



Morbid obesity and Bariatric surgery

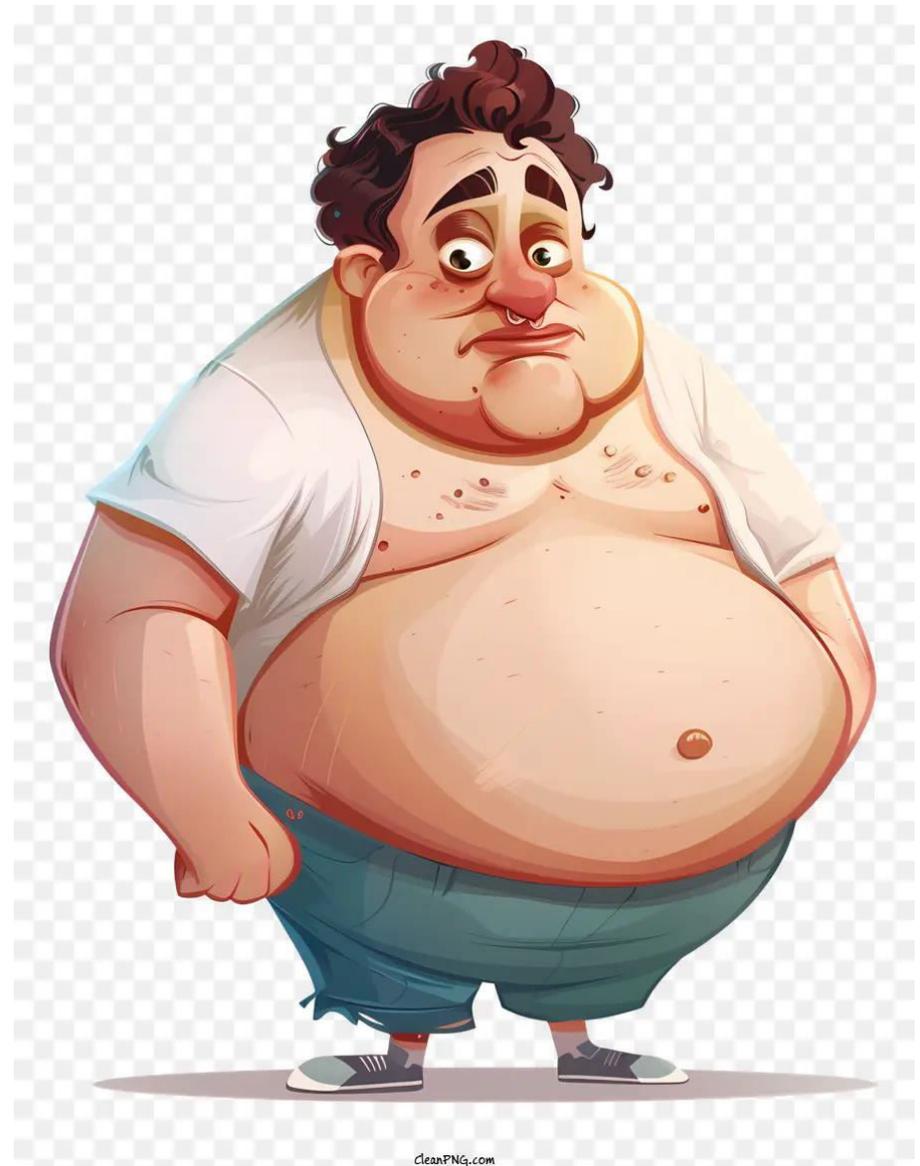
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Definition

- Obesity is a chronic disease, characterized by both abnormal and/or excess body fat accumulation.
- Recognized by WHO as global pandemic
- It can affect different age group even children less than 5 years
- Economic issue
- Consequences on the patient health and influence his life style



WHO statics

- In 2022, 1 in 8 people in the world were living with obesity.
- In 2022, 2.5 billion adults (18 years and older) were overweight. Of these, 890 million were living with obesity.
- In 2022, 37 million children under the age of 5 were overweight.
- Over 390 million children and adolescents aged 5–19 years were overweight in 2022
- At least 2.8 million people dying each year as a result of being overweight or obese.

What about Jordan

Some study's
reported 44.2%
of men and
47.8% of women
were obese



The rank
changed from 27
to 23 worldwide
between 2022-
2023

Obesity definition according to BMI

Table 20.1 • Definition of obesity according to body mass index

BMI (kg/m²)	WHO classification	Common clinical description
18.5–24.9	Normal range	Desirable
25–29.9	Pre-obese	Overweight
30–34.9	Obese class I	Obese
35–39.9	Obese class II	Clinically severe and complex obesity
40–49.9	Obese class III	
50 and over		Super-obesity

Hormonal and central regulation of the appetite

Leptin

- The peptide hormone leptin is produced mainly by the adipocytes, gastric mucosa, and enterocytes.
- Leptin receptors (aka obesity receptors or OB-R) are found in the central nervous system, including the arcuate nucleus of the hypothalamus.
- Leptin signals satiety. Leptin level is decreased in starvation, which increases appetite.
- Leptin must cross the blood-brain barrier to stimulate brain receptors, including those in the hypothalamus.
- The arcuate nucleus is an important site of leptin action

Insulin & PP

- Insulin: The β -islet product insulin has appetite-suppressing effects, as it inhibits NPY/AgRP neurons. Like leptin, insulin must cross the blood-brain barrier to stimulate the hypothalamus and other brain nuclei. Insulin is not as potent as leptin in suppressing appetite.
- Pancreatic polypeptide slows gastric emptying and suppresses appetite by inhibiting the hypothalamic NPY/AgRP system,

Ghrelin's

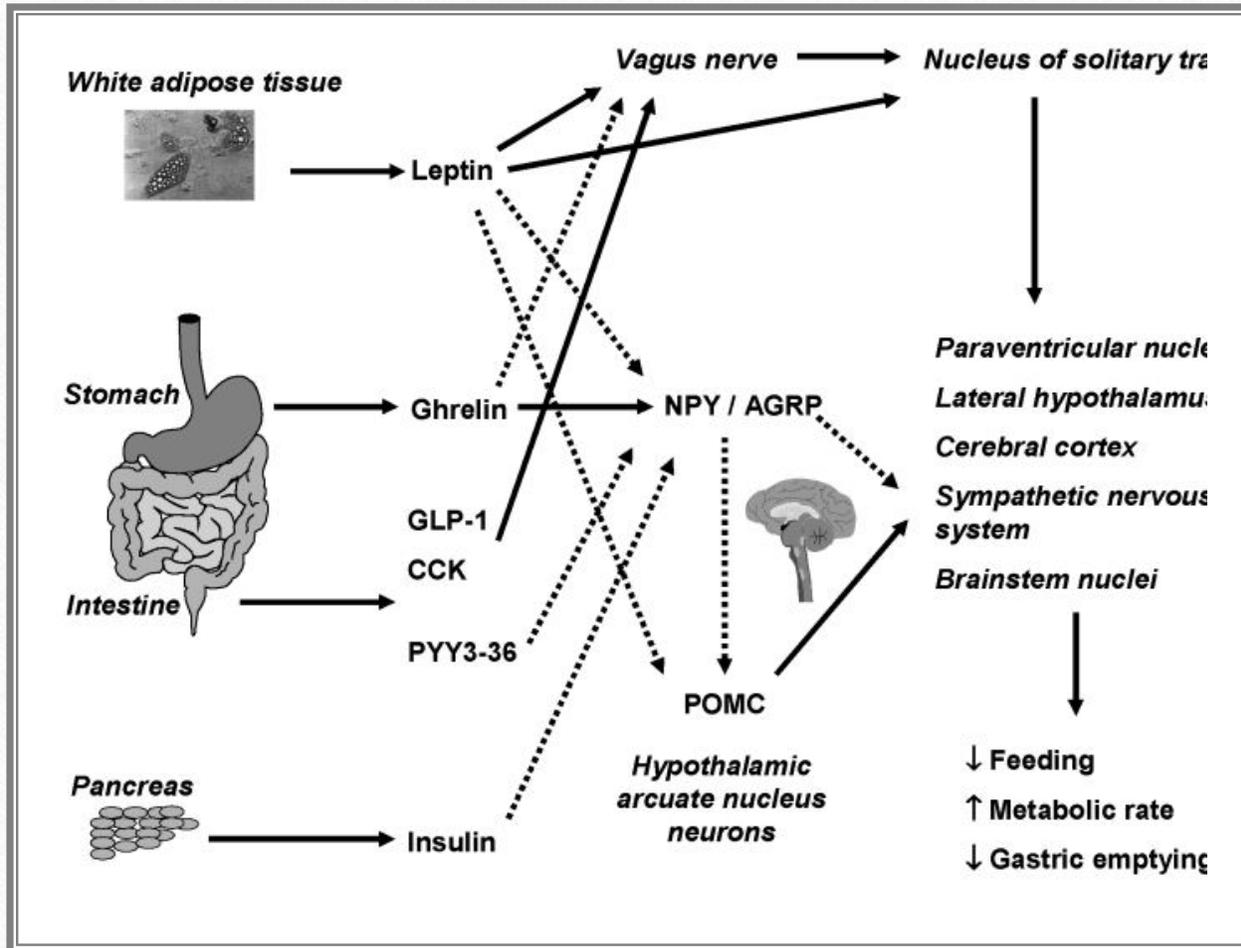
- Ghrelin's actions are both central and peripheral.
- Ghrelin also increases insulin secretion and sensitivity, induces thermogenesis, and has a role in the sleep-wake cycle.
- The mucosa of the empty stomach secretes ghrelin, and ingesting food suppresses its release.
- Ghrelin suppression varies with the type of food ingested and the circadian rhythm. This molecule has also been called the "hunger hormone." Patients with Prader-Willi syndrome have elevated ghrelin levels. [

