1. ANESTHESIA PART 1

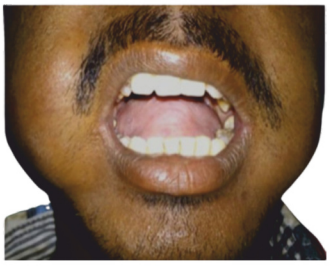
PRE-ANESTHETIC CHECKUP (PAC)

00:00:30

- Airway assessment → Most important
- History
- Investigations
- Fasting status

Airway Assessment

A



B

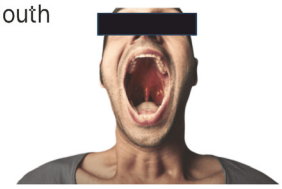
- Patient A: Restricted mouth opening → Difficult airway
- Patient B: Adequate mouth opening → Easy airway

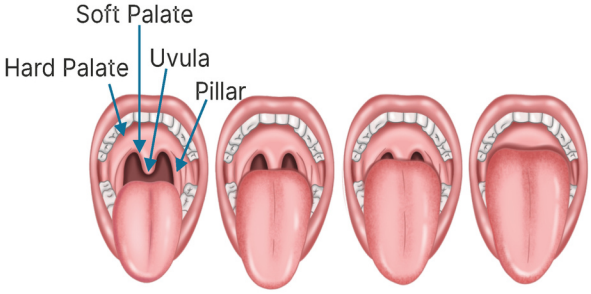
Steps in Airway Assessment

1. Open Mouth	2. Lift the Chin

• Mallampati classification
• Inter-incisor distance (IID)
	• Thyromental distance
	  ○ Normal ≈ 6.5 cm
	  ○ Short distance: Difficult airway
	• Sternomental distance
	  ○ Normal → > 12.5 cm
	  ○ Short distance: Short neck, Difficult airway

a. Open Mouth





b. Lift chin

Mallampati Classification

NEET PG 2018
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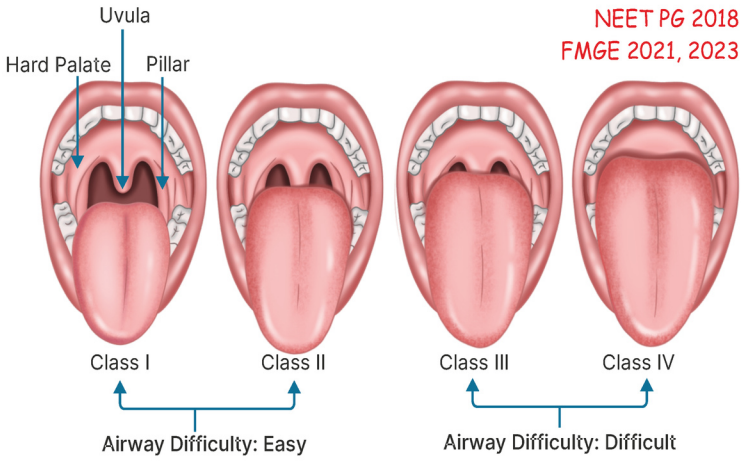
- Mallampati classification predicts the **difficulty of intubation**.
- Procedure:
  - Ask patient to **open mouth**
  - Observe **oropharyngeal structures**



Class	Mnemonic	Visible Structures	Airway Difficulty
Class 0	—	All Class I structures + **Epiglottis tip visible**	Very easy
Class I	**PUSH**	P - Tonsillar pillars U - Uvula S - Soft palate H - Hard palate	Easy
Class II	**USH**	U - Uvula (partial) S - Soft palate H - Hard palate ,Partial tonsillar pillars	Slight difficulty
Class III	—	Soft palate + Hard palate, Only base of uvula visible	Difficult
Class IV	—	Hard palate only	Difficult

Clinical Example

Q. Patient posted for hemorrhoidectomy under spinal anesthesia, anaesthetist did not take proper history, and now on the table, the patient is having bleeding from the surgical site?

Answer

- Later it was found that patient is on clopidogrel
- Proper PAC would identify medication history

PAC in Elective Surgery

- **PAC is mandatory in elective surgery**
- Purpose:
  - Detect comorbidities
  - Detect medication history
  - Prevent complications

Medications before Surgery

Drugs that can be continued

Mnemonic concept: All Active Agents Always Approved

Drugs usually continued:

- Antihypertensives

  - Except ACE inhibitors
  - Except ARBs
- Anti-anginal drugs
- Anti-lipidemic drugs
  - Example:
    → Atorvastatin
    → Rosuvastatin
- Anti-epileptic drugs
- Anti-thyroid drugs

Drugs that must be stopped before surgery
Mnemonic: **MY CLOTHES**

M - Monoamine Oxidase Inhibitors (MAOI)
- Stop 3-4 weeks before surgery
- Interaction with pethidine
- Causes severe sympathetic reaction

C - Clopidogrel
- Stop 8 days before surgery

L - Lithium
- Stop 24-48 hours before surgery

O - Oral Hypoglycemic Drugs
- Stop on the day of surgery

T - Tricyclic Antidepressants
- Stop 3 weeks before surgery

H - Heparin
- Stop 6 hours before surger

S - Smoking
- Ideally stop 2-6 weeks before surgery

Possible complication:
- Bronchospasm

Management precautions:
- Hydrocortisone
- Nebulization

Fasting Status (Last step of PAC)
- Patients must remain fasting before anesthesia
- Purpose: Prevent aspiration during anesthesia
- If fasting not maintained:
  - Gastric contents may enter lungs
  - Leads to serious complications
- Purpose of fasting: Prevent aspiration of gastric contents during anesthesia
- Aspiration risk: Stomach contains food or fluid during induction of anesthesia
- Fasting mandatory for elective surgery
- In emergency surgery :Anesthesia given using RSI (Rapid Sequence Induction)

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Fasting Duration (Adults)	Fasting Duration (Children)

• Solid food
  ○ 8 hours fasting
• Semi-solid food
  ○ 6 hours fasting
• Clear liquids (without pulp)
  ○ 2 hours fasting
	• Water / clear liquids
	  ○ 2 hours fasting
	• Mother's milk
	  ○ 4 hours fasting
	• Formula milk
	  ○ 6 hours fasting

ASA Classification

- After PAC, patient fitness for anesthesia is graded using ASA classification.
- Purpose:
  - Determines risk during anesthesia

ASA Class	Description	Examples	Risk
Class I	Healthy patient No systemic illness	—	Minimal risk
Class II	Mild systemic disease	Controlled diabetes, Social smoker, Social alcohol use	Mild risk
Class III	Moderate to severe systemic disease	Uncontrolled diabetes, Obesity, moderately reduced ejection fraction	Significant risk
Class IV	Severe systemic disease (life-threatening)	Recent myocardial infarction Recent stroke	High risk (risk of death during surgery)
Class V	Moribund patient	Ruptured abdominal aortic aneurysm	Very high risk (unlikely to survive without surgery)
Class VI	Brain-dead patient	Organ donor	Not applicable

- Quick Interpretation
  - Class 1 → Healthy
  - Class 2 → Mild disease
  - Class 3 → Severe disease
  - Class 4 → Life-threatening disease
  - Class 5 → Moribund
  - Class 6 → Brain dead

Local Anesthetics

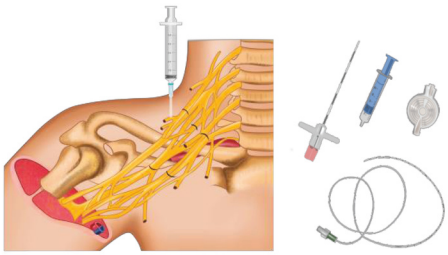
00:15:30

- Local anesthetics are drugs used in multiple anesthesia techniques.

Used in

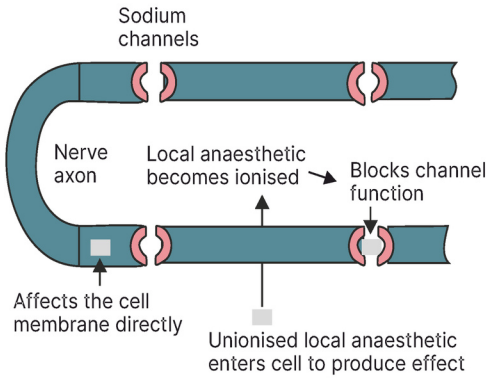
- Local anesthesia

- Spinal anesthesia
- Epidural anesthesia
- Nerve blocks



Not typically used in

- General anesthesia



Mechanism of action

Steps of action:

- Local anesthetic enters nerve in non-ionized form
- Inside nerve it becomes ionized
- Ionized form binds to sodium channels

Main Action

- Block sodium channels
- No depolarization
- No action potential
- Pain transmission blocked

Nerve Fiber Sensitivity

- Order of blockade:
  - A fibers > B fibers > C fibers
  - Within A fibers: Gamma>Delta>Beta>Alpha

Classification of Local Anesthetics

Amino Ester

Identification rule:

- Contain one "i" in name

Examples:

- Cocaine
- Procaine
- Tetracaine
- Proparacaine: Most commonly used ocular topical anesthetic
- Benzocaine

Important Information

Cocaine

- Only local anesthetic causing vasoconstriction
- Chronic use may cause
  - Hypertension
  - Stroke

Amino Amide

Identification rule:

- Contain two "I" letters

Examples:

- Lignocaine(Lidocaine, Xylocaine): Most commonly used local anesthetic worldwide
- Mepivacaine
- Bupivacaine: Most commonly used drug in spinal anesthesia
- Ropivacaine
- Dibucaine

Duration of Action (Longest → Shortest)

Mnemonic: Delhi To Bombay Love PC

- D - Dibucaine
  - Longest acting
  - Highly toxic
  - Not commonly used
- T - Tetracaine
- B - Bupivacaine: Commonly used in spinal anesthesia
- L - Lignocaine
- P - Procaine: Safest anesthetic in malignant hyperthermia
- C - Chloroprocaine: Shortest acting

Allergic Reactions

- More common with:
  - Amino ester local anesthetics
  - Metabolism produces PABA (para-aminobenzoic acid)
- Local Anesthetics Causing Allergy(Remember PABA relation)
  - Procaine
  - Benzocaine

Routes with High Toxicity Risk

- Risk of systemic toxicity increases in this order:
  - Intravenous (IV)>Tracheal>Intercostal>Brachial plexus

Lignocaine

FMGE 2018, 2020
INICET 2021

Mnemonic: **LIG**

- L - M/c used local anesthetic worldwide
- I - Used in IVRA (Intravenous Regional Anesthesia)
- G - Associated with malignant hyperthermia

Lignocaine Dose

- Plain lignocaine
  - 4.5 mg/kg
- With adrenaline
  - 7 mg/kg

Lignocaine Toxicity

- Primary toxicity: Central Nervous System (CNS)
- Sequence of CNS Toxicity
  - Perioral numbness(1st sign)
  - Tremors
  - Seizures
  - Respiratory arrest
  - Cardiac arrest
  - CNS symptoms appear before cardiac toxicity
- Bupivacaine induced arrythmia: Rx Amiodarone
- For Local Anesthetic Systemic Toxicity (LAST) :20% Intralipid solution

Clinical Scenario

- 17 yrs old male patient presented to the ER with complaints of pain in the right iliac fossa, diagnosed to have acute appendicitis now posted for open appendectomy Which anaesthesia?

