

PREMEDICATION IN ANAESTHESIA

Contents

- Definition
- History
- Aims
- Qualities of premedicant
- Drugs used
- Premedication in associated disorders
- Premedication in obstetrics patients
- Premedication in outpatients surgeries
- Premedication in pediatric patients
DEFINITION

Administration of various drugs before induction of anaesthesia.

HISTORY:

- 1869 – Bernard gave morphine as premedicant in dogs and showed it reduce the dose of chloroform required.

- 1911 – at anaesthetic section of Royal Society of Medicine, use of Atropine, Morphine and Scopolamine before induction was first described.
AIMS OF PREMEDICATION:

- To allay pre-operative fear and anxiety.
- To produce amnesia and analgesia.
- To reduce secretion from salivary glands and respiratory tract.
- To potentiate anaesthetic drugs.
- To depress unwanted reflex vagal activities.
- To reduce the pH and volume of gastric contents and risk associated with regurgitation and aspiration.
- To attenuate sympathetic reflex activities and stress associated with anaesthesia and surgery.
- To reduce incidence of post operative nausea and vomiting.

Qualities of an ideal premedication drug

- Devoid of any side effects.
- Minimal depression of respiration and cardiovascular function.
- Simple and pleasant to take.
- Should act over reasonable period of time.
- Should be effective in all patients.
1. OPIOIDS:

- As a premedicant produce analgesia and sedation

*Mechanisms of Action*:

- Interact with specific receptors in the CNS and in peripheral tissue namely $\mu$, $\kappa$, $\delta$.

<table>
<thead>
<tr>
<th>$\mu$</th>
<th>$\kappa$</th>
<th>$\delta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinal &amp; spinal analgesia</td>
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</tr>
<tr>
<td>Respiratory depression</td>
<td>Respiratory depression</td>
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<tr>
<td>Constipation</td>
<td>Dysphoria</td>
<td>Physical dependence</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>Sedation</td>
<td>Urinary retention</td>
</tr>
<tr>
<td></td>
<td>Miosis</td>
<td>Constipation</td>
</tr>
<tr>
<td></td>
<td>Diuresis</td>
<td></td>
</tr>
</tbody>
</table>

**ACTIONS:**

**CNS:**

- Analgesia, sedation, euphoria
- Depression of respiratory centre.
- Depression of vasomotor centre.
- Depression of cough reflex.
- Hypothermia
- Stimulate vagal centre (x)
CVS:
- Vasodilation
- Bradycardia
- Decrease cardiac work.

GIT:
- Constipation
- Delayed gastric emptying.

Respiratory system:
- Respiratory depression.
- Broncho constriction

Genitourinary:
- Urinary retention
- Diuresis
- Antidiuresis

CONTRA INDICATIONS:
- Respiratory insufficiency.
- Head injury
- Hypotensive states.
- Undiagnosed acute abdomen.
- Elderly patient
- Hypothyroidism
### Commonly used OPIOIDS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>0.1 – 0.2 mg/kg IM 10 – 15 mg IM in adults</td>
<td>Sedation, Anxiolysis, Analgesia</td>
<td>Depression of cough reflex, miosis, addictive properties</td>
</tr>
<tr>
<td>Pethidine</td>
<td>1.5 – 2 mg/kg IM Child, 50 – 100 mg IM Adults</td>
<td>Less spasmodic, Less histamine release, Less depression of cough reflex, Less newborn respiratory depression, Effective antishivering</td>
<td>Less potent, Antimuscarinic effects, High incidence of nausea vomiting, Convulsant.</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>2 – 5 μ g/kg IV</td>
<td>Hemodynamics stability, Absence of histamin release, Suppression of stress response, More potent, short duration</td>
<td>Muscle rigidity, Bradycardia</td>
</tr>
</tbody>
</table>

### 2. BENZODIAZEPINES

- As a premedicant – sedation, anxiolysis, anticonvulsant, muscle relaxation, anterograde amnesia.

**Mechanism of Action:**
- Facilitating the action of GABA on post synaptic membrane → increase chloride conductance → hypopolarization.

**Advantages of Benzodiazepines:**
1. High therapeutic index
2. Less respiratory depression
3. Low abuse potential
4. Lack microsomal induction
5. Specific antidote – Flumazenil.
### Commonly used BENZODIAZEPINES

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Advantage</th>
<th>Disadvatage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diazepam</td>
<td>0.25-0.5mg/kg orally 5-10mg iv</td>
<td>Potent sedative</td>
<td>Pain on injection Long acting</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Midazolam</td>
<td>0.03 – 0.05 mg/kg IV 0.5 mg/kg oral.</td>
<td>Short acting More potent</td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Lorazepam</td>
<td>25 – 50 mg oral 1 – 4 mg IV / IM.</td>
<td>Age and liver disease does not affect metabolism</td>
<td>Long acting</td>
</tr>
</tbody>
</table>

**Common Features :**

- Potentiate the effect of non-depolarizing muscle relaxant.
- Depressed respiration when administered with opioids.
- Scopolamine potentiate their amnestic activity.
- Midazolam is helpful in preventing emergence delirium after ketamine anaesthesia.
3. ANTICHOLINERGIC

As a premedicant –

• Reduced secretions.
• Vagolytic

Mechanism of Action:

• Block post ganglionic parasympathetic nerve endings through muscarinic receptors i.e. M₁, M₂, M₃ receptors.

