جامعة المستقبل
كلية التقنيات الطبية

Anesthesia for obese patient

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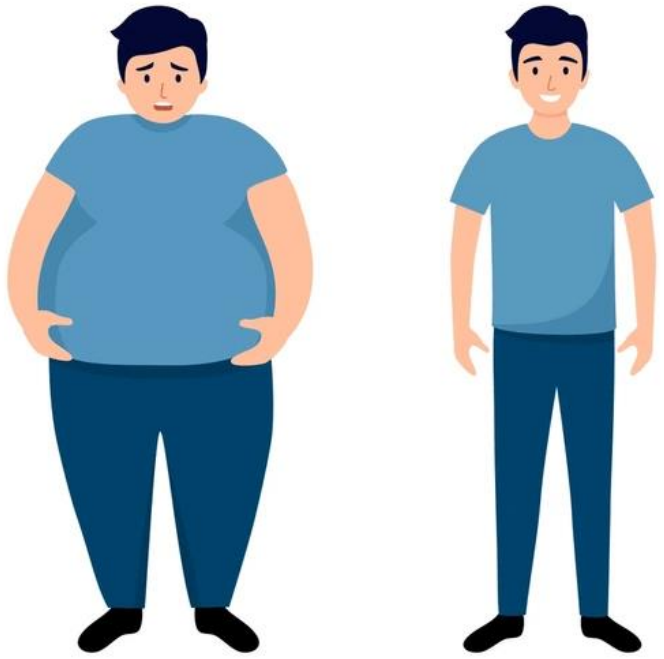
Introduction

- **Obesity** is a global health problem and the prevalence varies with socio-economic status.
- **Obesity** is defined in terms of body mass index (BMI).
- BMI is calculated by establishing a ratio between the patient's **weight** and **height** as follows: **Body mass index (BMI) = weight in kg/height in m2**
- BMI values are classified as follows:

✓ **BMI of 18.5–24.9 = normal**
✓ **BMI of 25.0–29.9 = overweight**
✓ **BMI of 30.0–34.9 = class I obesity**
✓ **BMI of 35.0–39.9 = class II obesity**
✓ **BMI of 40.0 or greater = class III obesity**



Introduction

- Interestingly, the regional distribution of excess fat is thought to be more predictive than BMI for morbidity and mortality.
- Excessive abdominal fat, "**central obesity**" is particularly predictive for ***NIDDM***, ***dyslipidemia*** and ***cardiovascular disease***.
- **Morbid obesity(Class III)** is a severe form of obesity characterized by a body mass index (BMI) of 40 or higher, or a BMI of 35 or higher with obesity-related health complications.
- A person may be diagnosed with **Class III obesity** if they meet one of these criteria:
- A BMI of 35 or higher with at least one serious obesity-related health condition, such as type 2 diabetes, high blood pressure, or severe sleep apnea.
- **Waist circumference** may also be measured, as carrying excess weight around the abdomen is a major risk factor for heart disease and type 2 diabetes.
- **Waist circumferences** need to be sex and race specific.

Cardiovascular system

- **Obesity** is associated with a **number of cardiac risk factors** includ:

- ✓hypertension,
- ✓ischaemic heart disease (**IHD**),
- ✓cardiomyopathies,
- ✓cardiac failure,
- ✓arrhythmias,
- ✓sudden cardiac death and
- ✓dyslipidemias.*
- An obese abdomen will directly compress venous return from the legs (also increasing the risk of deep vein thrombosis (**DVT**) and pulmonary embolism).
- Once ventilated, higher inflation pressures and application of PEEP further reduces venous return, which may result in a fall in cardiac output.
- The risk of ***pulmonary embolus*** and ***DVT*** is **doubled** in the **obese**.

Cardiovascular system

- **Specific Implications for Anaesthesia**:

✓looking for evidence of **IHD** and **cardiac failure** on history, examination and ECG.

