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Comparison of vasodilatory properties between isoflurane and sevoflurane using perfusion index: A randomized clinical trial

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Abstract

Background: Sevoflurane and isoflurane are widely used volatile anesthetics with distinct vasodilatory profiles. Monitoring their effects on vascular tone is critical for optimizing anesthetic management and maintaining hemodynamic stability during surgery. Perfusion Index (PI), a non-invasive parameter obtained via pulse oximetry, serves as a reliable indicator of peripheral vasodilation.

Objective: To compare the vasodilatory effect of sevoflurane and isoflurane using an evaluation of changes in PI, along with associated hemodynamic parameters such as mean arterial pressure (MAP) and heart rate (HR), in patients undergoing lumbar spine surgery under general anesthesia.

Methods: From July 2022 to December 2022, a randomized controlled trial was conducted at Department of Anesthesiology, CMH Dhaka. Sixty patients of ASA grade I and II aged 25-50 years scheduled for decompression and stabilization surgery of prolapsed lumbar intervertebral disc (PLID) were randomly assigned to receive either isoflurane (Group A) or sevoflurane (Group B) at age-adjusted MAC-equivalent concentrations. Induction and maintenance was by standardized protocols. PI, MAP, HR, and blood pressure were recorded every three minutes for 35 minutes following induction. Data were compared between groups using the appropriate statistical tests.

Results: Demographically and anthropometrically, the groups were comparable. Sevoflurane was associated with remarkably raised PI values, indicating greater peripheral vasodilation than isoflurane ($p<0.05$). Group B also indicated a hemodynamically more stable procedure with less MAP decrease and insignificant HR increase in relation to Group A. There were no variations in anesthetic drug doses or in BIS index values.

Conclusion: Sevoflurane produces more pronounced peripheral vasodilation, with higher PI values, and is better in terms of hemodynamic stability than isoflurane. PI monitoring offers a simple, non-invasive intraoperative assessment of vascular tone, useful for selection of anesthetic agents to maximize patient results.

Keywords: Sevoflurane, isoflurane, perfusion index, vasodilation, general Anaesthesia, hemodynamic stability, inhalational agents

Introduction

Sevoflurane and isoflurane are two commonly used halogenated inhalational anesthetic medicines with variable pharmacological effects on vascular tone [1]. Sevoflurane, being a polyfluorinated isopropyl methyl ether, has a low blood/gas partition coefficient (~0.68), enabling swift induction and recovery [2]. Sevoflurane is non-irritant to the respiratory system and is a bronchodilator. Hemodynamically, sevoflurane causes dose-dependent decrease in systemic vascular resistance (SVR), myocardial contractility, and mean arterial pressure (MAP), with a modest tachycardia increase [3]. Importantly, it neither sensitizes the myocardium to catecholamines nor is it arrhythmogenic [4]. Sevoflurane also causes cerebral vasodilatation with reduction in cerebral metabolic rate without rauzing EEG excitation. It also potentiates neuromuscular blockers to enhance muscle relaxation [5]. Isoflurane, which is a chemically halogenated ethyl methyl ether, is non-flammable but irritating to the upper respiratory tract with a pungent smell and therefore cannot be employed for gaseous induction. Isoflurane also decreases MAP through decreased SVR and increases HR greater than sevoflurane [6]. Isoflurane weakens myocardial sensitization to catecholamines, but arrhythmias are still uncommon.

Isoflurane similar to sevoflurane causes cerebral vasodilation and increases neuromuscular blockade [7]. Vasodilatory effects of these drugs should be carefully monitored in order to maximize anesthetic management and ensure adequate tissue perfusion [8]. Estimation of systemic vascular resistance is the only definitive way to assess vascular tone but requires invasive catheterization procedures that bear procedural risk and require expert hands [9]. Perfusion index (PI), acquired non-invasively by pulse oximetry, provides a rapid, simple, and reproducible way to assess peripheral vasomotor tone [10]. PI is the ratio of pulsatile arterial blood flow to non-pulsatile tissue blood flow, representing real-time vasodilation or vasoconstriction mediating sympathetic activity [11]. Vasodilation is reflected by rising PI values, which corresponds to augmented tissue perfusion and oxygenation, necessary for wound healing and infection prevention [12]. PI was found to have been validated in various clinical uses, including determination of anesthetic depth, detection of sympathetic blockade, and prediction of post-spinal hypotension [13]. With the differential vasodilatory impacts of sevoflurane and isoflurane, this study shall try to make an objective comparison of their impact on peripheral vascular tone by determining PI at age-corrected MAC-equivalent doses under general anesthesia. This technique offers an indirect way to measure vasodilation that might guide anesthetic choice for improved hemodynamic stability and patient outcome. The general goal of the study is to contrast PI-measured vasodilatory responses to isoflurane and sevoflurane. Detailed goals are to contrast MAP, HR, and change in blood pressure as well as PI values between the anesthetic groups.

