.
    f. Marginal ulceration bleeding or perforation.
    g. Dumping syndrome (autonomic instability).
    h. Life-long supplemental vitamins and minerals, Nutritional deficiencies (iron, calcium, Vitamin. B12, folate).
    i. Gallstones: due to rapid weight loss.

  - Complications of abdominal surgery: Infection, hernia, bowel obstruction.

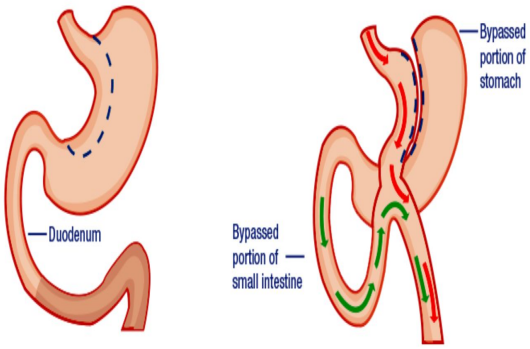
- **Sleeve** Gastrectomy:



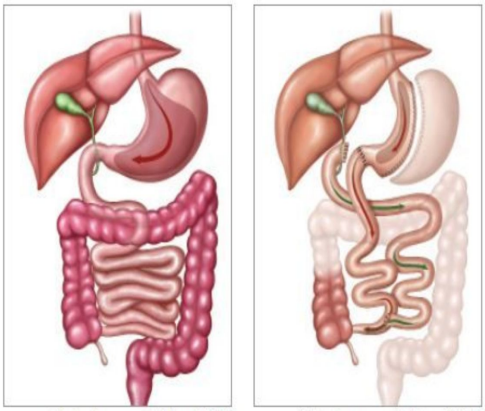
  - Advantages:
    a. Early satiety and low appetite.
    b. Stomach functions normally allowing food to be emulsified (just in smaller amounts).
    c. No dumping syndrome (pyloric portion of the stomach is left intact).
    d. Simpler and less operative time than bypass surgery.
    e. Excess Body Weight Loss (60%), Improvement in co-morbidities (range of 65%).

  - Complications:
    f. leakages (5%) or bleeding (10%) along the staple line.
    g. GERD (not suitable for GERD pts), Gallstones, Gastric stricture/fistula.

- Biliopancreatic **Diversion** Procedure:
  - Purely malabsorptive
  - Advantages: Reduces about 95% of excess body weight, Cures DM II and other metabolic disorders (95).
  - Disadvantages: Malnourishment, Protein deficiency, High doses of multivitamins and minerals, Diarrhea, anemia, osteoporosis, gallstones, liver failure.



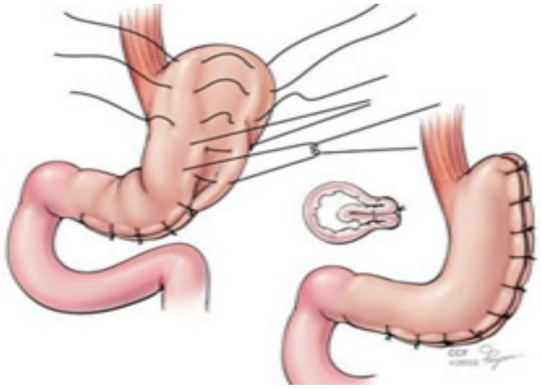
- Biliopancreatic **Diversion** and Duodenal **Switch** (BPD&DS):
  - Restrictive and malabsorptive.
  - Advantages:
    a. Cure of DM II and other metabolic disorders by 98%.
    b. No dumping syndrome.
    c. Less peptic and stomal ulcerations.
    d. Most surgeons recommend it for super obese patients or following other failed procedures
  - Disadvantages: The most complicated technically, High postoperative complication rates, metabolic deficiencies like BPD.



Before biliopancreatic diversion with duodenal switch surgery.

After biliopancreatic diversion with duodenal switch surgery.

- Gastric **Plication** Surgery: still considered experimental
  - It is a restrictive procedure similar to the Sleeve gastrectomy.
  - Advantages: Less leak and bleeding rates, reversible, EWL (40-70%).
  - Disadvantages: Technical accuracy is difficult, Vomiting, Gastric wall necrosis.