Choice of Anesthesia

- Open appendectomy → Spinal anesthesia preferred
- Laparoscopic appendectomy → General anesthesia

REGIONAL ANESTHESIA TYPES

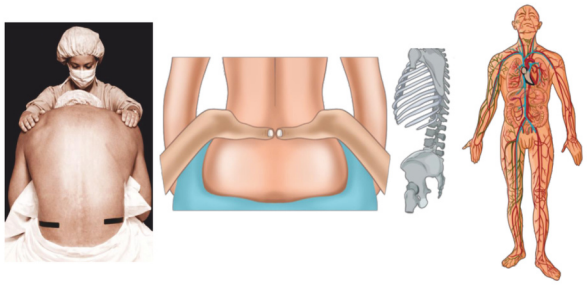
Regional anesthesia includes	Peripheral nerve blocks include
• Spinal anesthesia • Epidural anesthesia • Caudal anesthesia • Saddle block	• Brachial plexus block • Stellate ganglion block • Ankle block

Spinal Anesthesia

00:28:03

FMGE 2020, 2024
INICET 2025

- Injection of local anesthetic into the subarachnoid space



Used for

- Below-umbilical surgeries
- Short duration procedures (2–3 hours)

Examples

- Appendectomy
- Hernia surgery
- Hydrocele surgery
- Hemorrhoid surgery
- Anal fissure
- Anal fistula
- Diabetic foot surgery

Yourwish

Position for Spinal Anesthesia

- Two possible positions:
  - Sitting position (most commonly used)
  - Lateral position

Site of Needle Insertion

Needle inserted at:

- Lumbar intervertebral space

Preferred level:

- L3 - L5

Tuffier's Line

- Procedure:
  - Palpate highest points of iliac crest
  - Draw imaginary line between them
- This line corresponds to: L4–L5 level
- Thus helps identify: L3–L5 intervertebral space

Spinal Needle Type

Used needle:

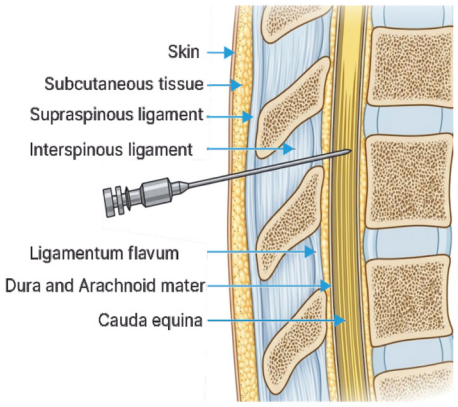
- Thin bore dura-separating needle
- Causes less damage to dura

Layers Pierced in Spinal Anesthesia

Mnemonic: **"Some Say Spinal Instigates lethargy during ax"**

Order of layers:

- Skin
- Subcutaneous tissue
- Supraspinous ligament
- Interspinous ligament
- Ligamentum flavum
- Dura mater
- Arachnoid mater
- Subarachnoid space (CSF)
- **Ligamentum flavum**
  - Thickest ligament
  - Puncture produces sudden loss of resistance (snap)



Confirmation of Needle Position

- When needle reaches subarachnoid space: CSF appears
- Aspirate CSF to confirm location
- This aspiration is called: Barbotage

Most Common Drug in Spinal Anesthesia

- Bupivacaine
- Although cardiotoxic, safe in spinal because drug is injected into CSF and not blood vessels

Additive Drugs in Spinal Anesthesia

- Common additives:
  - Opioids
  - Adrenaline
  - Sodium bicarbonate
- Commonly Used Opioids
  - Fentanyl
  - Sufentanil
  - Alfentanil
- Opioid Avoided in Spinal
  - Remifentanil
  - Contains neurotoxic preservative

Emergency Drug Tray before Spinal Anesthesia

- Phenylephrine / Ephedrine
- Atropine
- Pethidine
- Laryngoscope + Endotracheal tube + Adrenaline
- Manage spinal anesthesia complications

Intraoperative Complications of Spinal Anesthesia

Complication	Key Features / Cause	Example / Symptoms	Treatment
Hypotension (MC)	Sympathetic blockade → Vasodilation → Blood pooling in lower limbs	—	Phenylephrine, Ephedrine
Bradycardia	Due to high spinal / vagal predominance	—	Atropine
Shivering	Common post-spinal effect	—	Pethidine
High Spinal Anesthesia	Excess cephalad spread of anesthetic	Expected T6 → spreads to T4	Supportive (monitor airway & BP)
Total Spinal Anesthesia	Drug reaches intracranial level	Respiratory difficulty Severe hypotension Cardiac arrest	Intubation, Adrenaline

Postoperative Complications of Spinal Anesthesia

Complication	Key Features / Cause	Management / Prevention
Urinary Retention (MC postoperative)	Due to blockade of sacral nerves → impaired bladder function	Foley's catheterization (prevention & management)

Post-Spinal Headache (PDPH)	CSF leakage due to dural puncture → ↓ CSF pressure	Conservative: Coffee (caffeine)NSAIDs Head-low position Adequate fluids

Cranial nerve palsy after spinal

- Cause:
  - CSF loss
  - Meningeal traction
- Most commonly affected nerve: 6th cranial nerve (Abducens nerve)
- Associated symptom: Diplopia

Contraindications of Spinal Anesthesia

- Shock - Spinal causes sympathetic blockade → severe hypotension
- Raised Intracranial Pressure - CSF puncture may cause brain herniation
- Bleeding Disorders
  - Examples: Coagulopathy, Platelet count < 80,000, INR > 1.5
  - Risk: Spinal hematoma
- Fixed Cardiac Output Lesions - Severe cardiac disease, patient cannot tolerate hemodynamic changes
- Local Site Infection - Risk of spinal infection
- Patient Refusal - Patient consent mandatory

Epidural Anesthesia

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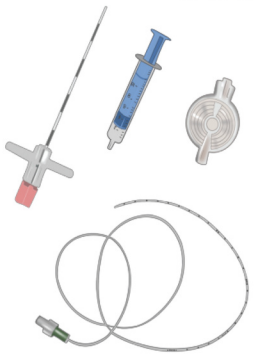


- Procedure: Injection of anesthetic into epidural space
- Main Use: Below-umbilical long duration surgeries
  - Examples: Total hip replacement, Total knee replacement
- Other Uses:
  - Labor analgesia (painless labor)
  - Thoracotomy pain
  - Rib fracture pain

Site of Epidural Anesthesia

Epidural Anesthesia Levels & Indications:

- Cervical Epidural
  - Used for: Cervical radiculopathy, Neck procedures
- Thoracic Epidural
  - Used for: Thoracotomy pain, Rib fracture pain
- Lumbar Epidural
  - Used for: Labor analgesia, Long duration below-umbilical surgeries

Epidural Needle

- Tuohy epidural needle

Specifications:

- 18-gauge
- Length: 9–10 cm

Caudal Anesthesia

- Epidural anesthesia given through sacral hiatus
- Common Use: Children, Anorectal surgeries
- Site: Sacral hiatus
- Last Layer Pierced: Sacrococcygeal ligament

Peripheral Nerve Blocks

00:46:30

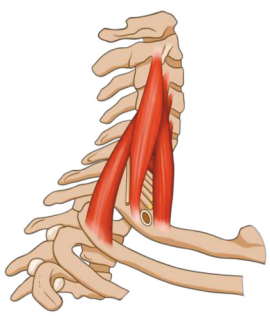
- Brachial plexus block
- Stellate ganglion block
- Ankle block

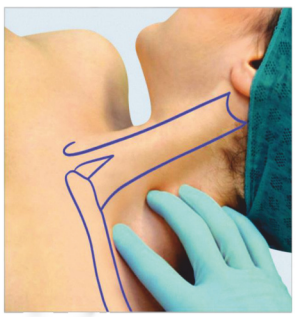
Brachial Plexus Block

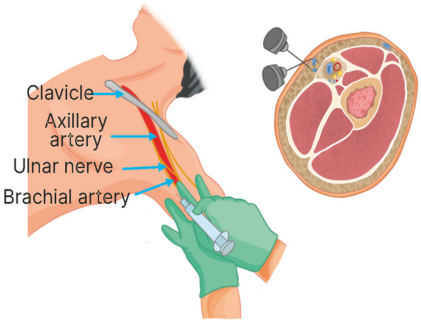
Three major approaches:

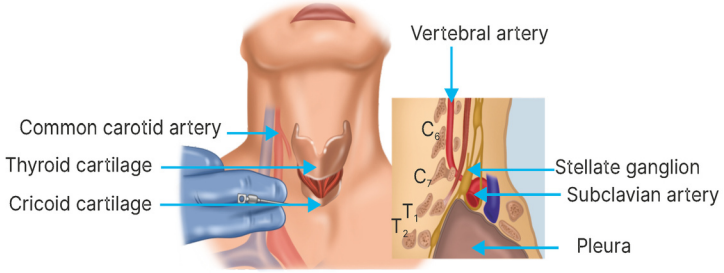
- Interscalene approach
- Supraclavicular approach
- Axillary approach

Approach	Blocks	Best used for	Nerve Spared	Special Features
Interscalene	Proximal brachial plexus	Shoulder surgery	Ulnar nerve	Mnemonic: "I and U not together"
Supraclavicular	Entire brachial plexus	Final anesthesia of upper limb	-	Site: 1 cm above clavicle Major complication: Pneumothorax
Axillary	Distal brachial plexus	Distal arm surgery	Musculocutaneous nerve	-









Stellate Ganglion Block

- Used to block sympathetic activity.

Indications

- Raynaud disease
- Drug-induced vasospasm
- PTSD

Location

- Near C6 vertebra
- At Chassaignac tubercle

Signs of Successful Stellate Ganglion Block

- Horner Syndrome
  - Ptosis
  - Miosis
  - Anhidrosis
- Guttmann Sign
  - Vasodilation of nasal mucosa
- Müller Sign
  - Hyperemia / vasodilation of tympanic membrane

Clinical Scenarios

Q. A 6 year old child is posted for adenotosillectomy due to recurrent tonsillitis

- Preferred anesthesia:
  - General anesthesia
  - Surgery involves head and neck

Q: 35 year old woman present with acute intestinal obstruction and is posted for emergency exploratory laparotomy

- Preferred anesthesia:
  - General anesthesia
  - Requires adequate muscle relaxation
  - Possible hemodynamic instability
- General anesthesia commonly used for:
  - Above-umbilical surgeries
  - Head and neck surgeries
  - Cardiac surgeries
  - Thoracic surgeries

General Anesthesia

00:52:30

- Two main objectives:
  - Unconsciousness
  - Muscle relaxation

Balanced Anesthesia

- Use of multiple drugs in combination to achieve anesthesia.
- Introduced by John Lundy

Phases of General Anesthesia

Phase	Purpose	Drugs	Details
1. Pre-oxygenation	Fill lungs with oxygen before induction	Breathing 100% oxygen via mask	Prevents desaturation during intubation
2. Induction Phase	Make patient unconscious	IV induction agents (e.g., propofol), then muscle relaxant	Followed by intubation
3. Maintenance Phase	Maintain anesthesia throughout surgery	Inhalational anesthetic agents, long-acting muscle relaxants	Ensures stable surgical conditions
4. Recovery Phase	Gradual return of consciousness	Discontinue agents post-surgery	Leads to extubation

Induction Agents

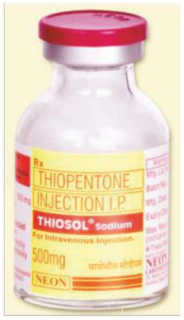
Opioid Induction	Non-Opioid IV Induction Agents
• Low ejection fraction • Severe cardiac compromise	• Sodium thiopentone • Propofol • Etomidate • Ketamine • Methohexital

Mechanism of Action

Receptor	Drugs	Mechanism	Clinical Effect
GABA receptor	• Sodium thiopentone • Propofol • Etomidate	↑ GABA activity → CNS inhibition	CNS depression → Unconsciousness
NMDA receptor	• Ketamine • Xenon • Nitrous oxide	NMDA receptor antagonism → ↓ excitatory transmission	Dissociative anesthesia

Sodium Thiopentone

INICET 2025



- Type: Ultra-short acting barbiturate
- Form: Yellow amorphous powder
- Preparation: Mixed with normal saline
- Never mix with: Ringer lactate (causes crystal formation)
- Mechanism: Ultra-short acting due to rapid redistribution
- Redistributes to: Fat, muscle, adipose tissue

Systemic Effects of Thiopentone

- **Mnemonic:** "Best friend of CNS, enemy of others."

System	Effects	Clinical Notes
CNS	↓ Intracranial pressure	Drug of choice in head injury
	Antiepileptic action	Used in seizures
	Used in narcoanalysis	"Truth serum"
Respiratory System	Bronchospasm	Contraindicated in bronchial asthma
Cardiovascular System	HypotensionTachycardia	Due to vasodilation
Muscle	No muscle relaxation	Needs adjunct (muscle relaxant)
Injection Site	Painful injection	Common adverse effect

Propofol

- Milky white solution→Drug of Choice for Day Care Surgery
- Composition:
  - Egg lecithin
  - Soybean oil
  - Glycerol
- After opening vial → use within 6 hours
  - Risk of bacterial contamination
- Short elimination time (~2 hours)

TIVA (Total Intravenous Anesthesia)

- General anesthesia using only IV drugs
- No inhalational agents
- DOC: Propofol

LMA Insertion

- Drug of choice for Laryngeal Mask Airway insertion

Advantages of Propofol

- Antiemetic
- Antipruritic
- Safe in malignant hyperthermia
- Safe in liver disease
- Safe in acute intermittent porphyria

Propofol Side Effects

- Pain During Injection:
  - Most painful IV induction agent
  - Management: Mix with lignocaine
- Propofol Infusion Syndrome:
  - Occurs with: Long-term infusion (>48 hours)
  - More common in: Children

- Features:
  - Metabolic acidosis
  - Skeletal myopathy
  - Cardiac myopathy
  - Green urine

Ketamine

NEET PG 2019
FMGE 2020

- Phencyclidine derivative
- NMDA receptor antagonist
- Complete Anesthetic Agent
- Provides:
  - Analgesia
  - Amnesia
  - Sedation

Systemic Effects of Ketamine

- Mnemonic
- Opposite of Thiopentone
  - Enemy of CNS
  - Friend of other systems

System	Effects	Clinical Notes
CNS	↑ Intracranial pressure ↑ Intraocular pressure	Contraindicated in head injury, neurosurgery, glaucoma
	Hallucinations, delirium, epilepsy	Avoid in schizophrenia
Respiratory System	Bronchodilation	Drug of choice in bronchial asthma
Cardiovascular System	↑ Blood pressure↑ Heart rate	Drug of choice in shock
	Direct myocardial depressant	Contraindicated in ischemic heart disease
Muscle	↑ Muscle tone	May cause rigidity
Injection Site	No pain	Unique feature
Emergence Phenomena	Dreams, hallucinations, agitation (recovery phase)	Treated with benzodiazepines (Diazepam, Midazolam)

