COMPLICATIONS OF GENERAL ANESTHESIA

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Key Concepts
• Categories of complication of anesthesia
• Respiratory complications of anesthesia
• Cardiovascular complication of anesthesia
• Management of complication of anesthesia

Abstract: Deaths during anaesthesia or surgical procedure in connection with anaesthesia are about 2% of overall surgical mortality. Complications which occur during or after the operative procedure can be discussed according to different systems of the body as they get involved as a result of this mishap. 35% of the patients have some complication and 18.4% complications are related to respiratory system. One should prevent the cause.

Key words: Anesthesia, Stridor, Bronchospasm, PONV, Anoxia

Mishaps and complications during anaesthesia are categorized as;
1. Ignorance of current existing knowledge of anaesthesia.
2. Failure to apply the existing knowledge of anaesthesia.
3. Highest frequency of complications during the maintenance period or in immediate post-operative time.
4. Disconnections between the patient and machine (20% cases).
5. Inadvertent gas flow changes (18%).
6. Inadequate experience of anaesthetist.

Causes in order of frequency are;
1. Hypovolaemia.
2. Respiratory depression following myoneural blockade or ‘usage of narcotic analgesics in higher dosage.
3. Complications of intubation.
4. Inadequate post-operative care and supervision.

Complications which occur during or after the operative procedure can be discussed according to different systems of the body as they get involved as a result of this mishap.

35% of the patients have some complication and 18.4% complications are related to respiratory system.

RESPIRATORY COMPLICATIONS
I. Airway obstruction.
2. Regurgitation and aspiration.

**AIRWAY OBSTRUCTION**
The common respiratory problems due to airway obstructions are:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>PROBLEMS</th>
<th>%AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Stridor</td>
<td>5.4</td>
</tr>
<tr>
<td>2.</td>
<td>Apnoea</td>
<td>1.5</td>
</tr>
<tr>
<td>3.</td>
<td>Impaired breathing</td>
<td>1.4</td>
</tr>
<tr>
<td>4.</td>
<td>Cyanosis</td>
<td>9.1</td>
</tr>
<tr>
<td>5.</td>
<td>Bronchospasm</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>18.4</td>
</tr>
</tbody>
</table>

Respiratory obstruction may occur from the level of lips upto bronchi.

Odentulous patients get obstruction because of lips which can be remedied by using an oropharyngeal airway.

Obstruction because of tongue fall can be dealt with by using the Jaw lift, oropharyngeal or nasopharyngeal airway.

Slight extension at atlanto-occipital joint of cervical spine may be helpful.

Obstruction above the glottis may be because of swab, broken or removed loose tooth, piece of denture, foreign body, vomitus, blood or edema.

Obstruction is removed by removing the foreign body or relieving edema.

At glottic level obstruction may be because of laryngospasm of ery-epiglottic fold’s sphincter like action and impaction of epiglottis in the larynx.

Peripheral stimulation such as uterine dilatation or anal sphincter dilatation need deepening of anaesthesia or stopping of surgical stimulus.

These conditions may need active treatment. If necessary short acting muscle relaxant such as suxamethonium in small dosage can be used.

In extreme respiratory obstruction, a wide bore needle can be used for cricothyroidotomy to save life of the patient and to provide oxygen inhalation.

Bronchospasm can be relieved, by using bronchodilators such as aminophylline, salbutamol etc.

Faults of apparatus like kinking of endotracheal tube, obstruction of the tube or connections with blood, sputum or absence of fresh gas flow to the patient because of unnoticed empty cylinders.

All the faulty apparatus is removed and the patient is ventilated with 100% oxygen.

Other respiratory abnormalities like tachypnoea, light anaesthesia or slow breathing because of narcotic analgesics or shallow breathing because of deep anaesthesia.

Irregular breathing or coughing may occur. These should be treated symptomatically.

Sputum retention may occur in post-operative period leading to hypoxia and lung atelectasis, infection and pneumonitis. These may end up in respiratory failure.

Adequate pain relief, suction of secretions and chest physiotherapy can improve the situation.
Drug induced respiratory disorders can be tabulated as follow:

<table>
<thead>
<tr>
<th>C.N.S depression</th>
<th>Anaesthetic agent narcotics. Oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuromuscular paralysis</td>
<td>Neuromuscular blocking agents, antibiotics Lithium.</td>
</tr>
<tr>
<td>Bronchospasm</td>
<td>Type I hypersensitivity B-blockers PG F2 &amp; Aspirin Captopril</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td>Propranolol, Heroin salicylates</td>
</tr>
<tr>
<td>Diffuse infiltration</td>
<td>Nitrofurantoin, Bleomycin Busulfan, oxygen Radiation miodarone</td>
</tr>
</tbody>
</table>

**REGURGITATION AND ASPIRATION**

Regurgitation of gastric contents occurs more commonly in obese patients, patients with hiatus hernia and during pregnancy. Patients with full stomach are more likely to vomit but they may regurgitate as well.