Central Regulation

- The central nervous system plays a vital role in regulating food intake through the brain-gut axis, with the **hypothalamic** leptin-melanocortin pathway as the key regulator of energy balance.
- Signals are received from several tissues and organs, such as the **gut: hormones** like ghrelin, peptide YY (PYY), cholecystokinin (CCK), glucagon-like peptide (GLP-1) and **mechanoreceptors measuring distention**; by pancreas through insulin; and by adipokine hormones such as leptin and adiponectin.

Hypothalamus

- The hypothalamus integrates these signals and acts via downstream pathways to maintain energy balance.
- The leptin/melanocortin pathway is activated via the leptin (LEPR) and insulin receptors (INSR) located on the surface of the neurons of the arcuate nucleus.
- Two antagonistic systems in the arcuate nucleus regulate appetite and maintain long-term and short-term energy balance.
- The first produces the prohormone pro-opiomelanocortin (POMC), which suppresses appetite.
- The second secretes neuropeptide Y (NPY) and Agouti-related protein (AgRP), which stimulate appetite



Appetite regulating system

Causes



Genetic : monogenic ,
polygenic , syndromic



Psychological



Metabolic



behavioural



Social



Drugs
(Antidepressants,
Antipsychotics)

- In any given environment, there is considerable individual variation in body weight and fat mass, suggesting that adiposity is influenced by complex interactions between genetic, developmental, behavioural, and environmental influences.



Genetic causes of obesity can be broadly classified into:

1- Monogenic causes:

Those caused by a single gene mutation

A lot of recognized gene mutation (11)

The melanocortin receptor (MC4R) Heterozygous mutation is the most common cause of monogenic obesity.

Early-onset and severe obesity with prevalence between 0.5–6% in different populations.

Affected children demonstrate hyperphagia with food-seeking behaviour in early childhood, are taller than their peers, may have higher blood pressure and advanced bone age, but are otherwise not dysmorphic

Other genes mutation :Leptin Receptor (LEPR) mutations, Proconvertase (PC1/2) deficiency, SIM1 deficiency...etc

2-SYNDROMIC OBESITY

The syndromic forms of obesity are often associated with phenotypes in addition to the early-onset severe obesity.

This may be caused by change in a single gene or a larger chromosomal region encompassing several genes.

Obesity is a feature of almost 100 syndromes; a little over half are not yet named, and 13.9% have more than one name.

The co-presenting phenotypes often include intellectual disability, dysmorphic facies, or organ system specific abnormalities.

The most frequent forms of syndromic obesity are Bardet Biedl and **Prader Willi syndrome (Most common)**.

3-Polygenic obesity:

- Caused by cumulative contribution of a large number of genes whose effect is amplified in a 'weight gain promoting' environment.

Clinical complication and the impact of obesity on the patient

- It has impact on every organ system
- Immune dysfunction
- Low grade inflammatory status



Complications of Obesity

- **PULMONARY DISEASES**
abnormal function
sleep apnea
hypoventilation
- **LIVER DISEASES**
steatosis
steatohepatitis
cirrhosis
- **GALL BLADDER DISEASE**
- **OSTEOARTHRITIS**
- **CATARACTS**
- **STROKE**
- **CANCER**
breast, colon, kidney,
prostate, uterus, esophagus,
cervix, pancreas.
- **HEART DISEASE**
- **STROKE**
- **DIABETES**
- **PANCREATITIS**
- **GOUT**
- **DEATH***

*1 In 5 US Deaths Linked To Being Overweight Or Obese.
source: American Journal of Public Health

www.thenext28days.com/meal-plans



Management

- **For obesity management to be successful, a multidisciplinary approach to both its assessment and treatment is required**

Always remember that



One size doesn't fit all!

INITIAL
ASSESSMENT
OF PATIENTS
WITH
OBESITY



INITIAL ASSESSMENT OF PATIENTS WITH OBESITY

- Approach should begin with a comprehensive evaluation of each patient's physical health and fitness, psychological health, nutritional health, dietary practices, and personal beliefs, goals, and expectations.
- Previous weight loss trials, smoking and alcohol history

Cont.

- Physical examination including BMI and obesity related problem
- Investigation : basic blood test , US looking for GBS and fatty liver , TFT , HbA1c
- Upper endoscopy : not routine
- Medical Clearance and fitness assessment

Cont.

- A trained psychotherapist, preferably with considerable expertise managing patients with obesity, should play a major role in this initial assessment
- Patients with a severe psychiatric disorder, like schizophrenia or bipolar disorder, must have it identified
- Early psychological evaluations also need to assess each individual's perceptions of their obesity and how stigmatized they feel because of it.

Cont.

- Obesity management also requires a detailed nutritional assessment and prolonged nutritional follow-up, even if surgery is elected as the cornerstone of therapy.
- Dietary measures enhance surgical outcomes.
- Potentially life-threatening nutritional deficiencies may occur in patients who elect either for or against MBS

Bariatric team

- Also, endocrinologist and psychologist will be part of the MDT

TABLE 64.4 NICE-accredited guidance on the make-up of the medical and surgical bariatric multidisciplinary team.

Bariatric physician in primary (can be the general practitioner) or secondary care (usually a diabetologist)

Dietitian

Specialist nurse

Appropriately trained mental health professional

Bariatric surgeon

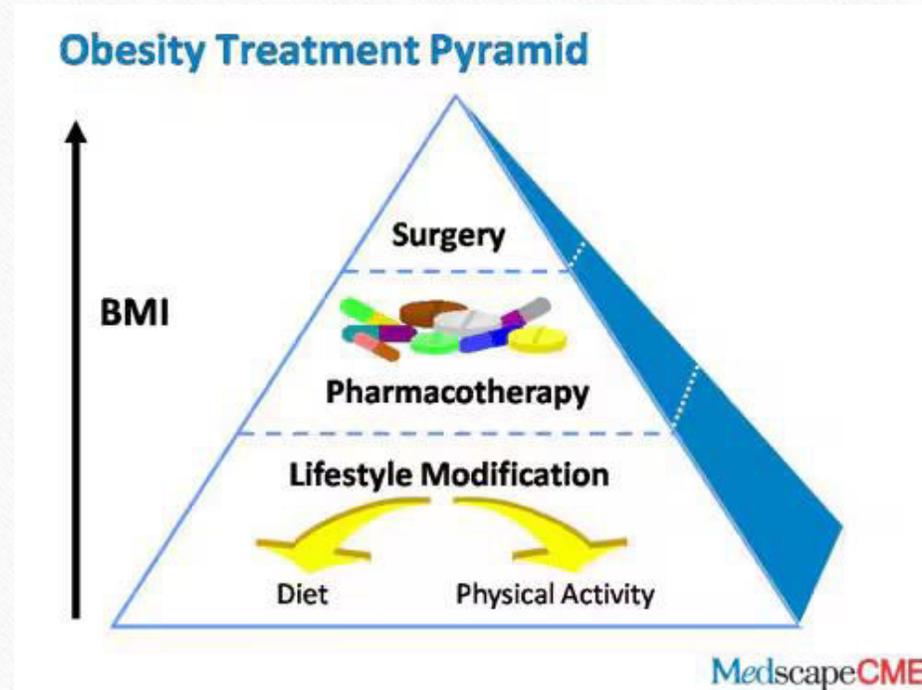
Anaesthetist

Radiologist

± Exercise therapists

Other secondary care specialities, e.g. respiratory/sleep medicine, cardiology

Management line



step-up approach

- A step-up approach should be offered, unless fast weight loss is needed to improve health:
- Behavioural/lifestyle intervention
- Nutrition
- Physical activity
- Psychologic counselling

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- Exercise is another essential component of therapy, even if MBS is undertaken, as it induces health benefits like weight loss, reduced blood pressure, improved physical function, enhanced lipid profile, lower fasting glucose levels, improved mental health, and better overall quality of life.
 - Studies also have revealed a 16% to 30% reduction in all-cause mortality risk in moderately active individuals, versus those who are sedentary, irrespective of a patient's body mass index (BMI) and waist circumference.