❖ PUD:

- Ulcer[4]: imbalance b/w acid-pepsin → ulceration of the mucosa exposed to acid.
- Most common site of PUD is the 1st part of duodenum.
- Gastric: mostly in lesser curvature distal half, and generally r chronic, probably malignant, in elderly.
- Acute ulcers: <3 m, no fibrosis.
- S&S: Recurrent, well localised epigastric pain. (typical).
  - Gastric ulcer: aggravated by eating (decreased weight) and relieved by vomiting.
  - Duodenal: aggravated by hunger and relieved by eating (increased weight), vomiting, antacids and milk.
  - Others: bleeding (per mouth or perrectum), obstruction, perforation, heartburn, anorexia, waterbrash, certain foods intolerance, intermittent vomiting.
  - Persistent vomiting (projectile, containing undigested food) should suspect gastric outlet obstruction.

Etiology

2. **Helicobacter pylori**[5]: Most common cause of gastric adenocarcinoma & PUD. Gram-negative flagellated rod.
   - Dx:
     - Non-invasive: Blood (immune response), Stool (H.pylori antigens), Urea breath test.
     - Invasive (require endoscopy-gold standard): Histology, Rapid urease test (on Bx), Microbiology culture.
   - Rx:
     A. Triple therapy for 10-14 d: PPI + Amoxicillin + Clarithromycin.
     B. Quadruple therapy[6] for 10-14 d: PPI + bismuth + tetracycline + metronidazole.
     C. Sequential (concomitant) therapy First 1-5 d: PPI + amoxicillin Then 6-10 days: PPI + clarithromycin + tinidazole.

2. **NSAIDs**: Aspirin, ibuprofen and diclofenac → COX inhibition to produce prostaglandin[7].

3. **Zollinger-Ellison syndrome**[8]: Gastrin secreting tumor (gastrinoma).
   - Failed medical Rx or unusual site at early age PUD should raise suspicion of this syndrome.
   - Malignant if exist alone, benign if exist w/ MEN I.
   - Complications: pain, bleeding, stenosis, perforation.
   - Clinical features: Diarrhea (acid in the small intestine), steatorrhea (Inactivation of pancreatic lipase).
   - Dx: serum gastrin (>500), CT or MRI (localise tumor), EGD (massive diffuse ulceration).
   - Rx: Resection if possible, if not gastrectomy.

2. Others: Smoking[9], genetics (1st degree relatives), blood group O, hyperparathyroidism → hypercalcemia → acid secretion → PUD. severe illness, trauma, MOF, sepsis, major surgery. CNS injuries (cushing's) and burns (curling's) → stress ulcers (special type of ulcer).

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[4] Losing all of the superficial layer (losing part of it is laceration, losing all layers is perforation).
[5] increased prevalence w/ age and developing countries, mostly undetected until duodenal ulceration occur, causes inflammatory response (gastritis) to antral mucosa. Gastritis → G cells → secretes gastrin → acid hypersecretion → metaplasia due to irritation → duodenal ulcerations.
[6] Only recommended as first line therapy if resistance to clarithromycin or metronidazole is high, or in patients with recent or repeated exposure to these drugs o levofloxacin can replace metronidazole or tetracycline
[7] Responsible for mucus and bicarbonate production, which both protect gastric mucosa from acid by maintaining an alkaline buffer zone.
[8] 90% found in the "Gastrinoma Triangle" (pancreas) but can be found in the stomach and duodenum, some consistent w/ MEN I (benign), others r single (malignant). hypergastrinemia → PUD.
[9] More related to gastric, delays healing → increases likelihood of complications (bleeding, perforation).

- Dx:
  - Hx: Typical Hx is enough to start treatment. If unresolved continue Ix.
  - GED: If failed medical (6 weeks) for duodenal, every gastric ulcer (take Bx → r/o malignancy). Or a pt w/ known Hx of PUD and presented to ER w/ severe epigastric pain (Erect AXR → r/o perforation).
  - Rapid urease test (CLO)[10]: R/O H.pylori.
  - Gastrin (serum): if severe unresolved Sx (suspecting Zollinger-Ellison syndrome).
  - Contrast meal[11]: if contraindicated or unavailable EGD.

- Rx - of uncomplicated PUD:
  - Lifestyle: avoid NSAIDs, smoking, chocolates, citrus food, excessive alcohol, lose weight.
  - H2 antagonist (ranitidine), PPI[12] (ome, lansoprazol).
  - Eradication of H. pylori: antisecretory agents (PPI+Abx) triple therapy for 7 days followed by 4-6 weeks of PPI (healing dose).

