EMERGENCY DRUGS USED IN OPERATION THEATRE
Basic components of general anesthesia

• **Definition of Anesthesia**: state of being unaware and unresponsive to painful stimuli

• Several aspects are involved

  • a) lack of conscious awareness = unconsciousness
  • b) lack of perception of pain = analgesia
  • c) lack of movement = muscle relaxation
  • d) modification of autonomic responses (HR,BP) to painful stimuli.
INTRODUCTION

- General anaesthetics (GAs) are drugs which produce reversible loss of all sensations and consciousness. It usually involves a loss of memory and awareness with insensitivity to painful stimuli, during a surgical procedure.

General anaesthesia

- need for unconsciousness ‘Amnesia-hypnosis’
- need for analgesia ‘Loss of sensory and autonomic reflexes’
- need for muscle relaxation
Triad of General anaesthesia

Hypnosis

Analgesia

Muscle relaxation
Analgesia

- Good analgesia = good anaesthesia
- Hypnotic sparing effect
- Opiates
- Local anaesthetics
- NSAIDS
- Paracetamol
Analgesia-Opiates

- Gold standard – morphine
- Derivatives- diamorphine, codeine
- Synthetic agents
  - Pethidine
  - Fentanyl/Alfentanil-short acting
  - Remifentanil-ultra short acting
Muscle relaxation

- Aids intubation
- Helps surgeon/surgery
- Surgery of long duration
- Reduces maintenance dose of anaesthetics agents
Muscle relaxants

- Two types
- Depolarising-short acting e.g.; suxmethonium
- Non-depolarising-medium/long acting
  - Tracurium
  - Vecuronium
  - Rocuronium
  - Cisatracurium (NIMBEX)
Hypnotic drugs-intravenous

- Gold standard- thiopentone
- Propofol
- Others
- Etomidate
- Benzodiazepines
- Ketamine
Inhalational anaesthetics

- Nitrous oxide-weak
- Isoflurane
- Sevoflurane
- Desflurane
- Halothane
Prerequisites

- Oxygen
- Suction
- Tilting trolley
- Resuscitation drugs
- Monitoring
- Anaesthetist
- Skilled assistance
- Drugs and machine
5 phases of general anesthesia

• Preparation
• Induction
• Maintenance
• Emergence
• Recovery
Complications of general anesthesia

• Respiratory failure
• Atelectasis
• Aspiration
• Hypotension
• Injury to peripheral nerves, cornea
• Injury to respiratory tract
Monitors during induction of anesthesia

- Pulse oximetry and end tidal CO2 are critical
- Eyes and ears of the anesthesia person
- Experienced assistant is very important
- Stethoscope, BP, EKG
- Prepare with plan B
Regional anaesthesia

- Spinal/epidural
  - surgery below umbilicus
  - Provides analgesia/muscle relaxation
- Plexus blocks eg brachial plexus
- Intravenous- Bier’s block
Regional anaesthesia

Analgesia

Muscle relaxation
Spinal Block - Position

Spinal block—lateral position.

Spinal block—sitting position.
Spinal needles

• Quincke Babcock needle

• Whitacre needle
Spinal needles

- Sprotte needle

Spinal needles

- Pitkin needle
Spinal needles

- Touhy needle

Spinal needles

- Greene needle
Spinal needles

Three parts
- Hub
- Canula
- Stylet

• Point of the canula is beveled and has a sharp edge
• Lumenal sizes: 18 gauge to 30 gauge
• Length: 3.5 to 4 inches
Drugs used in spinal anaesthesia

Lidocaine

• Rapid onset of action, intermediate duration and low toxicity

• Disadvantages – Transient neurological symptoms
Drugs used in spinal anaesthesia

Bupivacaine

- Amide local anaesthetic
- Exhibits sensory/motor split
- Dose of 7.5mg – ambulatory surgery
- Low concentrations (0.1-0.125%) – postoperative analgesia
Drugs used in spinal anaesthesia