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- Behavioural programs can result in the loss of 8–10% of bodyweight during the first six to eight months of treatment
 - Between 5 and 10% for the pharmacotherapy
 - Non-Compliance is the major cause of failure
 - Surgical treatment is the only effective and sustainable approach to achieve desirable weight loss

Pharmacotherapy

- (BMI \geq 30kg/m² or BMI \geq 27kg/m² if comorbidities)
- Used as adjunct with lifestyle modification
- Setmelanotide and Metreleptin are FDA approved for monogenic type of genetic obesity
- Important consideration of the safety index of the drugs , the possible side effects and the contraindications .

Medications for non-syndromic obesity

- Mechanism of action :The currently approved AOM target peripheral and central pathways to decrease energy intake by reducing appetite and increasing satiety.
- Orlistat has mainly a peripheral effect; it inhibits gastric and pancreatic lipases, thus decreasing dietary fat absorption.
- At 1-year, mean total body weight loss was 10.6 kg in the intervention group

Different medication are used

Drug (trade name)	Approval FDA/EMA (year)	Mechanism of action	Adverse events ^a	Contraindications ^b
Orlistat (Xenical, Alli)	FDA 1999 EMA 1998	Gastric and pancreatic lipase inhibitor	Oily rectal leakage, abdominal distress, abdominal pain, flatulence with discharge, fecal urgency, steatorrhea, fecal incontinence, increased defecation	Patients with chronic malabsorption syndrome or cholestasis, pregnancy
Phentermine/Topiramate (Qsymia)	FDA 2012	NE agonist/GABA agonist, glutamate antagonist	Elevation in heart rate, mood and sleep disorders, cognitive impairment, metabolic acidosis, paresthesia, dry mouth	Glaucoma, hyperthyroidism, during or within 14 days following the administration of monoamine oxidase inhibitors, hypersensitivity to sympathomimetic amines, pregnancy
Naltrexone/Bupropion (Contrave/ Mysimba)	FDA 2014 EMA 2015	Opioid receptor antagonist/DA and NE reuptake inhibitor	Nausea, constipation, headache, vomiting, dizziness, insomnia, dry mouth, diarrhea, sleep disorder	Chronic opioid use, acute opioid withdrawal, uncontrolled hypertension, seizure disorder, bulimia or anorexia nervosa, abrupt discontinuation of alcohol, benzodiazepines, barbiturates, and antiseizure drugs; concomitant use of MAOIs, patient receiving linezolid or IV methylene blue, pregnancy
Liraglutide (Saxenda)	FDA 2014 EMA 2015	GLP-1 analogue	Increased heart rate, hypoglycemia, constipation, diarrhea, nausea, vomiting, headache	Personal or family history of medullary thyroid carcinoma or multiple endocrine neoplasia syndrome type 2, pregnancy
Semaglutide (Wegovy)	FDA 2021 EMA 2021	GLP-1 analogue	Nausea, vomiting, diarrhea, abdominal pain, constipation, headache	Personal or family history of medullary thyroid carcinoma or in patients with multiple endocrine neoplasia syndrome type 2, pregnancy
Setmelanotide (Imcivree)	FDA 2020 EMA 2021	MC4R agonist	Injection site reactions, hyperpigmentation, nausea, headache, diarrhea, vomiting, abdominal pain	None
Tirzepatide ^c	Under consideration by FDA	GIP/GLP-1 dual agonist	Nausea, diarrhea, decreased appetite, vomiting, constipation, dyspepsia, and abdominal pain	Personal or family history of medullary thyroid carcinoma or multiple endocrine neoplasia syndrome type 2, known serious hypersensitivity to tirzepatide or any of the excipients

Abbreviations: DA, dopamine; EMA, European Medicines Agency; FDA, Food and Drug Administration; GABA, gamma-aminobutyric acid; GI, gastrointestinal; GIP, gastric inhibitory polypeptide; GLP-1, glucagon-like peptide 1; IV, intravenous; MAOIs, monoamine oxidase inhibitors; MC4R: melanocortin-4 receptor; NE, norepinephrine. ^aAdverse events presented here are those that are present in more than 10% of the population, based on the FDA approval leaflet. ^bContraindications are based on the FDA approval leaflet. ^cUnder expedited consideration for FDA approval.

Table 1: Anti-obesity medications: approval, mechanism of action, adverse events, and contraindications.

Don't memorize it

Endoscopic Options

- Endoscopic bariatric therapies emerged from the need for less invasive options when lifestyle and pharmacologic intervention fails.
- There are several endoscopic treatments available, however showed marginal results and mid and long-term data is lacking.
- Endoscopic techniques are not free of complications, and careful advice should be provided by an experienced professional .

Indication

- Bridging to allow unrelated interventions that are limited by the excess of weight (orthopaedic surgery, organ transplantation, complex abdominal hernia surgery)
- Difficult surgical access (multiple surgical interventions with strong adhesions)
- Limits of age for bariatric surgery exceeded
- Unsuccessful lifestyle and pharmacologic interventions in lower obesity classes