✓**Chest X-ray** and **echocardiography** are useful tests

✓Continue **cardiac drugs** throughout the perioperative period

✓**Heparin** prophylaxis,

✓TED **stockings** and early **mobilisation** are some measures to reduce the incidence of **DVT**.

Gastrointestinal, endocrine and other systems:

- increased incidence of **hiatus hernia**.
- Increase the **volume** and **acidity** of gastric contents.(risk of aspiration)
- **Non-insulin dependent diabetes mellitus** is much more **common**

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Respiratory system

- Since **obesity is a multisystem disease** affecting all organs, there are a number of implications relevant to the conduct of anaesthesia :

❖Respiratory system

- **Obstructive Sleep Apnea (OSA):**

✓At least 5% of morbidly obese patients will have OSA

✓ is caused by passive collapse of the pharyngeal airway during deeper planes of sleep , resulting in **snoring** and **intermittent airway obstruction**.

✓**hypoxemia** and **hypercapnia** results in arousal and disruption of quality sleep thus causing the characteristic **daytime somnolence**.

✓**Pulmonary** and **systemic vasoconstriction**, **polycythemia**, and **right ventricular failure** all occur and can cause type II respiratory failure

✓**treatment** includes *removal of precipitants*, *weight loss* and *nocturnal CPAP*.

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Respiratory system

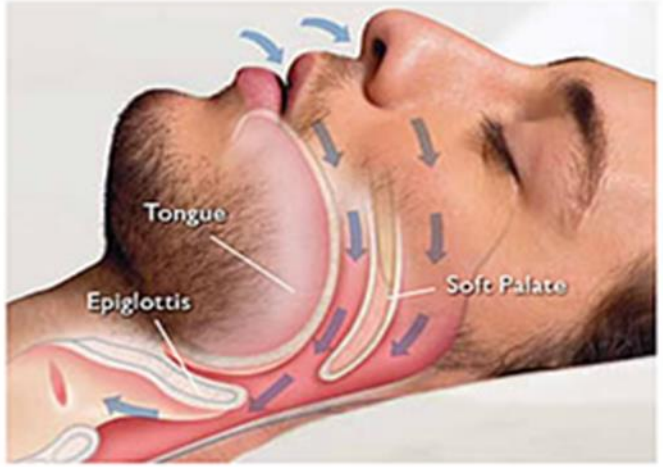
Obstructive Sleep Apnea (OSA):

- **Specific Anaesthetic considerations:**

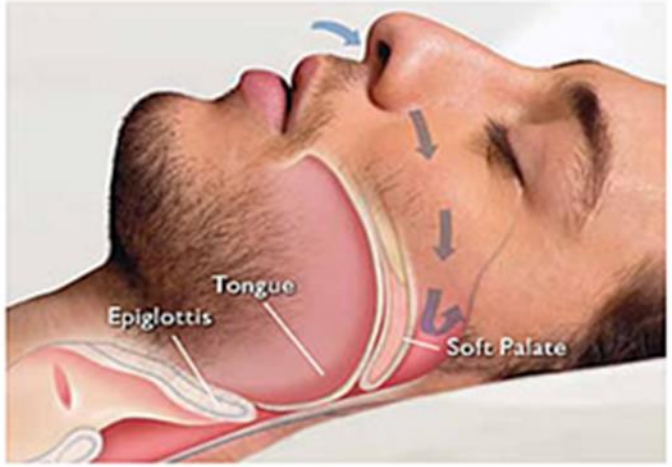
✓ Avoid sedative premedication (difficult to maintain airway)

✓ Airway obstruction is very likely to occur in the postoperative period

(give oxygen and apply CPAP if required)



Normal breathing
During sleep, air can travel freely to and from your lungs through your airways.



Obstructive Sleep Apnoea
Your airway collapses, stopping air from traveling freely to and from your lungs and disturbing your sleep.

Regional techniques and short acting anaesthetic agents are ideal to reduce postoperative drowsiness.

✓ Consider nocturnal oxygen for up to 5 days following major surgery if available.