Ropivacaine
Compared to bupivacaine

• Longer onset of block to T10 (5 min vs 2 min)
• Lower median maximal block height (T7 vs T5)
• Shorter regression of sensory block to T10 (55 min vs 110 min)
• Quicker mobilization (253 min vs 331 min)
• Less CNS and cardiac toxicity
<table>
<thead>
<tr>
<th>Drug</th>
<th>Preparation</th>
<th>Perineum, lower limbs (mg) dose</th>
<th>Lower abdomen (mg) dose</th>
<th>Upper abdomen (mg) dose</th>
<th>Duration (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>procaine</td>
<td>10% solution</td>
<td>75</td>
<td>125</td>
<td>200</td>
<td>45</td>
</tr>
<tr>
<td>tetracaine</td>
<td>1% solution in 10% glucose</td>
<td>4-8</td>
<td>10-12</td>
<td>10-16</td>
<td>90-120</td>
</tr>
<tr>
<td>lidocaine</td>
<td>5% in 7.5% glucose</td>
<td>25-50</td>
<td>50-75</td>
<td>75-100</td>
<td>60-75</td>
</tr>
<tr>
<td>bupivacaine</td>
<td>0.75% in 8.25% dextrose</td>
<td>4-10</td>
<td>12-14</td>
<td>12-18</td>
<td>90-120</td>
</tr>
<tr>
<td>ropivacaine</td>
<td>0.2-1% solution</td>
<td>7.5 to 12.5</td>
<td>12.5-17.5</td>
<td>17.5-25</td>
<td>90-120</td>
</tr>
</tbody>
</table>
Complications

1. Immediate complications
   - Hypotension
   - Bradycardia and Cardiac arrest.
   - High and Total spinal block leading to respiratory arrest.
   - Urinary retention.
   - Epidural hematoma, Bleeding.

2. Late complications
   - Post dural puncture headache (PDPH)
   - Backache
   - Nausea
   - Focal neurological deficit
   - Bacterial meningitis
   - Sixth Cranial nerve palsy
   - Urinary retention
LOCAL ANESTHETICS CALSIFICATION

- **Esters**: Cocaine, Procaine, Chlore, procaine, Tetracaine.

- **Amids**: Lidocaine, Mepivacaine, Prilocaine, Articaine, Popivacaine, Etidocaine.

- **Ketons**: Dyclon.

- **Quinoline**: Centbucridine.
Application of local anaesthesia

1-- Topical Anesthesia

Anesthesia of mucous membranes of the nose, mouth and throat can be produced by direct application of aqueous solutions of salts of many local anaesthetics or by suspension of the poorly soluble local anaesthetics as tetracaine (2%) or lidocaine (2%).

Epinephrine, topically applied, has no significant local effect and does not prolong the duration of action of local anaesthetics applied to mucous membranes because of poor penetration.
2-- Infiltration Anesthesia

Infiltration anesthesia is the injection of local anesthetic directly into tissue without taking into consideration the course of nerves.

- The local anesthetics used most frequently for infiltration anesthesia are
  1- lidocaine
  2- procaine
  3- bupivacaine

  When used without epinephrine, greater amounts could be given.
Application of local anaesthesia

3- Field Block Anesthesia
Field block anesthesia is produced by subcutaneous injection of a solution of local anesthetic in order to anesthetize the region distal to the injection.

4- Nerve block:
Injection of a solution of a local anesthetic into or about individual peripheral nerves or nerve plexuses
Undesired systemic effects of local anesthetics:

Occur due to systemic absorption of large doses due to:
1- accidental intravascular injection
2- Injection of large doses

1- Central nervous system:
   -- Stimulation of the CNS caused by inhibition of inhibitory neuronal activity, producing
   1- restlessness
   2- tremors that may proceed to convulsions.

   -- At high blood concentrations, local anesthetics cause depression and even respiratory failure..
Undesired effects of local anesthetics

II- Peripheral nervous system:
--- Local anesthetics affect transmission at the neuromuscular junction producing muscle weakness and tremors.

III- Smooth muscles:
--- Depress contractions of intestine, vascular, and bronchial smooth muscle.

IV- Allergic reaction:
--- Ester-linked local anesthetics may cause allergic reactions in a small population of patients due to their metabolism producing para amino benzoic acid which is allergic.
Vasoconstrictors

- Ephedrine hydrochloride: It is a complementary drug to manage hypotension produced by spinal or epidural anaesthesia.

