ANESTHESIA

by
Dr. Dhuha Waleed salih

Anesthesia : IS temporary loss of feeling or sensation

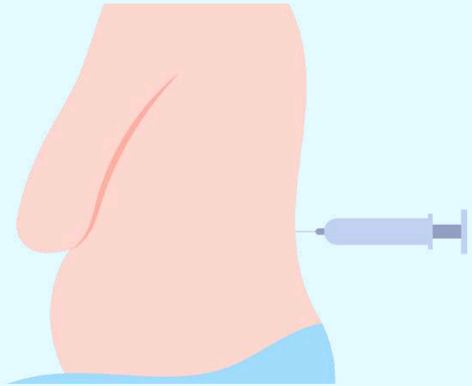
characterized by:

- **pain relief**
- **loss of consciousness**
- **suppression of reflexes and movement**
- **muscle relaxation**

TYPE OF ANESTHESIA

General anesthesia

local anesthesia



Regional anesthesia

GENERAL ANESTHESIA

refer to inhibition of sensory , motor and sympathetic nerve transmission at the level of brain, resulting in unconsciousness and lack of sensation .

signs and stages Of anesthesia

1. Stage 1 – Analgesia (Induction Stage)
- Loss of pain sensation while consciousness is maintained.
- Normal breathing and reflexes remain intact.

2. Stage 2 – Excitement (Delirium Stage)
- Loss of consciousness with involuntary movements and irregular breathing.

3. Stage 3 – Surgical Anesthesia
- Complete unconsciousness with muscle relaxation.
- Regular breathing, loss of reflexes, and no pain sensation.
- Divided into four planes based on depth of anesthesia.

4. Stage 4 – Overdose (Medullary Paralysis)
- Severe respiratory and cardiovascular depression.
- Risk of respiratory arrest and death.
- Requires immediate resuscitation.

1. Intravenous (IV) Anesthetics

• **Propofol:**
• A fast-acting anesthetic used for induction and maintenance of general anesthesia.
• Provides quick loss of consciousness, and is commonly used in short and medium surgeries.

• **Ketamine:**
• Often used in emergency settings and in situations with limited medical resources.
• Provides both analgesic and anesthetic effects but may cause hallucinations.
• Increases blood pressure, making it useful for patients in critical conditions.

• **Thiopental:**
• A barbiturate used for rapid induction of anesthesia.
• Often used for the induction phase of general anesthesia.

• **Etomidate:**
• Used primarily in patients with cardiovascular instability.
• Has less effect on the circulatory system compared to other agents.

2. Inhaled Anesthetics

• **Sevoflurane**:
• One of the most commonly used anesthetic agents.
• has rapid onset of action and rapid elimination
Mechanism: Sevoflurane enhances gamma-aminobutyric acid (GABA) receptor activity, increasing inhibitory neurotransmission in the central nervous system (CNS). It also inhibits N-methyl-D-aspartate (NMDA) receptors, reducing excitatory signaling.

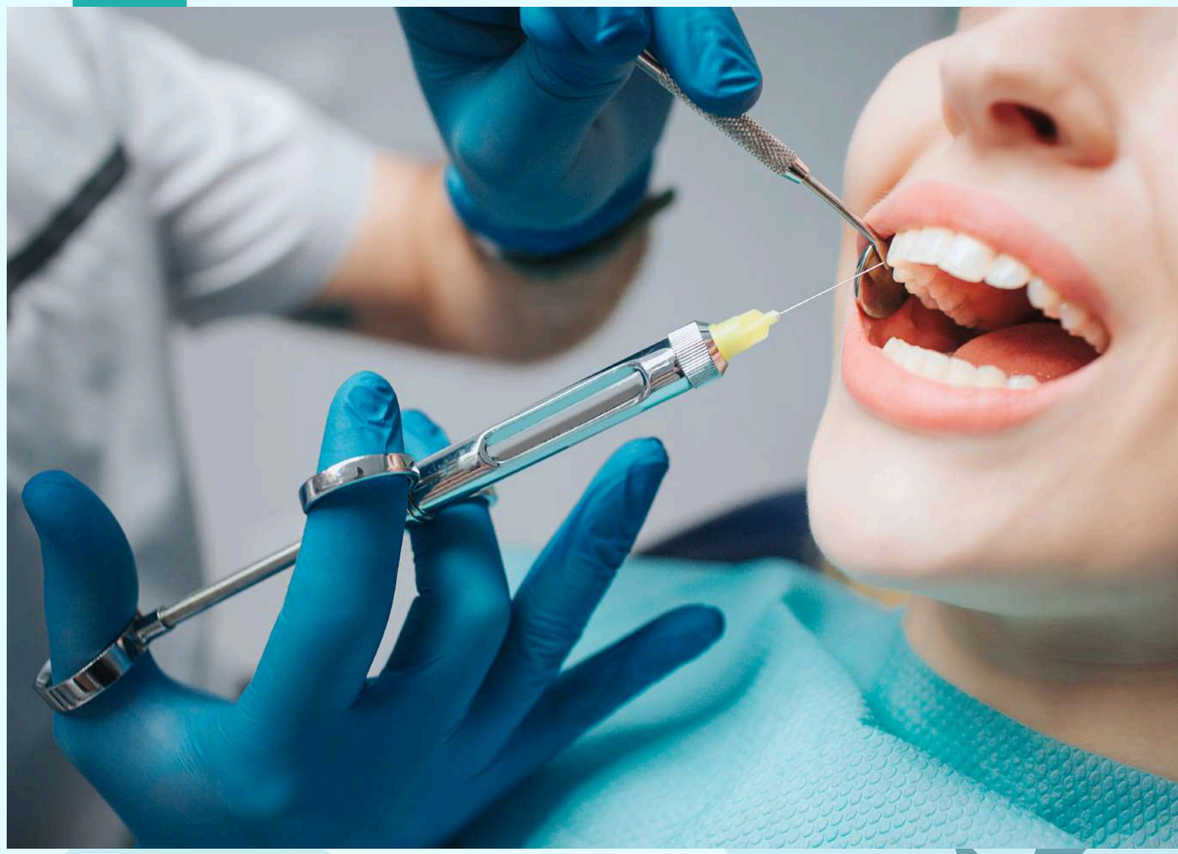
• **Isoflurane:**
• Commonly used for longer surgeries.
• has rapid onset of action and cause less cardiovascular depression.
Mechanism: Similar to sevoflurane, it potentiates GABA-A receptors, leading to CNS depression and inhibits NMDA receptors, reducing excitatory neurotransmission.