✓ Regional anesthesia **plus** noninvasive mechanical ventilation represent the **preferred technique for obese patient** with respiratory problems.

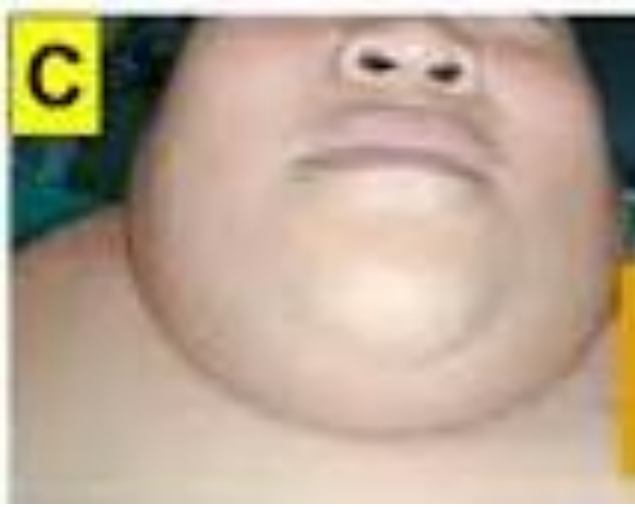
Airway

- **Obese** patients tend to have **short, fat necks** making both mask ventilation and direct laryngoscopy technically more challenging.
- A high BMI is associated with increased risk of difficult intubation.
- **Specific Anaesthetic considerations:**

✓Always assess the airway for prediction of difficult intubation.

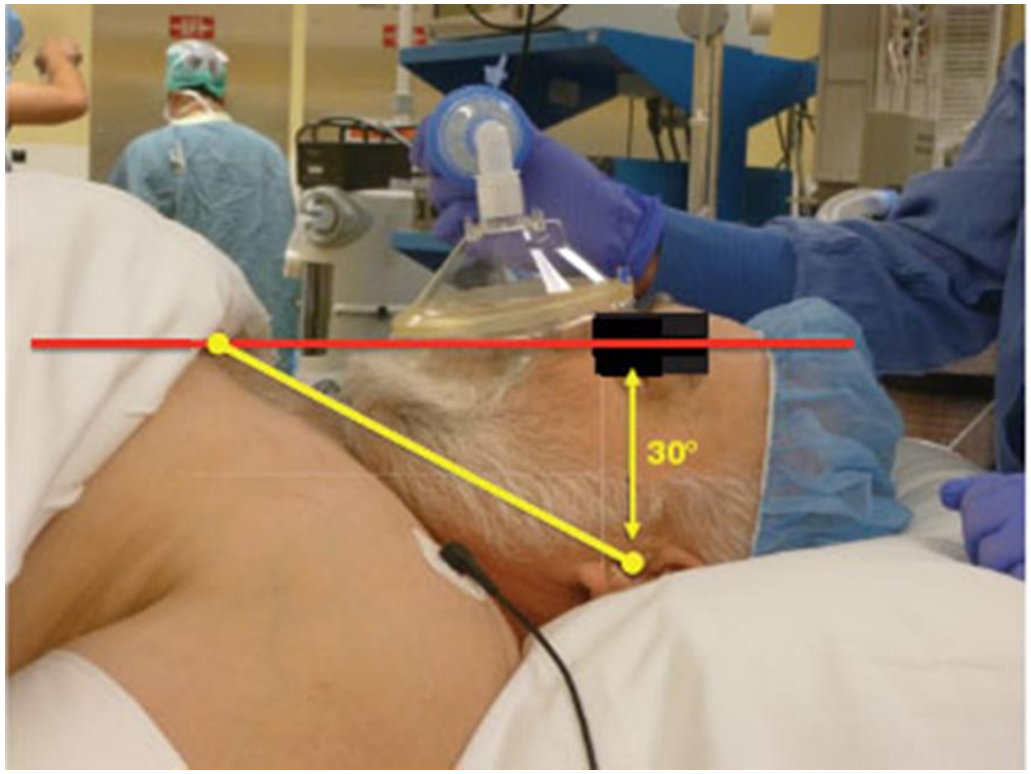
✓Difficult mask ventilation can sometimes be transformed by placement of an oral airway; typically laryngeal mask airways (LMAs) are used for this purpose.