- Epinephrine (adrenaline): Vasoconstrictor to retard systemic absorption of infiltrated local anaesthetics.

Reversal of block:

- Neostigmine: Neostigmine are used at the end of an operation to reverse the muscle paralysis produced by non-depolarizing blocking drug.
PREMEDICATION

DEFINITION:
Administration of drugs before induction of Anaesthesia.

Components: Psychological Pharmacological
PSYCHOLOGICAL PREMEDICATION

Nonpharmacological antidote to anxiety
PHARMACOLOGICAL PREMEDICATION

- Consists of administration of the drugs 1-2 hrs before the induction of anaesthesia.
- Route of administration:
  - Orally
  - Intramuscular
  - Intravenous
  - Intranasal
  - Dermal

GOALS OF PREMEDICATION:
- Primary goals
- Secondary goals.
Primary goals

• Anxiolysis & Sedation
• Analgesia
• Amnesia
• Increase in gastric fluid pH and decrease in gastric fluid volume
• Antisialagogue effect
• Decreased SNS reflex response
• Hemodynamic stability
• Decrease in anaesthetic requirement
Secondary Goals

- Facilitation of induction of anaesthesia
- Facilitation of Postoperative analgesia
- Prevention of post operative nausea and vomiting
DRUGS USED FOR SEDATION

- Benzodiazepines:
  - e.g.: Diazepam, midazolam, lorazepam
- Barbiturates:
  - e.g.: phenobarbitone
- Others:
  - Promethazine
ANALGESIA

- **OPIOIDS:**
  - Pethidine
  - Morphine
  - Fentanyl

- **NSAIDS**
  - Ketorolac
  - Diclofenac
EMERGENCY DRUGS

- ATROPINE
- ADRENALINE
- MEPHENTERMINE
- EPHEDRINE
- XYLOCARD
ATROPINE

- CLASS: ANTICHOLINERGIC DRUGS.
- BACKGROUND: A tertiary amine belladonna alkaloid, has a high affinity for muscarinic receptors.

PREPARATION

Available (ampule):
1ml = 0.6mg
Dose: 0.01-0.02mg/kg
Bradyarythmia:
0.04mg/kg
Onset: 1-2 min
Duration of Action: 20-30 min (i.v)
2-3 hrs (i.m.)
ADVERSE EFFECTS

- Blurred vision
- Confusion
- Mydriasis
- Constipation
- Urinary urgency

<table>
<thead>
<tr>
<th>Dose of atropine</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;10.0 mg</td>
<td>Hallucinations and delirium; coma</td>
</tr>
<tr>
<td>5.0 mg</td>
<td>Rapid heart rate; palpitation; marked dryness of the mouth; dilation of pupil; some blurring of near vision</td>
</tr>
<tr>
<td>2.0 mg</td>
<td>Slight cardiac slowing; some dryness of the mouth; inhibition of sweating</td>
</tr>
<tr>
<td>0.5 mg</td>
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</tbody>
</table>


ADRENALINE

- Class: Direct acting sympathomimetic drugs.
- It interact with both alpha and beta receptors.
- At low dose, beta effect (vasodilatation) on vascular system predominant.
- At high dose, alpha effect (vasoconstriction) are strongest.
MODE OF ACTION

ADRENOCEPTORS

\( \alpha_1 \)
- Vasoconstriction
- Increased peripheral resistance
- Increased blood pressure
- Mydriasis
- Increased closure of internal sphincter of the bladder

\( \alpha_2 \)
- Inhibition of norepinephrine release
- Inhibition of acetylcholine release
- Inhibition of insulin release

\( \beta_1 \)
- Tachycardia
- Increased lipolysis
- Increased myocardial contractility
- Increased release of renin

\( \beta_2 \)
- Vasodilation
- Slightly decreased peripheral resistance
- Bronchodilation
- Increased muscle and liver glycogenolysis
- Increased release of glucagon
- Relaxed uterine smooth muscle

Increase contractility of myocardium (Inotropic Effect, \( \beta_1 \) action)
Increase HR (Choronotropic Effect, \( \beta_1 \) action)
So, Increase In CO leads to Increase BP
# ADRENALINE

