
بسم الله الرحمن الرحيم

COMPLICATIONS OF ANESTHESIA

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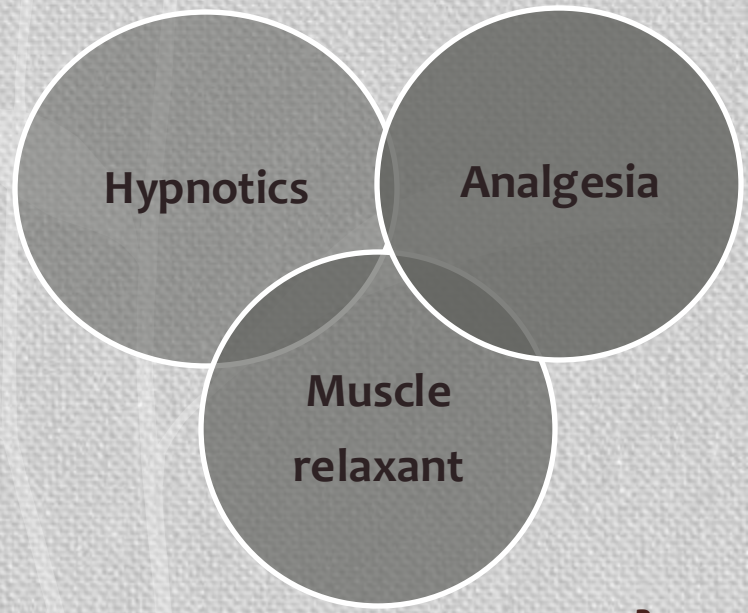
Introduction:

- Complication in medicine is an unanticipated problem that arises following and is a result of a procedure, treatment or illness.
- Anesthesia or anaesthesia from Greek “without sensation” is a state of controlled and temporary loss of sensation or awareness or both that is induced for medical purposes.

- It may include some or all of **analgesia, paralysis** , amnesia and **unconsciousness.**



Introduction:

- Complications of anesthesia are inevitable even with experienced doctors.
- These complications range from minor to major serious problems.
- By some estimates, the death rate from general anesthesia is about 1 in 250,000 patients.
- The specific risks of anesthesia vary with the **kind of anesthesia** , **type of surgery** (elective or emergent) and **patient specific factors**.
- Although complications of anesthesia are imperative, there are some factors that prevent them.

What do anesthetists do to prevent complications?

The anesthetist will see the patient before the operation and ask about:

1. The general health.
2. Any medications taken by the patient.
3. Any drug allergies that the patient may have.
4. Previous anesthetic history including family history.
5. Tobacco and Alcohol intake.
6. Examination of airway , lungs and heart.

Regarding the general health:

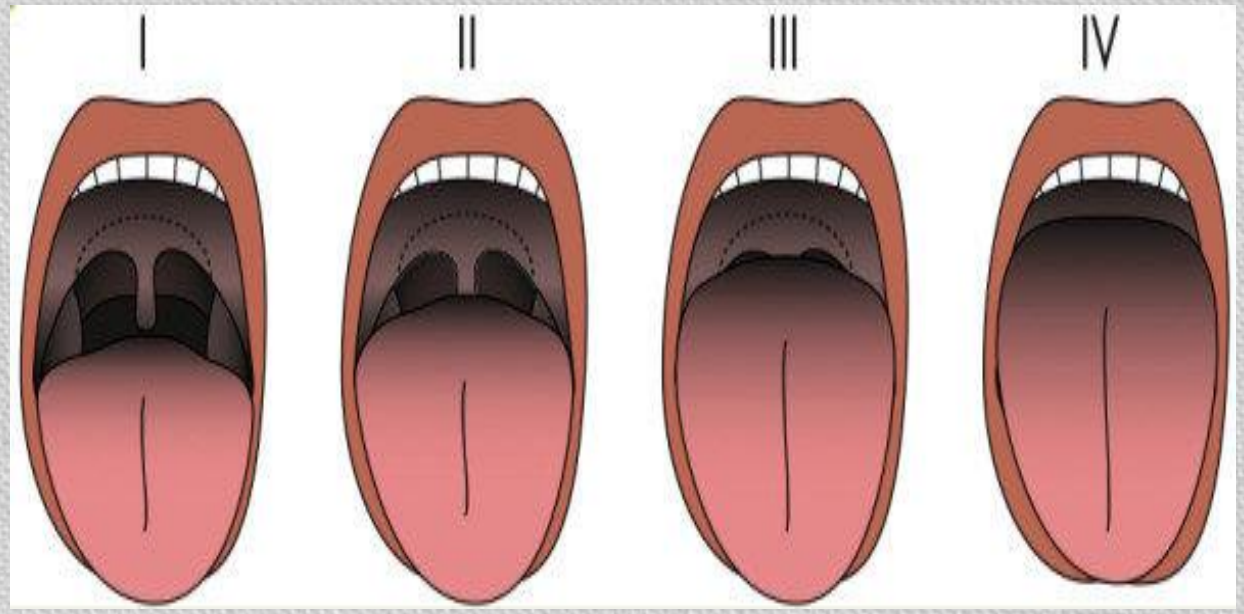
- Using the ASA physical status Classification System:

ASA Physical Status Classification System	
I.	A normal healthy patient
II.	A patient with mild systemic disease
III.	A patient with severe systemic disease
IV.	A patient with severe systemic disease that is a constant threat to life
V.	A moribund patient who is not expected to survive without surgical procedure
VI.	A declared brain-dead patient whose organs are being removed for donor purposes The addition of 'E' indicates emergency surgery.

Regarding medications:

- Any use of recreational drugs (Heroin, Cocaine, Prescription opioids , Methamphetamine and hallucinogens).
- Chronic use of analgesics .
- Some drugs must not be omitted before the anesthesia : Immunosuppressants , cancer drugs, thyroid drugs , anti-reflux medications , anti epileptics , anti- Parkinson drugs and all cardiovascular medications with exceptions.
- Some drugs must be omitted before the anesthesia: Diuretics , ACE inhibitors, ARBs , calcium channel blockers , NSAIDS and blood thinners.

Examination of the airway using the *Mallampati Score*:



A high Mallampati score (class III and IV) is associated with more difficult intubation as well as a higher incidence of sleep apnea.
Therefore, commonly complications happen in class III and IV

Important complications of general anesthesia

- **Complications may happen peri-operatively or post-operatively**
- **It may be minor or major**

Circulatory complications

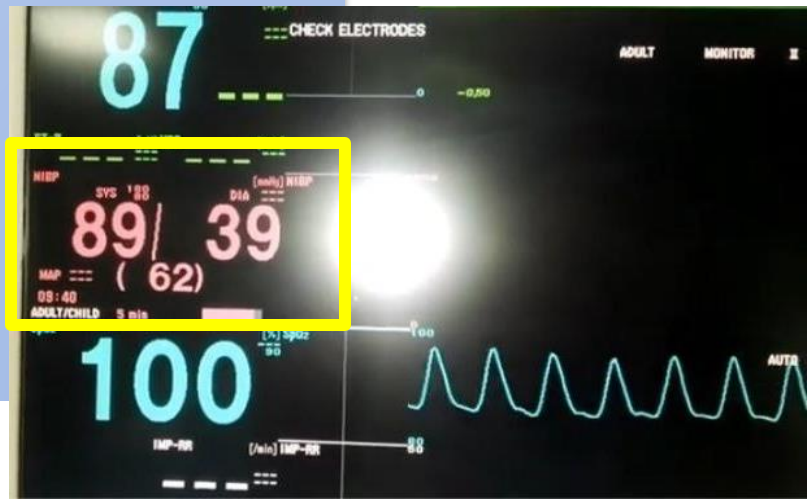
1-Hypotension:

- Peri- and post-operatively
- **Causes:**

1. Depression of the vasomotor center
2. Reduced CO (arrhythmia and reduced myocardial contractility)
3. Release of histamine due to pre-medications (opioids, anti-hypertensive drugs)

- **Managed by:**

Give fluids if not enough, vasopressor agents



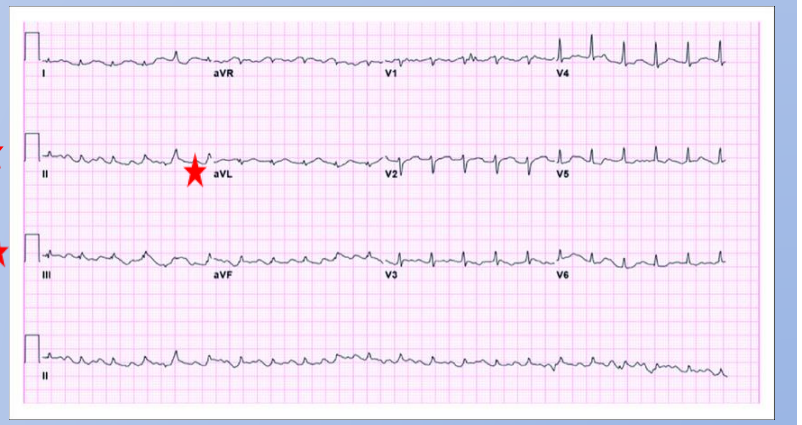
2- Cardiac arrest:

- Peri-operative serious complication may lead to death
- **Causes:**

1. Hypoxia due to ventilatory problem (most common one)
2. Post scoline asystole
3. Post-induction hypotension

- **Managed by:**

DC shock and amiodarone



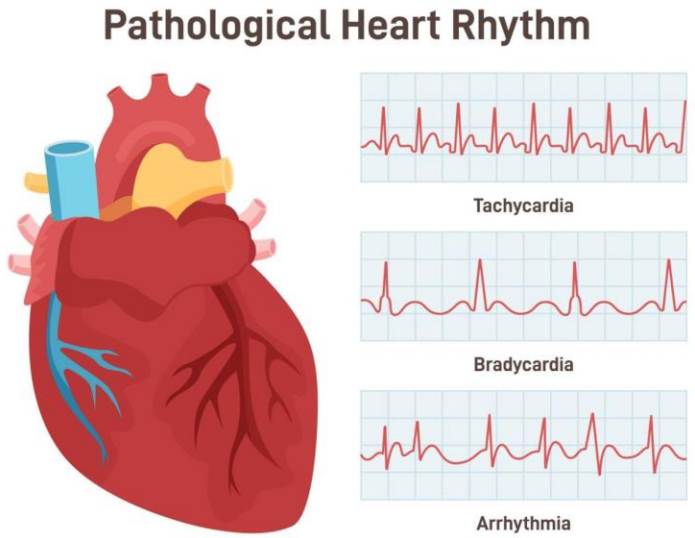
3- Arrhythmia:

- Peri- and post-operative complication precipitated by age and cardiovascular diseases
- **Causes:**

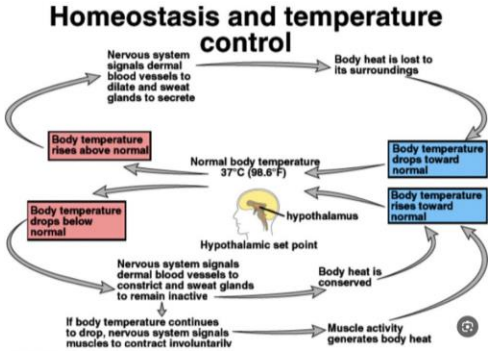
1. Electrolytes imbalance
2. Sympathetic stimulation due to stress
3. Hypoxia
4. Depressant effect of anesthetics

- **Managed by:**

Anti-arrhythmic drugs



4-Hypothermia:

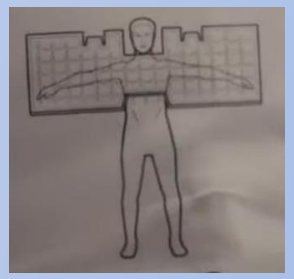


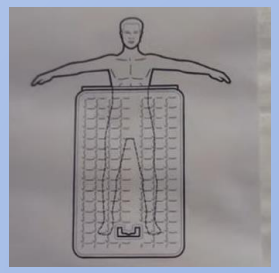
- Peri-operative reduction in the core temperature below 36 C
- **Causes:**

1. Disruption of the thermoregulation center by anesthesia
2. Muscles are disable to shiver due to muscle relaxants
3. Administration of cold fluid

- **Managed by:**

Warm blankets and fluids

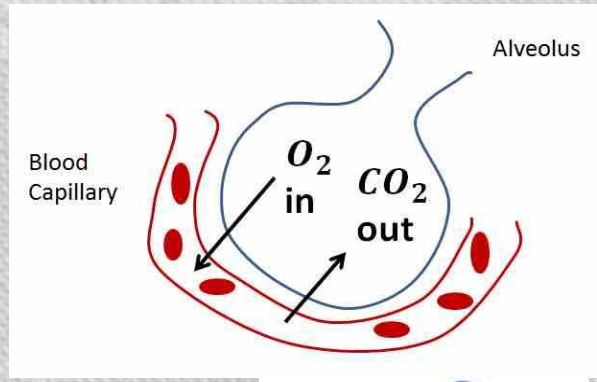




Bair hugger

Pulmonary complications

Risk factors are age, DM, obesity, smoking and COPD



1- Hypoventilation:

- It is a peri- and post-operative major complication of G.A.
- Hypoventilation can be caused by : fluid overload, pulmonary embolism, cardiac arrest, pulmonary atelectasis, asthma, COPD and breathing machine error
- The patient can develop **hypoxemia** (oxygen deficiency in arterial blood) or **hypoxia** (impaired tissue oxygenation).

Managed by: oxygen therapy and taking care of the underlying condition

2- Atelectasis:

- The collapse or impaired functioning of the lung
- **Causes:**

1. Impaired Surfactant
2. Bronchial obstruction
3. Pneumothorax

- **Managed by:** removal of obstruction, chest tube and PEEP in case of hypoxia

3- Pulmonary edema:

- Fluid accumulation in the lung
- **Causes:**

1. Acute changes in blood pressure
2. Vascular tissue damage
3. Heart failure
4. Aspiration

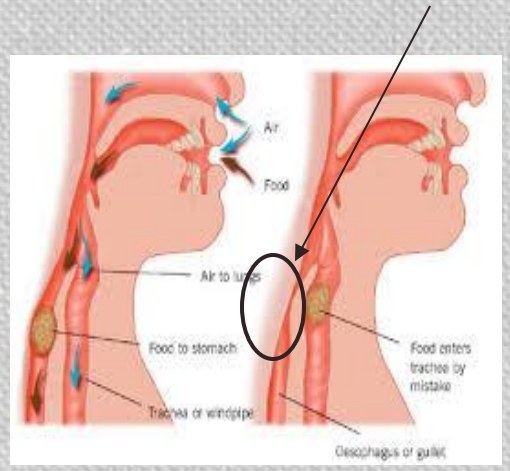
- **Managed by:** Mechanical ventilation and treatment of the underlying problem (HF …. diuretics)

4- Aspiration:

- The contents of the patient's stomach rise up from the esophagus and end up in the trachea. It occurs peri- or post-operatively.