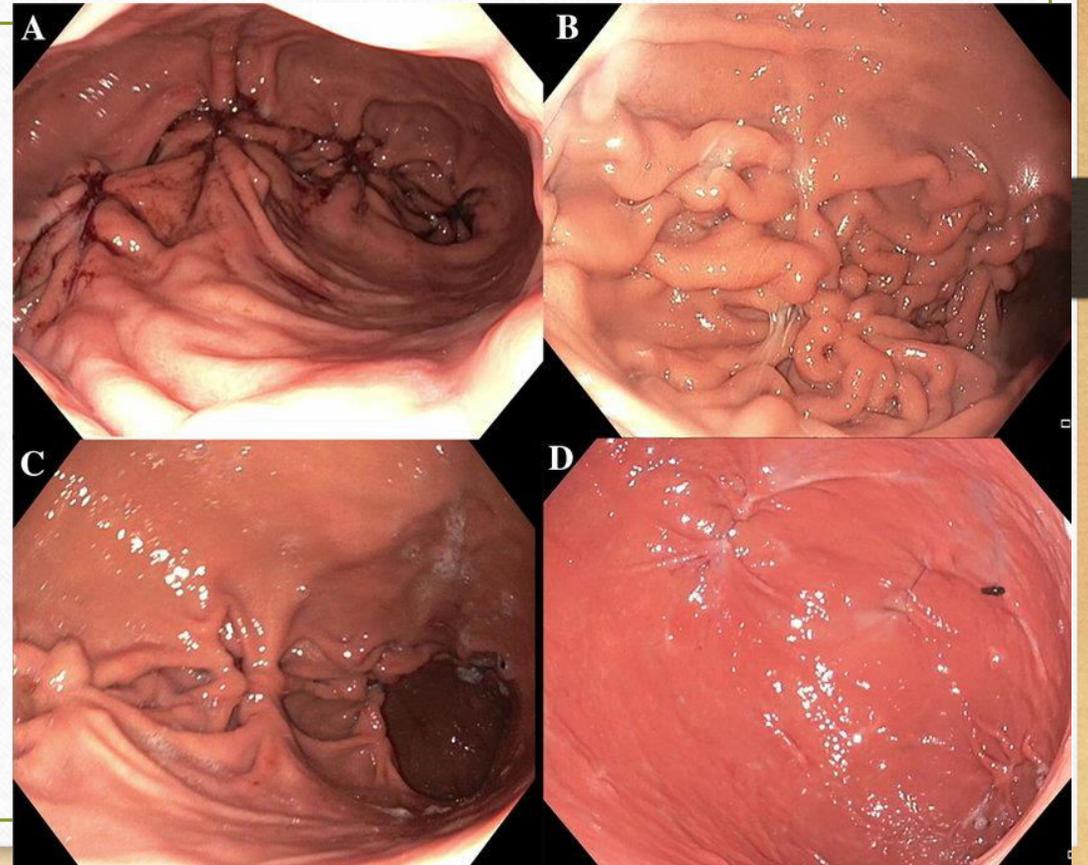
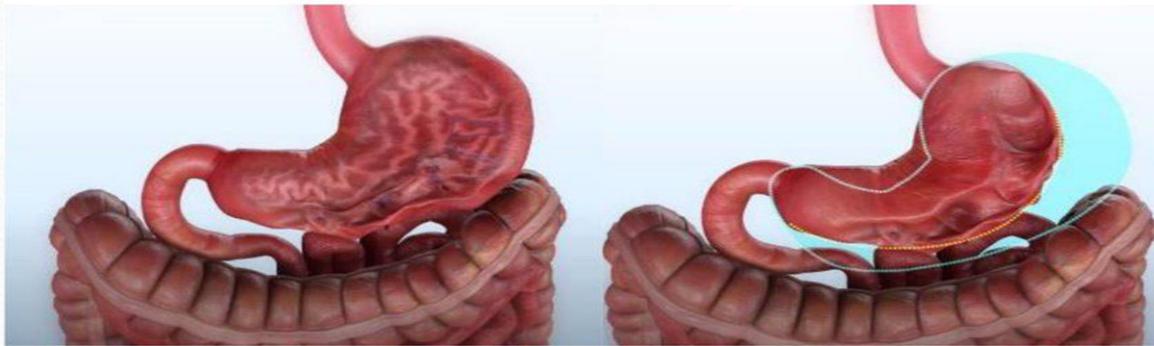
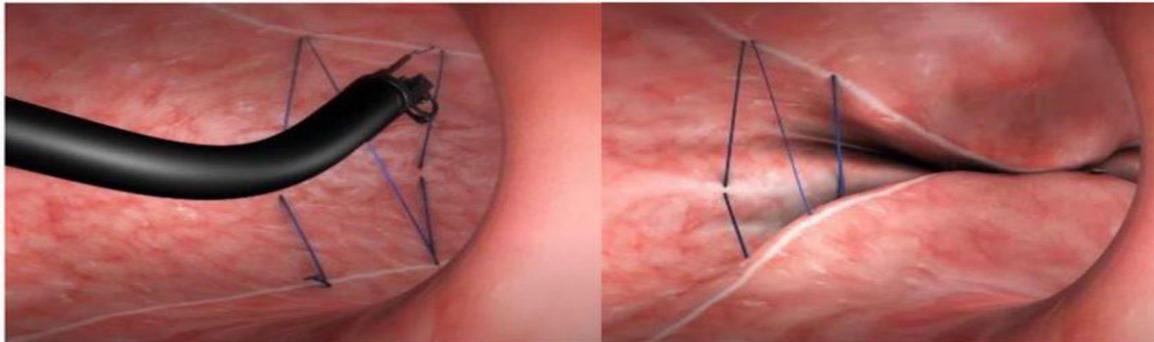
Endoscopic option

- **Intragastric balloon:** a balloon is inflated in the stomach limiting the space for food accommodation
- **Endoscopic sleeve gastropasty:** endoscopic suturing that mimics a sleeve gastrectomy
- **Gastric Botox :**botulinum toxin is injected into the stomach wall and delays gastric emptying and inhibits Ghrelin

Outcome

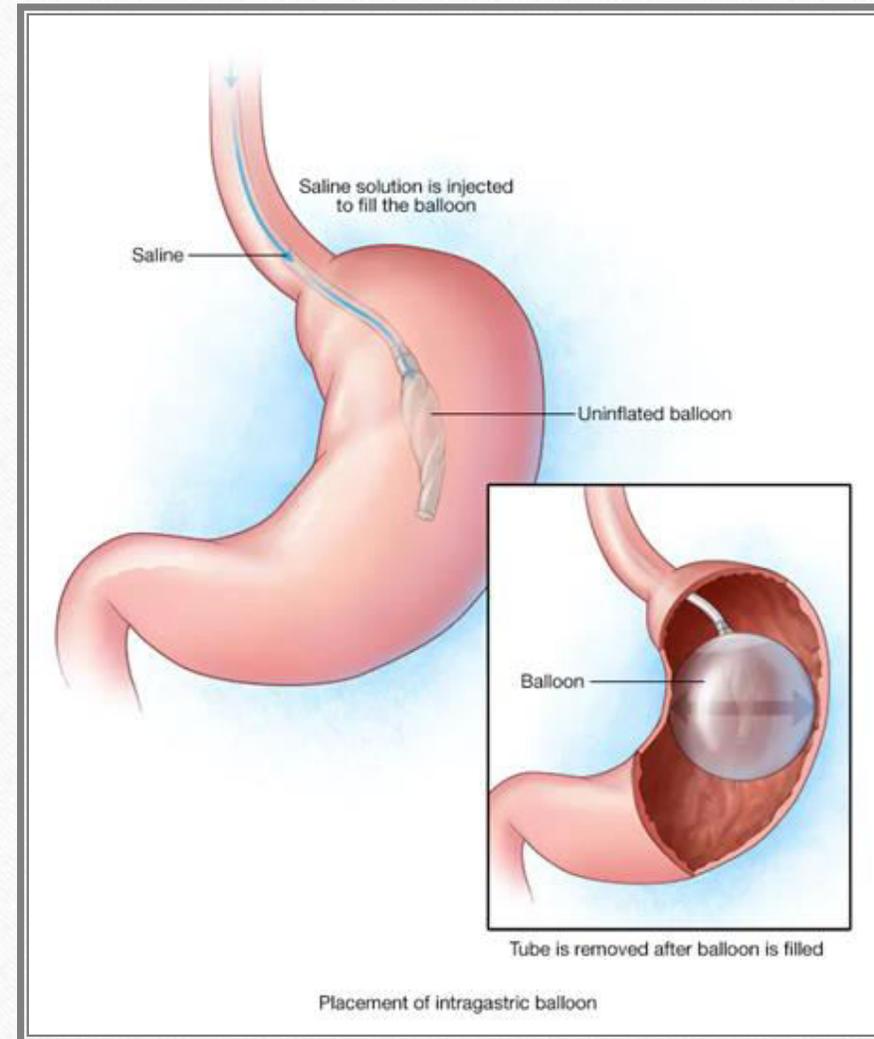
- In general, EMBTs are considered as safe, if not safer than MBS, though long-term data remain scarce.
- Advantages that EMBTs have over MBS are that most can be both repeated and reversed easily.
- Reported weight loss with EMBT generally ranges from 10% to roughly 20% of total body weight

Endoscopic gastric sleeve



Intra gastric ballon

- a balloon is inflated in the stomach limiting the space for food accommodation



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- only EBMTs that restrict gastric capacity—like various models of intragastric balloon (IGB) and endoscopic sleeve gastroplasty (ESG)—are being used in routine clinical practice.
 - The current indication spectrum for EBMTs is a BMI ranging from 30 kg/m² to just under 40 kg/ m² ; or a BMI >27 kg/m² in patients with 1 or more concomitant, obesity-associated comorbidities.

Surgical treatment

- Despite the emergence of EMBT, over the past few decades, a growing body of evidence has established MBS as the most effective treatment for obesity, with respect to reducing weight, improving numerous comorbid conditions that have been empirically linked to BMI, enhancing overall patient quality of life, and decreasing patient mortality.
- Among the various surgical approaches that are currently in use, sleeve gastrectomy (SG) and RYGB are currently the most commonly performed worldwide, in that order, though newer procedures, like one-anastomosis gastric bypass, show promise

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- Which procedure is employed should largely be decided on a patient-by-patient basis, that decision influenced by various patient characteristics—for example, the evidence favours utilizing RYGB over SG in patients with GERD as well as by the operating surgeon's level of experience with each surgical approach
 - As stated previously, preoperative patient preparation for MBS involves ensuring that each patient has realistic goals and expectations pertaining to the benefits and potential problems that might arise from surgery and that all psychosocial and behavioural barriers to adherence are addressed.