- Surgical Rx:
  - Indications: failed conservative, malignancy suspected or can't be ruled out.
  - vagotomy (block the neuronal stimulation →which blocks hormonal stimulation), antrectomy (take off G cells) + vagotomy, subtotal gastrectomy.
  - Duodenal (truncal vagotomy, highly selective vagotomy, gastric resectional surgery → no acid no ulcer). Vagotomy & antrectomy. All have little role since eradication therapy.

Surgery complications

- Early: leakage, bleeding, gastric retention.

- Late:
  - Recurrent ulcer (marginal ulcer, stomal ulcer ,anastomotic ulcer).
  - Gastrojejunocolic and gastrocolic fistula.

- **Dumping syndrome**[13]:
  - Early dumping: presence of hyperosmolar food from the stomach → duodenum, expands too quickly → hypovolemia (Syncope, loss of consciousness and lethargy) → takes 4 -6 mins.
  - Late dumping: food arrives at the duodenum → pancreas surprised and secretes a large amount of insulin → hypoglycemia (Tachycardia, Flushing, Sweating, Colicky pain, hotness and diarrhea may lead to fainting). Takes 15 mins.
  - Advise the patient to eat less sugar or give him acarbose.

- Anemia:
  - Iron deficiency[14] (microcytic, hypochromic).
  - B12 deficiency "megaloblastic or pernicious anemia": (macrocytic, hypochromic) Due to loss of IF production from parietal cells in the fundus.
- Postvagotomy diarrhea, chronic gastroparesis, pyloric obstruction/stenosis, alkaline gastritis.

[10] A Bx specimen taken from antrum placed in a gel containing urea → urease released by H. pylori and subsequent ammonia released and color change occur).
[11] Contrast fluid (visualise esophagus), contrast meal (visualise esophagus & stomach), follow through (visualise esophagus, stomach and small intestine).
[12] Irreversible H/K ATPase inhibition → acid secretion inhibition.
[13] A condition where the ingested food bypasses the stomach too rapidly and enter the small intestine largely undigested. B/c there is no pylorus due to surgery → undigested food will go to small bowel directly, this food has an osmotic potential(hyperosmolar) thus it drags fluid,occurs 1-3 hours after a meal.
[14] Due to decrease in acid production > decrease iron absorption.

- **PUD Complications:** Perforation, hemorrhage, obstruction.

Perforation

- Perforation usually occurs in acute ulcers on the anterior wall of the duodenum, while the posterior wall will involve bleeding because the gastroduodenal artery runs behind it.
- Gastric ulcers: related to NSIADs use and elderly.
- Sx: Acute severe unremitting epigastric pain, shoulder-tip pain[15].
- PEx: generalised peritonitis signs, vomiting may occur, Abdomen does not move freely with respiration, tenderness, guarding, board-like rigidity, respiration is shallow and bowel sounds are usually absent.
- Fluid can track down the right paracolic gutter → simulating acute appendicitis, can be spelled all over and cause generalized peritonitis[16].
- Dx:
  - Hx (NSAIDs, ulcer, liver disease)& PEx.
  - Erect AXR[17]: free air under the diaphragm (the absence of free air does not exclude).
  - Blood: Moderate hyperamylasaemia may be found.(high levels more suggestive of acute pancreatitis).
  - Where there is doubt, an emergency water-soluble contrast meal or an abdominal CT may be indicated.
- **Management**

1. **Initial**: resuscitation, O2, IV fluids (correct dehydration from 'third space loss'), Abx, NGT and foley. Intravenous opiate analgesia and PPIs should be given as necessary. A urinary catheter enables close monitoring of urine output.
2. **Definitive**: if pt still unstable, if stable monitoring & continue conservative.
   - Graham patch (simple closure)[18]. Take Bx if gastric ulcer.
   - All patients: 72 hours IV PPI + *H. pylori* eradication therapy for 2–3 weeks, followed by a healing course of oral PPIs.
   - EGD 6–8 weeks later to establish healing of the ulcer
   - Difficult size or location (large prepyloric ulcers or close to the lesser curvature): distal gastrectomy.
   - Malignant: gastric resection should be performed following tumour staging.

[15] Diaphragmatic irritation due to Irritant stomach contents in the peritoneal cavity.

[16] Pt may be pale, shocked and peripherally shut down (peripheral circulatory collapse, can lead to gangrene and organ failure). tachycardia, a weak pulse, cool extremities, and a low temperature.

