

Inhalational anesthesia divided into

❑ LEARNING OBJECTIVES

- ❖ Definition**
- ❖ Classification**
- ❖ inhalational and intravenous anesthetics**
- ❖ advantages**
- ❖ disadvantages**
- ❖ clinical uses**
- ❖ side effects .**

Inhalational anesthesia divided into

- 1) Gaseous anesthetics
- 2) Volatile liquid anesthetics

Gaseous anesthesia: - they are gases at room temperature like NITROUS OXIDE (NO)

Nitrous oxide:-

It is gas at room temperature, sweet odor, and cause laugh.

Advantages:-

- 1) It reduces the requirement of more potent and toxic general anesthetics (called second gas effect)
- 2) Rapid induction and recovery
- 3) Neither inflammable nor explosive

Nitrous oxide

❑ Disadvantages of Nitrous oxide

❖ It has little muscle relaxing effect, so, it must be administered with more potent anesthetics and muscle relaxant to produce a state of full surgical anesthesia.

❑ Clinical uses:-

- 1) Maintenance of surgical anesthesia in combination with other surgical general anesthetics and muscle relaxants
- 2) In sub anesthetic doses to maintain analgesia in obstetric practice
- 3) Emergency management of injuries
- 4) During post operative physiotherapy
- 5) For refractory pain in terminal illnesses

Nitrous oxide

➤ Contraindications:-

- 1) Intestinal obstruction
- 2) Occlusion of middle ear
- 3) Chronic obstructive airway disease
- 4) Arterial air embolism

➤ Nitric oxide cause diffusion hypoxia because the recovery is very rapid, so getting off the gas will take oxygen with it leading to diffusion hypoxia. (A continued administration of O₂ may be necessary during recovery especially in elderly)

Nitrous oxide

□ Adverse effects :-

- 1) nausea and vomiting .
- 2) prolong and repeated exposure may be associated with bone marrow depression.

□ Drug interactions :-

- Addition of 50% of NO and O₂ mixture to another inhalation anesthesia like Halothane will reduce the required dose of this drug by 50% and this is called (second gas effect) .

Ether (diethyl ether)

- ❑ It is irritant ,inflammable, bad odor , colorless and highly volatile .
- ❑ **Advantages :-**
 - 1) potent and reliable anesthetic .
 - 2) vasomotor center is resistance to the dose required for full anesthesia .
 - 3) Full muscle relaxation achieved in deep anesthesia .
 - 4) It is a bronchodilator used to treat bronchospasm resistant to other drugs ,but it is irritant to upper respiratory tract .
 - 5) Doesn't sensitized the heart to catecholamine or other sympathomimetic agents (no fair of arrhythmia) .

Ether (diethyl ether)

❖ Disadvantages :-

- 1) Explosive and flammable ;so contraindication in dithermy .
- 2) Irritant , leading to excessive bronchial and salivary gland secretion which can be stopped by Atropine .
- 3) bad odor .
- 4) Frequent post operative nausea and vomiting .
- 5) Induction and recovery period are very long ;because it is highly soluble in blood .

Ether (diethyl ether)

➤ Clinical uses :-

It was used in induction and maintenance of anesthesia in surgery .

➤ Contraindications :-

- 1)Sever hepatic disease .
- 2) Raised CSF pressure .

➤ Precautions :-

- 1-In febrile children ,it increases the risk of convulsion .
- 2- Dangerous use of dithermy with it .(flammable, explosive).
- 3-In pregnancy lead respiratory depression in fetus and postpartum hemorrhage due to relaxation and loss of uterine tone .

➤ Drugs interactions :-

- 1) It potentiates neuromuscular blockers because it is muscle relaxant .
- 2) With β –blockers lead to myocardial depression ;because Ether is heart depressant .

Halogenated agents:-

1)Halothane :-

✓ colorless ,volatile ,non irritant ,sweet odor ,neither inflammable nor explosive ,liquid at room temperature .

✓ Advantages :-

1-Potent non inflammable .

2- Smooth and rapid induction and rapid recovery from anesthesia due to low solubility .

3- No effect on bronchial and salivary secretion(non irritant)

4- Low incidence of post operative nausea and vomiting .