• **Desflurane**:
• Ideal for long surgeries due to its fast onset and quick elimination, allowing rapid awakening after surgery.
• **Mechanism**: Modulates GABA-A and NMDA receptors, suppressing CNS activity. It also reduces calcium ion flow in neurons, preventing nerve signal transmission

Nitrous Oxide:
• laughing gas and used for dental procedures
Mechanism: Primarily NMDA receptor inhibition, reducing excitatory neurotransmission, while also affecting opioid receptors to produce analgesia.

LOCAL ANESTHESIA

are the second major class of anesthetics , they reduce pain sensation at the level of peripheral nerves.
they are available in the form of solution, ointment, gel, creams, powders, suppositories and ophthalmic drops.



LOCAL ANESTHESIA

mechanism of action

its work by blocked all types of nerve fiber(sensory, motor and autonomic) by blocking the movement of certain ions(Na, k, Ca)only in the area in which the anesthetics is applied and their is no loss consciousness.

uses

used for surgical, dental and diagnostic procedures , suturing of skin laceration plastic and cosmetic surgery

example: lidocaine

drugs of Local Anesthesia:

1. Lidocaine
- Uses: Minor surgeries, dental work, topical anesthesia.
- Mechanism: Blocks voltage-gated sodium channels, preventing nerve impulse transmission.
- Onset & Duration: Fast onset (minutes), lasts 1–2 hours.