### COMPARATIVE EFFECTS OF ANTICHOLINERGICS

<table>
<thead>
<tr>
<th>Drug</th>
<th>CAS</th>
<th>Sedation &amp; Amnesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine</td>
<td>1</td>
<td>low</td>
</tr>
<tr>
<td>Scopolamine</td>
<td>3</td>
<td>medium</td>
</tr>
<tr>
<td>Glycopyrolate</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>
ACTIONS :

CNS –
- Overall CNS stimulation by atropin
- CNS depression by hyosin.

CVS –
- Facilitate AV conduction – increase PR interval.
- Tachycardia and stimulation of vasomotor centre – increase blood pressure.
- Histamine release and direct vasodilator effect – decrease blood pressure.

SMOOTH MUSCLES :
- All smooth muscles are relax
- In GIT – constipation
- Bronchodilatation
- Urinary retention

GLANDS :
- Decrease secretion from all glands.
- Decrease the volume of gastric content.

INCREASE BODY TEMPERATURE

EYE –
- Mydriasis
- Cycloplegia
SIDE EFFECT:
- Dry mouth, difficulty in swallowing
- Fever
- Difficulty in micturation.
- Photophobia, blurring of vision.
- Excitement
- Psychotic behavior.

COMMONLY USED DRUGS:
- Atropine – 0.02 mg/kg IV/IM
  Disadvantage – CNS excitation
  Tachycardia
  Fever.

4. Drugs used to alter gastric fluid volume & pH:
   As a premedicant – reduced the likelihood of aspiration of gastric contents.

   Risk factors: associated with aspiration.
   - Abdominal distention
   - Diabetics
   - Emergency surgery.
   - Raised intracranial tension.
   - Hiatal hernia.
   - Pregnancy
   - Drugs
     - Antimuscarinics opioids.
A. Antacids

   a) Soluble : Na bicarbonate

   b) Non-soluble – Mg hydroxide, Al hydroxide, Calcium carbonate.

Actions:

- Neutralises gastric acid immediately.
- Does not decrease gastric volume.
- Can increase gastric volume – when used with opioids.
- Better to administer with prokinetics.
- In soluble antacids. May cause significant pulmonary damage after aspiration.

B. H₂ antagonists:

- Ranitidine – 50 – 200 mg orally
  50 – 100 mg IV
- Cimetidine 150 – 300 mg orally/parenterally
- Famotidine. 20 mg orally BD

Actions:

- Block nocturnal and fasting acid production.
- Partially block meal induced acid secretion.
- Ranitidine most commonly used have less side effect and long duration of action.
- Cost effective.
C. Proton Pump Inhibitor:
- Inhibit H⁺ K⁺ ATPase enzyme present in parital cells
- Minimal side effect
- Cost is concern
- Drugs:
  - Omeprazole – 20 – 40 mg OD
  - Lansoprazol – 15 – 30 mg OD

D. Prokinetics:
- Acts by increasing cholinergic activity in enteric neurons.
  - Agonist at 5HT4 – promotes release of ACH.
  - D2 antagonism – potentiate cholinergic stimulation anti emetic and anti nausea.
- Well tolerated
- If given rapidly – abdominal cramps.
- Drowsiness, restlessness, agitation.

Drugs:
- Metoclopramide – 0.1 – 0.3 mg /kg IV
- Domperidon – 0.3 – 0.6 mg /kg orally
- Domperidon produce less CNS side effects.
5. Antiemetics-

• Nausea and vomiting are single most common factor delaying recovery of patients.

  • Factors associated with increased incidence of nausea and vomiting
    • Sex – female
    • Type of surgery- gynaecological, laparoscopic, ENT, ophthalmic sx
    • Prolonged duration of anaesthesia
    • Metabolic disturbances
    • Raised ICT
    • Previous history
    • Psychogenic stimuli

DRUGS-

1. 5HT3 Antagonist-

   • Blocks 5HT3 receptors on intestinal vagal afferent as well as CNS
   • Most effective
   • Exhibit few side effects
   • Cost is major concern

   Ondansetron- 4-8mg iv
   0.1mg/kg upto 4 mg in children

   Dolasetron- 25-50mg oral
   12.5mg IV
2. Butyrophenones-
   • Action is through central dopaminergic blockade.
   • Potent sedative with an anti anxiety action.
   • Extrapyramidal effects $\alpha_1$ anti adrenergic action, anticholinergic effects are major side effects.
   • Drugs:
     • Droperidol 2.5 mg to 10 mg IM or IV.