[17] Right lateral decubitus is alternative incase of a comatosed or disable pt (why? Because on the right there is the liver and any gas above it is abnormal, but if you do left up the gas in the stomach can be misleading). If inconclusive, put in an NG tube and push 50 cc of gas via syringe then repeat x ray. If there is no free air on the plain film, computed tomography (CT) or ultrasound can be useful to detect small amounts of free air or fluid

[18] Ulcer is plugged using a pedicled omental patch (If the omentum is necrotic, the round ligament of the liver is a good substitute), coupled with a thorough peritoneal lavage.

Bleeding

- Presentation: haematemesis and/or melaena. Very rarely (brisk bleeding → fresh rectal bleeding → signs of cardiovascular instability are present)
- **Hx & PEx:** PMHx (PUD, previous bleeding, liver disease, previous surgery, coagulopathies), drug Hx (NSAIDs, anticoagulants) and social Hx (alcohol abuse).
- Acute substantial blood loss and shock (hypotension, tachycardia, tachypnoea and pallor), and signs of liver disease and portal hypertension (spider naevi, portosystemic shunting and bruising/Never Cauterize in varices).
- **Blood tests**
  - CBC: Anaemia.
  - Urea: high (due to the absorption of blood and its subsequent metabolism by the liver).
  - Coagulation profile: coagulation derangement (if significant liver disease).
- **Management**
  1. **Resuscitation:** O2, IV access (Ix, cross-matching and fluids[19]), NGT (monitor the bleeding and prevent aspiration), a Urinary catheter. A central and arterial line may aid resuscitation.

2. **Detection and endoscopic treatment:**
   - Identify the bleeding point → arrest the bleeding[20] (90% spontaneous) → prevent recurrence.
   - Features of increased risk of further bleeding: ulcer base bleeding, a visible vessel and adherent clot.
   - angiography[21] (if endoscopy unable to identify site).

3. **Surgical management:** Emergent surgery (if failed endoscopic therapy).

Obstruction

- S&S: Pain (dull, epigastric) & vomiting (projectile, large volumes of undigested food & non bile stained), +/- weight loss, palpable dilated stomach, gastric splash, visible gastric peristalsis from the left to right in the upper abdomen.
- Could be due to stricture formation.
- Dx:
  - History: (smoking).
  - AXR: double bubble.
  - EGD: locate area of obstruction. Mandatory after resuscitation to r/o gastric carcinoma.
  - Contrast swallow, Bx r/o malignancy.
- Rx:
  - Resuscitation, normalisation of electrolyte & acid-base abnormalities, nasogastric suction & washout.
  - Surgical: Gastrojejunostomy.

[19] Volume replacement is determined by pulse, blood pressure, urine output and central venous pressure. (Over-transfusion or rapid transfusion in those with compromised cardiac function can lead to pulmonary oedema).
[20] Homeostatic techniques such as adrenaline, application of heater probes and clips.
[21] Limitation of this investigation is that it can only detect active bleeding of greater than 1 mL/min. In these patients, selective embolisation can be used to stop the bleeding and thus avoid the need for surgery.

★ **Other gastric and duodenal diseases** (abnormal presentation of ulcer)**:**

- **Mallory-weiss syndrome**
  - longitudinal tear in the gastric mucosa near EG junction (most common site); due to rapid increases in gastric pressure from retching/vomiting against a closed glottis.
  - presentation[22]: hematemesis +/- melena (acute upper gastrointestinal hemorrhage), usually caused by severe retching, coughing, or forceful vomiting.

  - Tx:
    A. ABC.
    B. Brief history (nothing significant on PEx).
    C. 90% bleeding stop spontaneously by ice-water gastric lavage (cold gastric wash).
    D. If it doesn't stop, we perform EGD "to investigate and treat".
      - How EGD Rx ? cauterize it, band it, clip it, inject epinephrine or embolize.
      - Small tear → cautery.
      - Large tear → Surgical repair.

- **Superior Mesenteric Artery Syndrome:**
  - Obstruction of the third portion of the duodenum which is compressed by superior mesenteric artery (SMA) (anteriorly) and Aorta (posteriorly).
  - History: most commonly associated with severe debilitating illnesses with sudden severe weight loss (Malignancy, Malabsorption syndromes, Trauma, Burns, others[23]).
  - Example: Patient involved in RTA, long ICU stay on NG tube feeding develops sudden weight loss and vomiting.
  - Dx:
    - History: any condition leading to a sudden weight loss.
    - X-ray with contrast: stomach distention and dilation of the proximal duodenum.
    - CT scan arteriography: to visualize the angle "confirms it".

  - Tx:
    - Conservative: gastrointestinal decompression[24], correction of electrolyte abnormalities, nutritional support. If conservative fails to resolve the condition go for surgical.
    - Surgical: Strong's procedure[25] (dividing ligament of treitz), Gastrojejunostomy[26] , Duodenojejunostomy[27].