Methodology

The research was designed as a randomized clinical trial at the Combined Military Hospital (CMH) Department of Anesthesiology, Dhaka. The trial was conducted for six months between July 1, 2022, and December 31, 2022, to provide an adequate data collection window for the documentation of perioperative hemodynamic change during prolapsed lumbar intervertebral disc (PLID) decompression and stabilization surgery. The study population was adult patients 25-50 years old who were undergoing decompression and stabilization surgery for PLID under general anaesthesia. The inclusion criterion was ASA physical status I or II patients to minimize confounding due to systemic diseases. Male and female patients with Mallampati grades I and II were included. Exclusion criteria such as ASA grades III and IV, on vasoactive medications, and having cardiovascular and neurological disorders were excluded in order to avoid interference with hemodynamics and perfusion parameters. Simple random sampling method was utilized in allocating participants into two groups so as to ensure equal confounder distribution. Using data from a previous comparative study on alterations in mean arterial pressure (MAP) during isoflurane and sevoflurane anesthesia, sample size was computed to achieve 80% statistical power and 5% significance level, which worked out to a required total sample size of 58. To account for dropouts, 60 patients were enrolled and divided into two groups randomly ($n = 30$ each): Group A (Isoflurane) and Group B (Sevoflurane). The research plan also got the approval of Institutional Ethics Committee of CMH, Dhaka. Informed written consent was obtained from all patients after explaining study aims and procedures elaborately, ensuring voluntary and confidentiality. All the patients underwent complete preoperative assessment, including medical history, physical examination, and laboratory tests recorded on routine check-up forms. Pre-medication was standardized with intravenous omeprazole 40 mg and metoclopramide 10 mg given 60 minutes before surgery to decrease gastric acidity and prevent aspiration risk. After entry into the operating theater, an 18G intravenous cannula was inserted to administer fluids and medications. Intraoperative routine monitoring included continuous recording of systolic, diastolic, and mean arterial pressure (SBP, DBP, MAP), heart rate (HR), oxygen saturation (SpO_2), end-tidal CO_2 ($EtCO_2$), electrocardiogram (ECG), and Bispectral Index (BIS). Baseline hemodynamics and perfusion index (PI) were recorded five minutes before induction in preparation for control values. Standardization of anesthesia induction: fentanyl 2 µg/kg IV was administered, followed by propofol 2 mg/kg IV until loss of verbal response. Tracheal intubation was facilitated using Rocuronium bromide (0.6 mg/kg IV). Following intubation, mechanical ventilation with 100% oxygen was administered to achieve $EtCO_2$ of 32-35 mmHg. Maintenance of anesthesia was either isoflurane (Group A) or sevoflurane (Group B) in a mixture of oxygen and nitrous oxide. Titration of volatile anesthetic concentration to achieve an age-adjusted minimum alveolar concentration (MAC) of approximately 1.0, as confirmed by BIS monitoring with values between 40 and 60 to ensure adequate depth of anesthesia. Boluses of fentanyl (0.5 µg/kg IV) intraoperatively were administered when HR was greater than 100 bpm or when MAP increased by greater than 20% from baseline, indicating inadequate analgesia or depth of anesthesia. Intermittent boluses of rocuronium 0.1 mg/kg IV were used to provide muscle relaxation. Core temperature was maintained above 35.5°C to avoid hemodynamic disturbance due to hypothermia. Hemodynamic indices like PI, MAP, HR, and blood pressure were observed every 3 minutes for 35 minutes during the period of anesthesia maintenance, which is the critical time. The multi-parameter monitor automatically recorded data electronically, providing for precise and uninterrupted recording of fluctuations. BIS SQI of more than 50% was considered within acceptable limits to be used for analysis. Vaporizer dial adjustments were done by another anesthesiologist blinded to study objectives to maintain equi-anaesthetic concentrations of the concerned agents and reduce observer bias. Age correction of MAC values was carried out using ISO-MAC standard charts so that the values can be compared across different age groups. Halting of inhalational agent was performed at the point of immediate closure of skin. Residual neuromuscular blockade was reversed intravenously with neostigmine (0.05 mg/kg) and atropine (0.02 mg/kg). Patients were extubated once consciousness and spontaneous respiration were recovered, and subsequently transferred to the post-anesthesia care unit (PACU) for continued monitoring of vital signs and recovery parameters.