Cardio-Stable IV Induction Agent

01:08:32

- A cardio-stable IV induction agent is a drug that:
  - Does not increase BP
  - Does not decrease BP
  - Does not increase pulse rate
  - Does not decrease pulse rate
  - Maintains stable hemodynamics

Yourwish

Etomidate

- Clinical Importance
- Drug of choice for: Cardiac surgery
- Hemodynamically unstable patients
- Side Effect
  - Long-term infusion causes:
    → Adrenal insufficiency
    → Adrenal cortical suppression

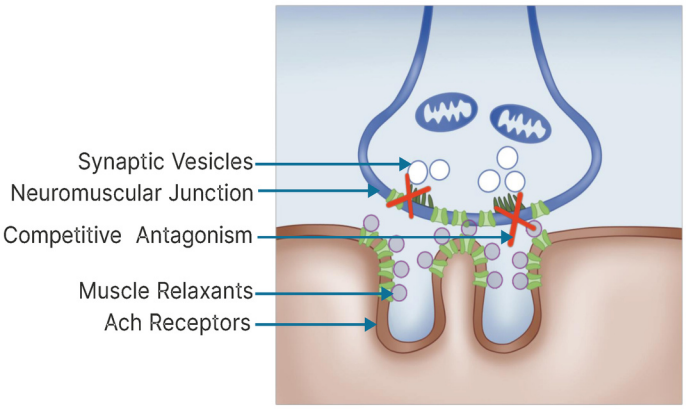
Methohexital

- Ultra-short acting barbiturate
- Drug of choice for:
  - Electroconvulsive therapy (ECT)
  - Psychiatric shock therapy
  - Schizophrenia treatment

Muscle Relaxants

NEET PG 2018, 2020, FMGE 2024, 2025, INICET 2025 01:09:45

- Purpose:
  - Used in general anesthesia
  - Produce skeletal muscle relaxation
- Mechanism of Action
  - Act at the neuromuscular junction
  - Block acetylcholine receptors
  - Prevent neuromuscular transmission
  - Cause muscle paralysis



Classification of Muscle Relaxants

Type	Group	Drugs
Depolarizing Muscle Relaxant	—	Succinylcholine (Suxamethonium)
Non-Depolarizing Muscle Relaxants	Benzylisoquinolinium	• Atracurium • Cisatracurium • Mivacurium • Doxacurium
	Steroidal	• Pancuronium • Vecuronium • Rocuronium

First Muscle Relaxant

- d-Tubocurarine

Side effects

- Histamine release
- Ganglion blockade
- Severe hypotension

Atracurium

- Hofmann degradation: Metabolism independent of liver/kidney
- Mechanism: Temperature and pH dependent degradation
- Clinical importance: Useful in liver disease, renal failure
- Side effects:
  - Histamine release
  - Laudanosine formation → Seizures (long infusion)

Cisatracurium

- Improved version of atracurium
- Advantages over atracurium:
  - Minimal histamine release
  - Less laudanosine production
- Metabolism: Hofmann degradation
- Clinical importance: Drug of choice in liver disease, renal failure

Duration of Action (Non-Depolarizing)

Mnemonic: "My Short Dog Has Long Tail"

- Mivacurium → Shortest
- Doxacurium → Longest

(Doxacurium rarely used due to toxicity)

Pancuronium

Mnemonic: "RRR – Pancuronium"

R1 – Recovery

- Delayed recovery
- Long duration

R2 – Renal Excretion

- Contraindicated in:Renal failure

R3 – Rate

Effect

- Increases heart rate
- Increases BP

Clinical Importance

- Drug of choice in: Shock

Vecuronium

- Most cardio-stable muscle relaxant
- Maintains normal BP and heart rate
- Excretion Biliary excretion
- Contraindicated In Obstructive jaundice

Rocuronium

- Fastest onset among non-depolarizing relaxants
- Difference Fastest onset ≠ Shortest duration
- Side Effect pain during injection

Succinylcholine (Scoline)

- Type: Depolarizing muscle relaxant (Other name: Suxamethonium)
- Fastest acting muscle relaxant with shortest duration
- Onset: 30–45 seconds
- Duration: 3–8 minutes
- Metabolism: Plasma pseudocholinesterase

Scoline Apnea

- Occurs when: Pseudocholinesterase deficiency
- Result: Prolonged paralysis, delayed breathing recovery
- Diagnosis: Dibucaine number test
- Management: Positive pressure ventilation, fresh frozen plasma (FFP)

Side Effects

- Fasciculations: Violent muscle contractions → Muscle soreness (most common)
- Hyperkalemia: Potassium release from muscle cells (↑ 0.5–1 mEq/L)
  - Contraindicated in: Hyperkalemia, burn patients, muscular dystrophy, neuromuscular disease, stroke
- Malignant Hyperthermia: Most dreaded complication
  - Triggering drugs: Succinylcholine, halothane
  - Features: Rapid ↑ $ETCO_2$, hyperthermia, muscle rigidity, metabolic acidosis, tachycardia
  - Treatment: Dantrolene (drug of choice)

Clinical case

Q. A 26 year old male . ASA I is posted for laproscopic appendicectomy pre op evaluation is normal. He induced with propofol and succinylcholine intubation is smooth and surgery begins.

- Five minutes later
  - ETCO2 starts rising rapidly
  - Heart rate 140/min
  - Temp rise 16.8 to 38.9
  - Muscle rigidity is noted

Malignant Hyperthermia

Genetics

- **Inheritance:** Autosomal dominant
- **Gene involved:** RYR1 gene (Ryanodine receptor)pmc.ncbi.nlm.nih+1

Pathophysiology

- Trigger → Ryanodine receptor activation
- ↓ Excess calcium release from sarcoplasmic reticulum
- ↓ Severe muscle contraction

- ↓ Hypermetabolism
- ↓ Hyperthermia + acidosis

Triggering Agents
- **Most important:** Succinylcholine, halothane
- Also possible with other volatile anesthetics

Early Clinical Features
- Rapid rise in $ETCO_2$
- Tachycardia
- Muscle rigidity
- Hyperthermia

Other Features
- Metabolic acidosis
- Hyperkalemia
- Rhabdomyolysis
- Myoglobinuria

Diagnosis
- **Confirmatory test:** Halothane-Caffeine Contracture Test

Management
- **First steps:** Stop triggering agents, stop inhalational anesthetics, give 100% oxygen
- **Drug of Choice:** IV Dantrolene Sodium
- **Mechanism:** Blocks calcium release from sarcoplasmic reticulum

Inhalational Anesthetic Agents

01:20:53

- Primary use: Maintenance of general anesthesia special use
- In children:
  - Used for induction of anesthesia
  - Children may not tolerate IV cannulation
- Agent Used for Induction in Children
  - Sevoflurane
  - Sweet odor
  - Non-irritant

Two Important Parameters
- **MAC (Minimun Alveolar Concentration):**
  - Definition: Minimum concentration needed to prevent movement in response to surgical stimulus
  - Significance: Indicates potency of anesthetic ($MAC \propto 1 / Potency$)
  - Meaning: High MAC → Low potency; Low MAC → High potency
- **Potency Order (H I S D X):**
  - Most potent: Halothane
  - Isoflurane

- Sevoflurane
- Desflurane
- Xenon
- Least potent: Nitrous oxide

- **Blood-Gas Partition Coefficient:**
  - **Definition:** Indicates speed of induction and recovery
  - **Relationship:** High coefficient → Slow induction; Low coefficient → Fast induction
- **Fastest Induction Agents (fast → slow):**
  - Xenon
  - Desflurane(Clinically most used fastest agent)
  - Sevoflurane
  - Isoflurane
  - Halothane

Halothane

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"4 H of Halothane":

- Hyperthermia: Can trigger malignant hyperthermia
- Heart Effects: Hypotension, bradycardia; sensitizes myocardium to catecholamines → Contraindicated in heart disease
- Hepatitis: Halothane hepatitis (immune-mediated liver injury); occurs with repeated exposure
- High Bronchodilation: Maximum bronchodilation (previously choice for bronchial asthma); now sevoflurane preferred (halothane may increase airway resistance)
- Additional Feature:
  Produces maximum muscle relaxation

Isoflurane

- Main Uses
  - Neurosurgery
  - Cardiac surgery
  - Decreases intracranial pressure (ICP)
  - Safe in renal disease
- Side Effect: Coronary steal phenomenon

Sevoflurane

- Used for:
  - Induction
  - Maintenance
- Properties
  - Sweet odor
  - Non-irritant
- Clinical Uses
  - Induction in children
  - Bronchial asthma
  - Daycare surgery
  - Neurosurgery

Nitrous Oxide

Category	Details
Type & Properties	• Least potent inhalational anesthetic • MAC ≈ 105 • Blue cylinder
Clinical Role	• Used as carrier gas • Not used as primary anesthetic • Provides good analgesia
Contraindications	• Cardiac surgery • Closed cavity surgeries (pneumothorax, intestinal obstruction, middle ear surgery) • Reason: Expands air-containing spaces
Diffusion Hypoxia	**Mechanism:** Rapid diffusion into alveoli → displaces O_2 • **Result:** Sudden hypoxia after stopping N_2O • **Prevention:** 100% O_2 before discontinuation
Second Gas Effect	• Enhances uptake of other inhalational agents • **Result:** Faster induction

Reversal Phase of General Anesthesia

01:36:25

- Goal:
  - Restore consciousness
  - Restore muscle power
- **Step 1** – Stop Inhalational Agents → Patient regains consciousness
- **Step 2** – Reverse Muscle Relaxation → Muscle relaxant effect persists.
- **Reversal agents**
  - Neostigmine(M/c)
    → Side effect: Bradycardia
    → Solution: Combine with Atropine or Glycopyrrolate (prevents bradycardia)
  - Pyridostigmine
  - Edrophonium
  - Sugammadex
    → New-generation reversal agent
    → Use: Reverses Rocuronium, Vecuronium
    → Advantages: No bradycardia; no need for atropine/glycopyrrolate

Signs of Adequate Reversal

- **Bedside Test:** Sustained head lift
  - Patient lifts head for >5 seconds
  - Adequate muscle recovery
- **Best Test**: Train-of-Four (TOF) Monitoring
  - TOF ratio > 0.9
  - Complete neuromuscular recovery

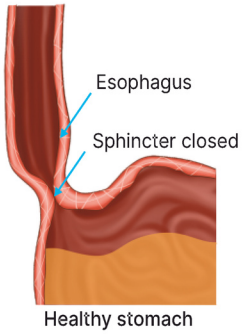
Condition	IV Induction Agent	Muscle Relaxant	Inhalational Agent
Heart Disease	Etomidate (E)	Vecuronium (V)	Desflurane (D) / Isoflurane (I)
Bronchial Asthma	Ketamine	Avoid benzylisoquinolinium relaxants	Sevoflurane (1st) / Halothane (2nd)
Shock	Ketamine	Pancuronium	Desflurane / Isoflurane
Daycare Surgery	Propofol (P)	Mivacurium (M)	Sevoflurane (S)
Neurosurgery	Etomidate / Propofol	Vecuronium	Isoflurane / Desflurane

2. AIRWAY MANAGEMENT & EQUIPMENT

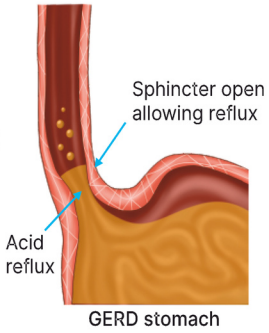
RAPID SEQUENCE INDUCTION (RSI)

00:00:09

- **Definition**
  - Giving general anaesthesia to a patient with a full stomach.
  - Normally, for GA, the patient should be in a fasting state to avoid the risk of aspiration.
  - RSI is used when a patient is in an emergency (e.g., RTA patient who just had a meal)
- **Patients at Risk of Aspiration**
  - Obese patients
  - Emergency patients
  - GERD patients (Gastro-oesophageal Reflux Disease)
  - Patients with high intra-gastric pressure (e.g., pregnancy)



Healthy stomach

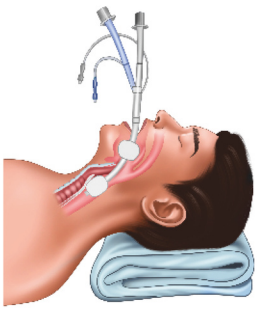


GERD stomach

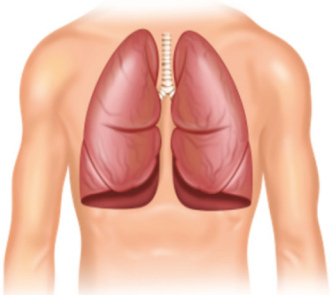
Steps Of Rapid Sequence Induction

- **Preoxygenation**
  - Done before applying pressure
  - Use a normal mask
  - Bag mask ventilation is avoided

    → Reason: Bag mask ventilation pushes air into the oesophagus → triggers aspiration
- **Sellick's Maneuver**
  - Immediately after induction, pressure is applied on cricoid cartilage
  - This closes the oesophagus, which prevents aspiration



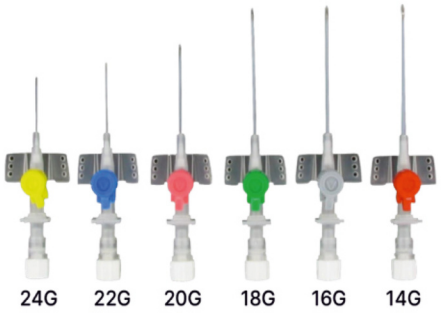
- **When to Remove Cricoid Pressure**
  - After intubating the patient
  - Inflate the cuff of the endotracheal tube
  - Once the cuff is inflated → it encircles the whole trachea → no risk of aspiration
  - Even if aspiration material comes, it does not go inside
  - Remove the cricoid pressure.