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- Patients also must be alerted to any nutritional deficiencies and have such deficiencies corrected preoperatively. Cessation of tobacco, alcohol, and drugs is mandatory and should be maintained lifelong.
 - Patients also should be assessed for and instructed in an exercise program that they can realistically resume postoperatively

MBS and obesity related cancer

- Obesity is associated with an elevated risk of multiple cancers, including oesophagus, breast, colorectal, endometrial, gallbladder, stomach, kidney, ovary, pancreas, liver, thyroid, multiple myeloma, and meningioma
- There is evidence to suggest that MBS can lead to a significant reduction in incidence of obesity-associated cancer and cancer-related mortality,
- Benefits were also documented for the incidence of specific cancers, such as gastrointestinal and hepatobiliary cancers, genitourinary cancers, and gynaecological cancers.
- Furthermore, MBS may significantly reduce overall cancer mortality compared with nonsurgical obese controls

Indication

- New IFSO / ASMBS guideline in 2022 for MBS indication
- According to BMI
 - BMI>35 regardless the co-morbidities
 - BMI 30-34.9 with metabolic disease or co-morbidities
 - BMI>27 for Asian people
- Failure of non-surgical options.
- Committed patient : the patient should be adherent to post operative care and follow up , able to take the supplement and to follow the recommendation for any test

Types

Restrictive :

AGB, VBG , Sleeve
gastrectomy

Malabsorptive

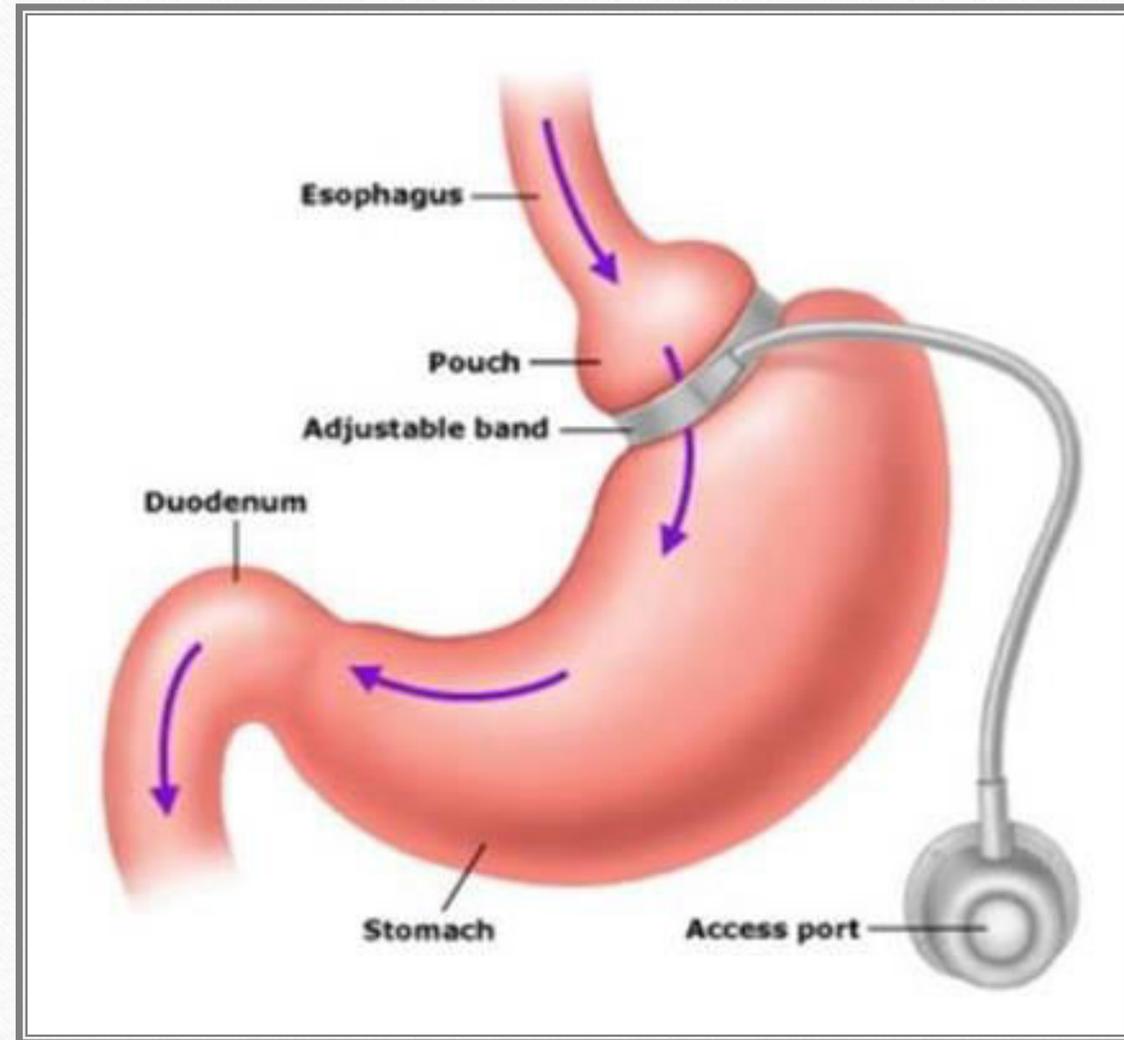
biliopancreatic
diversion (BPD) with
and without duodenal
switch (DS)

Combined

Roux en-Y gastric
bypass (RYGBP)

Restrictive Adjustable Gastric Band

- open or laparoscopic placement of a silicone band with an inflatable balloon around the proximal stomach at the angle of His.
- The band is connected to a reservoir that is implanted over the rectus sheath. The patient undergoes serial adjustments to inflate the band and create a small proximal gastric pouch
- LAGB appears to result in a mean excess weight loss of 42.8% after 12 years or longer