1)Halothane

❖ Disadvantages :-

- 1-Sever hepatitis (may be fatal) .
- 2- In anesthetic dose ,it depresses both cerebral function and sympathetic activity .
- 3- Should be combined with NO, to produce surgical anesthesia (due to its cardio depressant effect) .
- 4- Should be combined with muscle relaxants to prepare patients for surgery .
- 5- It suppresses sympathetic activity ,but sensitized the heart to catecholamine

❖ Adverse effects :-

- 1)Cardiac arrhythmias .
- 2) Hepatic damage .

❖ Drug interactions :-

- 1-It potentiates anti hypertensive drugs (cardio depressant) .
- 2- Giving Atropine to reduce the risk of hypotension .

Halogenated agents:-

2)Enflurane :-

Less potent , cardio respiratory depressant; less metabolized than Halothane ,not sensitized the heart to catecholamine .

3)Isoflurane :-

Intermediate potency between Halothane and Enflurane; stabilizes heart rhythm ; it decrease the systolic blood pressure due to decrease the vascular resistance .

I.V. anesthesia

□ They are highly lipid soluble ;reach to CNS rapidly ;so they have extremely rapid induction . I.V. anesthesia can be eliminated by redistribution to adipose tissue where they are inactive .

□ Thiopentone (Thiopental) :-

- Very short acting barbiturate ;extensively bound to plasma proteins ;administered parent rally (i. v.) ;rapidly induces hypnosis and anesthesia without analgesia ;it distributed extensively in highly vascular tissue of brain ,then subsequently diffuses selectively into fatty tissues where it is pharmacologically inactive .

□ Advantages :-

- 1) Acting quickly (within about 30 seconds) .
- 2) The anesthetic effect last for 4-7 minutes (useful in brief operation) .
- 3) Anesthesia induced pleasantly without excitement .

Thiopentone (Thiopental)

✓ Disadvantages :-

- 1) Insignificant analgesic effect .
- 2) Very short muscle relaxant effect .
- 3) Cannot be used alone as anesthetic due to short period of action .

✓ Clinical uses :-

- Induction of anesthesia prior to administration of inhalational and other anesthetic

✓ Contraindications :-

- 1) Allergy to Barbiturates .
- 2) Severe cardiovascular diseases or hypotension .
- 3) Obstructive air way diseases like in status asthmatics .
- 4) Addison's disease .
- 5) hepatic dysfunction .
- 6) Myxoedema .

Thiopentone (Thiopental)

- **Side effects :-**

1) Short period of apnea .

2) Rapid injection lead to sever hypotension .

3) Coughing , sneezing and laryngeal spasm .

4) Very irritant if it outside the veins .

Ketamine

❑ **In anesthetic dose** it produces a special type of anesthesia known as (dissociative anesthesia) ,which is a state of analgesia with light hypnosis .Anesthesia produced by Ketamine is not potent or effective .

❑ Advantages :-

- 1) Produce anesthesia for 15 min. which is characterized by profound analgesia .
- 2) Less vomiting incidence .
- 3) production of anesthesia is associated with sympathomimetic effect (help in blood pressure maintenance
- 4) It rarely induces bronchospasm(useful in asthmatic patients)

Ketamine

➤ Disadvantages :-

- 1) No muscle relaxing effect .
- 2) Hallucination can occur during recovery .
- 3) It increase the heart and increase the intracranial pressure and I.O.P. (due to its sympathomimetic activity)

➤ Clinical uses :-

- 1) Sub anesthetic dose used to provide analgesia for painful procedures of short duration e.g. bone marrow sampling and radio therapeutic procedures .
- 2) Used for induction and maintenance of anesthesia for short lasting procedures that don't require muscle relaxation .

Ketamine

❑ Contraindications :-

- 1) Moderate and severe hypertension .
- 2) Congestive heart failure .
- 3) History of C.V.A. or cerebral trauma or any condition associated with increase I.C.P. .
- 4) Chronic alcoholism .
- 5) eye injury and increase the I.O.P.
- 6) Psychiatric disorder e.g. Schizophrenia .