



Some common anaesthetic emergencies and accidents which may be encountered during anaesthesia are listed below with a brief outline of the problem and recommended treatments.

1. Failure of circulation under GA/ Cardiovascular collapse /Hypotension:

Such complication usually results due to excessive loss of blood during anaesthesia. The loss may be sudden or in prolonged operations. Estimation of loss is difficult. Such complication is taken care by administering compatible blood or plasma expanders like dextran. Don't give excessive dextran as it may lead to failure of clotting mechanism. Prognosis is generally poor in patients with excessive pre operative fluid losses leading to circulatory failure. Such type of emergency can be prevented with appropriate fluid therapy before, during and after the operation.

2. Sudden hypotension:

Such type of emergency is seen in patients during surgery, may be caesarians in cattle and sheep or due to sudden pressure on the coeliac complex when handling liver or spleen in dogs and cats. The emergency is characterized as follow:

- The pulse becomes imperceptible.
- Respiration ceases.
- Veins dilate (noticed in the tongue).
- Pupils remain normal in size indicating working heart.

Immediately stop the operation and let the blood pressure come to normal. Avoid such emergency by gentle surgery.

3. Shock:

Primarily develops due to over dosing of the anaesthetic or excessive fluid loss during surgery. Treatment is executed on the general principles of the management of shock. Such a complication is normally prevented by administering pre operative steroids along with compatible IV fluids before and during the surgery.

4. Disturbances in cardiac rhythm:

A variety of disturbances in the cardiac rhythm may be seen during anaesthesia.

- a) **Bradycardia:** Such a emergency is not serious until or unless it is too severe. Usually seen in deep anaesthesia, hypothermia, drugs and vagal reflexes. Treat with an anticholinergic e.g atropine. If an anticholinergic

does not correct the problem consider the use of dopamine as an infusion at a rate of 2-10ug/kg/min. Add 80 mg to 500mL fluid to give 160ug/mL and infuse 0.01-0.06mL/kg/min.

- b) **Tachycardia:** Can be from pain, hypercarbia, hypoxemia, hypovolaemia. It is also seen in young animals or during shock or in animals premedicated with atropine. Generally not serious. Consider using 2% lignocaine HCl (without adrenaline) intravenously if the increase in heart rate is too much.
- c) **Heart conduction abnormalities:** Common in all the animals under all forms of anaesthesia appreciated only after recording ECG. The most common are SA block, AV block, T wave changes etc. Generally not alarming and most of such arrhythmias disappear once adequate oxygen exchange is established as these changes are mostly associated with myocardial hypoxia.

5. Heart Failure:

The common types of heart block seen are **ventricular fibrillation** and **ventricular asystole or arrest of the heart or cardiac standstill**. Such an emergency mostly develops when there is overdosing of the anaesthetic drug. Revival is very important since brain cells are very sensitive to hypoxia. Generally brain damage is irreversible if circulatory failure is for more than 3-4 min. respiration remains normal till respiratory center becomes anoxic.

The following remedies can be adopted in heart failure:

- **Immediate cardiac massage:**
 - a) **Compression of heart through intact chest wall:** It should be forcible and fairly rapid, more than 60/min in dogs and small animals (done with hands) and 30-40/min in large animals (done with the foot or knee).
 - b) **Direct cardiac massage:** No time is wasted for preparation of the site. Incision is given in the 6th intercostal space. Reach the heart and massaging is done by squeezing the heart from the apex towards the base.
- **Further treatment:** The further treatment will depend upon the type of the heart failure.
 - a) **Cardiac standstill:** Inject 5 ml of adrenaline HCl (1:10,000) or 2-3 ml of 10% calcium chloride direct into the ventricle and quickly

massage into the coronary artery. Simultaneously 10% calcium gluconate, 10-20 ml is administered by IV route.

- b) **Ventricular fibrillation:** The best and the most specific treatment for this type of emergency is to pass the electric current through myocardium. The alternative treatment includes injection of 1% lignocaine HCl @1-4mg/kg, IV which helps to depress the cardiac contractions, decrease the excitability and so helps in overcoming the fibrillation. Methoxamine, a pure alpha adrenergic agonist drug, can also be used as it increases myocardial contractions without causing vasoconstriction. Use of 8.4% sodium bicarbonate (1 mEq/kg) is also useful as it counters acidosis and improves the action of epinephrine. The total dose of 8.4% sodium bicarbonate to be given is calculated as under:

$$\text{mEq of 8.4\% NaHCO}_3 = \frac{\text{Wt. of animal (kg)}}{5} \times \frac{\text{Duration of arrest (min)}}{2}$$

Important: During direct cardiac massage, positive pressure ventilation with oxygen is a must and continued till circulatory failure is vanished. The chest shouldn't be closed until spontaneous heart beats are present for at least 20 min. After chest closure, create the negative pressure with suction pump.

