



***SNS SNSCAHS OF ALLIED HEALTH SCIENCES
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***DEPARTMENT OF OPERATION THEATRE AND
ANAESTHESIA TECHNOLOGY***

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SUBJECT: Principles of Anaesthesia II

HYPOXIA: Hypoxia



- *The common cause of hypoxemia seen in perioperative period are:*
- *Failure to intubate/ventilate:*
 1. *Failure to intubate and not even able to ventilate is the worst nightmare and readiness to face and handle such situation can prevent this catastrophe.*
- *Pulmonary aspiration of gastric contents:*
 1. *Aspiration can occur any time in perioperative period.*
 2. *Although it is not always possible to prevent aspiration however it is still considered as preventable complication of anaesthesia*
 3. *Pulmonary aspiration is one of major cause of death associated with anaesthesia.*
 4. *Mortality after aspiration is 5-70% depending on th volume and PH of aspirated material and time interval between detection and management.*



- Incidence : 1 in 3000
- Hydrodynamics of regurgitation:
 1. Normal intragastric pressure is 5-7 cm H₂O and regurgitation is prevented by the tone of lower esophageal sphincter.
 2. A pressure of >20cm H₂O is required to overcome the competency of lower esophageal sphincter which can lead to regurgitation but in conditions like pregnancy,hiatus herina which distorts the anatomy of lower esophageal sphincter,a pressure >15cm H₂O can cause regurgitation of gastric contents.
 3. During anaesthesia tone of cricopharyngeal sphincter is also decreased which can lead to aspiration.

Predisposing factors:

- Full stomach
- Depressed level of consciousness
- Conditions decreasing tone of lower esophageal sphincter:
 1. Pregnancy
 2. Abdominal tumors,abdominal obesity,ascites,laproscopy-increases intraabdominal pressure.



3. Hiatus Hernia

4. Presence of Ryles tube

- Ryles tube increases the chances of aspiration because of following reasons:*

- 1. Presence of Ryles tube decreases tone of lower esophageal sphincter*
- 2. Presence of Ryles tube in pharynx stimulates vomiting*
- 3. It is impossible to completely evacuate the stomach with Ryles tube.*

- Drugs:*

- 1. Atropine/Glycopyrrolate*
- 2. Opioids*
- 3. Thiopentone*
- 4. SNP*
- 5. Dopamine*
- 6. Halothane*
- 7. Ganglion blocker*

- Conditions delaying gastric emptying:*

- 1. Diabetes*
- 2. Hypothyroidism*
- 3. Narcotics*



- 4. Pain
- 5. Anxiety
- 6. Anticholinergics



Signs and Symptoms:

- *Tachypnea, cough due to laryngospasm/bronchospasm*
- *Tachycardia*
- *Wheezing and crepitations*
- *Cyanosis/Hypoxia*
- *X-ray chest shows infiltrates*

Management:

Prevention:

- *Keep the patient nil orally as per recommendations*
- *Inhibition of gastric acid secretion by H2 antagonists like ranitidine, before surgery in patients who are at high risk of aspiration*
- *Metoclopramide: It fastens gastric emptying and increases tone of lower esophageal sphincter*



- *Neutralization of gastric content by antacids.*

Anaesthetic Management:

- *Full stomach or other high risk causes of aspiration posted for emergency surgery should be managed in the following way to prevent aspiration:*
 1. *All high risk patients for aspiration must be premedicated with metoclopramide and ranitidine.*
 2. *Regional anaesthesia is preferred over general anaesthesia*
 3. *If there is slightest doubt of difficult intubation and situation permits, then awake intubation with HYPOXIAal analgesia of upper airway is highly recommended.*
 4. *If general anaesthesia is to be given, rapid sequence intubation technique must be employed in following manner*
 5. *Preoxygenation with 100% oxygen for 3-4 minutes is mandatory*
 6. *After preoxygenation induction is accomplished with ketamine or thiopentone.*
 7. *Therotecially ketamine is preferred because it maximally preserves laryngeal and pharyngeal reflexes but because of its side effects it is hardly used.*



8. *Profol maximally inhibit upper airway reflexes therefore not an optimal selection in patients vulnerable for aspiration*
9. *Succinyl choline and ketamine do increase the intragastric pressure but not above critical (20cm H₂O) Therefore can be safely used.*
10. *As soon as the patient becomes unconscious the assistant applies the backward and downward pressure of 30-40 newtons on cricoid cartilage which compresses the esophagus between assistant finger and vertebral column preventing aspiration as well as air leak into esophagus.*
11. *Although the efficacy of cricoid pressure has been doubted by number of clinicians however its use is still recommended strongly.*
12. *Ventilation with bag and mask is absolutely contraindicated because mask ventilation will lead to air leak into stomach to achieve intragastric pressure above critical (>20cm H₂O)*
13. *Since ventilation with mask is contraindicated therefore intubation should be done at the earliest.*
14. *Cricoid pressure should be released only once cuff is inflated and the position of endotracheal tube is confirmed.*



Treatment of aspiration:

- *Immediate turn the patient to one side with head low position*
- *Do suction to prevent further aspiration, Tracheal suction may be sufficient in mild cases*
- *Antibiotics, bronchodilators, steroids.*





THANK YOU