Results

This randomized clinical trial was conducted at the Department of Anesthesiology, Combined Military Hospital (CMH), Dhaka. A total of 60 patients scheduled for decompression and stabilization surgery under general anesthesia for prolapsed lumbar intervertebral disc (PLID), classified as ASA grade I and II, were included. Participants were allocated to two groups of 30 participants each: Group A was subjected to general anesthesia with isoflurane, and Group B to general anesthesia with sevoflurane. The primary objective was to compare the vasodilatory effect of isoflurane and sevoflurane by measuring the perfusion index (PI).

Table 1: Socio-demographic Characteristics (n = 60)

Variable	Group A (n = 30) n(%)	Group B (n = 30) n(%)	Total (n = 60) n(%)	P value
Gender				
Male	18 (60)	23 (76.7)	41 (68.3)	0.165**
Female	12 (40)	7 (23.3)	19 (31.7)	
Residence				
Rural	14 (46.7)	19 (63.3)	33 (55)	0.194**
Urban	16 (53.3)	11 (36.7)	27 (45)	
Age (Mean ± SD)	27.83±1.82	27.30±1.71	27.57±1.77	0.246*

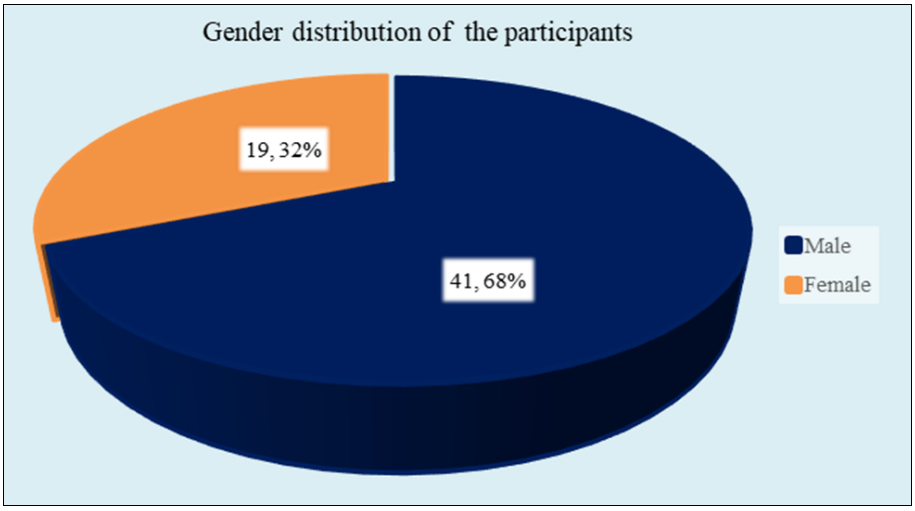

Fig 1: Pie chart showed gender distribution of the participants (N = 60)