Yourwish

INTRAVENOUS CANNULA (IV CANNULA)

00:02:55

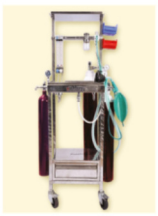


- Range: 14 to 26 gauge
  - Purple colour (for pre-term infants/newborns): 26 gauge
  - Paediatric cases: 22 and 24 gauge
  - Adults (routine surgery): 18 and 20-gauge
  - Shock patients: 14 and 16 gauge
- Mnemonic for IV Cannula Colors
  - "Oh Great God, Please Bless Your People"
- Flow Rates (Remember from bottom to top: 26 to 14)

Letter	Colour	Gauge	Flow Rate (mL/minute)
O	Orange	14	270
G	Gray	16	200
G	Green	18	100
P	Pink	20	50
B	Blue	22	30
Y	Yellow	24	20
P	Purple	26	10

ANAESTHESIA MACHINE (BOYLE'S MACHINE)

NEET PG 2018, 2024
FMGE 2019, 2021, INICET 2024

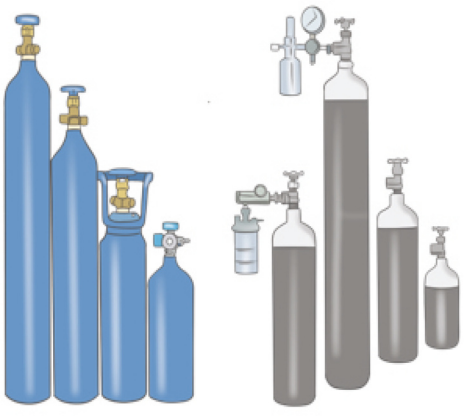


- **Introduction**
  - Also called Anaesthesia Workstation or Boyle's Machine
  - Introduced by Edmund Gaskin Boyle in 1917
- Three Systems of Anaesthesia Machine

High-Pressure System	Intermediate Pressure System	Low-Pressure System
Cylinders	Flow control valves	Rotameter
Yoke valve assembly	Oxygen-nitrous proportionating devices	Vaporizer
Pressure gauge system	Oxygen flush (35-75 L/min oxygen)	Common gas outlet
Pressure-reducing valve	Central supplies	—

Cylinders

- Material of Cylinders
  - Molybdenum (MC used)
    → Non-MRI compatible
  - Titanium or Aluminium
    → MRI compatible
- Sizes of Cylinders
  - Size A = Smallest
  - Size J = Largest
  - Size E = Most commonly used



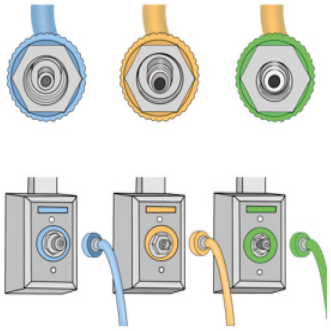
Gas	Body Color	Shoulder Color
Oxygen	Black	White
Air	White	Black
Nitrous	Blue	Blue
Entonox - Mixture of nitrous + oxygen in equal parts	Blue	White
Carbon Dioxide	Green	Green

- Pipeline Colors (Central Supply)
  - Rule: Pipeline color = Shoulder color of cylinder
  - Oxygen pipeline: White
  - Air pipeline: Black
  - Nitrous pipeline: Blue
  - Vacuum pipeline: Yellow
- Central Supply Pressure
  - Air pressure in central supply: 60 PSI

FMGE 2021
INICET 2020
00:10:50

Pin Index Safety System (piss)

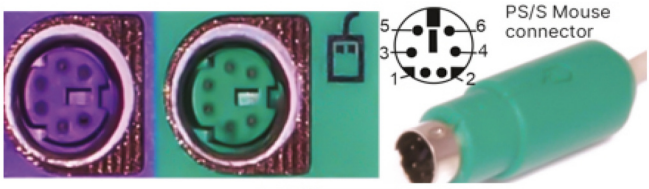
- Prevents the wrong attachment of cylinders
- Integrated into the yoke valve assembly
- Pins on the machine, holes on the cylinders will have to match

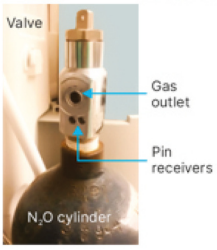


Pin Index System (Label positions 1-7)

FMGE 2019

Gas	Pin Index
Air	1, 5
Oxygen	2, 5
Nitrous	3, 5
Entonox	7
Carbon Dioxide	1,6 or 2,6





- **Diameter Index Safety System (DISS)**
  - Safety system for pipeline attachments (central supply)
  - Prevents the wrong attachment of pipelines
  - Eg: Cannot insert the oxygen pipe into the vacuum port

Vaporizer

00:13:27

- It is a system that stores a liquid inhalational agent
- Made of copper
- **Special Requirements**
  - Desflurane requires a special vaporizer
  - Reason: Low boiling point
  - A special vaporizer is very costly

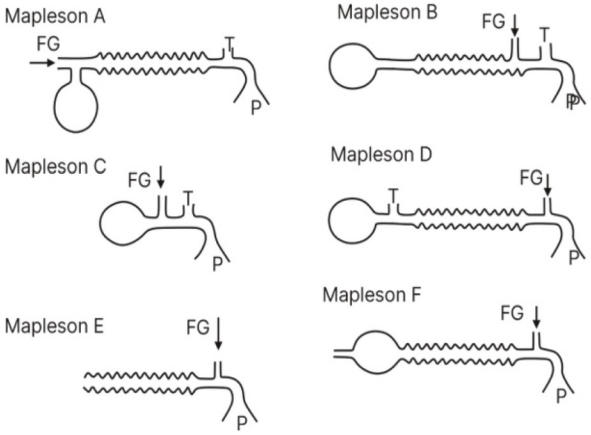
Color Coding of Vaporizers

FMGE 2022

Agent	Color	Mnemonic
Halothane	Red	Hell-o-thane = Hellfire = Red
Isoflurane	Purple	-
Sevoflurane	Yellow	Sevo = Sweet semiya = Yellow
Desflurane	Blue	Des = Desi = Jersey color = Blue

BREATHING CIRCUITS

00:15:02



- Types Currently Used
  - Semi-closed circuits: Mapleson circuits (most common)
  - Closed circuits
  - Open circuits (Schimmelbusch mask) used initially - not used anymore

Mapleson Circuits

NEET PG 2018
INICET 2024

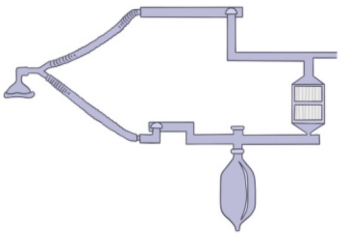
- **Mapleson A Circuit**
  - Introduced when no controlled ventilation/ventilator was available
  - The patient will be ventilated spontaneously
  - **Problem**: Patient was re-breathing their own Co_2
- **Magill Modification - Magill circuit**
  - Added an inner tube to the Mapleson A
  - Inner tube → Expiratory gases
  - Outer tube → Inspiratory gases

- Fresh gas flow = Minute volume (to prevent re-breathing)
- Circuit of choice: Spontaneous ventilation

- **Mapleson B and C Circuits**
  - Obsolete circuits
  - Not used at all
- **Mapleson D Circuit**
  - Most commonly used nowadays
  - Circuit of choice: Controlled ventilation
  - Problem: Re-breathing of Co_2
- **Bain Modification - Bain circuit**
  - Modified by Dr. Archie Bain
  - Added inner tube:
    → Inner tube → Inspiratory gases
    → Outer tube → Expiratory gases
  - Fresh gas flow = 1.6 times minute volume (prevents complications)
  - Length: 1.8 meters
  - Used for: Head and neck surgeries
- **Mapleson E Circuit**
  - Bagless and valveless circuit
  - If you remove the bag and valve from Mapleson D → Mapleson E
  - Also called Ayre's T-piece
  - Used for:
    → Shifting a patient from one center to another
    → Weaning a patient from a ventilator
  - Currently not used
- **Jackson Rees Modification**
  - Modified by adding a bag to the Mapleson E circuit.
- **Mapleson F Circuit**
  - Jackson Rees modification of Mapleson E
  - Circuit of choice: Controlled as well as spontaneous ventilation in Paediatric cases
- **Important Rule for Mapleson Circuits**
  - As we proceed from A to F, APL valve goes away from the patient

Closed Circuit

00:20:40



- Characteristics
  - No APL valve
  - No expiratory valve
  - Expired CO_2 goes through the expiratory limb into the chamber, where it gets absorbed.
    → Chamber → Carbon Dioxide Absorbing Chamber
- Heart of the closed circuit: Soda lime
  - The alternative is Baralyme

- SODA LIME: Composition
  - 80% Calcium hydroxide
  - 16% Water
  - 3% Sodium hydroxide
  - 1-2% Potassium hydroxide
  - Plus Silica (improves the hardness of granules)

- Agents to AVOID with Soda Lime: CTS
  - C: Chloroform
  - T: Trilene
  - S: Sevoflurane
- Sevoflurane + Soda Lime = Olefin
  - Occurs when sevoflurane is given in low flows
  - React with soda lime to form Compound A (also called Olefin)
  - Compound A is nephrotoxic
- BARALYME
  - 80% Calcium hydroxide
  - 20% Barium hydroxide
- Agents to AVOID with Baralyme: DIE
  - D: Desflurane
  - I: Isoflurane
  - E: Enflurane
- Reaction
  - Forms carbon monoxide
  - Maximum incidence: With desflurane

NEET PG 2022, INICET 2021

00:24:00

Ambu Bag

- **AMBU** = **A**rtificial **M**anual **B**reathing **U**nit
- It Delivers 100% oxygen to the patient
- Valves on Ambu Bag
  - Ruben's Valve
    → Unidirectional valve
    → Prevents re-breathing of Co_2
  - Pressure Relieving Valve
    → Seen in paediatric ambu bags

AIRWAY DEVICES

00:25:06

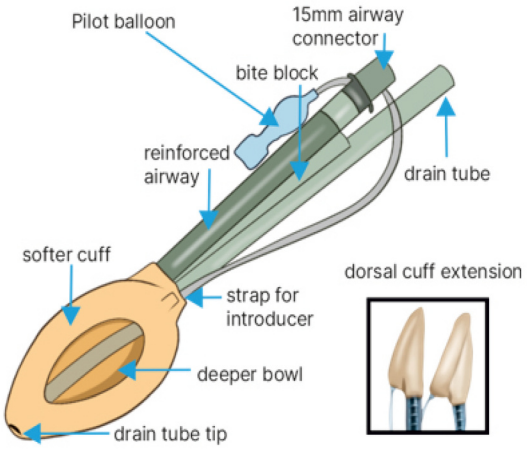
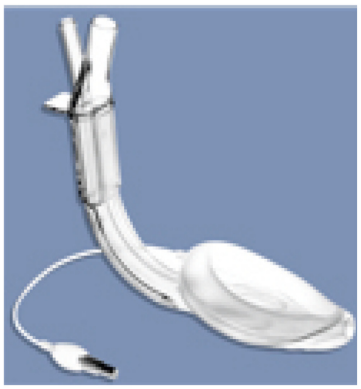
NEET PG 2022
FMGE 2018, 2020, 2023
INICET 2018, 2020

Laryngeal Mask Airway (lma)

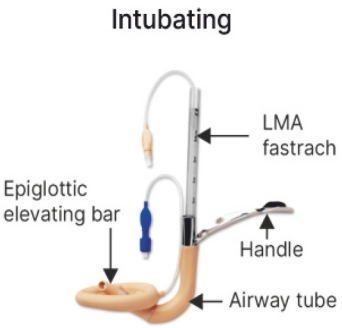
- These are a temporary airway device
- 1st Generation LMA (Single port - only for ventilation)
  - Classical LMA
  - Flexometallic LMA
  - Cobra LMA
  - Ambu Aura

- **2nd Generation LMA (Extra port added)**
  - Gastric port
  - Oesophageal port (for Ryle's tube insertion to deflate the stomach)
  - **Importance**: Prevents risk of aspiration