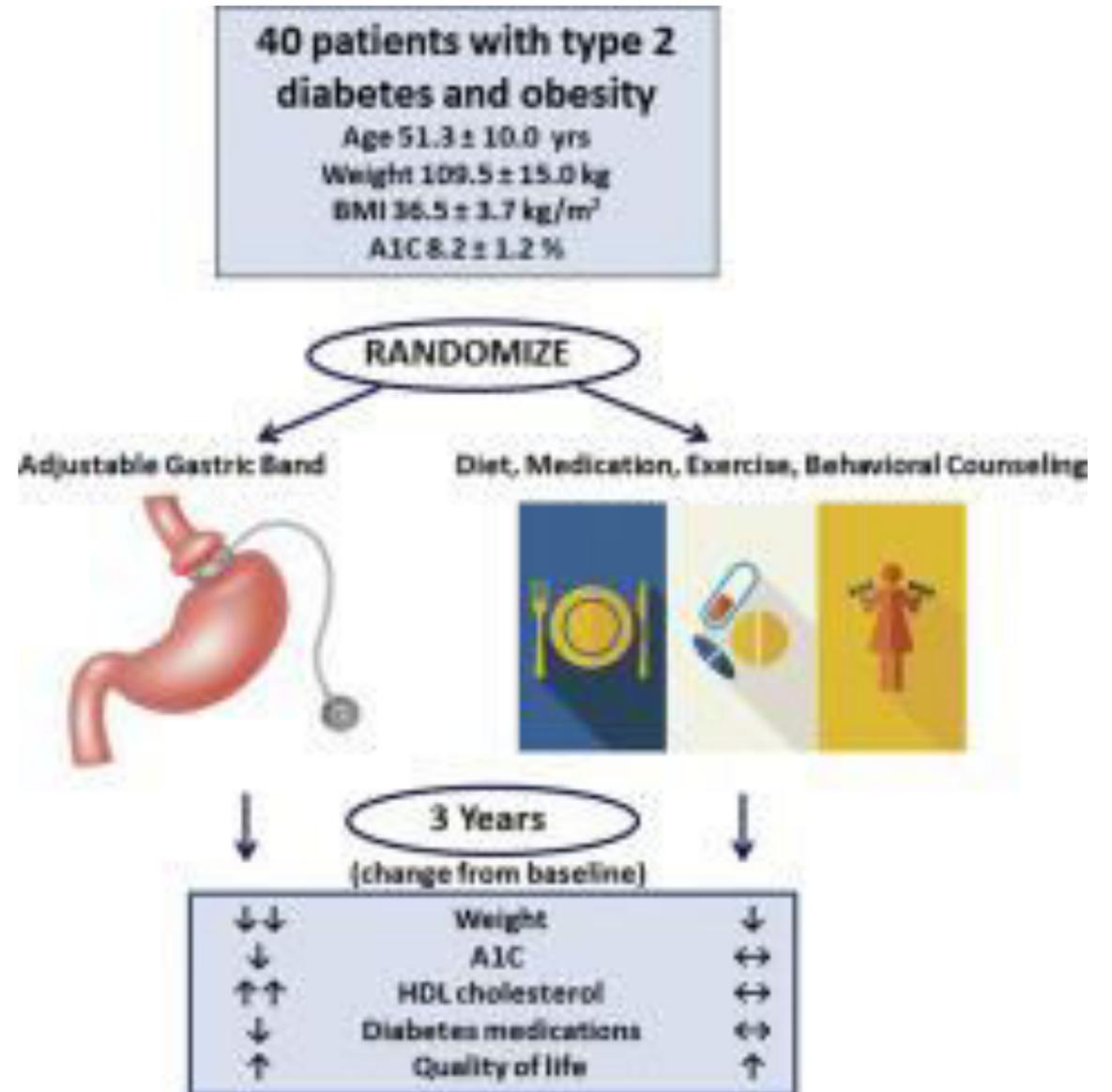


AGB

- Reversible , lower mortality rate
- Complication
 - Port infection
 - Band slippage and migration presenting with dysphagia &GOO
 - Band erosion

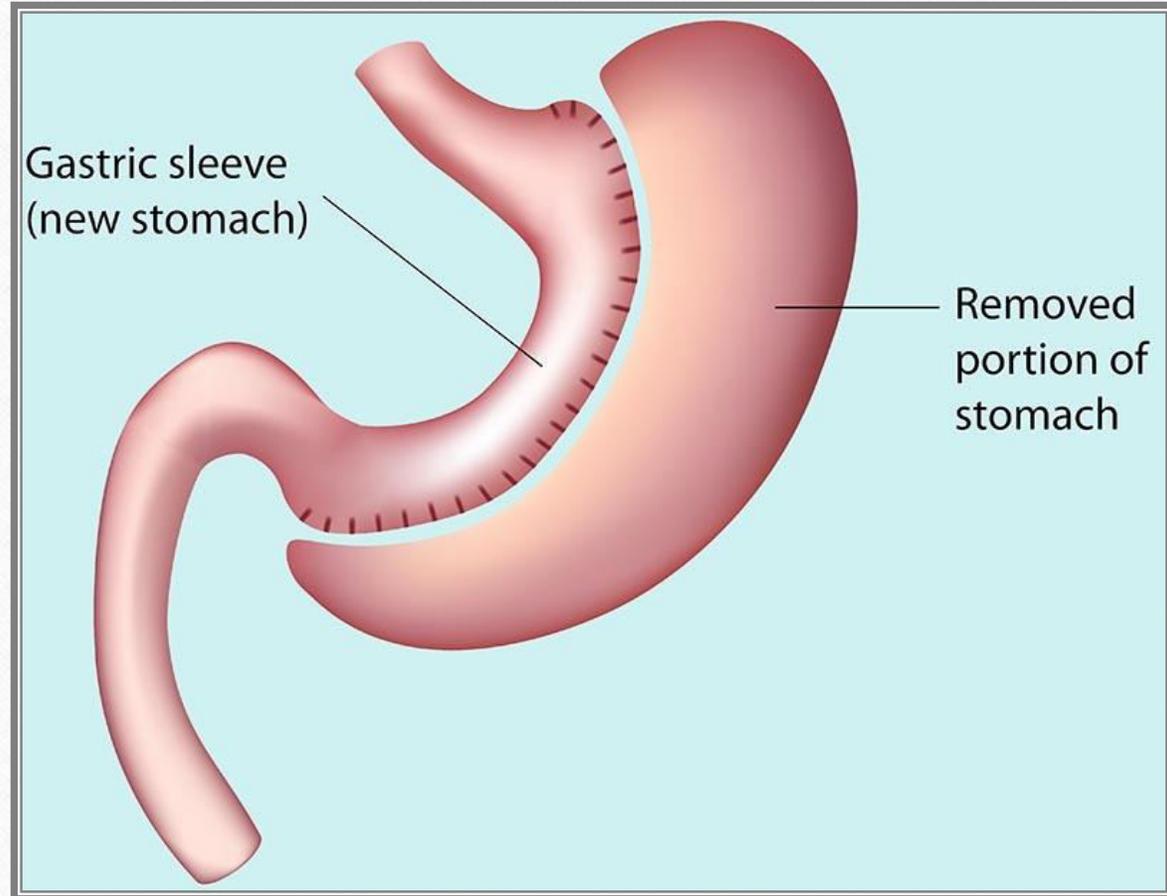
AGB

- How effective is it ?



Lap Sleeve Gastrectomy

- Laparoscopic sleeve gastrectomy (LSG) is the most common bariatric and metabolic surgery procedure, accounting for up to 60% of all bariatric procedures both globally and in the US
- It could be on 2 stage in super obese patient
 - Result in 60-70% EWL
- At 10 years, the estimated mean %EWL was 43.5%



LSG

- Recent studies have also shown a high incidence of worsening of de novo gastroesophageal reflux (GERD), esophagitis, and Barrett oesophagus (BE) after LSG
- The prevalence of esophagitis was significantly higher after LSG than LRYGB; 31% vs 7%

Complication of Sleeve Gastrectomy

- GERD
- Sub optimal weight loss and sleeve dilatation
- Stenosis and stricture
- Gallstone
- DVT/PE

Complications associated with laparoscopic sleeve gastrectomy

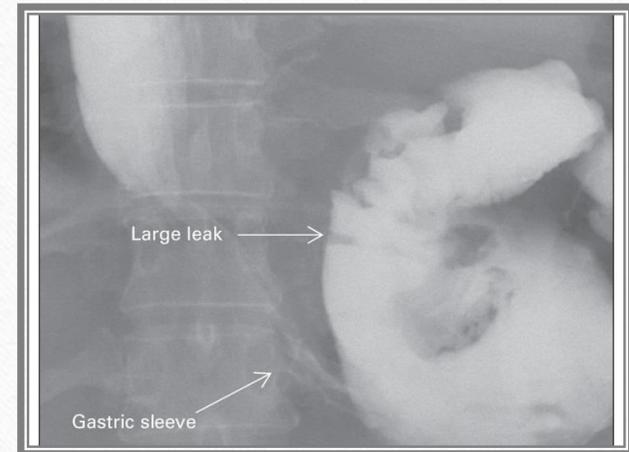
Complication	Chronicity	Diagnosis	Management
Hemorrhage	Acute	Physical findings, serial CBC	Transfusion with or without laparoscopy/laparotomy
Leak	Acute/chronic	Physical findings, UGI series	Drainage (infrared laparoscopy), antibiotics with or without stenting and/or repair
Abscess	Chronic	CT scan, ultrasound	Drainage, antibiotics
Stricture	Chronic	Endoscopy, UGI series	Endoscopy (dilatation), surgery (seroyotomy)
Nutrient deficiency	Chronic	Physical findings, blood work	Nutritional supplements
GERD	Chronic	History, endoscopy	Treatment with proton pump inhibitor

Bleeding

- 6% after LSG.
- Intra- or extraluminal
- Management of intraluminal, l bleeding follows the common algorithm taken for an upper gastrointestinal bleed.
- Common sources for extraluminal bleeding include the gastric staple line, spleen, liver or abdominal wall at the sites of trocar entry. We suggest a second-look laparoscopy in any patient who presents with extraluminal bleeding

