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Veterinary Cardiopulmonary Resuscitation, Oxygen Therapy and Enteral Nutrition in Critical Care: A Review

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Abstract

Cardiopulmonary arrest (CPA) is a life-threatening emergency requiring immediate intervention in veterinary patients. Effective management involves cardiopulmonary resuscitation (CPR), oxygen therapy, and appropriate nutritional support. This review summarises current concepts in basic and advanced life support, oxygen supplementation strategies, and enteral nutrition in critically ill animals. Emphasis is placed on evidence-based practices to improve survival and clinical outcomes (Fletcher *et al.*, 2012; Hofmeister *et al.*, 2009).

Keywords: CPR, veterinary critical care, oxygen therapy, enteral nutrition, dogs, cats

1. Introduction

Veterinary critical care encompasses the management of life-threatening conditions such as cardiopulmonary arrest, respiratory failure, and severe malnutrition. Cardiopulmonary resuscitation (CPR), oxygen therapy, and nutritional support are fundamental components of intensive care management. Early intervention and adherence to standardized protocols significantly improve survival rates in small animal practice (Fletcher *et al.*, 2012; Haskins, 2015).

2. Cardiopulmonary Resuscitation (CPR)

2.1 Goals of CPR

The primary goal of CPR is to restore spontaneous circulation and maintain adequate perfusion to vital organs, particularly the brain and heart. Successful resuscitation integrates basic life support (BLS) and advanced life support (ALS) (Hofmeister *et al.*, 2009).

2.2 Basic Life Support (BLS)

Basic life support involves early recognition of cardiopulmonary arrest, initiation of chest compressions, airway management, and assisted ventilation. Current veterinary guidelines recommend the CAB sequence (compressions, airway, breathing) rather than the

traditional ABC approach (Fletcher *et al.*, 2012).

Chest Compressions

Effective chest compressions are essential to maintain coronary and cerebral perfusion. Compressions should be delivered at a rate of 100–120 per minute, with a depth of one-third to one-half of the thoracic width. Interruptions should be minimized to ensure optimal perfusion (Fletcher *et al.*, 2012; Hofmeister *et al.*, 2009).

Airway and Breathing

Airway patency should be established rapidly, preferably via orotracheal intubation. Ventilation is recommended at approximately 10 breaths per minute with a tidal volume of 10 mL/kg (Haskins, 2015).

2.3 Advanced Life Support (ALS)

Advanced life support includes pharmacologic interventions, correction of electrolyte imbalances, fluid therapy, and defibrillation. These measures aim to address underlying causes and enhance the effectiveness of BLS (Fletcher *et al.*, 2012).

Defibrillation

Defibrillation is indicated in cases of ventricular fibrillation or pulseless ventricular tachycardia. Biphasic defibrillators are preferred due to higher efficacy. Initial energy levels of 2–5 J/kg are recommended (Hofmeister *et al.*, 2009).

2.4 Adjunct Devices

Impedance threshold devices (ITDs) may improve coronary perfusion pressure; however, their use in small animals remains limited (Fletcher *et al.*, 2012).

2.5 Post-Resuscitation Care

Post-CPR management focuses on stabilizing hemodynamics, maintaining oxygenation, and preventing secondary organ damage. Intensive monitoring is essential during this phase (Haskins, 2015).

3. Oxygen Therapy

3.1 Importance of Oxygen Supplementation

Oxygen therapy plays a critical role in managing respiratory distress and hypoxemia. It enhances arterial oxygen content and supports cellular metabolism (Haskins, 2015; Macintire *et al.*, 2017).

3.2 Respiratory Depression

Respiratory depression is characterized by inadequate elimination of carbon dioxide, leading to hypercapnia. Severe cases may progress to apnea, requiring mechanical ventilation

(Haskins, 2015).

3.3 Hypoxia

Hypoxia is defined by a PaO_2 below 60 mmHg and may result from airway obstruction or ventilation-perfusion mismatch. Diagnosis is achieved via pulse oximetry or arterial blood gas analysis (Macintire *et al.*, 2017).

3.4 Pulmonary Complications

Pneumothorax

Pneumothorax may occur due to trauma or surgical complications. Management includes oxygen therapy and thoracostomy (Fossum, 2019).

Bronchospasm

Bronchospasm may arise from airway irritation or anesthetic complications and is treated with bronchodilators (Macintire *et al.*, 2017).

Barotrauma and Volutrauma

Excessive airway pressure during ventilation can lead to lung injury; careful monitoring is essential (Haskins, 2015).

Tracheal Injury

Tracheal tears, particularly in cats, may occur due to improper intubation (Fossum, 2019).

4. Enteral Nutrition in Critical Care

4.1 Indications for Nutritional Support

Nutritional support is indicated in animals with prolonged anorexia (>3 days) or significant weight loss (>10%) (Chan, 2015).

4.2 Importance of Enteral Nutrition

Enteral nutrition is preferred when the gastrointestinal tract is functional, as it maintains mucosal integrity and reduces bacterial translocation (Chan, 2015; Remillard & Saker, 2016).

4.3 Types of Feeding Tubes

Nasoesophageal Tube: Suitable for short-term nutritional support; complications include aspiration and dislodgement (Chan, 2015).

Esophagostomy Tube: Used for long-term feeding; requires general anesthesia (Remillard & Saker, 2016).

Percutaneous Endoscopic Gastrostomy (PEG) Tube: Preferred for long-term support, especially in esophageal disorders (Chan, 2015).

Jejunostomy Tube: Used when gastric feeding is contraindicated (Remillard & Saker, 2016).

5. Conclusion: Effective management of critically ill veterinary patients requires a

multidisciplinary approach integrating CPR, oxygen therapy, and nutritional support. Adherence to current guidelines and early intervention significantly improve patient survival and recovery. Continued research and clinical training remain essential to advance veterinary critical care (Fletcher *et al.*, 2012).

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