- **Types:**

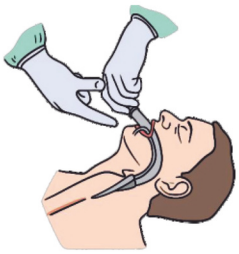
• LMA ProSeal	
• SLIPA (Streamlined Liner of Pharynx Airway)	
• i-gel	
• LMA Supreme	
• Ambu Gain	

- **3rd Generation LMA**
  - **Baska Mask**
    - → Excellent for positive pressure ventilation
    - → Superior gastric reflux protection
    - → Best for secretion clearance



- Special Type: Intubating LMA
  - Not under 3rd generation
  - Special type of LMA
  - After putting an LMA, we can introduce an endotracheal tube through another port

- Characteristic all LMA
  - LMAs are a temporary airway
  - Used in Short procedures
  - Patients should not be at risk of aspiration
  - Cannot use for:
    - → Obese patients (risk of aspiration)
    - → Full stomach patients
    - → Blood in the oral cavity



Airway Anatomy

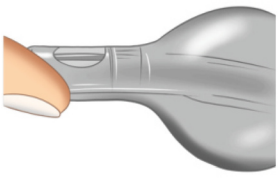
00:28:28

- Narrowest Portion of Airway
  - **Adult**: Glottic opening
  - **Child**: Subglottis
- The best way to secure the Airway is Endotracheal intubation (Not LMA)

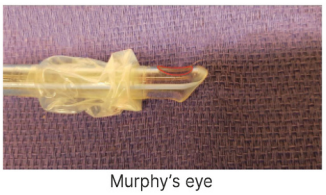
Endotracheal Tubes

00:29:00

- Types of Endotracheal Tubes
  - Red Rubber Tubes (NOT used now)
    - → High-pressure, low-volume cuff
    - → Causes pressure necrosis of the trachea
  - PVC Cuffed Tubes (MC used)
    - → Low-pressure, high-volume cuff



- Parts of the Endotracheal Tube
  - Murphy's Eye
    - → Opening on the lateral side of the tube
    - → Provides an alternate route for ventilation if the main opening is blocked due to secretions during prolonged ventilation
- Size of Endotracheal Tube
  - Size = Internal diameter of tube (Not length)
  - Internal diameter determines resistance



Murphy's eye

Endotracheal Intubation

00:32:14

- Position for Intubation: Sniffing Morning Air Posture (For slim/moderately built patients)
  - Flexion at the cervical spine
  - Extension at the atlanto-occipital joint

- Ramped Up Position (For obese patients)
  - Keep many pillows beneath the patient's shoulder
  - Head is elevated
  - The oral and pharyngeal axis is in a single direction

Types Of Laryngoscopes

- Curved Blade Laryngoscope
  - Macintosh laryngoscope
  - Commonly used in adults
- Straight Blade Laryngoscope
  - Miller's laryngoscope
  - Commonly used in paediatrics
- McCoy's Laryngoscope(Modified Laryngoscopes)
  - Added a small structure to handle
  - Helps lift the epiglottis and tongue

- McGrath Laryngoscope: Video laryngoscope
- Other Video Laryngoscopes (For difficult airway)
  - GlideScope
  - C-MAC blade (D type)
  - McGrath laryngoscope
  - A-track

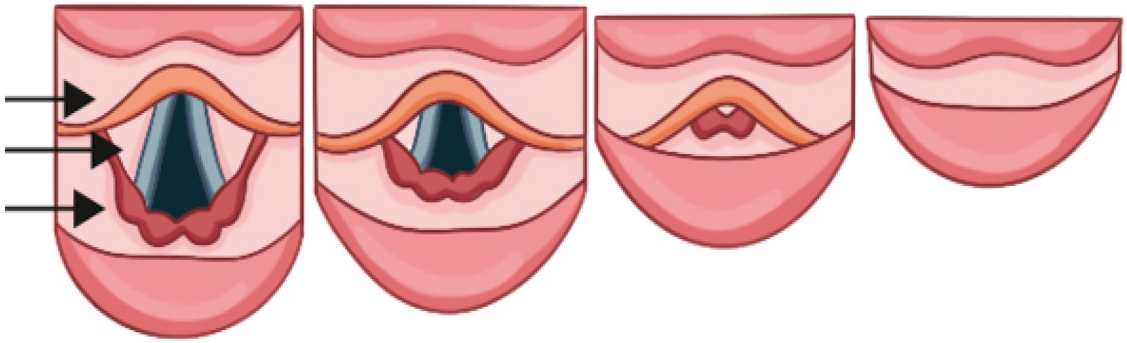
Cormack-lehane Grading

00:35:46

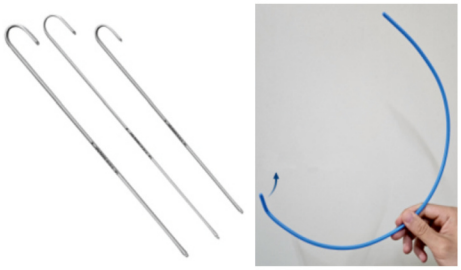
- **Not given during PAC**
- Given **while intubating**
- **Not a predictor of a difficult airway**
- It is based on the appearance of the vocal cords after putting the laryngoscope

Grade	What is Visible
Grade 1	Whole laryngeal aperture visible / Full glottic opening
Grade 2	Only the posterior wall is visible
Grade 3	Only epiglottis visible (vocal cords NOT visible)
Grade 4	Epiglottis are also not visible

Yourwish



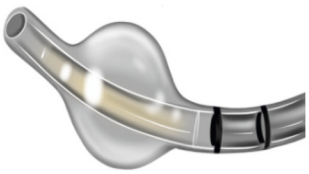
Management Of Grade 3/4



- **For Grade 3:**
  - Use **Bougie**- end is curved
- **For Grade 4:**
  - Blind intubation (keeping anatomy in mind)
  - OR Fibre optic intubation (if available)
- **Bougie vs Stylet**
  - **Bougie**: Used for Grade 3 Cormack-Lehane
  - **Stylet**: Used when using flexometallic tubes

Endotracheal Tube Position

00:38:56



- Correct Position: 3-4 cm above carina
- Screening Tests (Not confirmatory):
  - Auscultation
  - Fog/fumes on tube (patient breathing)
- Best Confirmatory Test: CAPNOGRAPH

Capnography- $Etco_2$

- Normal Reading: 35-45 mmHg

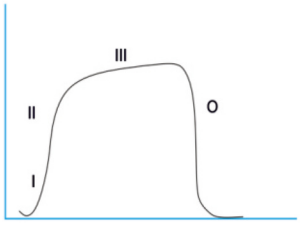
Phases Of Capnograph

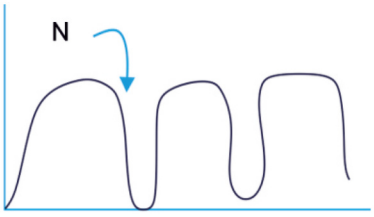
Phase	Name
Phase 1	Inspiratory baseline
Phase 2	Expiratory upstroke
Phase 3	Alveolar plateau
Phase 0	Inspiratory downstroke

Angles

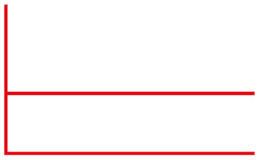
- **Alpha angle**: Between Phase 2 and Phase 3
- **Beta angle**: Between Phase 3 and Phase 0
- **Measurement point of capnography**: At the beta angle

Abnormal Capnography Patterns



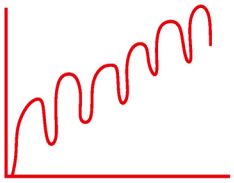


- **Flat Line Capnography ($ETCO_2$ = 0)**
  - Oesophageal intubation
  - Cardiac arrest (post-intubation)
  - Circuit disconnection
  - Complete bronchospasm



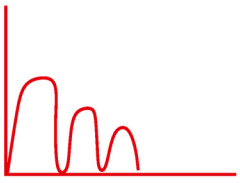
- **Shark Fin Capnography**
  - Appearance: Like the fin of a shark
  - Cause: Bronchospasm
  - Initially $ETCO_2$ low
  - As bronchospasm worsens → $ETCO_2$ rises

- **Stepladder Capnography**
  - Appearance: Stepladder increase in capnography
  - Cause: Malignant hyperthermia
  - Triggered by:
    → Suxamethonium (scoline)
    → Inhalational agents (halothane)
    → Due to the triggering of abnormal ryanodine receptors
  - Capnograph value is usually 100 mmHg



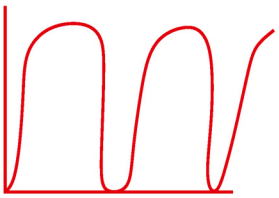
- **4. Capnography Above Baseline**
  - Appearance: Rising above baseline
  - Causes:
    → Faulty expiratory valve
    → Soda lime exhaustion (in closed circuit)
  - Patient re-inhaling own Co_2

- **Suddenly Falling $ETCO_2$**
  - Appearance: The capnograph value is always decreasing
  - Cause: Venous air embolism (VAE)
  - Other features of VAE:
    → $ETCO_2$ falls
    → Airway pressure increases (sudden increase)
    → Mill wheel murmur
  - Best diagnostic test for VAE: Trans-oesophageal echocardiography
  - Management:
    → Notify the surgeon and stop the surgery
    →Don't use fluid



- **Curare Notch Capnography**
  - Appearance: Notch developing in the capnograph
  - Meaning: Return of spontaneous breathing
  - Management: Give a top-up dose of muscle relaxant

- **Hyperventilation**
  - Capnograph: Below baseline
  - Reason:
    → Increasing respiratory rate
    → CO_2 washed off
- **Hypoventilation**
  - Capnograph: $ETCO_2$ rises (above baseline)
  - Reason: Decreasing respiratory rate



Special Endotracheal Tubes

00:50:24

Flexometallic Tube

- Used for: Prone position surgeries
- Reason:
  - A normal PVC tube can bend and kink in the prone position
  - Flexometallic tube prevents kinking
- Insertion: Use the stylet first, then insert the tube
- Example: Major spine surgery in the prone position
  - After turning prone → airway access is extremely limited

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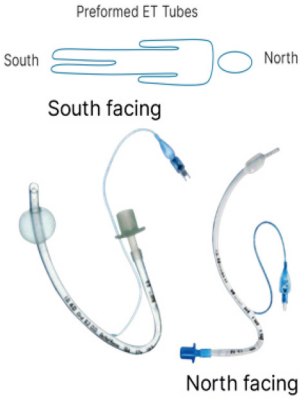
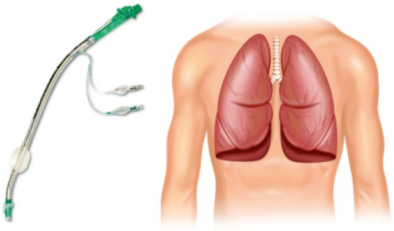
RAE Tube (Ring, Adair, Elwyn Tube)

- Type: Nasotracheal tube
- Used for: Oral cavity cancers



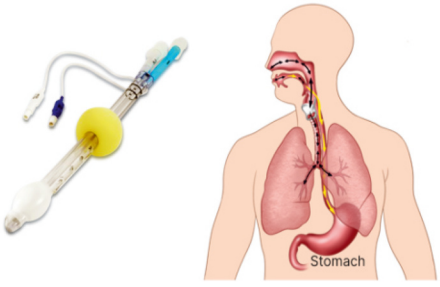
Double Lumen Tube (DLT)

- Used for: Surgeries requiring one lung ventilation
  - Carcinoma of the lung
  - Lung abscess surgery
- Position confirmation: Fibre optic bronchoscope



Oesophageal Combitube

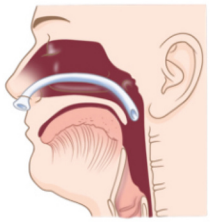
- Used for: Emergency scenarios, which help us to blindly insert the tube
- **Ideal for**: Casualty/Emergency
  - Patient semiconscious/drowsy
  - GCS - poor
  - If we don't know intubation



Airway Adjuncts

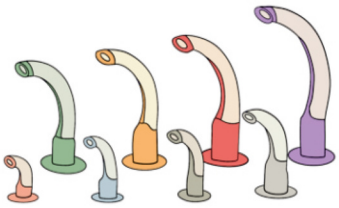
00:55:20

- **Uses:**
  - Patient with clenched teeth
  - Coming with a seizure/fit
    → Need to secure the airway where we cannot administer GA
  - The patient is not allowing oral airway insertion



Types

- Nasopharyngeal Airway (NPA)
  - Size determination: Keep between the tip of the nose and the tragus of the ear
  - Insertion:
    → Prelubricate the airway with lignocaine gel
    → Introduce airway
    → Take an Ambu bag and ventilate the patient
  - Contraindications:
    → Bleeding disorder
    → Skull base fracture (can pierce and damage the brain)