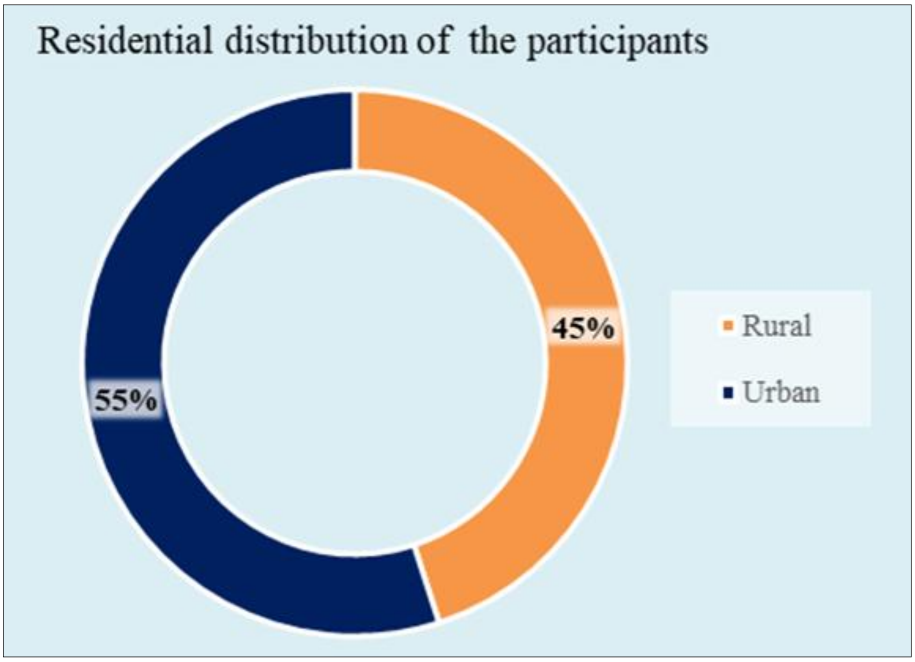

Fig 2: Ring chart showed residential distribution of the participants (N = 60)

Table 2: Anthropometric Measurements (N = 60)

Measurement	Group A (Mean ± SD)	Group B (Mean ± SD)	Total (Mean ± SD)	P value
Height (cm)	168.97±5.46	170.17±6.66	169.57±6.07	0.449*
Weight (kg)	67.17±5.48	66.67±4.87	66.92±5.14	0.710*
BMI	23.61±1.29	23.06±1.68	23.28±1.51	0.251*
ASA Grade (I:II)	28:2	27:3	55:5	0.640**

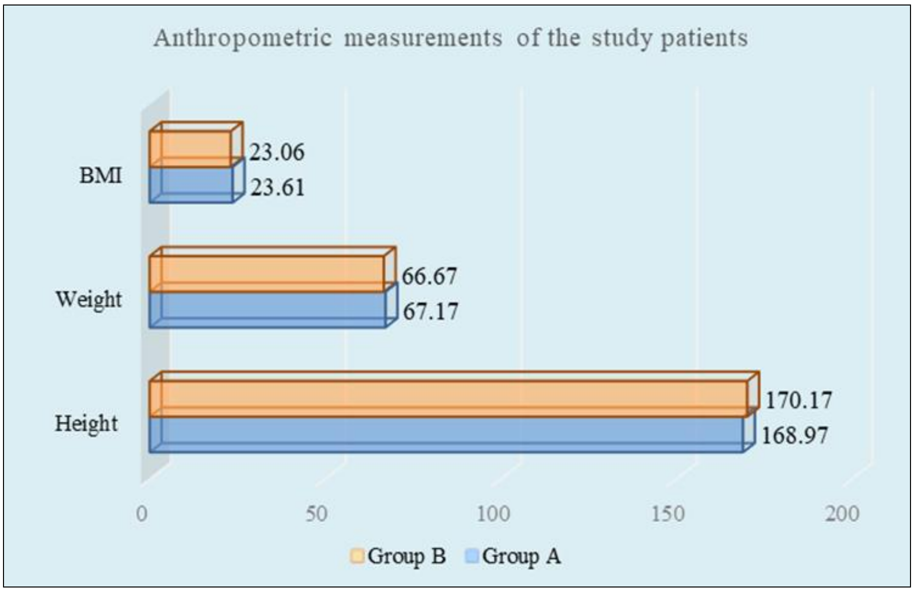

Fig 3: Bar chart showed anthropometric measurements of the patients (N = 60)

Table 3: Intraoperative Drug Dose and BIS Index (N = 60)

Variable	Group A (Mean ± SD)	Group B (Mean ± SD)	P value*
Propofol (mg/kg)	134.33±10.95	133.33±9.73	0.710
Rocuronium (mg/kg)	40.30±3.28	40.0±2.92	0.710
Time-averaged BIS	42.10±3.49	44.17±5.01	0.070
Duration of adequate hypnosis (BIS 40-60) (min)	32.17±5.19	35.53±3.97	0.007

Table 4: Perfusion Index (PI) at Different Time Points (N = 60)