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>ADVERSE EFFECTS</th>
<th>CONTRAINDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRONCHOSPASM</td>
<td>CNS EFFECTS: ANXIETY, HEADACHE, TENSION, TREMOR.</td>
<td>HYPERTHYROIDISM: INCREASED ADRENERGIC RECEPTOR ON VASCUATURE—HYPERSENSITIVE RESPONSE</td>
</tr>
<tr>
<td>ANAPHYLACTIC SHOCK</td>
<td>HEMORRHAGE: MARKED ELEVATION OF BP—CEREBRAL HEMORRHAGE</td>
<td>COCAINE: PREVENT RE-UP TAKE OF CATECHOLAMINES—LONGER PERIOD OF TIME.</td>
</tr>
<tr>
<td>GLAUCOMA(2%)</td>
<td>PULMONARY EDEMA</td>
<td></td>
</tr>
<tr>
<td>IN ANESTHETICS: TO INCREASE DURATION OF LOCAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DOSING

- In cardiac arrest
  1 mg (10 mL 1:10,000 solution)
  IV push every 3 to 5 minutes.
  If this fails, higher doses of epinephrine (up to 0.2mg/kg) are acceptable but not recommended (there is growing evidence that it may be harmful)

- In anaphylaxis: 3-5mcg/kg

PREPARATION

Available in Ampule at concentration:
1mg/ml (1:1000)
Preparation:
100mcg/ml
10mcg/ml
METHENETERAMINE

Class: Sympathomimetic (Mixed action adrenergic agonist)

Mechanism of action:
- Acts indirectly by releasing norepinephrine from its storage sites and directly by exerting a slight effect on alpha and beta-1 receptors and a moderate effect on beta-2 receptors mediating vasodilation. Causes increased CO; also elicits slight CNS effects.
## INDICATION AND DOSING

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>DOSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension due to anesthesia</td>
<td><strong>IV, Adults:</strong> 30-45 mg; 30-mg doses may be repeated as required; or, <strong>IV infusion, Adults and children:</strong> 0.1% (1 mg/mL) mephentermine in D5W with the rate of infusion and duration dependent on response. <strong>IV, Pediatric:</strong> 0.4 mg/kg (12 mg/m²) as a single dose.</td>
</tr>
<tr>
<td></td>
<td><strong>Prophylaxis of hypotension in spinal anesthesia.</strong></td>
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<tr>
<td></td>
<td><strong>IM, Adults:</strong> 30-45 mg 10-20 min before anesthesia. <strong>IM, Pediatric:</strong> 0.4 mg/kg (12 mg/m²) as a single dose.</td>
</tr>
<tr>
<td>Haemorrhage (only as emergency treatment until blood or blood substitutes can be given)</td>
<td>Not recommended, but IV infusion of 0.1% in D5W may maintain BP until blood volume is replaced.</td>
</tr>
</tbody>
</table>
Available: 1ml = 30mg
Preparation: 1ml + 4ml NS = 6mg/ml
EPHEDRINE

**Class:** Sympathomimetic (Mixed action adrenergic agonist)

- Action: longer duration of action; excellent oral absorption and penetrates into CNS.
- Elimination: unchanged in urine.
EPHEDRINE

Mechanism of action:
Stimulates both alpha-and beta-receptors, causing increased heart rate, enhanced cardiac output and increased BP.

- Raises systolic and diastolic blood pressure by vasoconstriction and cardiac stimulation.
- Also causes bronchodilation but is less effective than epinephrine.

DOSING AND PHARMACOKINETICS

Onset: 30-60 sec
Duration of action: 60 min
Available: 1ml=30mg
DOSAGE: 3-6 mg I.V.
XYLOCARD

- **Class**: Antiarrhythmics class I B
- **Mechanism of action**: 
  Sodium channel blocker: It acts by passing through the nerve membrane to attach or block the sodium conducting ion channels thereby inhibiting the nerve impulses.

<table>
<thead>
<tr>
<th>ONSET OF ACTION: 45-90 SECONDS</th>
<th>DOSING: 1.5-2MG/KG FOLLOWED BY INFUSION AT A RATE OF 1-4 MG/MIN.</th>
<th>INDICATION: VENTRICULAR TACHYARRHYTHMIA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DURATION: 10-20 MINS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AVAILABLE AS LOXICARD: 
2%:
1ML = 20MG
Roles & Responsibilities must be clear, Otherwise......