- **Oropharyngeal Airway (Guedel's Airway)**
  - Used for: Unconscious patients
  - Reason:
    → It is inserted through the mouth
    → In a conscious patient, it will result in the gag reflex
  - Size determination: Keep between the tragus of the ear and the angle of the mouth

Oxygen Delivery Devices

00:58:45

NEET PG 2022
INICET 2021

- **Classification**
  - Low flow devices
  - High flow devices

Low-flow Oxygen Devices

- Nasal Cannula
  - Flow rate: 1-6 L/min
  - FiO_2 delivered: 25-45%
- Face Mask
  - Flow rate: 6-10 L/min
  - FiO_2 delivered: 35-65%
- Non-Rebreathing Mask (NRBM)
  - Flow rate: 10-15 L/min
  - FiO_2 delivered: 95%
- Venturi Mask
  - Flow rate: 2-15 L/min
  - FiO_2 delivered: 24-60%
  - Fixed oxygen delivery device
  - Works on Bernoulli's principle (air flowing through a narrowed passage)

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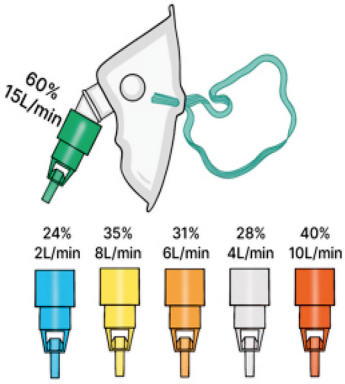
High Flow Oxygen Device

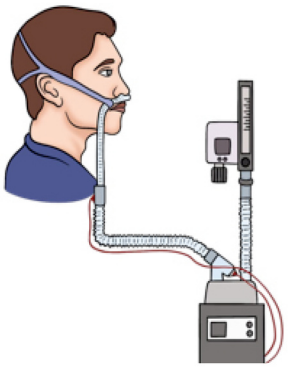
- High Flow Nasal Cannula
  - Flow rate: 40-60 L/min
  - FiO_2 delivered: 100%

Venturi Mask - Color Coding

- **Mnemonic: "Boy Was Often Yelling, Run Girl"**

Color	Liters	FiO_2
Blue (B)	2	24%
White (W)	4	28%
Orange (O)	6	31%
Yellow (Y)	8	35%
Red (R)	10	40%
Green (G)	15	60%



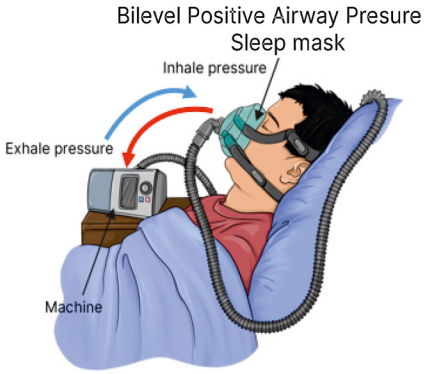


VENTILATION

01:03:50

NEET PG 2024
FMGE 2025, INICET 2020

- **When to Use a Ventilator**
  - If saturation is not improving with a high flow nasal cannula
  - Below 90% saturation → tissues become hypoxic/vulnerable to hypoxia



Non-invasive Ventilation

- Ventilation through a mask (not through a tube)
- Vital Prerequisites:
  - The patient should be conscious
  - The patient should be on an empty stomach
    → High-pressure air → aspiration
- Modes of Non-Invasive Ventilation
  - CPAP (Continuous Positive Airway Pressure)
    → Used for: Mild to moderate COPD
  - BiPAP (Bilevel Positive Airway Pressure)
    → Used for: Severe COPD
    → Two modes:
      - Inspiratory pressure mode
      - Expiratory pressure mode
    → Use: High inspiratory + Low expiratory pressure

Invasive Ventilation

- When to Use
  - Non-invasive not working, no rise in spO2
  - Patient becoming unconscious
  - The patient cannot sustain the airway
  - GCS <7 or <8 → intubate → Then start invasive ventilation
- Important Concepts
  - Tidal volume
  - Pressure

Modes Of Invasive Ventilation

CMV (Continuous Mandatory Ventilation)

- Here, a ventilator can fully support the patient while controlling both volume and pressure
  - Heavy sedation is required
  - Side effect:
    → If kept on CMV for long → patient becomes totally dependent → atrophy of muscles occurs

ACMV (Assist Control Mandatory Ventilation)

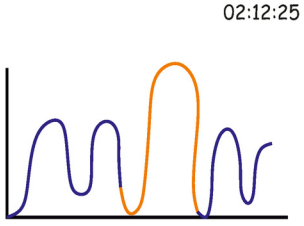
- Volume Control Mode
  - Control variable: Volume
  - The ventilator generates pressure
  - Sedation: Moderate sedation
  - Side effect:
    → If the patient is hyperventilated- Respiratory alkalosis
- Pressure Control Mode
  - Control variable: Pressure
  - Commonly used in ARDS patients (low compliance)
  - Sedation: Moderate sedation
  - Side effect:
    → Patient hypoventilated -? Respiratory acidosis

Spontaneous Mode (step Down Mode)

- SIMV (Synchronized Intermittent Mandatory Ventilation)
  - Side effect:
    → Asynchrony of breathing pattern → Respiratory acidosis
- Pressure Support Mode

Ventilator Settings

- Respiratory Acidosis Management:
  - Increase the respiratory rate to 20 or 24
- ARDS Management:
  - Give low tidal volume (4-6 mL/kg)
  - High tidal volume → overinflation → lung collapse



Parameter	Normal Value
Respiratory Rate	12-18/min
Tidal Volume	6-8 mL/kg
FiO_2	21-100%
PEEP	5-24 cmH_2O
I: E Ratio	1:2 or 1:3

Reverse I: E Ratio Ventilation

- Reverse I: E Ratio
  - 3:1 or 4:1
- Used in refractory ARDS (not responding to normal ventilator settings)
  - Other Option for ARDS → Prone ventilation

Peep (positive End-expiratory Pressure) 01:15:35

- PEEP
  - Improves oxygenation
  - Prevents atelectasis
  - Decreases the work of breathing
- When to Use PEEP
  - ARDS patients
  - Pulmonary edema
- Side Effects of High PEEP
  - Decreases venous return → Decreases cardiac output → Hypotension
- Contraindications of PEEP
  - Shock
  - Increased intracranial pressure
  - Head injury/Neuro patients

BASIC LIFE SUPPORT (BLS) & ADVANCED CARDIAC LIFE SUPPORT (ACLS) 01:16:44

- **Rescue Position (Lateral Position)**
  - When to use:
    → Collapsed patient
    → Has pulse & breathing but unconscious
  - Purpose: Protect airway

Steps Of Bls

- Mnemonic: SCCCS
  - S = Scene Safety
  - C1 = Check for Response
  - C2 = Call for Help
  - C3 = Check for Pulse and Breathing
    → Check carotid pulse (adults)
    → Check brachial pulse (infants)
  - S= Start CPR (if no pulse, no breathing)

- **CPR PROTOCOL**
  - **Old protocol**: ABC
    → A = Airway
    → B = Breathing
    → C = Circulation
  - **Current protocol: CAB**
    → C = Circulation (compressions)
    → A = Airway
    → B = Breathing (rescue breaths)
  - **CPR Sequence**
    → Start with compressions
    → Secure airway
    → Give rescue breaths

Basic Life Support (bls) & Cpr

- Signs Indicating Need for CPR
  - No pulse and no breathing → Start CPR immediately

Chest Compressions Parameters

- Adults
  - Rate: 100-120 compressions per minute
  - Depth: 2-2.4 inches or 5-6 cm
  - Ratio→ 30 compressions: 2 rescue breaths
  - Sets: 4 sets of 30:2 in one minute
  - Allow complete chest recoil while giving compressions

- **Infants**
  - Depth: 1.5 inches or 4 cm
  - Children (>1 year): Depth: 2 inches or 5 cm or 1/3 of the anteroposterior diameter of the chest

Compression To Ventilation Ratios

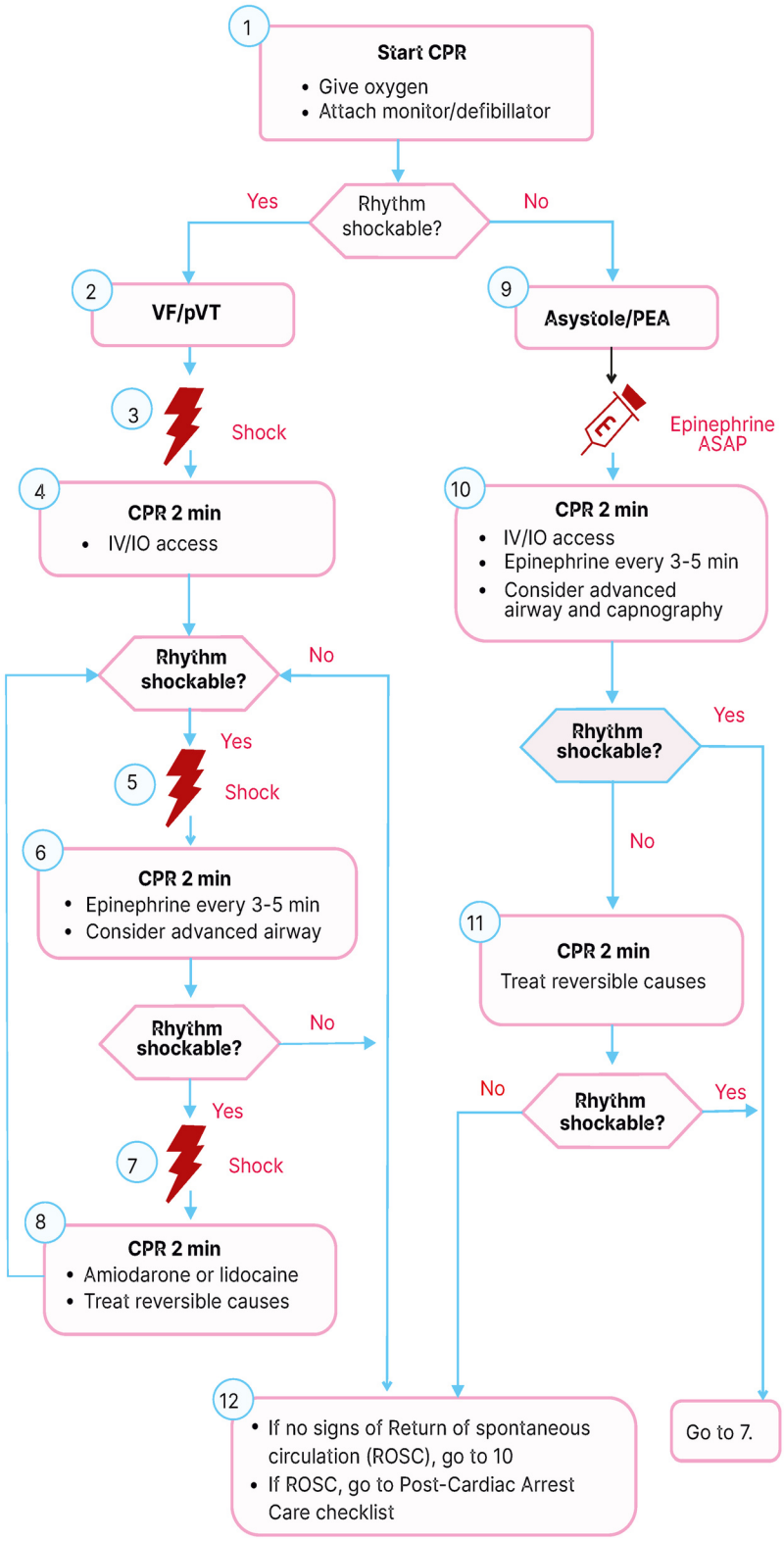
	Adults	Paediatrics
Single rescuer	30: 2	30: 2
More than one rescuer	30: 2	15: 2
After Advanced Airway Placement (ET tube / LMA)	1 rescue breath every 6 seconds	1 rescue breath every 2-3 seconds

- Newborns
  - Ratio: 3:1 (3 compressions: 1 rescue breath)
- After Advanced Airway Placement (Endotracheal Tube/LMA)
  - Don't pause after 30 compressions
  - Continue 100-120 compressions per minute continuously

Yourwish

Advanced Cardiac Life Support (acls) Algorithm

Adult Cardiac Arrest Algorithm



CPR Quality

- Push hard (at least 2 inches [5cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruption in compressions,
- Avoid excessive ventilation.
- Rotation compressor every 2 minutes, or sooner if fatigued.
- If no advanced airways, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography If $petCO_2$ <10 mm Hg, attempt to improve CPR quality.

Shock Energy for Defibrillation

- Biphasic: Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

Drug Therapy

- **Epinephrine IV/IO dose:** 1mg every 3-5 minutes
- **Amiodarone IV/IO dose:** First dose: 300mg bolus. Second dose: 150mg.