6. Respiratory acidosis:

Such an emergency develops when minute respiratory volume is decreased leading to decreased excretion of CO₂ and resultant respiratory acidosis. The most common causes for such an emergency are low total gas flow in the semi-closed system, exhausted soda lime in the closed system and any type of obstruction in the airway. Respiratory acidosis is always of serious nature when it is prolonged and death of the patient may result if pH of the blood falls below 6.7.

Remedy includes maintenance of proper gas flow; replacement of soda lime if exhausted and always intubate the animal.

7. Hypoxia:

This is characterized clinically by cyanosis of mucous membranes. It is dangerous when prolonged because may lead to brain damage and development of comatose condition. It should always be avoided by proper oxygenation of the patient during anaesthesia may be by using positive pressure ventilation with external source of oxygen.

8. Laryngeal and bronchial spasms:

Mostly seen in cats under ether anaesthesia and can be controlled by relaxant drugs. Remedy includes sprinkling of local anaesthetic on the larynx. Always intubate the animal and ensure proper airway. Intravenous pethidine is quite helpful and prevents reoccurrence.

Bronchial spasms are uncommon and are particularly seen in ruminants because of aspiration of regurgitated material.

9. Respiratory tract obstruction:

This results due to the base of the tongue or epiglottis and seen when the animal is not intubated. Such an obstruction can be overcome by extending the head and drawing the tongue out. However over extension of the tongue may cause obstruction in pigs. To prevent such a complication, always intubate the animal during anaesthesia.

10. Respiratory arrest/apnea:

Such an emergency develops due to overdosing of anaesthesia using primarily the injectable anaesthetics and also with some of the inhalant anaesthetics. Use of muscle relaxant drugs can also cause apnea. The emergency can be controlled as follows:

- Stop the anaesthetic administration immediately.
- Support ventilation with artificial respiration e.g. IPPV, chest pressing etc.
- Administer antagonist if available.
- Administer respiratory stimulants.
 - Picrotoxin, @ 1mg/kg, IV (Toxic)
 - Leptazol, @ 2-4mg/kg, IV (Dogs & cats); 1g total dose in horses & cattle.
 - Nikethamide (Coramine): Commonly used respiratory stimulant. @ 10-25ml, IV in large animals; 1-3ml, IV in dogs and cats.
 - Doxaprim, 1-3ml, IV in dogs and cats.

11. Induction apnea:

Mostly seen during barbiturate or propofol anaesthesia in dogs. There is respiratory depression leading to hypoxia and increased $p\text{CO}_2$. High oxygenation with approximately 97% O_2 removes the hypoxic condition but $p\text{CO}_2$ levels remains below CO_2 threshold in the respiratory centre – animal ceases to breathe. After redistribution of the anaesthetic in the body tissues, depression of the respiratory centre is reduced, $p\text{CO}_2$ levels rise above the CO_2 threshold in the

respiratory centre – normal breathing starts. Slow rate of injection reduces the incidence of such a complication.

12. Corneal abrasions:

This type of complication develops due to decreased tear production during anaesthesia, most common in ketamine anaesthesia. Use topical eye ointment/ocular instillations to avoid this.

13. Hepatitis:

Commonly seen when halothane is used. The other possible causes are hypoxaemia and hypotension. Treat with supportive medicines. Avoid such complication.

14. Hypertension:

Rarely seen when lots of pain, hypercarbia or too light level of anaesthesia. Treatment is as per the cause.

15. Hyperthermia:

Seen in heavy hairy breeds of dogs or when there is inadequate heat loss. Remedy includes cooling of the patient with cool water.

16. Malignant hyperthermia:

Rare condition in pigs, horses and dogs mostly develops with succinyl choline and volatile anaesthetics. Characterized by tachycardia, muscle rigidity, increased ventilation with hyperthermia. Treatment includes removal of the triggering agent.

17. Hypothermia:

Results due to lack of insulation as cold tables, open body cavities etc. Also develops when there is vasodilation and hypovolaemia. Temperature below 32°C may lead to death. Bradycardia and sub-normal temperature are the characteristics. Treatment includes warming of the patient: water bottles in the axilla & groin area; use of blankets and provision of warm environment.

18. Renal failure:

Normally results due to hypotension, hypovolaemia and inadequate IV fluids during anaesthesia. Such a complication must be avoided with proper IV fluids.

19. Vomition and regurgitation:

It is commonly seen in ruminants and other animals, when the patient is not properly prepared for the surgery (improper fasting etc.). Always do proper fasting to avoid this complication.

ANAESTHETIC ACCIDENTS:

- 1. Explosions and fires**
- 2. Postural accidents:** Facial/radial paralysis in large animals when casting on the hard surface.
- 3. Local necrosis:** When accidental perivascular injection of irritant anaesthetics e.g. chloral hydrate or thiopentone Na (Barbiturate slough).
- 4. Venous thrombosis:** May develop with higher concentration (>5%) of thiopentone Na.

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