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Original Research Article

Propofol and Desflurane Anaesthetic Agent Comparison for Short Elective Surgery

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Abstract

Background: Desflurane is noted for having a quick onset and quick offset of action, which enables the anaesthetist to quickly modulate the depth of anaesthesia.

Objective: To contrast the effects of desflurane and propofol when used as a single agent for brief elective procedures.

Materials and Methods: Eighty patients scheduled for elective brief surgery were included in this hospital-based prospective comparative analysis. Patients were either given Group D: O_2:N_2O (50:50) + Desflurane 3-4% or Group P: O_2:N_20 (50:50) + Propofol 3-5 mg/kg after undergoing regular pre-anaesthetic workup. Between the two groups, comparisons were made for baseline data, pertinent intraoperative information, procedural simplicity, hemodynamic changes, recovery, and complication rate. With SPSS version 22, statistical analysis was carried out.

Results: Jaw opening, LMA attempts and ease of insertion were equivalent across the two groups ($p> 0.05$). Propofol significantly sped both the time to unconsciousness and the time to LMA implantation ($p <0.05$). Desflurane group participants had significantly higher mean pulse rates and MAP ($p <0.05$).

Conclusion: Desflurane that was inhaled created favourable circumstances for inserting an LMA, and the intraoperative hemodynamic profile was stable during anaesthesia. When inhalational induction is required, desflurane may be taken into consideration as an alternate induction agent.

Keywords: Desflurane, Propofol, Elective Surgery, Day Care Surgery, Inhalational Agent, Hemodynamic Parameters.

Introduction

Desflurane is noted for having a quick onset and quick offset of action, which enables the anaesthetist to quickly modulate the depth of anaesthesia. Although it is claimed to be irritating to the airway, it is not typically utilised for inhalational induction.[1-2] It also appears to give very cardio-stable anaesthesia with maintenance of tissue perfusion even in the presence of hypotension.[1] However, two investigations[3-4] have demonstrated that regulated desflurane induction can be swift and well tolerated when combined with opioid premedication. According to a

different study, the presence of fentanyl decreased the prevalence of coughing from 25% to 5%.[5] Currently, a common induction drug for surgical anaesthetic is intravenous propofol. Since propofol's recovery is quicker and clearer than thiopental's, sodium thiopental has generally been displaced as the preferred method of inducing anaesthesia.[6] Many anesthesiologists believe that it is unsuitable for maintenance, and more specifically for inducing anaesthesia, due to its strong odour and propensity to irritate the upper airway.[7] Desflurane and propofol were thus compared in the current study as sole agents for anaesthesia during brief elective procedures.

Materials and Methods

It was an April 2022, and August 2022 hospital-based prospective comparative study. For the elective brief operation scheduled, 80 patients were accepted. Patients were divided into two groups of 40 each after receiving written informed valid permission from the institutional ethical committee.

Inclusion criteria:

1. Age group- 18 to 60 years.
2. ASA grade I – II.
3. Elective short surgeries – requiring general anesthesia with laryngeal mask airway placement e.g. fibroadenoma, hernia, fistula, appendicitis.

Exclusion criteria:

1. Allergy to propofol /Egg allergy.
2. History of upper respiratory tract infection within 1 month of surgery.
3. Documented uncontrolled hypertension/ chronic obstructive pulmonary disease.
4. Addiction to alcohol/drug abuse.

Methodology

Patients were visited the night before surgery and informed about the procedure, anaesthesia, post-operative pain treatment, rescue medication, etc.

Following premedication with glycopyrrolate 0.004 mg/kg, fentanyl 3 mcg/kg, and midazolam 0.03 mg/kg and preloading with ringer's lactate 5-8 ml/kg, anaesthesia was induced with either Group D: O_2:N_2O (50:50) + Desflurane 3-4% by the tidal volume induction technique, stepping up by 1% with each breath until the

Group P: O_2:N_20 (50:50) plus 3-5 mg/kg of propofol

The following factors for each group were observed: Conditions during LMA insertion: number of attempts in both the desflurane and propofol groups, time to loss of consciousness, time to LMA insertion, jaw opening, ease of insertion.[8]

Degree of jaw opening:

1. Good: Jaw fully opened.
2. Moderate: Jaw partially opened.
3. Poor: Jaw needed to be prized open.

Ease of insertion:

1. Good: Insertion smooth and easy.
2. Moderate: Insertion followed by cough, gag, excitatory movement that were self-limited and settled without intervention.
3. Poor: Insertion was met with resistance and cough, gag, or excitatory movement that required treatment with propofol.