**MANAGEMENT**

Prevention of aspiration pneumonitis is the most important. Following measures can be taken;

1. The patient is kept fasting or the stomach is emptied by putting a stomach tube.
2. Use of H2-antagonists like cimetidine or Ranitidine.
3. Use of antacids, sodium acid citrate 30 mls 5-10 minutes before operation.
4. Proper cricoid pressure application in high risk cases.
5. Cuffed endotracheal intubation.
6. Suction of pharynx after intubation if some secretions are present.

If aspiration has already occurred inspite of preventive measures, then the management will be;

1. Repeated tracheal aspirations. Bronchial lavage can be done with 10 ml normal saline.
2. Oxygen administration.
3. Cardiovascular support.
4. Treatment of pulmonary edema.
5. Bronchodilators.
6. Hydrocortisone.
7. Antibiotics.
8. Bronchoscopy if solid material is suspected.

**CARDIO-VASCULAR SYSTEM DYSRHYTHMIAS**

These may be associated with;

1. Pre-existing cardiac disease.
2. Hypoxemia, hypercapnia, toxaemia of drugs
3. Electrolyte disturbances, dehydration.
4. Myocardial infarction or Ischaemia.

**HYPERTENSION**

Possible causes are;

1. Pain.
2. Hypoxia.
3. Hypercarbia.
4. Emergence delirium.
5. Previously uncontrolled essential hypertension.
6. Undiagnosed pheochromocytoma.

**HYPOTENSION**

It occurs possibly because of hypovolaemia, may as well be because of arrhythmias, myocardial ischaemia and position of the patient.

**POST OPERATIVE NAUSEA AND VOMITING**

Vomiting may be central or peripheral. The usual causes are;

1. **Anaesthetic agents and techniques:** Diethyl ether, cyclopropane, trichloroethylene, pethidine, halothane in this order.
Nitrous oxide and oxygen mixture causes about 15% incidence of vomiting.

Prolonged time of operation and hypoxia predisposes the situation.

Depth of anaesthesia is another cause for vomiting.

2. **Type of patient:**
   Some patients vomit very much e.g. during travelling or immediately after a simple diet.

3. **Stomach conditions:**
   Empty stomach gives less likelihood of vomiting and full stomach has more chances of vomiting.

4. **Narcotic analgesics:**
   About 30% of patients vomit after receiving these drugs.

5. **Type of operation:**
   It is more common after laparotomy or biliary surgery.

6. **Sex:**
   It is more frequent in women than men.

**TREATMENT**
One should prevent the cause. The factors and use of drugs of any of the following groups:
1. Anticholinergic drugs.
2. Antihistamines.
3. Phenothinazines.
4. Butyrophenones.
5. Miscellaneous e.g. Metochlopromide.

**NEUROLOGICAL COMPLICATIONS**

**CONVULSIONS**
These may occur because of deep ether anaesthesia, any type of light anaesthesia causing clonus, epilepsy, hypoxia or reaction to local anaesthetic drugs.

The etiological factor should be stopped Diazepam IV in appropriate dosage should be given.

O₂ should be given to avoid hypoxia.

**DELAY IN RECOVERY FROM ANAESTHESIA**
It may occur because of;
I. Drug overdosage during anaesthesia with narcotics and muscle relaxants etc.
II. Disturbance of physiology from anaesthesia such as hypercapnia, hypoxia, electrolyte disturbance, acid base imbalance and hypothermia.
III. Disturbance resulting from surgery such as;
   a) Shock.
   b) Fat or air embolism.
   c) Operative trauma in the brain.
IV. Incidental diseases such as CVA.

**DELAYED POST ANOXIC ENCEPHALOPATHY**
Anoxia can cause damage to the nerve cells in the brain. It is recommended that anoxia should not happen during or after operation.

All the preventable measures should be taken and those patients who have recovered from such anoxia must rest for 10 days in the bed under close observation.

Paralysis following intra or extradural analgesia may occur.

Postoperative convulsions and headache
may be seen.

References