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[22] Typically, the patient first vomits food and gastric contents,This is followed by forceful retching until it causes tearing of oesophagus, proximal of the stomach, gastro-oesophageal junction then bloody vomitus.
[23] Aids, bariatric surgery, spinal cord injury, paraplegia, drug abuse, prolonged bed rest and anorexia nervosa.
[24] A nasogastric tube decompresses the dilated stomach and proximal duodenum (improving patient comfort and aiding in monitoring fluid losses). Doctor also mentioned that before gastrojejunostomy, you can convert patient from NG tube feeding(which goes to the stomach) to jejunal feeding.
[25] Mobilization of the duodenal-jejunal junction by dividing the ligament of Treitz. The duodenum is then positioned to the right of the superior mesenteric artery so it does not lie within the space between the aorta and the superior mesenteric artery.
[26] Gastrojejunostomy is performed by bringing a loop of jejunum up to the stomach and performing a side-to-side anastomosis
[27] With duodenojejunostomy the duodenum can be left intact or divided and the proximal jejunum brought through the right mesocolon to perform a side-to-side duodenojejunostomy.

- **Diverticulum**:
  - Outpouching, duodenum 2nd part is most common.
  - Types: true (all layers), false (only mucosa is involved).
  - Dx: incidental finding on barium meal examination and endoscopy.
  - Complications: obstruction, bleeding and inflammation (diverticulitis).
  - Tx: if symptomatic, excision

- **Ménétrier's** disease:
  - gastric mucosa (rugal folds) hypertrophy → Over-secretion of acid and protein-rich mucus" → epigastric pain & hypoproteinemia.
  - Presentation: Epigastric pain, weight loss , diarrhea, hyponatremia→ edema, N/V, anemia.
  - Dx: Hx & PEx, CT (enlarged gastric folds), Upper GI Endoscopy W/ Bx.
  - Tx: Atropine (to reduce the secretion), PPI (Omeprazole), H.pylori eradication, gastrectomy (rarely).

- Gastritis:
  - Inflammation of the gastric mucosa.
  - Etiology: Injurious agents, both chemical and bacteriological, extreme stress resulting from shock (over-indulgence in alcohol).
  - Biliary gastritis is seen in the presence of bile in the stomach (frequently seen after Polya-type"billroth II" partial gastrectomy).
  - Prevention: by resuscitation, mucosal protective agents, and minimising gastric acid secretion.

- Dieulafoy's lesion:
  - Profuse bleeding from an abnormal vessel situated in the gastric mucosa and not associated with ulceration,(usually n upper stomach).
  - Rx: initial treatment by injection sclerotherapy if failed surgical sewing.

- Bezoars:
  - Accumulations of hair or vegetable matter → reduced nutritional intake and malnourishment.
  - Dx: barium examination.
  - Tx: surgical removal (gastrotomy).

Upper GI bleeding (OSCE)

- The commonest cause of upper GI bleeding is **PUD**.

DDx[28]	
Common causes	Uncommon causes
- Peptic ulcer 45% (Duodenal 25%, Gastric 20%). - Esophageal varices (PHTN) 20%, - Gastritis 20%, - Mallory-Weiss syndrome 10%	- Gastric carcinoma. - Esophagitis. - Pancreatitis. - Hemobilia. - Duodenal diverticulum.

- Upper gastrointestinal bleeding presents with:
  - Haematemesis, Coffee-ground vomitus[29], Melaena, hematochezia[30].

★ Management: ABC → Hx & PEx (short) → Common Dx → Ix: (blood & EGD"diagnostic & therapeutic")

- Approach:

A. Resuscitation:

1. ABCs[31].
2. **O2** (High flow) & **IV lines** (2 large bore line → draw blood, send for routine labs, coagulation profile and cross matching then fluids), **NGT** and urinary **catheter**.
3. Correct any coagulopathy if it's due to liver disease.

B. Once patient is stable:

1. **Hx** (focused on risk factor): Hx of PUD, liver disease or alcoholism, previous bleed or coagulopathies, drugs (NSAIDS, aspirin, anticoagulants), previous surgery.

2. **Endoscopy**: Diagnostic and therapeutic (effective in 80-90% of patients)
   - DO NOT DO THIS IF YOU SUSPECT PERFORATION!
   - Within 12-24 hours, the aim is to locate site and stop the bleeding.
   - Non variceal → IV PPI (for 3 days).
   - Variceal → Octreotide and vasopressin (for 3 days).
   - Then epinephrine, banding (varices), clipping, sclerotherapy (if banding fails), TIPS (remember you can't cauterize varices).

