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MANAGEMENT OF CRISES DURING ANESTHESIA AND SURGERY. PART IX: REGURGITATION, VOMITING AND ASPIRATION

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Vomiting or regurgitation of gastric contents is a potentially disastrous complication of anesthesia. The problem is most commonly seen in emergency operations, during anesthesia or in patients with intra-abdominal pathology. The most disastrous complication of vomiting or regurgitation is aspiration which varies from asymptomatic to severe respiratory compromise or even death. It may complicate apparently forthright anesthesia. Essentially most cases happened due to failure to identify risk factors for aspiration and failure to modify the anesthetic technique accordingly[1-3].

The condition should be considered as an emergency situation that demands proper action to avoid any fatal outcome. The anesthesiologist should consider aspiration in any spontaneously breathing patient who developed desaturation, laryngospasm, airway obstruction, bronchospasm, bradycardia, or cardiac arrest. Suspicion of aspiration requires thorough monitoring in the recovery room for cardiorespiratory stability.

Authors classify risk factors into four major groups that may predispose patients to aspiration: patient related, operation related, anesthesia related, and device related[4-10].

Patient factors: Full stomach, Delayed gastric emptying, Incompetent lower oesophageal sphincter, Oesophageal diseases, Morbid obesity, Pregnancy, Nonsmoker, Eldery, Children aged ≥3 years.

Surgical factors: Upper gastrointestinal surgery, Lithotomy or head down position, Laparoscopy, Choleocystectomy, Strabismus surgery, Patients undergoing laparoscopic cholecystectomy may regurgitate or vomit bile-stained fluid.

Anesthetic factors: Light anesthesia may evoke coughing, hiccoughs, laryngospasm, gagging, Positive pressure ventilation, Difficult airway, Stomach insufflation with anesthetic gases during intermittent positive pressure ventilation, Prolonged surgery for longer than 2 hours, Premature insersion or removal of air way devices and Controlled ventilation through the laryngeal mask which is associated with an increase rate of stomach distension over time and thus the risk of aspiration.

Device factors: First-generation supra-glottic airway devices.

Aspiration signs:

Laryngospasm/airway obstruction
Bronchospasm/wheeze/crackles
Hypoventilation/dyspnoea/apnoea
Pulmonary oedema/Reduced compliance(ARDS)
Desaturation/bradycardia/arrest

Management of regurgitation, vomiting and aspiration[11]:

Inform the surgeon
Head down, lateral position if feasible
Apply cricoid pressure
Try clearance and suction of the airway
Give 100% oxygen
Consider deepening anesthesia
Try gentle mask CPAP/IPPV
If the patient's condition allows, and the appropriate equipment and assistance is at hand, proceed immediately with intubation.
Give suxamethonium and atropine
Intubate with cricoid pressure
speed up surgery
An alternative management is to allow the patient to recover consciousness and start again. Deepening anesthesia may be necessary to properly visualize and clear the pharynx/airway without precipitating laryngospasm and for further aspiration or vomiting.

Further care

Sedation, analgesia, IPPV via ETT
Suction airway, optimize FIO2 and PEEP
Bronchoscopy and lavage if necessary
Bronchodilators as necessary, Salbutamol 0.5% 1ml(5mg) by mask nebuliser 4 hourly
Chest x-ray: if normal and saturation normal so extubate
If stable after 2 hours in recovery send to ward and arrange for followup
If unstable or inadequate saturation: maintain intubation and IPPV, admit to the ICU
Explain what happened to relations and friends
Repeat chest x-ray and blood gases
Consider PEEP and inotropes
Culture sputum
Steroids and antibiotics should not be used early or routinely
Explain what happened to the patient

The case is considered to be "stable" when: saturation is 95% and above with FiO_2 <0.5, heart rate <100, respiratory rate <20/minute (adults), normothermic, no bronchospasm or minimal bronchodilation needed.

The 4th National Audit Project of Royal College of Anaesthetists[12,13] reviewed data regarding the incidence and causes of airway complications in the UK. More than half of airway-related deaths in anesthesia resulted from aspiration. In addition, cases that survived commonly resulted in significant morbidity and prolonged stay in intensive care. Therefore, prevention is the corner stone aim towards decreasing the risk of aspiration, while treatment is principally supportive once the airway has been secured. Hence the 4th National Audit Project of Royal College of Anesthetists suggested some recommendations to reduce the risk of vomiting, regurgitation and perhaps aspiration.
Anesthesiologist must assess all patients for risk of aspiration prior to anesthesia. This applies particularly to urgent and emergency surgery. Where significant doubt exists, the higher risk should be assumed.

The airway management strategy should be consistent with the identified risk of aspiration. Where reasonable doubt exists it is likely to be safer to assume increased risk and plan accordingly.

Induction is a high-risk period for aspiration and this may occur before or during airway management. No matter how low the perceived risk of aspiration, when anesthesia is induced, the equipment and skills should exist to detect, and promptly manage, regurgitation and aspiration.

Rapid sequence induction should continue to be taught as a standard technique for protection of the airway. Further focused research might usefully be performed to explore its efficacy, limitations and also explore the consequences of its omission. Aspiration during Rapid Sequence Induction/Intubation(RSI) was noted in a single case during RSI with cricoid force applied.

To maximize the likelihood of good quality cricoid force being applied, those who perform cricoid force should be trained in its methodology, should practice at regular intervals and should consider the use of simple methods of simulation.

Aspiration and the laryngeal mask: The single most frequent setting in which aspiration was reported was during the maintenance phase of laryngeal mask anaesthesia, in patients with risk factors.

If tracheal intubation is not considered to be indicated but there is some (small) increase or concerns about regurgitation risk a second generation supraglottic airway is a more logical choice than a first generation one.

Aspiration at the end of anesthesia: Emergence or recovery is a risk period. When aspiration is recognised as a risk at induction, steps should be taken to reduce the risk of aspiration at emergence.

Aspiration of blood: The diagnosis of aspiration of blood clots at the end of intraoral surgery may be missed if it is not specifically considered. Anesthesiologist caring for patients undergoing intra-oral surgery should be educated in the prevention, detection and management of blood clot aspiration. When a capnograph trace is flat (indicating the absence of ventilation: the tube therefore displaced or obstructed) and there has been blood near the airway, active measures should be taken to exclude inhaled blood clot. These may include bronchial suction, changing the tracheal tube, fibreoptic inspection or rigid bronchoscopy.

An important factor that needs attention is the type and amount of aspirated material. Acid aspiration causes damage to the lung tissue, and the degree of the damage increases as acidity and volume increase. More severe damage is caused by bile. Food particles may obstruct the airway. The main controversies regarding treatment judgments involve the decision to use antibiotics and corticosteroids. Antibiotics should only be used in cases of pneumonia. There is no evidence that using steroids either reduces mortality or improves outcome[14-19].

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