- **Causes:** Sedative patient cannot control swallowing and cough.
- **Risk factors:**

1. Emergency surgery
2. Lack of fasting
3. Delayed gastric emptying



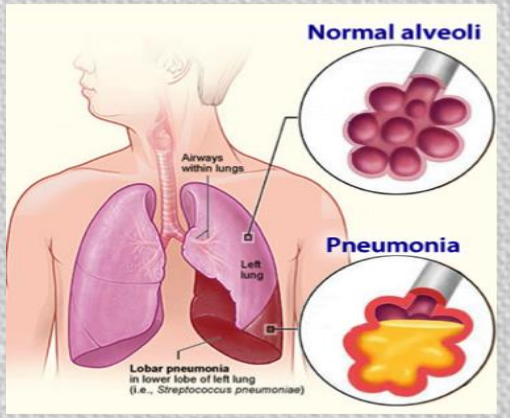
- **The consequences:** acute lung damage or pneumonia that may cause death
- **Managed by:** suction air way, intubation with o2 therapy and lavage

5- Pneumonia:

- Lung infection , in which the air sacs fill with pus and may become solid. Which interferes with ventilation. (serious condition)

- **mechanism:** Low resistance to infection due to impaired cough, ciliary movement and alveolar macrophages.
- **Causes:**

1. Aspiration
2. Contaminated endotracheal tube



- **Managed by:**

IV antibiotics and fluids + oxygen therapy

6- Bronchospasm:

- Contraction of smooth muscle in the bronchus (narrowing of the air way)

7- Laryngospasm:

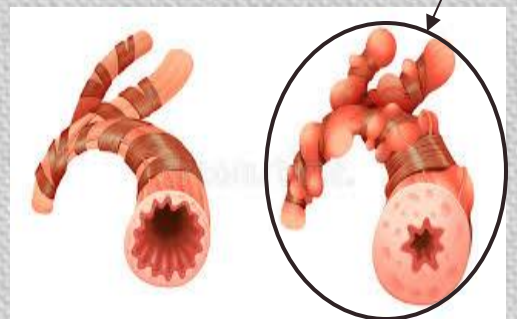
- prolonged closure of the vocal cords in response to a trigger during <u>light anesthesia</u>
- commonly during induction phase

Causes

Premature intubation, extubation, foreign body irritation and or presence of secretions and blood ☹

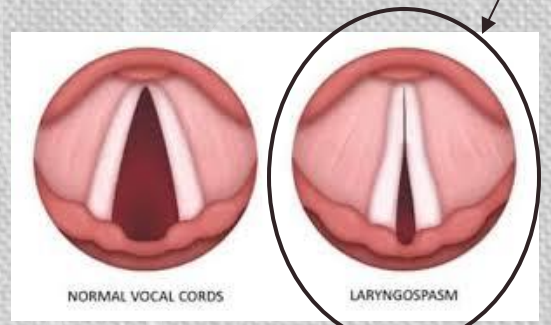
Management:

1. 100% O2 mechanical ventilator
2. Brochodilators



Management:

1. 100% O2 mechanical ventilator
2. Muscle relaxant



8- Scoline apnea :

- Prolonged period taken by a patient to regain the ability to breath after being given a standard dose of the muscle relaxant, scoline (succinylcholine: depolarizing muscle relaxant)

- **Etiology:** autosomal recessive mutation causes pseudocholinesterase deficiency or atypical form
- **Managed by:**

1. Mechanical ventilation
2. Transfusion of fresh frozen plasma
3. Maintenance of the anesthesia

Air way injury

- It is a peri-operative complication occurs due to difficult intubation or mal-practice during intubation
- Occurs due to tracheal intubation that involve laryngoscopy and endotracheal intubation

1. Upper incisor injury (the most common one)
2. Temporomandibular joint injury
3. Laryngeal and tracheal injury
4. Esophageal perforation
5. pharyngoesophageal perforation

Nausea and vomiting

- Are the most common minor post-operative complications.