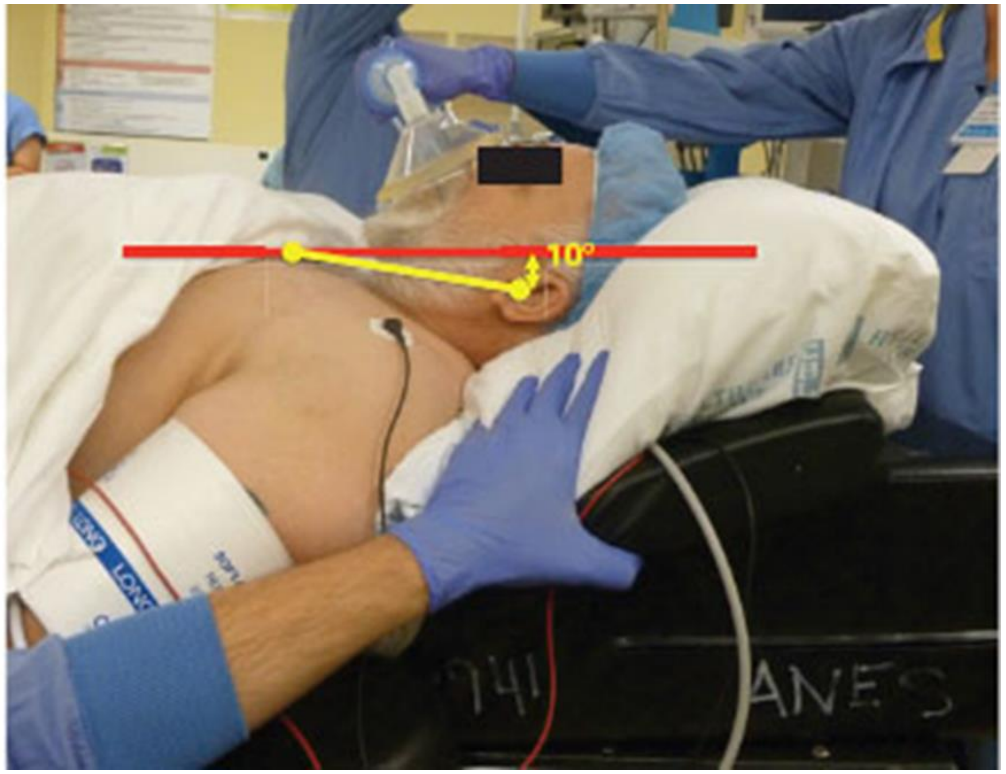
✓ Obese women are more likely to have large breasts, which can interfere with easy placement of the laryngoscope, therefore aim for a degree of head-up tilt, and if necessary, apply traction on the breasts to allow placement of the laryngoscope.