Time	Group A (Mean ± SD)	Group B (Mean ± SD)	P value*
Baseline (pre-surgery)	1.37±0.31	1.32±0.32	0.658
5 min after induction	1.31±0.29	1.29±0.31	0.800
10 min after induction	3.13±0.61	3.01±0.63	0.456
15 min after induction	6.12±1.17	4.54±0.38	<0.001
20 min after induction	8.24±0.86	4.90±0.48	<0.001
25 min after induction	8.62±1.02	5.37±0.58	<0.001
Prenociception	8.57±1.09	5.37±0.55	<0.001
Postnociception	4.19±0.68	3.01±0.65	<0.001
35 min after induction	5.96±0.65	3.56±0.38	<0.001

Perfusion index was similar at baseline and early induction time points but was significantly higher in the isoflurane group from 15 minutes onwards, indicating greater vasodilation. PI decreased following nociception but remained higher in the isoflurane group.

Table 5: Heart Rate (bpm) at Different Time Points (N = 60)

Time	Group A (Mean ± SD)	Group B (Mean ± SD)	P value*
Baseline	68.13±3.81	66.77±3.49	0.153
5 min after induction	71.63±5.65	70.73±5.95	0.551
10 min after induction	82.30±6.11	83.07±7.61	0.668
15 min after induction	79.77±3.91	81.37±4.04	0.124
20 min after induction	74.40±3.61	76.00±4.07	0.112
25 min after induction	69.10±4.05	70.37±3.88	0.221
Prenociception	68.57±3.80	69.73±4.44	0.279
Postnociception	90.40±5.07	87.33±4.59	0.017
35 min after induction	68.60±6.31	66.33±3.76	0.096

Table 6: Systolic Blood Pressure (SBP) at Different Time Points (n = 60)

Time	Group A (Mean ± SD)	Group B (Mean ± SD)	P value*
Baseline	125.33±5.71	123.0±5.66	0.118
5 min after induction	122.50±6.53	123.0±7.38	0.782
10 min after induction	122.67±6.91	123.67±8.08	0.609
15 min after induction	121.83±8.65	122.50±8.27	0.762
20 min after induction	115.83±7.43	119.00±6.87	0.108
25 min after induction	112.17±7.75	116.67±6.40	0.050
Prenociception	114.83±6.73	117.00±6.32	0.285
Postnociception	133.83±7.48	130.67±7.66	0.174
35 min after induction	116.17±8.42	119.33±8.77	0.323

Table 7: Diastolic Blood Pressure (DBP) at Different Time Points (n = 60)

Time	Group A (Mean ± SD)	Group B (Mean ± SD)	P value*
Baseline	78.17±6.53	76.67±7.27	0.484
5 min after induction	73.67±7.41	75.33±5.52	0.407
10 min after induction	75.83±8.42	75.50±7.22	0.913
15 min after induction	71.83±7.18	71.33±5.77	0.795
20 min after induction	68.17±6.19	68.33±6.96	0.944
25 min after induction	65.17±5.17	68.17±5.71	0.055
Prenociception	69.33±6.66	70.67±6.36	0.562
Postnociception	83.00±5.29	78.33±7.58	0.019
35 min after induction	69.83±6.99	70.50±5.47	0.753

Discussion

The aim of the present study was to compare the vasodilatory action of isoflurane and sevoflurane, two of the most commonly used volatile anesthetics, using the noninvasive perfusion index (PI) of pulse oximetry, along with hemodynamic parameters like mean arterial pressure (MAP), heart rate (HR), systolic blood pressure (SBP), and diastolic blood pressure (DBP) [14]. Results indicated that isoflurane produced significantly higher values of PI than sevoflurane at various time points following induction (15, 20, 25 minutes), windows prior to and following nociception, and at 35 minutes following induction. These findings validate that isoflurane produces a greater vasodilatory effect than sevoflurane, corroborating previous work. For instance, Xu *et al.* [15] too found increased PI pattern with isoflurane, denoting increased peripheral vasodilation. In a similar manner, Ryu *et al.* [16] established that desflurane (another second volatile anesthetic, the isoflurane equivalent) caused higher PI compared to sevoflurane, in favor of the argument that peripheral vascular tone is influenced by the type of anesthetic. Relative to hemodynamic measures, MAP was decreased from 15 minutes after induction and including nociception windows in the isoflurane group to statistical significance. This supports findings by Gupta *et al*., [17] and Tantry *et al*., [18] who found increased hypotensive effect when isoflurane was administered compared to sevoflurane. The decrease in MAP by isoflurane is primarily due to its dose-dependent reduction in systemic vascular resistance. The associated hypotension was generally secondary to a compensatory tachycardia, also seen in the present study with elevated HR in the isoflurane group at post-nociception. Sevoflurane, however, exhibited a stable hemodynamic profile with little impact on HR, as supported by Singh *et al*.'s [18] observation that sevoflurane does not produce tachycardia or coronary steal phenomenon. Demographic and anthropometric baseline parameters such as age, sex, BMI, and ASA physical status were comparable between groups to avoid confounding effect on the result. Induction of anesthesia was standardized with propofol and rocuronium and BIS monitoring showed adequate hypnosis in the two groups, although time to adequate hypnosis was shorter in the isoflurane group as per its pharmacokinetic properties such as higher blood-gas solubility and lower MAC compared to sevoflurane. Overall, the current study supports the perception that isoflurane causes more vasodilation and hypotension than sevoflurane, as indicated by higher perfusion index values and lower arterial pressures. Such physiologic responses need to be considered in the selection of volatile anesthetics, particularly in patients in whom hemodynamic stability is most important. Further studies with large groups and varied surgical circumstances may provide additional information on the clinical relevance of these findings.