- **Risk factors:**

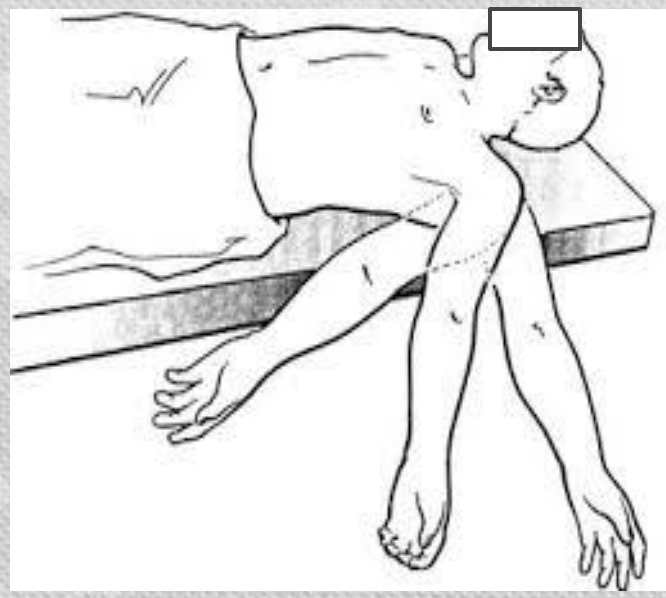
1. Use of volatile anesthetics
2. Long duration surgeries
3. Use of post-operative ***opioids***

Managed by:
Anti-emetic drug (metoclopramide) and IV fluids

Why adhesive tape is used??

- In anesthetic patient there is absence of the eye lid reflexes and lacrimation lead to dryness of the cornea which lead to corneal abrasion and ulceration.
- We use adhesive tape covering the eyelids to prevent it from dryness.

Nerve injury



- Due to prolonged compression of the nerve or inappropriate patient's position during long surgeries .

- ulnar nerve, brachial plexus, sciatic nerve and radial nerve (position problem)
- Facial nerve and supra orbital nerve (compression by face mask)
- Lingual nerve (compression by endotracheal tube)

- The most common nerve injury is **ulnar nerve injury**
- To avoid this problem the surgeon should be careful about padding of variable area and aware of patient's position

IMPORTANT COMPLICATIONS OF LOCAL ANESTHESIA

Block of the peripheral nerve

Complications of local anesthesia:

1. Nerve injury (direct injury)
2. Pain
3. Infection
4. Ischemic necrosis
5. Bleeding and hematoma formation

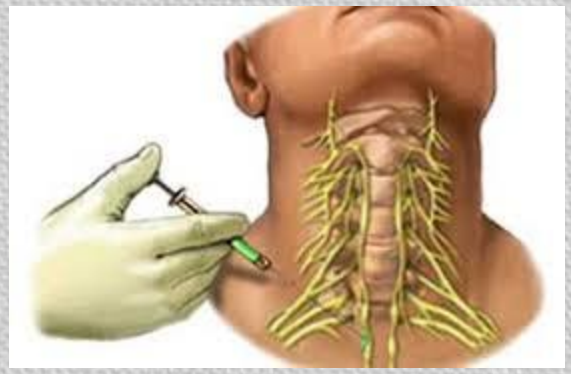


FIGURE 46-28 Ulnar nerve block at the elbow with region of anesthesia illustrated on the hand.

FIGURE 46-26 Median nerve block at the wrist.

Specific serious side effects of some drugs

- Post-operative halothane hepatitis **halothane** (is hepatotoxic)
- Malignant hyperthermia may occur in susceptible patients given **inhalational anesthetics** (N_2O , enflurane, sevoflurane, halothane)
- All hypnotics(anesthetics) cause hypotension except **ketamine** causes hypertension because it induces catecholamines release
- All **opioids** causes respiratory depression

IMPORTANT COMPLICATIONS OF REGIONAL ANESTHESIA

Regional anesthesia: epidural or spinal

Normally no loss of consciousness

Post-dural puncture headache

- It's severe headache worsening in the upright position and relieved with lying . It's very common after spinal anesthesia,
- **Etiology:** CSF leakage from the puncture site
- Decrease in the CSF volume may lead to compensatory vasodilatation of the cerebral vessels that causes severe headache. Also, accumulation of the CSF in the epidural space irritates the meninges
- **Managed by:**