Airway

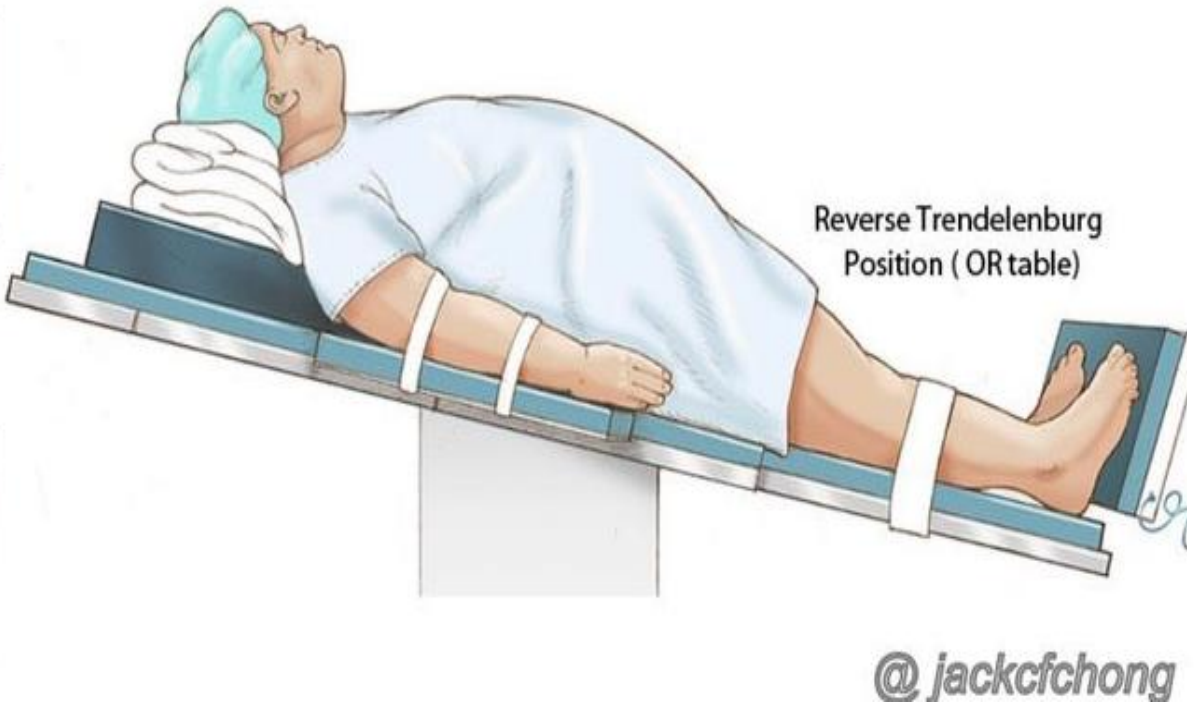
- ✓**LMAs** and other supraglottic airway devices remain relatively **contraindicated** for **elective** use in **MO** patients, but are **acceptable** choices for **emergency** use.
- ✓For intubation, **ramps** are recommended to achieve optimal sniffing position. These ramps are created by placing folded blankets under the patient's shoulders, neck, and occiput. The idea is to bring the patient's **chin** to a **higher** point than the **chest**.

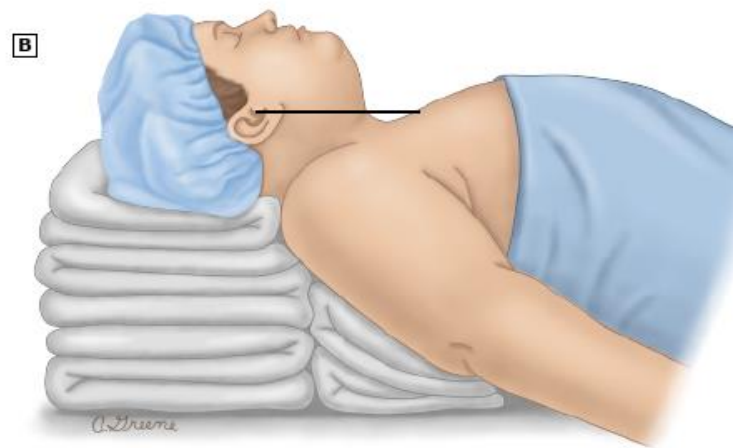




RSI in Morbidly Obese Patients

- Ramped position better than sniff position
- Reverse Trendelenberg position also helpful
- Ear-to-sternal-notch in same horizontal plane
- Patient's face parallel to the ceiling