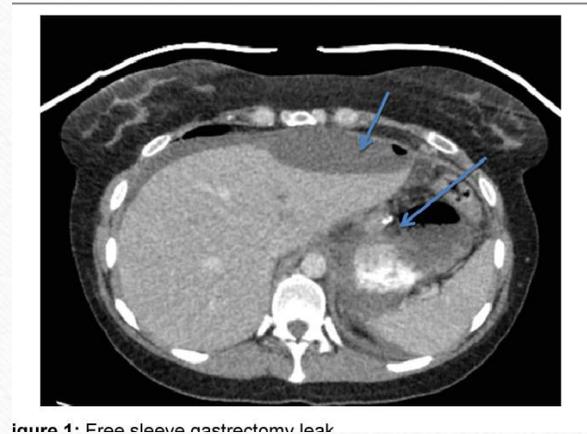
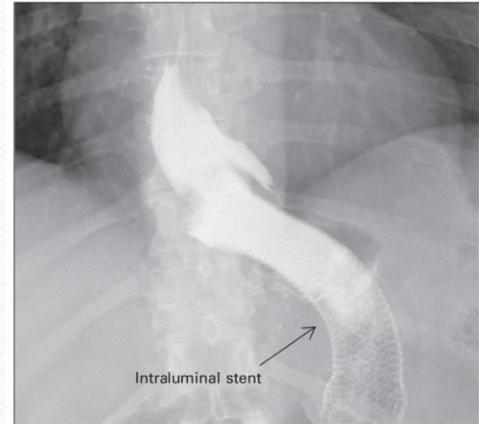
Leak

- 5% of patients following LSG
- type I or subclinical leak or Type II or clinical leak
- early leak is within the first 3 days after surgery, whereas a delayed leak more than 8 days after surgery.
- proximal site -near the gastro-oesophageal junction is most common site



Leak

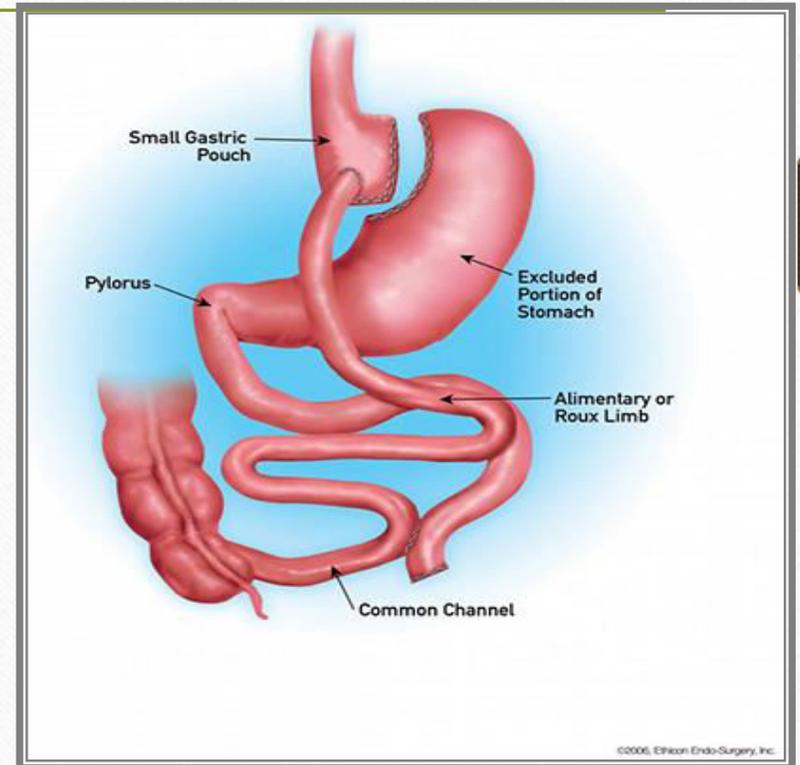
- Abdominal pain , fever , tachycardia
- CT scan with oral contrast , GG swallow
- **Treatment**
 - Stabilization
 - AB
 - Drainage of collection
 - Nutritional
 - Stent
- Surgery option if unstable or failed non surgical management



-
- Most relevant disadvantages of sleeve gastrectomy are its irreversibility and risk of gastro-oesophageal reflux disease (GERD), which can induce Barrett's oesophagus

RYGB

- Restrictive and malabsorptive procedure
- Open or lap
- Most patients expect to lose 70%-80% of their excess weight in the first 12 months after the surgery
- More nutritional and vitamin deficiency than sleeve gastrectomy



Complication

- Early Vs Late
- General complication (infection , DVT /PE, UTI)
- Specific related to the surgery
- DVT/PE most common cause of mortality post bariatric surgery
- Mortality rate around 0.2%

Early

- **Leak**

- Fortunately, the incidence of ASL is relatively low at 0.4%–5.2%
- most frequently at the gastrojejunal anastomosis, also JJ anastomosis or stapler line , unrecognized miss bowel injury
- Abd pain , fever , tachycardia , elevated CRP, WBC
- CT / contrast study used for diagnosis but sometimes it can miss it
- Management : AB , drainage , stent placement , surgical treatment in unstable patient
- Always think about leak in those patient presented with acute abdomen post RYGB

Bleeding

- Either intraluminal or extra luminal
- Intra luminal – stapler line –endoscopy and clipping
- Extraluminal –JJ anastomosis or gastric remnant – surgery

Intestinal obstruction

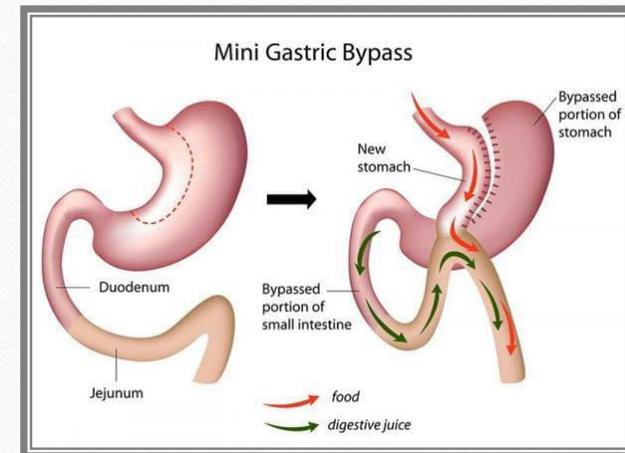
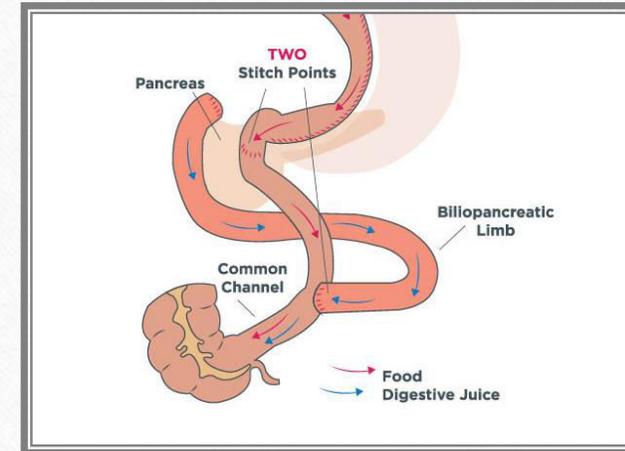
- Causes : adhesion , internal hernia –Paterson space , post site , technical and twisting
 - Manifestation based on the site of obstruction
- obstruction of the biliopancreatic limb – Upper abdominal pain – Deranged liver function tests – Distention of the gastric remnant
 - obstruction of the alimentary limb – Inability to tolerate oral intake
 - CT scan
- NG , IVF , surgical treatment except in adhesive cause without peritonitis you can offer trial of conservative management

Other late complication

- Marginal ulcer
- Gastric remnant distention
- Gallstone – cholecystectomy only in symptomatic patient
- Nutritional deficiency : iron, folate and vitamin B12 deficiencies, magnesium, calcium, zinc, 25-hydroxyvitamin D, thiamine.
- Dumping syndrome

Other types of bariatric surgery

- Mini –bypass
- BPD/DS



RYGB Vs Sleeve Weight loss

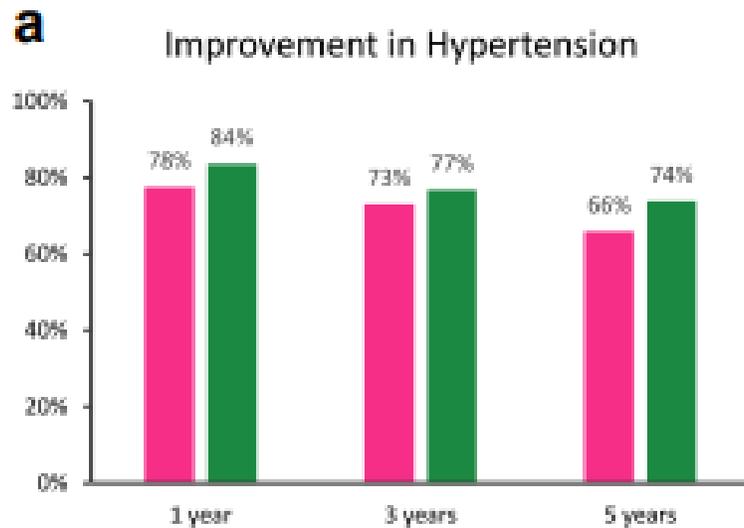
- weight loss after sleeve gastrectomy and Roux-en-Y gastric bypass was within the defined equivalence margin at follow-up of 5 years. This implies that both surgical techniques are clinically comparable in terms of long term weight loss.
- Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass). Ulas Biter , 2024
- Sleeve Gastrectomy are More economical , Technically simpler to perform , Free of any surgical anastomoses , Free of the risk of internal hernias ,Easier to learn, with a shorter learning curve , Faster to perform, with shorter operating times and Feasible and relatively safe in patients considered at higher surgical risk.

