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RESEARCH ARTICLE
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COMPARISON OF INHALATIONAL VITAL CAPACITY INDUCTION WITH SEVOFLURANE TO INTRAVENOUS INDUCTION WITH PROPOFOL FOR LARYNGEAL MASK AIRWAY INSERTION IN ADULTS: A RANDOMISED STUDY

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Abstract

Background: The selection of an anesthetic agent significantly influences airway management, patient comfort, and safety. While intravenous propofol remains a popular choice due to its rapid onset and suppression of airway reflexes, it is associated with cardiovascular depression. Sevoflurane, via the vital capacity breath (VCB) technique, has emerged as a promising alternative due to its non-irritant properties and stable hemodynamic profile.

Objective: To compare the efficacy of vital capacity induction with 8% sevoflurane versus intravenous 2 mg/kg propofol in terms of insertion conditions, onset time, and hemodynamic responses during laryngeal mask airway (LMA) placement in adult surgical patients.

Methods: A prospective randomized study was conducted on 104 patients (ASA I-II), undergoing elective surgeries under general anesthesia. Patients were randomized into Group S (sevoflurane) and Group P (propofol), each with 52 patients. Parameters assessed included time for eyelash reflex loss, LMA insertion time, jaw relaxation, ease of insertion, apnea incidence, patient movement, gagging, coughing, laryngospasm, and hemodynamic variables at various time points.

Results: Propofol provided faster induction (eyelash reflex loss: 44.13 ± 4.34s vs. 61.38 ± 5.83s; $p<0.001$) and quicker LMA insertion (12.92 ± 3.84s vs. 19.06 ± 3.93s; $p=0.002$). However, it was associated with higher apnea incidence (5.8% vs. 1.9%). Sevoflurane maintained more stable hemodynamic parameters. Both agents provided comparable LMA insertion conditions.

Conclusion: Both sevoflurane via VCB and IV propofol are effective for LMA insertion. Sevoflurane offers greater hemodynamic stability with a slightly delayed induction, while propofol ensures rapid induction at the cost of respiratory depression.

Keywords: Sevoflurane, Propofol, LMA, Vital Capacity Breath, Inhalational Induction, Airway Management

Introduction

The Laryngeal Mask Airway (LMA) is a cornerstone in modern airway management, particularly in ambulatory and minor surgical procedures. Propofol has long been the drug of choice for LMA insertion due to its rapid onset and ability to suppress upper airway reflexes. However, its use is not devoid of drawbacks such as hypotension, apnea, and injection site pain.

Inhalational induction with sevoflurane, especially via the Vital Capacity Breath (VCB) technique, presents an alternative with potential benefits including non-irritant behavior, bronchodilation, and superior hemodynamic stability. Despite these advantages, there remains limited literature comparing the efficacy and safety of sevoflurane VCB induction directly with intravenous propofol in adult patients.

This study was conducted to evaluate whether sevoflurane via VCB provides comparable or superior LMA insertion conditions and hemodynamic outcomes compared to intravenous propofol.

Materials and Methods

Study Design and Setting

A prospective, randomized, controlled study was conducted at ESIC Medical College and PGIMSR, Bengaluru, between August 2022 and January 2024. The study was approved by the institutional ethics committee and registered appropriately.

Inclusion Criteria

ASA physical status I or II Age between 20–60 years Weight between 30–70 kg Undergoing elective surgery under general anesthesia, duration 1–1.5 hours No requirement for endotracheal intubation

Exclusion Criteria Anticipated difficult airway ASA III/IV Gastroesophageal reflux disease Emergency surgery History of difficult intubation or airway pathology

Sample Size

Based on a prior study by Udaybhaskar et al., considering a 95% confidence level and 80% power, a minimum of 52 subjects were required per group.

Randomization

Simple randomization was performed using computer-generated codes, allocated via sealed envelopes.

Interventions

Group P (n=52): Induction with IV propofol 2 mg/kg; additional boluses if jaw relaxation inadequate.
Group S (n=52): VCB inhalational induction with 8% sevoflurane in 100% oxygen via primed circuit.
All patients received premedication with pantoprazole 40 mg, ondansetron 4 mg, midazolam 1 mg, glycopyrrolate 0.2 mg, and fentanyl 2 μg/kg IV.

Results

Demographics

No statistically significant difference between the groups in terms of age (p=0.31), weight (p=0.245), BMI (p=0.158), or gender distribution.

Induction and Insertion Times

Parameter	Group S (Sevoflurane)	Group P (Propofol)	P-value
Eyelash Reflex Loss (sec)	61.38 ± 5.83	44.13 ± 4.34	<0.001
LMA Insertion Time (sec)	19.06 ± 3.93	12.92 ± 3.84	0.002

Insertion Conditions
Full jaw relaxation: 78.8% (S) vs. 92.3% (P) Apnea: 1.9% (S) vs. 5.8% (P)
Gagging and coughing: Slightly more in sevoflurane group but not statistically significant
Laryngospasm: Rare in both groups

Hemodynamic Parameters
Propofol caused significant transient drops in systolic and diastolic blood pressure post-induction, while sevoflurane maintained more consistent blood pressure and pulse rates throughout the peri-induction period.

Discussion
This study reinforces the role of both agents in providing satisfactory LMA insertion conditions. However, it highlights key contrasts:
Induction time: Propofol has a clear advantage, achieving faster unconsciousness and LMA insertion.
Respiratory depression: More pronounced with propofol, as shown by higher apnea incidence.
Hemodynamic effects: Sevoflurane maintains stability, making it more suitable in patients at risk of hypotension.

The results align with studies by Udaybhaskar et al. and Sarkar et al., where sevoflurane demonstrated favorable cardiovascular profiles, while propofol was associated with quicker onset but greater hemodynamic fluctuation.
This study adds to existing literature by using a standard VCB technique and directly comparing two commonly used agents in a controlled adult population.

Conclusion
Both sevoflurane (via VCB) and IV propofol are effective and safe for LMA insertion in ASA I–II adults undergoing elective surgeries. While propofol provides quicker induction and superior suppression of airway reflexes, sevoflurane offers smoother hemodynamic stability and is non-invasive. The choice should be guided by patient comorbidities and clinical context.

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