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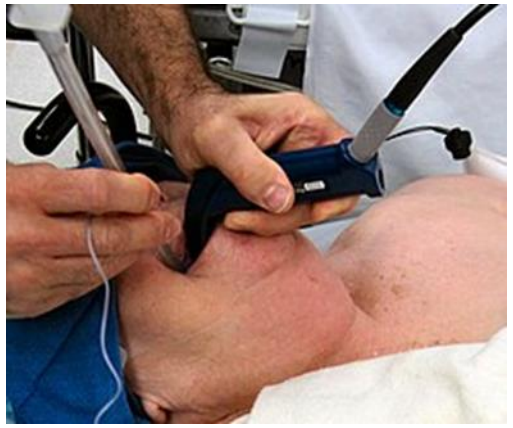
Ventilation

- **Increase body mass → increase O2 consumption → increase Co2 production → increase minute ventilation.**
- **Decrease chest wall compliance**
- **Increase work of breathing**
- **Decrease FRC**



Specific Implications for Anaesthesia

✓ **pre-oxygenation** should be done with the patient ***semi erect*** to increase the time to desaturation.

✓ Hypoventilation will often occur when breathing spontaneously via an LMA/facemask and thus these techniques **are not recommended**.

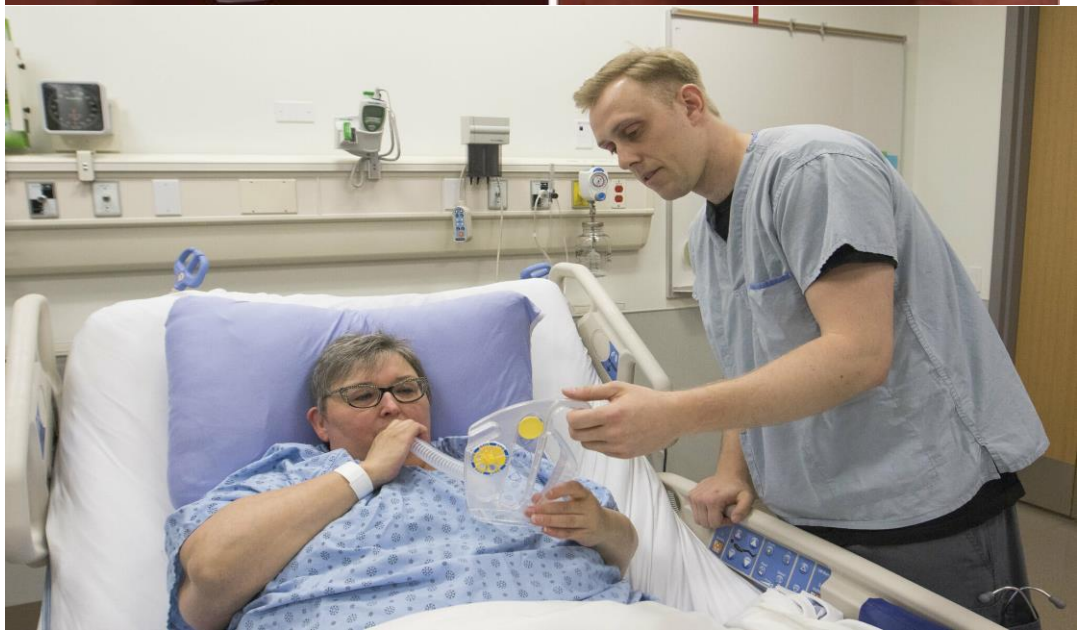
✓ Application of **PEEP** via an endotracheal tube is particularly useful in improving oxygenation by reducing small airways collapse.

✓ **Tidal volume** should be calculated based on *ideal body weight* (IBW).

IBW = 50 + (0.91 x {height in centimeters – 152.4}) for men
IBW = 45.5 + (0.91 x {height in centimeters – 152.4}) for women

Ventilation

- ✓ **Extubation** is usually best performed with the patient in the ***sitting position*** as awake as possible. Otherwise the ***left lateral position*** is very safe initially. Sit up once awake.
- ✓ o***ver-sedated*** obese patients are even more likely to develop partial airway obstruction.
- ✓ obese patients ***should be*** maintained on oxygen, humidified if possible, on the ward postoperatively with continuous pulse oximetry.
- ✓ Postoperative physiotherapy/incentive spirometry and use of regional techniques such as epidural analgesia should reduce atelectasis and postoperative respiratory failure.