...NO...
IT'S YOUR
JOB TO CLOSE
THE DOORS...

ROLE CLARITY
Emphasis need for accurate history

“I need to understand exactly how much you drink or what drugs you take as this may affect your anaesthetic and your recovery after surgery”
IMPORTANCE OF PRE-OPERATIVE SCREENING

• Up to 30 % of hospitalized patients report high risk use of alcohol
• Use of alcohol or illicit drugs has been found in history of up to 40 % of trauma patients
• Alcohol – related problems are frequently missed among the elderly, women and people of high socio economic status
• Alcohol dependence influences amount of anaesthetic, opioid or other drugs used to achieve therapeutic effects.
• Post operative alcohol withdrawal may complicate recovery or causes medical emergency.
• Reviews the patients chart and assessment data and assess the patients readiness for surgery.

• Collects data pertinent to anaesthesia such as comorbidities, history of asthma, previous surgeries, experiences related to anaesthetics and complications.

• Family history of adverse reactions with anaesthetics such as malignant hyperthermia.

• History of smoking, drug and alcohol use can alter the effect of anaesthesia medications.

• Avoiding smoking for as few as 12 hours prior to surgery has been shown to reduce the negative effects of smoking.

• Smokers have also been documented to need increased anaesthetic dosages and greater amounts of postoperative pain medication.
Pre Op Checklist
Day of Surgery

- Client teaching completed
- Consent form signed
- NPO
- In gown
- Allergy & ID Bands on
- No Jewelry-Bands taped
- Voiding prior to transfer
- Pre op Meds
- Side rails up after Pre Op
- Contact lens out
- Dentures / Bridges out
- Nail polish removed
- Vitals within 4 hours of surgery or 3C² minutes after Pre Op
- Pre Op labwork on chart
- Abnormal lab values
- Skin prep
- Hx of Aspirin Antidepressant Steroid NSAID's
• Obtain baseline serum electrolytes. Electrolyte imbalance can potentiate effects of neuromuscular blocking agents.
• Allergies to contrast dyes, iodine solutions, adhesive tape, food allergies and sensitivity to latex are relevant.
• Check ID bands and assess for allergy band
• Explain the procedure to client to secure cooperation and confidence from the patient.
• Getting supplies and equipment ready for the procedure,.
• Be aware that transient apnoea usually occurs at the time of maximal drug effect (1-2 min), spontaneous respiration should return in a few seconds or almost 3 – 4 min.
• Have immediately available: Facilities for emergency ET Intubation, artificial respiration and oxygen. Monitor vital signs and keep airway clear of secretions.
• CPR
General Anesthesia ...what to keep ready!

- There are 2 types of laryngoscopes:
  - Macintosh: for adults, with curved blade
  - Miller or Magill: for children, with straight blade
What to keep ready!

Endotracheal tubes

**TYPES**

- ET tubes can be:
  - cuffed
  - uncuffed
- Cuffed ET tubes are used in children > 8 years
- The cuff when inflated maintains the ET tube in proper position and prevents aspiration of contents from GI tract into respiratory tract
- In children < 8 uncuffed ET tubes are used because the narrow subglottic area performs the function of a cuff and prevents the ET tube from slipping.
What to keep ready!

Laryngeal Mask Airway

- Uses
  - In short procedures
  - Life-saving difficult intubation
  - Conduit for smooth emergence
  - Way of intubation in difficult cases

- Contraindications
  - Increased risk of aspiration
  - Full stomach
Positioning for Spinal Anesthesia
Post-anesthesia Care Unit (PACU)

- Articles that may be needed for care are located near the client’s unit in the PACU
  - Breathing aids
  - Circulatory aids
  - Drugs
    - Narcotics
    - Sedatives
    - Drugs for emergency situations
• Leave no client alone until he or she has fully regained consciousness.
• Check the physician’s orders and carry them out immediately.
Immediate Postoperative Complications

• Observe the client postoperatively for immediate complications, for example
  – Hemorrhage
  – Shock
  – Hypoxia
  – hypothermia
I want to keep improving for my patients.
Your turn...