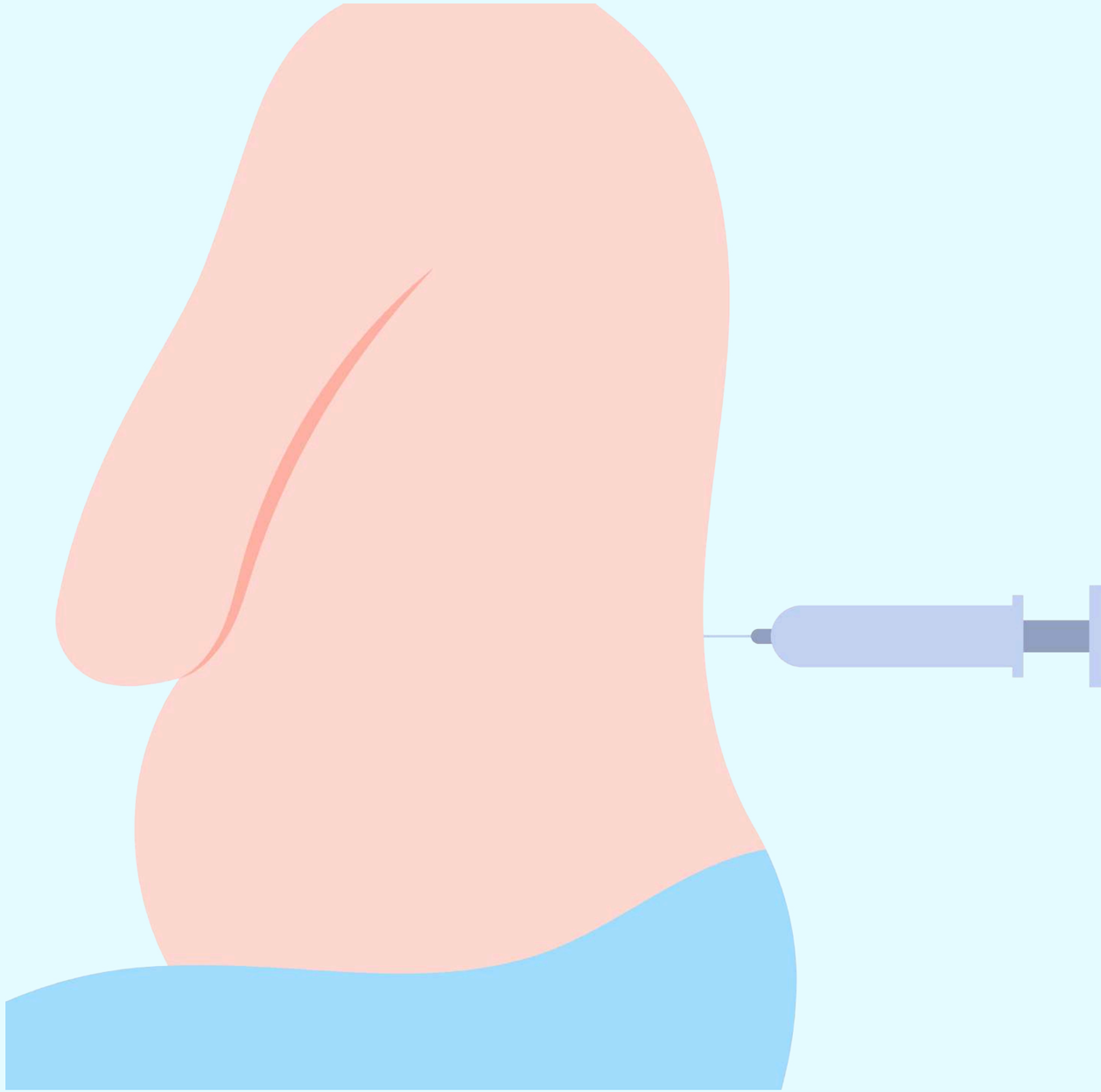
2. Bupivacaine
- Uses: Surgical anesthesia (epidural, spinal, nerve blocks).
- Mechanism: Similar to lidocaine, but longer duration and more potent.
- Onset & Duration: Slower onset, lasts 4–6 hours.

3. Ropivacaine
- Uses: Surgery, labor pain management.
- Mechanism: Blocks sodium channels, lower cardiac toxicity than bupivacaine.
- Onset & Duration: Intermediate onset, lasts 4–6 hours.

4. Benzocaine
- Uses: Topical pain relief (sore throat, ulcers, skin irritations).
- Mechanism: Stabilizes nerve membranes, fast but short-acting.
- Onset & Duration: Rapid onset, short duration.

REGIONAL ANESTHESIA

Regional Anesthesia is a type of anesthesia that blocks sensation in a specific part of the body, allowing a patient to remain awake or sedated while preventing pain in the targeted region. It is commonly used for surgeries and procedures involving the lower body, arms, or abdomen.



Types of Regional Anesthesia:

1. Spinal Anesthesia:

- Involves injecting anesthetic into the cerebrospinal fluid (CSF) in the subarachnoid space.
- Provides rapid and complete numbness below the injection site.
- Commonly used for cesarean sections, lower abdominal, and lower limb surgeries.

2. Epidural Anesthesia:

- Anesthetic is injected into the epidural space (outside the spinal cord).
- Can be used for continuous pain relief, such as during labor and postoperative pain control.
- Slower onset compared to spinal anesthesia but allows for prolonged administration.

3. Peripheral Nerve Blocks:

- Anesthetic is injected near a specific nerve or nerve group to numb a particular limb or region.
- Examples include:
  - Brachial Plexus Block (for arm or shoulder surgeries)
  - Femoral Nerve Block (for knee or thigh procedures)
  - Sciatic Nerve Block (for lower leg or foot surgeries)

4. Intravenous Regional Anesthesia (Bier Block):

- Used for short procedures on the arm or leg.
- A tourniquet is applied to prevent anesthetic from spreading beyond the limb.

REGIONAL ANESTHESIA

Advantages of Regional Anesthesia:

- Reduces the need for general anesthesia and its associated risks.
- Provides better postoperative pain control.
- Lowers the risk of nausea, vomiting, and respiratory depression.
- Allows for faster recovery..

Disadvantages & Risks:

- nerve injury or prolonged numbness.
- Hypotension (especially with spinal and epidural anesthesia).
- Risk of infection at the injection site.
- Rare complications like spinal headaches (post-dural puncture headache).