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Gastrointestinal, endocrine and other systems:

- **Specific Implications for Anaesthesia:**
- Prescribe oral **H2 receptor antagonists** (e.g. **ranitidine** 150mg) or **proton pump inhibitors(PPI)** (e.g. **omeprazole** 20-40mg) routinely 1-2 hours preoperatively, and if in doubt, perform **rapid sequence induction** with cricoid pressure at induction and **extubate** when **fully awake.**
- Perform a **random blood sugar test** on all obese patients.
- Ensure good perioperative sugar control to reduce infection and risk of myocardial events.
- continue **statins(atorvastatin)** over the perioperative period as they might improve coronary plaque stability.

Drug handling in obesity

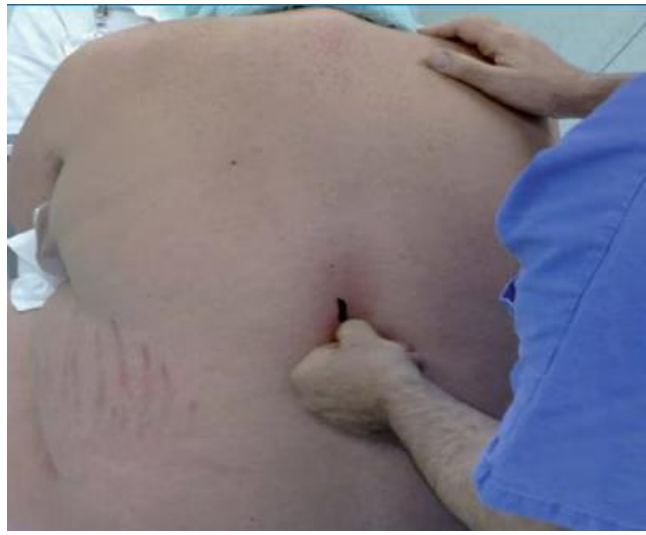
- **In the obese patient**, *volumes of distribution, binding* and *elimination* of drugs are unpredictable. This uncertainty necessitates that the anaesthetist pay more attention to the clinical end points of drug action such as loss of verbal contact, tachycardia etc. rather than focusing specifically on whether to dose on ideal, lean or actual body weight.
- The apparent **volume of distribution** for a fat-soluble drug such as **thiopentone** is ***increased*** because of its **lipophilic** nature and therefore ***the dose should be increased*** but a raised volume of distribution also results in reduced elimination resulting in ***prolonged effects***.
- Recent work suggests that **suxamethonium** should be given at a dose of 1mg/kg ***actual body weight***.

Anesthetic agents

- **Intravenous drugs dosing depend on total body weight:**
  - ✓ Midazolam
  - ✓ Thiopental
  - ✓ Propofol (maintenance infusion)
  - ✓ Fentanyl
  - ✓ Succinylcholine
  - ✓ Cisatracurium
- **Intravenous drugs dosing depend on ideal body weight:**
  - ✓ Propofol (induction)
  - ✓ Remifentanil
  - ✓ Vecuronium
  - ✓ Rocuronium

Regional anaesthesia

- **Good regional anaesthesia** may reduce opioid and inhalational requirements intraoperatively in thoracic and abdominal surgery and may also be used as the sole technique in peripheral surgery.
- However it is *technically harder* because of the *loss of landmarks, increased movement of the skin and the need for long needles*.
- Initial failure rate is higher in the obese.
- Due to the *engorged extradural veins and extra fat constricting the potential space*, *less local anaesthetic is needed for epidurals*. **75-80%** of the normal dose may well be sufficient.
- Venous access, as a routine part of any anaesthetic technique is also technically more difficult in the obese, especially central venous access, where ultrasound is particularly useful if available.



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