1. Analgesia, bed rest and adequate hydration
2. Epidural blood patch is injected at the site of the meningeal tear
3. Other medications: theophylline and hydrocortisone (vasoconstrictors)

Total spinal block

- **Etiology:** injection of large amounts of anesthetic agents into the spinal cord
- **Consequences**:

1. Respiratory arrest (block of C3-C5 nerve roots)
2. Hypotension and bradycardia (block of sympathetic fibers T1-T4)
3. Loss of consciousness (cerebral spread of the anesthetics)
4. Total paralysis

- **Managed by:**

Intubation and ventilation until the spinal block wears off

Hearing loss

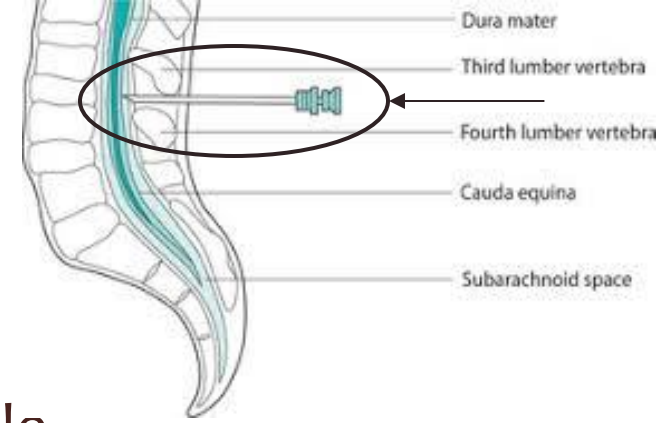
- Permanent or transiet condition after dural puncture
- **Causes:**

1. Altering in the CSF pressure (affects the perilymph of the inner ear)
2. Embolism

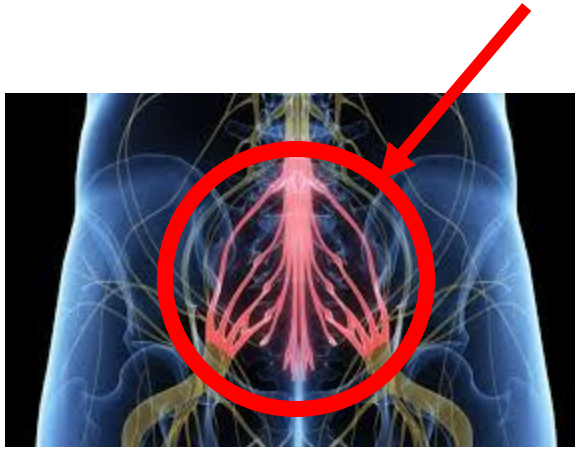
Hypotension

- Occurs normally but may be complicated by higher doses of anesthetics
- **Etiology:** partial or total block of the sympathetic nerves

Cauda equina syndrome



- It is a damage to the cauda equina (bundle of nerves) during needle insertion in the spinal anesthesia
- **Sign and symptoms:** low back pain radiates to the leg, numbness around the anus and loss of bowel or bladder control



Meningitis (septic or aseptic)

Thank you

اللهُمَّ عُدْنا بِثَغرٍ تُحبّه وتَرضاه..

واصنَع نفوسنا حتّى تكون لكَ وحدكَ، واصقِل بالإيمان قلوبنا، وبالإخلاص مسارنا، وارزقنا قلبًا لا ينام، وروحًا لا تُضام، ونَفسًا تتعلّق بالسّماء، وعُمرًا يُقضَىٰ في سبيلك، ووفّقنا يُغرَس لدينك، وارزقنا حياةً في رضاك، وموتًا يترك خلفه ألف ظِلٍّ وقلبٍ ورسالة.