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airways in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of spontaneous circulation (ROSC)

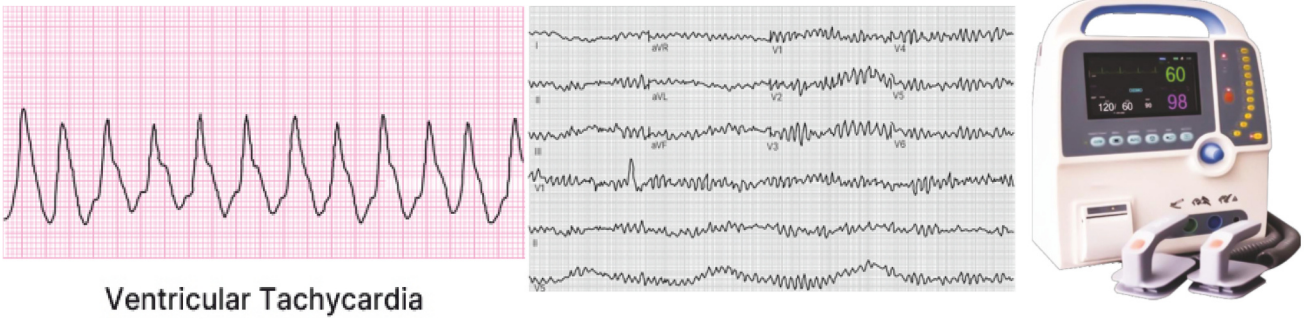
- Pulse and blood pressure
- Abrupt Sustained increase in in $PetCO_2$ (typically >40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypoglycemia
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

- **Initial Steps**
  - Patient in cardiac arrest → Start CPR
  - Give oxygen
  - Connect to the defibrillator
  - Determine rhythm: Shockable or Non-shockable
- **Shockable Rhythms**
  - **Types**:
    → Ventricular tachycardia
    → Ventricular fibrillation
  - **Management of Shockable Rhythm**
    → Deliver shock (Asynchronous shock)
    → Check rhythm after every 2 minutes
    → Give shock if required
    → **After 2 shocks** → Start adrenaline
    → **After 3 shocks** → Start amiodarone
    → Rule out 5 H's and 5 T's
- **Non-Shockable Rhythms**
  - Patient showing asystole (flatline)
  - Don't give shock
  - Continue compressions
  - Start adrenaline as soon as possible
  - Rule out 5 H's and 5 T's as soon as possible (immediately or after starting adrenaline)
  - Repeat adrenaline every 3-5 minutes

Defibrillation



Ventricular Tachycardia

- Types of Shock Delivery
  - Monophasic: 360 joules
  - Biphasic: 120-200 joules
  - Type: Asynchronous, monophasic cardioversion
  - Only delivered in shockable rhythms

Drugs In Cardiac Arrest

01:25:00

- **Adrenaline (Epinephrine)**
  - **When to give**: After 2 shocks in shockable rhythm
  - **Dose**: 1 mg
  - **Dilution in cardiac arrest**: 1:10,000

→ Local anaesthetic: 1:1 lakh OR 1:2 lakh
→ Anaphylaxis: 1:1,000

- **Routes** (in order of preference):
  → IV route
  → If IV not possible → IO (intraosseous in tibia)
  → If IO not possible → Endotracheal tube (Pour adrenaline into the ETT if the airway is secured)

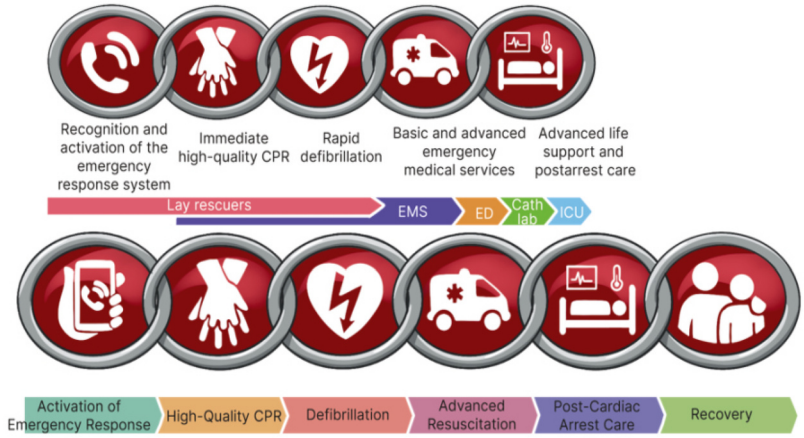
5 H's AND 5 T's (Reversible Causes of Cardiac Arrest)

If Asystole/PEA/Non-shockable Rhythm
↓
Start CPR
↓
Give Epinephrine ASAP
↓
R/O 5 H's/5 T's

	Causes
5 H's	Hypoxia
	Hypovolaemia
	Hypothermia
	Hydrogen ion acidosis (Acidosis)
	Hypo / Hyperkalaemia
5 T's - Heart-related	Cardiac Tamponade
	Coronary Thrombosis
5 T's - Lung-related	Pulmonary Thrombosis
	Tension Pneumothorax
Last T	Toxins (Drug overdose can also cause cardiac arrest)

Chain Of Survival

01:27:38



- New Chain of Survival (6th Link Added)
  - Recovery ← New addition

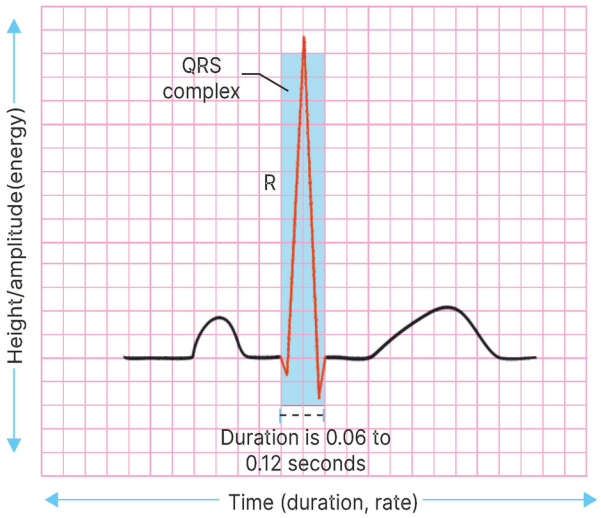
Post-cardiac Arrest Care (rosc - Return of Spontaneous Circulation)

- After Achieving ROSC
  - Airway Management:
    → Check if the patient is alert, conscious, or unconscious
    → Check if the patient can manage the airway by himself
    → Intubate if airway management is required
  - Respiratory Parameters:
    → Maintain SPO_2 between 92-98% OR up to 100%
  - BP Maintenance:
    → Systolic BP: >90 mmHg
    → MAP: ≥65 mmHg
  - Targeted Temperature Monitoring:
    → Keep the patient's temperature between 32-36°C
    → Decreases basal metabolic rate

Tachycardia Management

01:29:35

- **Unstable Tachycardia:**
  - Signs of Instability (HASIA Signs)
    → **H** = Hypotension
    → **A** = Altered mental status
    → **S** = Signs of shock
    → **I** = Ischaemic chest discomfort
    → **A** = Acute heart failure
  - Management
    → Synchronized cardioversion
    → Asynchronous is only given in cardiac arrest
- **Stable Tachycardia Management: VABC Protocol**
  - **V** = Vagal maneuver
  - **A** = Adenosine
    → First dose: 6 mg adenosine
    → If not improving with 6 mg → Increase to 12 mg
  - **B** = Beta blocker
    → Injection Sotalol: 100 mg over 10 minutes (MC used)
  - **C** = Calcium channel blocker

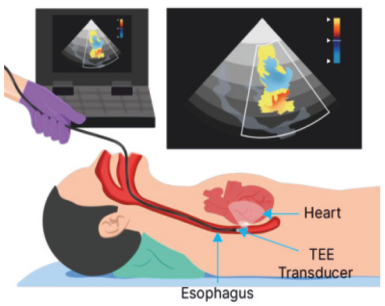


MONITORING IN ANAESTHESIA

01:31:50

NEET PG 2019, 2020
FMGE 2022, 2025

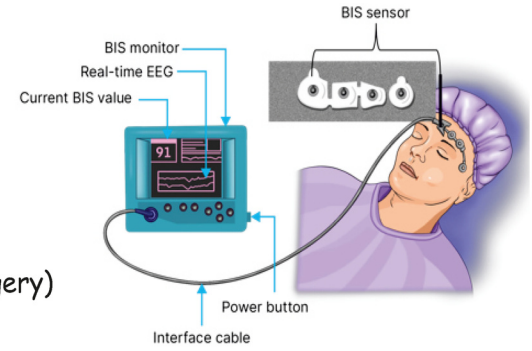
- Oxygenation Monitoring
  - Method: Pulse oximetry
  - Principle: Beer-Lambert's law
- Ventilation Monitoring
  - Method: Capnography
- Circulation Monitoring
  - ECG
    → Lead 2: Detects arrhythmias
    → Lead 5: Detects ischaemias



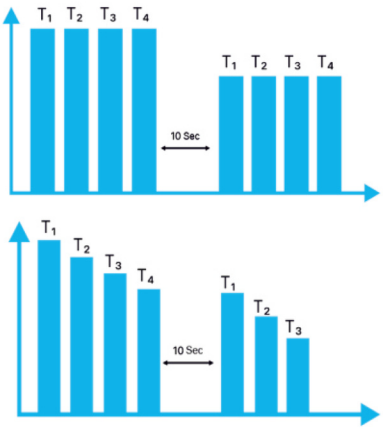
Transesophageal echocardiography

- BP
  - → NIBP: Non-invasive BP monitoring
  - → IBP: Invasive BP monitoring
- Trans-oesophageal Echocardiography
  - → Used for major surgeries
  - → Detect venous air embolism

- Temperature Monitoring
  - Peripheral temperature: Used for normal small surgeries
  - Core temperature: Used for major surgeries
    - → Most common site: Oesophagus
    - → Most accurate site: Pulmonary artery (invasive)
- Awareness Monitoring
  - BIS Monitor (Bispectral Index)
  - Calculates the sum of the EEGs and gives a value
  - Values:
    - → 100 = Patient fully awake
    - → 65-85 = Patient is sedated
    - → 40-65 = Surgical anaesthesia (Best value required for any surgery)
    - → **<40** = Deep hypnotic state



- Neuromuscular Monitoring
  - Train of 4 (MC Used)
  - Nerve used: Ulnar nerve
  - Muscle involved: Adductor pollicis
  - Working
    - → Connect to monitor the first
    - → See twitch response after 4 stimuli in the thumb



Interpretation Of Train Of 4

- **No Muscle Relaxant:**
  - All 4 twitches are visible with full height
- **Depolarising Muscle Relaxant (e.g., Suxamethonium/Scoline):**
  - All 4 twitches reduced but of equal height
  - Train of 4 ratio (T4/T1) = 1 (all same height)
- **Non-Depolarising Muscle Relaxant**
  - Twitch response shows fading
  - Train of 4 ratio (T4/T1):
    - → 0 (if 4th twitch disappeared)
    - → Usually <0.4 under a non-depolarising muscle relaxant
  - For Reversal from Muscle Relaxant
    - → Train of 4 ratio should be >0.9
  - Order of Twitch Disappearance/Reappearance
    - → First twitch to disappear: 4th twitch
    - → First twitch to reappear: 1st twitch

MISCELLANEOUS POINTS

- Intraoperative Fluid of Choice: Ringer's Lactate
- Intravenous Regional Anaesthesia (IVRA) / Bier's Block
  - Most Commonly Used Local Anaesthetic: Lignocaine
  - Tourniquet Pressure
    → Upper limb: 50 + Systolic BP
    → Lower limb: 100 + Systolic BP
- EMLA Cream (Eutectic Mixture of Local Anaesthetic)
  - Lignocaine 2.5% + Prilocaine 2.5%
  - Used in paediatric cases when not allowing IV cannula placement
  - Contraindication: Neonates
    → Prilocaine causes methaemoglobinaemia in neonates

Difficult Airway Management

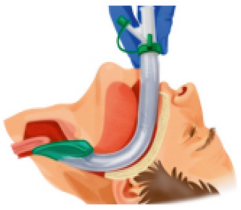
01:41:15

NEET PG 2024
FMGE 2024, 2025
INICET 2024

- Predictors of Difficult Airway
  - **O** = Obese patient
  - **B** = Beard patient
  - **E** = Edentulous patient
  - **S** = Snorers
  - **E** = Elderly patient

Das Guidelines

- **Plan A: Intubation**
  - Intubation with normal laryngoscopy
  - At least 3 attempts
  - If 3 attempts fail → Move to Plan B
- **Plan B: Supraglottic Airway**
  - Aim: Ventilate the patient
  - Method: Introduce a supraglottic airway device
    → Any LMA can be used
    → Most commonly: **2nd generation LMA**
  - If LMA is not working and SPO_2 is still low → Move to Plan C
- **Plan C: 2-Person Technique**
  - One person holds the mask very tightly
  - The other person holds the bag and pushes air
  - If still oxygen saturation low → Move to Plan D
- **Plan D: Emergency Front of Neck Access**
  - CICV scenario (Cannot Intubate, Cannot Ventilate)
  - Method: Scalpel or needle cricothyrotomy



MCQ

01:44:40

Q. A 58-year-old postoperative patient develops fever, tachycardia, and hypotension (MAP 55 mmHg). Lactate = 5 mmol/L. Despite fluids and norepinephrine, MAP = 62 mmHg, urine output = 20 mL/hr. Which additional drug should be considered?

a. Vasopressin
b. Phenylephrine
c. Adrenaline
d. Milrinone

Answer: a. **Vasopressin**

- Hypotension → Give fluids- Lactate 5 mmol/L → Patient still dehydrated
- Fluid given, still BP not improving → Start Norepinephrine (Vasopressor)
- Still not improving → Add Vasopressin
- Still not improving → Add Adrenaline
- If cardiac output is low, → Add Dobutamine
  → Can also give Injection Hydrocortisone

Q. Which drug is most likely responsible for the occurrence of hyperthermia and muscle rigidity in a patient undergoing surgery while being administered anesthesia with halothane?