Conclusion

This study contrasted the vasodilatory activities of isoflurane and sevoflurane by perfusion index (PI) in patients who were undergoing lumbar spine surgery. Results showed that isoflurane had significantly higher levels of PI and greater reductions in MAP, SBP, and DBP, and exhibited tighter vasodilation. Although heart rate increased more with isoflurane after nociceptive stimulus, all the data overall suggest that isoflurane causes more pronounced vasodilation than sevoflurane. PI was an effective noninvasive monitor of these changes.

Limitations

- Small sample size (60 patients) restricts generalizability.
- Only ASA I & II patients and single surgery type were used.
- Observations were restricted to 35 minutes' post-induction.
- External factors influencing PI were not controlled.
- No hormonal or biochemical markers were assessed.

More studies involving larger and more heterogeneous populations are advised.

Abbreviation

ASA: American Society of Anesthesiologists
BIS: Bispectral Index
BPM: Beats per Minute
CMH: Combined Military Hospital
DBP: Diastolic Blood Pressure
ECG: Electrocardiogram
$EtCO_2$: End-tidal Carbon Dioxide
HR: Heart Rate
IV: Intravenous
MAC: Minimum Alveolar Concentration
MAP: Mean Arterial Pressure
PACU: Post-Anesthesia Care Unit
PI: Perfusion Index
PLID: Prolapsed Lumbar Intervertebral Disc
SBP: Systolic Blood Pressure
SpO_2: Peripheral Capillary Oxygen Saturation
SQI: Signal Quality Index
SVR: Systemic Vascular Resistance