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[28] PUD (duodenal - gastric), Mucosal Lesions (esophagitis, gastritis and duodenitis), Gastroesophageal varices, Mallory Weiss tear, Angiodysplasia, Malignancy, Aortoenteric fistulas, Dieulafoy's Lesion.
[29] Is due to vomiting of blood that has been in the stomach long enough for gastric acid to convert hemoglobin to methemoglobin,it's less severe than hematemesis.
[30] Passage of bright-red blood from the rectum, always indicates lower GI bleeding except if there's huge massive peptic ulcer.
[31] A: by asking the patient a question, if the patient can answer!it's clear B pulse oximetry, if <95% auscultate to assess air entry C BP and pulse

2. **Angiography**: If endoscopy is not available; selective embolization can be used to identify and stop bleeds. However, it can only detect active bleeding.
3. **Surgical**: if the bleed is from a major artery or other treatments fail.
    1. Duodenal Ulcers: A posterior wall ulcer, which has eroded into the gastroduodenal artery may be under run with sutures through an opening of the anterior wall of the duodenum (duodenotomy)
    2. Gastric Ulcers: With a bleeding gastric ulcer, the possibility of malignancy must be considered, Bx is essential in all cases to determine its nature.
    3. Management:
        - Young fit patients → ulcer excision (small wedge resection).
        - Elderly W/ significant comorbidities → under-running of the ulcer may be preferred.
        - If pathology comes back positive for malignancy the patient should be staged and managed accordingly. If it's benign, H. Pylori eradication is indicated with avoidance of NSAIDS.

❖ Abdominal hernia:

- Hernia: An abnormal protrusion of intra-abdominal contents through a defect in the abdominal wall.
- Causes/types:

  A. Congenital: like indirect inguinal hernia, umbilical hernia.
  - Patent processus vaginalis almost always causes indirect inguinal hernia.

  A. Acquired:
  - Loss of tissue strength and elasticity, due to aging or repetitive stress: hiatal hernia.
  - Operative/Trauma, in which normal tissue strength is altered surgically: incisional hernia.
  - Increased intra-abdominal pressure: Heavy lifting , Coughing, asthma, and COPD , Straining at defecation or urination (e.g. Benign prostatic hypertrophy, constipation, colon/rectal cancer), Multiparity (Multiple pregnancies), Ascites and abdominal distension & Obesity.

- Terms:
  - Reducible: The contents of the sac are reduced spontaneously or manually.
  - Irreducible: The contents remain constantly outside.
  - Inflamed: Rare, Due to inflammation on the sac contents, e.g. acute appendicitis or salpingitis.

- Classification:

  1. Incarcerated:
  - Trapped or imprisoned, Initially it is reducible, then it becomes irreducible (either spontaneously or manually).
  - Does not denote obstruction, Blood supply remains intact. Nausea, vomiting, and symptoms of bowel obstruction (possible).

  2. Strangulated: A surgical emergency
  - Likely in hernias with narrow necks, blood supply is seriously impaired (ischemic contents).
  - Gangrene may occur within 5-6 hours after the onset of symptoms.
  - The femoral hernia is the most liable to strangulation due to its narrow neck and its rigid surroundings[32].
  - Presentation:
    a. Sx of an incarcerated hernia present combined with a toxic appearance[33].
    b. Sx: Sudden pain over the hernia, N/V.
    c. Signs: Tense and tender, Absent cough impulse (non expansile).

  3. Obstructed: Contains obstructed intestine, Small intestine obstruction presents with pallor and vomiting, Large intestine obstruction presents with distention and constipation, Blood supply remains intact.

- Sites of Hernia: Mid-line, Umbilical area, Para-median line, Inguinal region, Femoral canal, Lumbar area, Obturator foramen, Incisional or scar-line.

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[32] The constricting agents that compresses the blood supply are: (In order of frequency), The Neck → External ring in children → Adhesions with the sac (rare)

[33] Strangulation is probable if pain and tenderness of an incarcerated hernia persist after reduction.

Inguinal Hernia

- The most common hernia in both sexes. Subdivided into direct and indirect. (adult males mostly indirect).

