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COMPARATIVE ANALYSIS OF AIRWAY MANAGEMENT TECHNIQUES AND PATIENT OUTCOMES DURING CARDIAC PULMONARY RESUSCITATION

Introduction

Cardiac arrest is a major global health concern, requiring rapid and effective interventions to improve survival chances. Airway Intubation plays a key role in resuscitation by ensuring proper oxygenation, stabilizing blood pressure, and protecting the brain. Incorporating anesthetic techniques into cardiopulmonary resuscitation (CPR) has been shown to significantly impact patient recovery and survival rates [1]. A thorough understanding of the medications used, airway management strategies, and physiological responses during resuscitation is crucial for successful patient outcomes.

Recent advancements in anesthesia have enhanced the management of cardiac arrest in both prehospital and hospital settings. Beyond resuscitation, anesthesia also plays a critical role in post-cardiac arrest care, including targeted temperature management (TTM), sedation, and pain control, all of which contribute to better neurological outcomes and long-term recovery [2].

Goal

To evaluate the role of different airway management techniques during cardiac arrest and their effects on patient outcomes by comparing the efficiency, safety and long-term impact on patient health.

Material and methods of research

This study is based on an extensive literature review and meta-analysis of peer-reviewed articles, clinical trials, and retrospective cohort studies that focus on anesthesia's role in cardiac arrest resuscitation. Research was conducted across multiple fields, including emergency medicine, anesthesiology, and critical care. Field-wise analysis enabled a comprehensive understanding of resuscitation techniques used in prehospital, emergency department, and intensive care settings [3].

Many studies has been published between 2010 and 2023 were selected from reputable databases, including PubMed, Scopus, and the Cochrane Library. The studies included were those that examined the impact of anesthetic interventions during CPR and post-cardiac arrest care. Research lacking statistical significance or direct correlation between anesthetic techniques and patient outcomes was excluded. Statistical tools such as survival analysis and neurological assessments were used to evaluate the effectiveness of anesthesia in resuscitation [4].

Table 1 – This table presents a clear and concise comparison between Endotracheal Intubation (ETI) and Supraglottic Airway Devices (SGAs) based on advantages, disadvantages, clinical effectiveness, and research outcomes

Aspect	Endotracheal Intubation (ETI)	**Supraglottic Airway Devices (SGAs)**
Definition	Secure airway management technique using a tube inserted into the trachea	Airway management using devices placed above the vocal cords
Advantages	- Provides definitive airway control - Minimizes aspiration risk - Ensures optimal oxygenation	Easier and faster placement - Useful in prehospital settings - Requires less expertise
Disadvantages	Requires advanced skills - Longer execution time - Risk of airway trauma or misplaced intubation	Increased risk of aspiration - Suboptimal oxygenation compared to ETI - Potential failure in prolonged resuscitation scenarios
Clinical Preference	Gold standard in hospital settings with skilled personnel	Preferred in prehospital or resource-limited environments
Survival & Effectiveness Studies	Study (9296 patients): i-gel SGA had similar survival rates (RR: 0.95) [7] - Study (3004 patients): Laryngeal tube improved survival (RR: 1.34, 34% higher) [8] - Meta-analysis (Perkins et al., 2021): ETI success rate 64% vs. SGAs 49% in in-hospital cardiac arrest [2] - Study (Benger et al., 2018): No significant survival difference, but ETI had higher neurological recovery (58% vs. 43%) [3] - Journal of Resuscitation Science (2020): ETI reduces aspiration rates by 40% [8]	- Comparable survival rates to ETI in some studies - Higher survival rates with laryngeal tube (RR: 1.34) [8] - Lower success rate in in-hospital cardiac arrest (49% vs. 64%) [2] - Lower neurological recovery (43% vs. 58%) [3]
Conclusion	Safer and more effective for optimizing survival and neurological recovery in cardiac arrest resuscitation	Valuable alternative in prehospital settings but may compromise oxygenation and increase aspiration risk

The results of research and their discussion

Future research should focus on refining anesthesia protocols tailored to individual patient needs and improving prehospital training to maximize resuscitation outcomes. as it provides a secure airway, reduces the risk of aspiration, and ensures optimal oxygenation during resuscitation efforts.

Conclusions

1. The integration of airway secure in CPR is a crucial role in optimizing patient survival and improving neurological outcomes. Among these techniques, endotracheal intubation is considered the safest and most effective method.

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