3. Phenothiazine
   • Action is through antidopaminergic and anticholinergic properties.
   • Powerful hypnotic with minimal respiratory depression.
   • Cost Effective.
   • Drugs:
     • Promethazine, perphenazine, promazine.

6. Centrally acting $\alpha_2$ agonists –
As a premedicant –
   • Sedation and anxiolysis
   • Reduced requirements of anaesthetic and analgesic drugs.
   • Maintain perioperative hemodynamic stability.
   • Reduced agitation in children after Sevoflurene anaesthesia
   • Reduced PONV.
   • Obtund stress response

Drugs:
   • Clonidine – 3 – 5 $\mu$g /kg orally – 60 – 90 min. before surgery.
   • Residual post-op sedation is major concern.
PREMEDICATION IN ASSOCIATED DISORDERS:

1. **Hypertensive patients**:
   - Objective of premedication –
     - Optimum sedation and anxiolysis
     - To preserve perioperative hemodynamics stability
     - To obtund stress response to intubation and surgery.
   - Antihypertensive drugs to be continued except Losertan & Diuretics
   - $\alpha_2$ agonist, opioids, esmolol are given to preserve perioperative hemodynamic stability.
   - Hypokalemia - common in patients on diuretics
     - to be correct preoperatively.

2. **Ischemic Heart Disease Patients**:
   - Objective of premedication – optimum sedation and anxiolysis without undesirable ventilatory and circulatory depression.
   - Anticholinergic mainly atropin to be avoided.
   - One useful combination is morphine 10 – 15 mg. IM + hyoscine 0.4 – 0.6 mg IM.
   - Aspirin to be discontinued 7 days before surgery.
3. **Rheumatic Heart Disease Patients**:

- Premedication should decrease anxiety and associated adverse circulatory response
- Patients are more susceptible to depressant effect of sedative drugs
- Prophylactic antibiotics should be considered
- Anticholinergics better avoided
- Patients on anticoagulant therapy- warfarin should be substituted by heparin 3-5 days prior sx

4. **Patients with COPD and Asthma**:

- Bronchodilators, steroids should be continued
- Prophylactic antibiotics in COPD patients
- Opioids to be used cautiously – respiratory depression, bronchoconstriction
- Anticholinergics should be individualized – dries secretion difficult to remove
- NSAIDS should be avoided
5. **Diabetes mellitus:**

- Objectives:
  - Avoid hypoglycemia, excessive hyperglycemia, ketoacidosis
  - Blood glucose should be maintained 120-180m
- OHD to be avoided on day of surgery
- Premedication to avoid aspiration and nausea vomiting

**PREMEDICATION IN OBSTRETIC ANAESTHESIA**

- Patients are at risk of aspiration due to –
  - Progesterone delays gastric emptying
  - Gravid uterus
  - Drugs esp. opioids
- Opioids and BZD may cause adverse effect on neonate
- Amnesia – woman may not be able to remember her birthing experiences
PREMEDICATION IN OUTPATIENTS SURGERIES

- Aims and objectives are similar, care to be taken not to prolong recovery of patient
- Short acting benzodiazepines medazolam commonly used
- Short acting opioids such as fentanyl, sufentanyl are preferred
- Alpha 2 agonists can be used
- NSAID on fixed dosing schedule may reduce intra op opioid requirement
- Premedication to avoid aspiration and nausea, vomiting
  - 5HT 3 antagonists are most effective
  - Droperidol less than 10 umg/kg cost effective
  - Phenothiazines to be avoided

PREMEDICATION IN PAEDIATRIC PATIENTS

- Premedication in infants
  - Infant less than 6 months do not require sedative premedication
  - Antisialogogues no longer required in neonate
  - Aim is to obtund vagal reflexes
- Premedication in children
  - Aims –
    - To get calm and comfortable child in operating room
    - To decrease secretions
    - To obtund vagal reflexes
    - To avoid post op. behavioral disturbances
• Considering fear for needles, routes other than im/iv preferred

1. Sedatives:

   **Midazolam** - most commonly used
   0.5-0.75mg/kg orally 20 mins prior
   0.4-0.5mg/kg per rectally

2. Analgesics:

   **Diclofenac** - 1.5mg/kg rectally

3. Opioids:

   Pethidine - 1-2mg/kg im
   Morphine - 0.1-0.2mg/kg im
4. Ketamine-
   6mg/kg orally
   3-5mg/kg im/iv

5. Anticholinergics-
   Atropine- 0.02mg/kg im/iv
   glycopyrrolate- 4-8ug/kg im/iv

6. Antiemetics-
   Droperidol- 0.05-0.1mg/kg
   Ondansetron- 0.1mg/kg
   Promethazine- 0.5mg/kg
THANK YOU