DDx	
- Hydrocele. - Saphena varix[34] - Spermatic cord lipoma. - Inguinal lymphadenopathy. - Psoas abscess. - Femoral artery aneurysm. - Cutaneous lesions, e.g. sebaceous cyst, skin tumor.	- Encysted hydrocele of the cord. - Varicocele. - Epididymo-Orchitis. - Testicular torsion. - Undescended testis. - Ectopic testis. - Testicular tumor. - Pseudohernia.

Indirect[35]

- Most common of all forms at all age groups, M: F = 20:1.
- Travels down the inguinal canal on the outer side of the spermatic cord.
- Its neck lies **lateral** to the **inferior epigastric vessels**.
- Can be due to a congenital lesion i.e patent processus vaginalis (Seen in young patients).
- Strangulation is common, but <u>less</u> than in femoral hernia.

Direct

- Comes out forward via the posterior wall of the inguinal canal, at Hasselbach's (i.e. inguinal) triangle, due to a defect or weakness of the fascia transversalis.
- Always acquired, never congenital.
- It has a wide neck and therefore there is no hazard of strangulation.
- The neck is **medial** to the **inferior epigastric vessels**. Does not attain a large size.

★ Hasselbach's triangle is bounded by: Inguinal ligament inferiorly + Inferior epigastric artery laterally +Lateral border of the rectus muscle medially.

- **Clinical Presentation**:
  - Groin pain referred to the testicle, a large hernia causes dragging pain.
  - Cough impulse (Expensile).
  - Presents as a swelling or fullness at the hernia site.
  - Aching sensation (radiates into the area of the hernia).
  - No true pain or tenderness upon examination.
  - Enlarges with increasing intra-abdominal pressure and/or standing.

★ **Pantaloon** (Saddlebag) hernia is the **simultaneous** occurrence of a **direct** and an **indirect** hernia. It causes two bulges (medial and lateral) that straddle the inferior epigastric vessels.

[34] Dilation of the saphenous vein at its junction with the femoral vein in the groin.
[35] In adult males: Mostly on the right side because of delayed descent of the right testicle. 12% bilateral.

Treatment (Mostly surgical)

- Types of Procedures:
  - **Hernioplasty**: repair of the posterior inguinal canal with autogenous or heterogenous (steel) materials.
  - **Herniotomy** (for pediatrics only): remove herniated sac.
  - **Herniorrhaphy**: suturing the defect (types: Bassini, McVay, Shouldice).
  - **Laparoscopy**: if bilateral hernia, recurring, or needs to be removed as quickly as possible.
- In adults, we do herniotomy and herniorrhaphy (repair) because the problem is due to weakness.
- In children, we do herniotomy only; because the problem is congenital, not muscle weakness.
- If strangulated " give Abx and correct fluids.

- **Preoperative consideration**:
  - Pre-op risk factors (smoking, obesity, steroids, DM).
  - Post-partum (Wait for at least 6-12 months).
  - Anesthesia type (local, spinal, regional, & general).
  - Patient's skin care, bowel prep, prophylactic Antibiotics.
  - Surgeon's aseptic techniques, familiarity with anatomy and appropriate approaches.
  - Asymptomatic Hernia (operate or not!?) → Yes; if pt. is married, constipation, prostatism, cough, heavy wt. lifting, and whom you may lose F/U

- **Essential steps for inguinal hernia repair**:
  1. Complete division of the external oblique aponeurosis and transversalis fascia.
  2. Differentiation between indirect and direct defects.
  3. Isolation of the spermatic cord.
  4. Ligation and removal of the sac at the deep inguinal ring flush with peritoneum.
  5. Oblique reconstruction of the inguinal canal with an anterior and posterior wall and an internal and external ring.

OSCE

★ How to differentiate direct from indirect inguinal hernia? And between hernia & hydrocele?

Direct Vs. Indirect:

- Reduce the hernia by pressing the internal inguinal ring and ask the patient to cough
  - ➔ if protruded again = direct.
  - ➔ if it didn't protrude again = indirect.

Hernia Vs. Hydrocele:

- Reducibilty.
- Transillumination test.
- Can you go over it during palpation? If yes hydrocele, if no hernia.

Femoral Hernia

- It is a peritoneal fat or abdominal content in the femoral canal.
- Risk factors: female (common), pregnancy, inguinal hernias.
- Most liable to strangulation (It is a narrow canal, so it gets strangulated or incarcerated easily).
- The hernia descends vertically to the saphenous opening.

- **Presentation**:
  - Bulge on pubic bone, pain in groin, (increase by bending, coughing, or lifting).
  - It could be painless, dragging sensation.