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

References

1. Rocha TLA, Borges TF, Rodrigues SD, Martins LZ, da Silva MLS, Bonacio GF, Rizzi E, Dias-Junior CA. Sevoflurane and isoflurane anesthesia induce redox imbalance, but only sevoflurane impairs vascular contraction. Fundamental & Clinical Pharmacology. 2023;37(5):937-46. https://doi.org/10.1111/fcp.12901
2. Topal A, Gül N. Comparison of the arterial blood gas, arterial oxyhaemoglobin saturation and end-tidal carbon dioxide tension during sevoflurane or isoflurane anaesthesia in rabbits. Irish Veterinary Journal. 2006;59(5):278-81. https://doi.org/10.1186/2046-0481-59-5-278
3. MacPhail CM, Monnet E, Gaynor JS, Perini A. Effect of sevoflurane on hemodynamic and cardiac energetic parameters in ferrets. American Journal of Veterinary Research. 2004;65(5):653-8. https://doi.org/10.2460/ajvr.2004.65.653
4. Juhász M, Molnár L, Fülesdi B, Végh T, Páll D, Molnár C. Effect of sevoflurane on systemic and cerebral circulation, cerebral autoregulation and CO_2 reactivity. BMC Anesthesiology. 2019;19:109. https://doi.org/10.1186/s12871-019-0784-9
5. Takagi S, Kitajima O, Yamamoto M, Matsui M, Suzuki T. Potentiation by sevoflurane of rocuronium-induced neuromuscular block is greater in older than younger adult patients: A randomised controlled trial. British Journal of Anaesthesia. 2020;125(4):e351-3. https://doi.org/10.1016/j.bja.2020.05.047
6. Singh M, Verma I, Meena D, Vyas CK. Sevoflurane versus isoflurane in patients undergoing valvular heart replacements: A comparative study. International Journal of Scientific Study. 2020;8(1):1-5. https://doi.org/10.17354/ijss/2020/1
7. Sullender CT, Richards LM, He F, Luan L, Dunn AK. Dynamics of isoflurane-induced vasodilation and blood flow of cerebral vasculature revealed by multi-exposure speckle imaging. Journal of Neuroscience Methods. 2021;366:109150. https://doi.org/10.1016/j.jneumeth.2021.109150
8. Zhou H, Neudecker V, Perez-Zoghbi JF, *et al*. Age-dependent cerebral vasodilation induced by volatile anesthetics is mediated by NG2+ vascular mural cells. Communications Biology. 2024;7:1519. https://doi.org/10.1038/s42003-024-07200-7
9. Rajagopalan N, Borlaug BA, Bailey AL, Eckman PM, Guglin M, Hall S, Montgomery M, Ramani G, Khazanie P. Practical guidance for hemodynamic assessment by right heart catheterization in management of heart failure. JACC: Heart Failure. 2024;12(7):1141-56. https://doi.org/10.1016/j.jchf.2024.03.020
10. Sun X, He H, Xu M, *et al*. Peripheral perfusion index of pulse oximetry in adult patients: A narrative review. European Journal of Medical Research. 2024;29:457. https://doi.org/10.1186/s40001-024-02048-3
11. Coutrot M, Dudoignon E, Joachim J, Gayat E, Vallée F, Dépret F. Perfusion index: Physical principles, physiological meanings and clinical implications in anaesthesia and critical care. Anaesthesia Critical Care & Pain Medicine. 2021;40(6):100964. https://doi.org/10.1016/j.accpm.2021.100964
12. Nouvong A, Hoogwerf B, Mohler E, Davis B, Tajaddini A, Medenilla E. Assessing chronic wound perfusion in the lower extremity: Current and emerging techniques. Chronic Wound Care Management and Research. 2010;1:1-9.
13. Hung K-C, Liu C-C, Huang Y-T, Wu J-Y, Chen J-Y, Ko C-C, *et al*. Predictive efficacy of the perfusion index for hypotension following spinal anesthesia in parturient undergoing elective cesarean section: A systematic review and meta-analysis. Diagnostics. 2023;13(15):2584. https://doi.org/10.3390/diagnostics13152584
14. Ajayan N, Christudas J, Morris L, Mathew O, Hrishi AP. A perfusion index-based evaluation and comparison of peripheral perfusion in sevoflurane and isoflurane anaesthesia: A prospective randomised controlled trial. Turkish Journal of Anaesthesiology and Reanimation. 2023;51(2):97-104. https://doi.org/10.5152/TJAR.2023.21435
15. Xu Z, Xu T, Zhao P, Ma R, Zhang M, Zheng J. Differential roles of the right and left toe perfusion index in predicting the incidence of postspinal hypotension during cesarean delivery. Anesthesia & Analgesia. 2017;125(5):1560-6.
16. Ryu KH, Hwang SH, Shim JG, Ahn JH, Cho EA, Lee SH, *et al*. Comparison of vasodilatory properties between desflurane and sevoflurane using perfusion index: A randomised controlled trial. British Journal of Anaesthesia. 2020;125(6):935-42.
17. Gupta M, Shri I, Sakia P, Govil D. Comparison of equi-minimum alveolar concentration of sevoflurane and isoflurane on bispectral index values during both wash in and wash out phases: A prospective randomised study. Indian Journal of Anaesthesia. 2015;59(2):79-84.
18. Tantry TP, Karanth H, Shenoy SP, Ayya SV, Shetty PK, Adappa KK. Isoflurane versus sevoflurane with interscalene block for shoulder arthroscopic procedures: Value of process capability indices as an additional tool for data analysis. Indian Journal of Anaesthesia. 2016;60(12):939-44.
19. Singh M, Verma I, Meena D, Vyas CK. Sevoflurane versus isoflurane in patients undergoing valvular heart replacements: A comparative study. International Journal of Scientific Study. 2020;8(1):6-13.

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