RYGB Vs Sleeve DM

- Overall, 75% of gastric bypass patients saw their diabetes stay in remission, compared with only 34.8% of patients in the sleeve gastrectomy group
- **Diabetes remission:** Gastric bypass surgery results in high rates of Type-2 diabetes remission five years after the operation, even after patients regain a significant amount of weight.
- **Gastric bypass vs. sleeve gastrectomy:** Patients who underwent sleeve gastrectomy and regained their weight were five times more likely to see their diabetes return than patients who had gastric bypass surgery and regained their weight.
- Continued Diabetes Remission Despite Weight Recurrence: Gastric Bypass Long-Term Metabolic Benefit , Omar M Ghanem, MD, FACSa and other .2024, Journal of the American College of Surgeons

HTN

— sleeve gastrectomy — Roux-en-Y gastric bypass

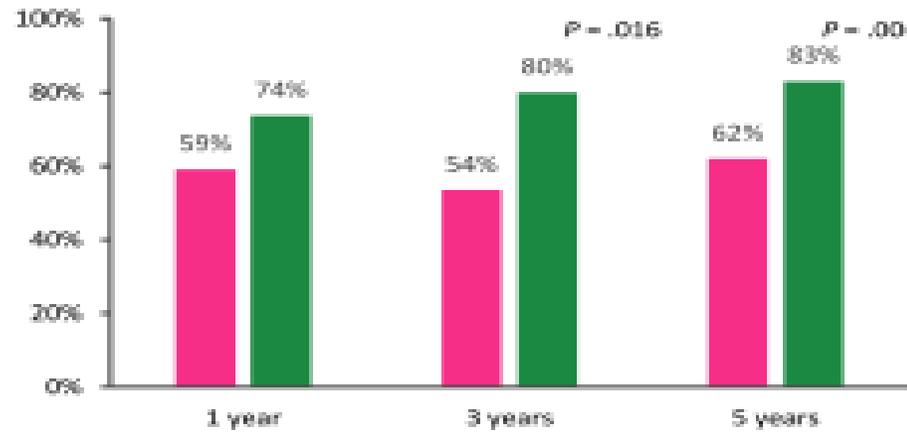
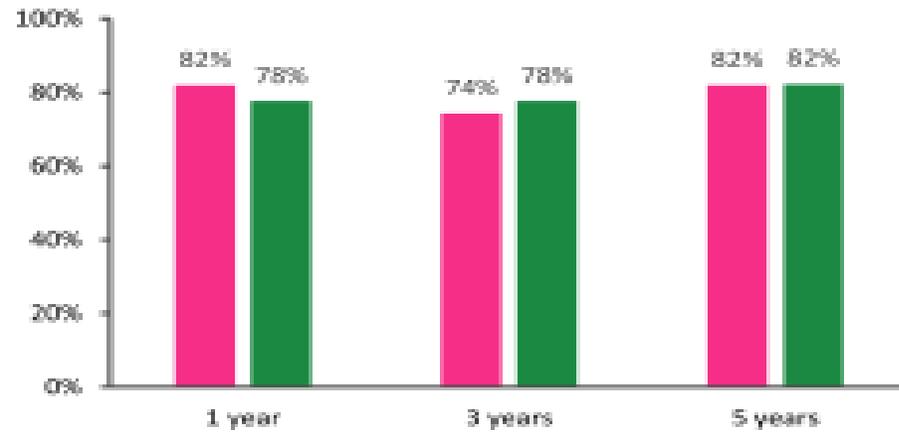
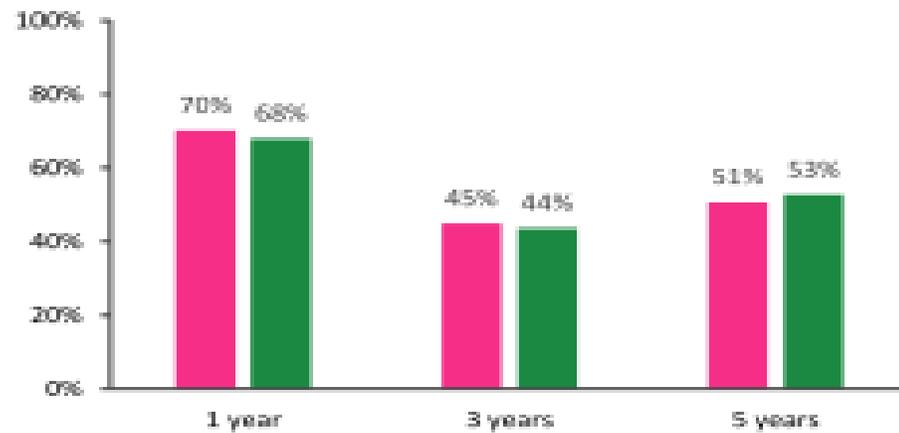
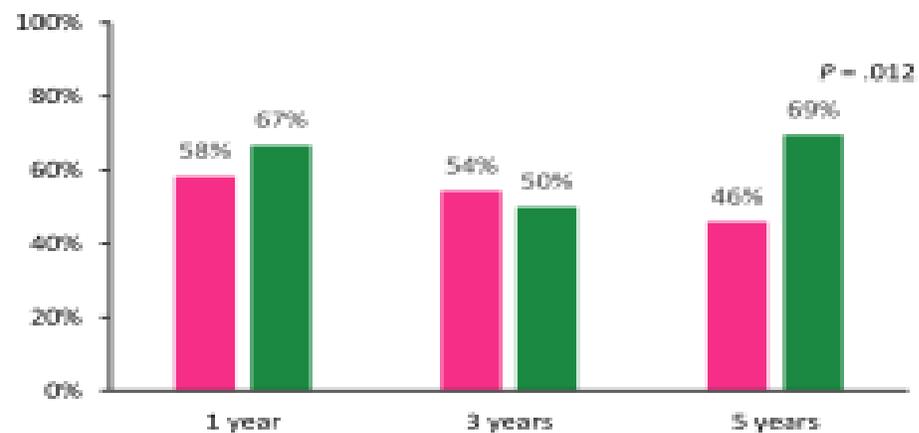


Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass). Ulas Biter , 2024

- The proportion of patients with hypertension remission was greater for those treated with gastric bypass compared with sleeve gastrectomy at 5 years and 1 year
- After Roux-en-Y gastric bypass, hypertension remission rates exceeded 50%
- Laparoscopic Roux-en-Y gastric bypass versus laparoscopic sleeve gastrectomy for 5-year hypertension remission in obese patients: a systematic review and meta-analysis, Climent, Elisenda, *Journal of Hypertension* [38\(2\):p 185-195, February 2020](#)

Others

- Dyslipidaemia improved more frequently after Roux-en-Y gastric bypass compared to sleeve gastrectomy ($P = 0.006$).
- De novo gastro-oesophageal reflux disease occurred more frequently after sleeve gastrectomy vs Roux-en-Y gastric bypass ($P < 0.001$).
- Minor complications were more frequent after Roux-en-Y gastric bypass (5%, 15/316) compared to sleeve gastrectomy (2%, 5/312).
- No statistically significant differences in major complications, and health-related quality of life were encountered.
- Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass). Ulas Biter , 2024

c**Improvement in Dyslipidaemia****d****Improvement in OSAS****e****Improvement in severe Joint pain****f****Improvement in GERD**

— sleeve gastrectomy — Roux-en-Y gastric bypass

Thank You