- **Rx**: (Methods are like inguinal hernia but without herniotomy)
  - Laparoscopic or open surgery.
  - Lockwood's infra-inguinal approach.
  - Lotheissen's trans-inguinal approach.
  - Mc-Evedy's high approach.

★ Inguinal hernias are located above and medial to the inguinal ligament and pubic tubercle, whereas femoral hernias are located below and lateral to the inguinal ligament and pubic tubercle.

Umbilical & Para-Umbilical Hernias (PUH)

- Seen in infants and children. F:M = 20:1.
- PUH affects adults. The defect is either supra or infra-umbilical through the linea alba " When enlarged, it becomes rounded or oval shaped.
- May contain omentum (in adults), small intestine or transverse colon (bowels in neonates)
- Etiology: Obesity, Flabbiness of the abdominal muscles, Multiparity.

- **Clinical Features**:
  - Irreducibility in PUH is due to omental adhesions within the sac.
  - Pain may be colicky due to partial or complete intestinal obstruction.

- **Rx**:
  - Open (Mayo's repair) or laparoscopic **repair** (if the defect is more than 4 cm).
  - Repair: Simple transverse repair of fascial defect.

Incisional Hernia

- 2nd most common hernia (after inguinal).
- Occurs in surgical scars and it has no actual neck (or its neck is wide), so it does not lead to complications.
- **Causes**:
  - Mechanical factors (increase in intra abdominal pressure postoperatively) → Prolonged ileus, Chronic cough, Repeated vomiting, Lifting heavy objects in the immediate postoperative period.
  - Patient factors → Infection, Malnutrition, Diabetes and chronic illness, Steroid treatment.
  - Technical factors → Too much tension on closure, or closure with absorbable sutures, Ischemia.
- **Clinical features:** swelling at the scar associated sometimes with pain.
- **Rx**: Open or laparoscopic repair (You should NOT repair it right away, wait for the patient to heal from his previous problem then repair it later

Epigastric Hernia

- Due to a defect in the linea alba between the xiphoid process and the umbilicus.
- Starts as a protrusion of the extraperitoneal fat at the site where a small blood vessel pierces the linea alba.
- If the protrusion enlarges, it drags a pouch of peritoneum after it.
- More in men (3:1 ratio), 20 % are multiple.
- **Clinical features**: May be asymptomatic or painful, either locally or simulates peptic ulcer pain.
- **Rx**: simple suturing (with a high recurrence rate), or hernioplasty.

Approach to A patient with Hernia (OSCE)

A. History: Hx of a palpable, soft mass that increases with Valsalva maneuver:

a. Painless (unless incarcerated or strangulated).
b. Spontaneously reduced or manually.
★ Ask about: reducibility, episodic pain, febrile, rectal bleeding, previous surgeries.

B. PEx: Important to examine the pt in both standing and supine positions:

a. Palpable mass that increases in size while the patient performs the Valsalva maneuver.
b. Cough Impulse.
★ Ask the pt. to reduce the hernia by himself, if he can't DO NOT DO IT.

C. Ix: Investigations in hernia is not that important because it's a clinical diagnosis:

a. CBC → Leukocytosis may occur with strangulation.
b. Electrolytes, BUN, creatinine levels → Assess the hydration status of the patient with N/V.
c. Urinalysis → narrowing the DDx of genitourinary causes of groin pain.
d. Imaging studies:
   - Imaging studies are not required in the normal workup of a hernia, but if it is → US.
   - If an incarcerated or strangulated hernia is suspected → Flat and upright abdominal films to diagnose a small bowel obstruction.

D. Rx:

a. Treatment is hernia repair.
b. Laparoscopic technique is indicated only in TWO conditions:
   - Bilateral Hernia, or Recurrent Hernia.

c. We have two laparoscopic types:
   - TAPP (transabdominal preperitoneal).
   - TEP (totallyextraperitoneal) repair.

d. Open technique: Bassini repair, Draning, Shouldice, McVay (Cooper's ligament repair), Mesh (i.e. hernioplasty).

Post-operative Complications

A. Early:

1. Groin pain (usually goes away in 4-6 weeks).
2. Bleeding/Hematoma (improper dissection plains).
3. Urinary retention.
4. Bowel and bladder injury (laparoscopic 2%).
5. Surgical Site Infection (open 5%, Lap. <2%).
6. Testicular problems 1% (necrosis, infertility).

B. Late:

1. Hernia recurrence (tension free 5%, others 25%).
2. Chronic groin pain (10%).

Best wishes 💪😍
Adel Alshihri