NEET PG 2021

a. D-curare
b. Suxamethonium
c. Cis-atracurium
d. Rocuronium

Answer: b. Suxamethonium

Q. A patient presented with headache, vomiting, and fever. Meningitis was suspected. While performing a lumbar puncture, which is the last structure you will pierce just before entering the lumbar cistern?

a. Ligamentum flavum NEET PG 2021
b. Dura mater
c. Arachnoid membrane
d. Pia mater

Answer: c. Arachnoid membrane

- Layers in Spinal/Epidural (Mnemonic: Some Say Spinal Instigates Lethargy During Anaesthesia)
  - **S** = Skin
  - **S** = Subcutaneous tissue
  - **S** = Supraspinous ligament
  - **I** = Interspinous ligament
  - **L** = Ligamentum flavum
  - **D** = Dura
  - **A** = Arachnoid

Q. Identify the mask in the image used for patients with COVID-19 infection?

NEET PG 2022

a. Venturi mask
b. Hudson mask
c. Nebuliser
d. Non-rebreathing mask

Answer: d. Non-rebreathing mask

Q. Which drug is used to reverse the muscle relaxant effects of vecuronium when renal function is normal?

NEET PG August 2024 (Morning Batch)

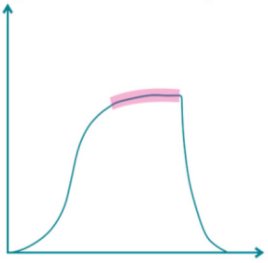
a. Sugammadex
b. Neostigmine
c. Atropine
d. Physostigmine

Answer: a. Sugammadex

- Sugammadex
  - Used for Vecuronium and Rocuronium reversal
  - Advantage:
    → More rapid-acting than neostigmine
    → Does not cause bradycardia (Neostigmine causes bradycardia)
  - If renal function is normal, use sugammadex
- Commonly Used Reversal Agents
  - Neostigmine (most common)
  - Pyridostigmine
  - Edrophonium
  - L-cysteine

Q. In the given capnograph, what does the marked area denote?

NEET PG August 2024 (Morning Batch)



a. Expiratory upstroke
b. Alveolar Plateau
c. Inspiratory downstroke
d. Inspiratory baseline

Answer: b. Alveolar Plateau

Q. A 25-year-old patient undergoing orthopedic surgery who underwent general anesthesia suddenly developed a rise in $EtCO_2$, temperature, and muscle rigidity. Which of the following drugs leads to such complications?

NEET PG August 2024 (Evening Batch)

a. Propofol
b. Nitrous oxide
c. Etomidate
d. Halothane

Answer: d. Halothane

Yourwish

Q. A 35-year-old male undergoing abdominal surgery under general anesthesia develops sudden generalized muscle rigidity, rapid increase in body temperature, and tachycardia shortly after administration of sevoflurane and succinylcholine. His end-tidal CO_2 is rising despite controlled ventilation. What is the most appropriate immediate treatment? NEET PG 2025

a. Dantrolene
b. Diazepam
c. Pancuronium
d. Vecuronium

Answer: a. Dantrolene

Q. A 55 y/o man is undergoing general anaesthesia for abdominal pain and surgery. Shortly after administration of a non-depolarising neuromuscular blocker, he develops bronchospasm, hypotension, and flushing of the face. Which of the following skeletal muscle relaxants is most likely responsible for this reaction? NEET PG 2025

a. Atracurium
b. Cisatracurium
c. Vecuronium
d. Pancuronium

Answer: a. Atracurium

- Benzylisoquinoliniums:
  - Atracurium, Cisatracurium, Mivacurium
    → Release histamine → Allergic reaction
    → Atracurium releases more histamine than cisatracurium

Q. Which of the following structures are not pierced during epidural anesthesia? FMGE June 2021

a. Supraspinous ligament
b. Interspinous ligament
c. Ligamentum flavum
d. Dura

Answer: d. Dura

- **Last layer punctured**: Ligamentum flavum (toughest ligament)

Q. A patient undergoing airway assessment is asked to fully open their mouth. Using the image shown, determine the Mallampati classification observed. FMGE Dec 2021

a. Mallampati class IV
b. Mallampati Class II
c. Mallampati class III
d. Mallampati class I

Answer: c. Mallampati class III

Q. The following are non-depolarizing muscle relaxants except? FMGE Dec 2021
a. Pancuronium
b. Rocuronium
c. Suxamethonium
d. Vecuronium

Answer: c. Suxamethonium

Q. Preoperative assessment of the oral cavity for endotracheal intubation in an adult is done by: FMGE Dec 2021
a. Mallampatti score
b. Cormack Lehane
c. ASA grading
d. AHA grading

Answer: a. Mallampatti score

Q. In the operating theater, you observe the utilization of a particular vaporizer. Which of the listed gases would you anticipate it to comprise? FMGE June 2022
a. Desflurane
b. Sevoflurane
c. Halothane
d. Isoflurane

Answer: b. Sevoflurane
- **Yellow**: Sevoflurane
- **Blue**: Desflurane
- **Red**: Halothane
- **Purple**: Isoflurane

Q. What should be done after immediate defibrillation is performed on a young male patient who was brought to the emergency department unconscious after collapsing at a railway station, with no pulse felt and a monitor showing ventricular fibrillation? FMGE June 2022
a. Check for a pulse
b. Resume chest compressions
c. Epinephrine 1 mg IV
d. Amiodarone 300 mg IV bolus

Answer: b. Resume chest compressions

Q. In a 45-year-old patient undergoing a preoperative assessment for a surgical procedure, which classification of Mallampati score is assigned based on the following description: Hard palate, soft palate, uvula, tip of the uvula, and tonsil pillars are visible. No oropharyngeal structures are obstructing the view. FMGE July 2023
a. Grade I
b. Grade II
c. Grade III
d. Gracie IV

Answer: a. Grade I

- **Grades**
  - **Class 1**: Hard palate + Soft palate + Uvula + Tonsillar pillars visible (USH - Uvula, Soft, Hard)
  - **Class 2**: Hard palate + Soft palate + Tip of uvula visible (part of uvula not seen)
  - **Class 3**: Hard palate + Soft palate + Base of uvula visible
  - **Class 4**: Only hard palate visible (H only)

Q. In a 60-year-old patient who has just experienced a cardiac arrest, which of the following interventions is not a part of the Advanced Cardiovascular Life Support (ACLS) protocol? FMGE July 2023

a. Amiodarone
b. Defibrillation
c. Adrenaline
d. Soda Bicarbonate

Answer: d. Soda Bicarbonate

Q. Inhalational induction of choice in children is: FMGE Jan 2023

a. Sevoflurane
b. Desflurane
c. Halothane
d. Isoflurane

Answer: a. Sevoflurane

Q. Which of the following is most suitable for intravenous regional anesthesia? FMGE Jan 2023

a. Bupivacaine
b. Mepivacaine
c. Procaine
d. Lidocaine

Answer: d. Lidocaine

- Lignocaine is most commonly used local anaesthetic worldwide
  - Used in IVRA
  - Causes hyperthermia

Q. Which of the following topical local anesthetics is commonly used in cataract surgery? FMGE Jan 2024 Part 1

a. Proparacaine 0.5%
b. Bupivacaine 0.5%
c. Halothane
d. Nitrous Oxide

Answer: a. Proparacaine 0.5%

Q. Which of the following is the mechanism of action of Local anesthetics? FMGE Jan 2024 Part 1

a. Blocks Na^+ channels
b. Stimulate Ca^+ Channels
c. Block CI^- Channels
d. Stimulate K^+ channels

Answer: a. Blocks Na^+ channels

- **Mechanism of Action of Local Anaesthetic**
  - Before entering nerve → Non-ionising form
  - Enters nerve → Becomes ionised
  - Ionised form → Blocks sodium channels
  - Sodium channels blocked → Depolarisation blocked → Action potential blocked → No Pain.

Q. In epidural anesthesia, which of the following layers is least likely to be punctured during the procedure?
FMGE June 2024 Part 1
a. Arachnoid mater
b Ligamentum flavum
c. Supraspinous
d. Infraspinous

Answer: a. Arachnoid mater

Q. Which of the following inhalation agents has a blood-gas partition coefficient similar to nitrous oxide?
FMGE June 2024 Part 1
a. Isoflurane
b. Desflurane
c. Sevoflurane
d. Halothane

Answer: b. Desflurane

Potency (MAC Values - Low to High)

- **Mnemonic: MHISDXN (Most potent to Least potent)**
  - **M** = Methoxyflurane (Most potent, Lowest MAC)
  - **H** = Halothane
  - **I** = Isoflurane
  - **S** = Sevoflurane
  - **D** = Desflurane
  - **X** = Xenon
  - **N** = Nitrous oxide (Least potent, Highest MAC)

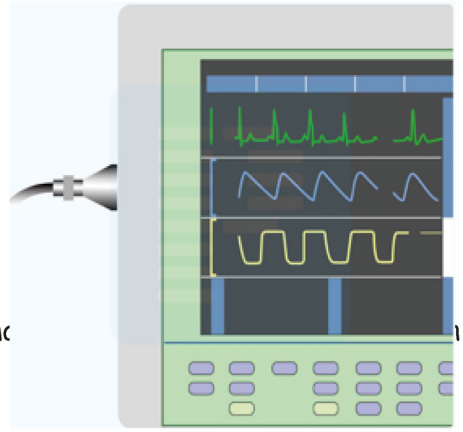
Blood-Gas Coefficient

- **Order: NXDSIHMTK (Opposite of MAC)**
  - **N** = Nitrous oxide (0.42)
  - **D** = Desflurane (0.47 - similar to nitrous oxide)

Q. A 35 y/o asthmatic patient is scheduled for a minor surgical procedure. Which induction agent and muscle relaxant combination is safest for this patient?
FMGE Jan 2025 Part 2
a. Propofol and Succinylcholine
b. Ketamine and d-tubocurarine
c. Ketamine and Vecuronium
d. Thiopental and Recuronium

Answer: c. Ketamine and Vecuronium

Q. You are in the operating room and notice the tracing in yellow colour on this device. What does it indicate?



a.Capnography

b. Airway pressure

c. O_2 pressure in inhaled air

d. O_2 pressure inhaled air

Answer: a.Capnography

Q. Which of the following can be used for the induction of anesthesia, ma
endotracheal intubation?

a. Halothane

b. Desflurane

c. Sevoflurane

d. Isoflurane

Answer: c. Sevoflurane

Q. In conventional oxygen therapy, which device will deliver the highest FiO_2?

a. Venturi mask

b. Hudson mask

c. Non-rebreathing mask

d. High Flow Nasal Cannula

Answer: c. Non-rebreathing mask

Q. Arrange the following agents based on their potency:

a. Methoxyflurane > Halothane > Isoflurane > Nitrous Oxide

b. Methoxyflurane > Isoflurane > Halothane > Nitrous Oxide

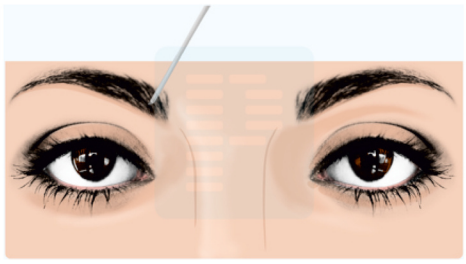
c. Methoxyflurane > Nitrous Oxide > Halothane > Isoflurane

d. Methoxyflurane > Halothane > Nitrous Oxide >Isoflurane

Answer: a. Methoxyflurane > Halothane > Isoflurane > Nitrous Oxide

Q. What is the nerve blocked in the following local anaesthesia technique?

INICET Nov 2021



a. Supratrochlear nerve

b. Anterior ethmoidal nerve

c. Sphenopalatine nerve

d. Greater palatine nerve

Answer: a. Supratrochlear nerve

Supratrochlear Nerve Block

- Used for:
  - Orbital surgeries
  - Eyebrow surgeries
  - Forehead cellulitis/abscess

Anterior Ethmoidal Nerve Block

- Used for:
  - Nasal septum surgeries
  - Nasal packing

Sphenopalatine/Greater Palatine Block

- Used for Palatine laceration/ surgeries