Statistical Analysis:

The SPSS programme version 22 was used to analyse the data. When appropriate, data were statistically characterised using the mean (SD), frequencies (number of cases), and percentages. If the independent samples were normally distributed, the Student t test for independent samples was used to compare the quantitative variables between the research groups. Using the Chi square test, categorical data were compared. Statistical significance was defined as a probability value (p value) less than 0.05.

Results

Table 1: Participants' baseline information, loss of consciousness, and LMA insertion

Variable	Desflurane (n-40)		Propofol (n=40)		p-value
	Mean	SD	Mean	SD	
Age	28.11	12.12	25.16	7.32	0.20
Weight (Kg)	50.31	4.53	49.31	3.33	0.41
Duration of surgery (min)	54.51	12.87	59.44	11.85	0.10
Time to loss of consciousness (Sec)	225.31	58.94	41.51	8.47	**0.01***
Time to LMA insertion (Sec)	50.71	10.37	37.11	12.22	**0.01***

According to table 1, the two groups' demographic characteristics, such as age, weights, and length of operation, were equivalent (p> 0.05). Desflurane and propofol groups experienced consciousness loss in 225.31 and 41.51 seconds, respectively (p <0.05). When compared to the Desflurane group, the Propofol group's time to LMA insertion was considerably shorter (50.71 sec vs 37 sec; p <0.05).

Table 2: Pre-operative parameters are compared between research groups.

Variable	Desflurane (n-40)		Propofol (n-40)		p-value
	N	%	N	%	
ASA grade I	40	100.0%	40	100.0%	1.11
Good Jaw Opening	36	83.3%	38	90.0%	0.55
Single attempt for LMA	36	86.7%	36	90.0%	1.42
Ease of Insertion - Good	35	86.7%	34	80.0%	0.45

As per table 2 Jaw opening, attempts for LMA and ease of insertion was also comparable in both the groups (p> 0.05).

Table 3: Comparison of Aldrete score among study groups

Aldrete Score	Desflurane (n-40)		Propofol (n-40)		p-value
	Mean	SD	Mean	SD	
0 min	8.45	0.514	7.10	0.43	**0.01**
10 min	9.14	0.525	8.47	0.44	**0.01**
20 min	9.47	0.326	8.67	0.48	**0.01**
30 min	10	0	8.91	0.36	**0.01**
40 min	10	0	8.57	0.19	**0.01**
50 min	10	0	9.43	0.41	**0.01**
60 min	10	0	9.23	0.48	**0.01**

The Modified Aldrete score was substantially higher in Desflurane than in Propofol from 0 to 60 minutes after extubation to 1 hour of recovery room stay, according to Table 3 (p <0.05). Desflurane's mean VAS score at 20 and 30 minutes was 0.54 and 0.64, while propofol's was 0.22 and 0.24, respectively (p <0.05). (Not shown in table).

Table 4: Comparison of Complication rates in study groups

Complications	Desflurane (n-40)		Propofol (n-40)		p-value
	N	%	N	%	
Cough	6	14.3%	3	7.7%	0.60
Nausea/ Vomiting	6	13.3%	3	6.7%	0.57

As per table 4 Complication rate was comparable between Desflurane and propofol groups (14.3% vs 7.7%; p- 0.60).

Table 5: Comparison of Pulse rate and Mean Arterial Pressure (MAP) in study groups

Variables	Desflurane (n-40)		Propofol (n-40)		p-value
	0 min	60 min	0 min	60 min	
Pulse rate	6	22	3	14	0.01*
MAP	6	26	3	18	0.01*

As per table 5 mean pulse rate from 0 min to 60 min and mean arterial pressure at 0 min and from 0 min to 65 min was statistically significantly higher in Desflurane group in comparison to Propofol group ($p< 0.05$).

Discussion

Our research compared Desflurane and Propofol as single agents for anaesthesia. Regarding demographic factors including age, sex, weight, and length of operation, the two groups were comparable ($p> 0.05$). Both groups had similar levels of jaw opening, LMA attempts, and ease of insertion ($p> 0.05$).

The Propofol group experienced consciousness loss and LMA placement in a noticeably shorter amount of time. Our research was in agreement with a prospective trial on LMA insertion with Desflurane induction conducted by Wai May Leong and Ee Lyn Ong (2015).[6] Eighty patients scheduled for elective surgery were divided into two groups and randomly assigned to receive either an induction with tidal breath desflurane (n = 40) or 2.5 mg/kg propofol (n = 40) before LMA installation. In 60 day care patients, Wrigley et al. (2011)[7] compared the induction and recovery properties of Desflurane with Propofol. During gaseous inductions, desflurane produced loss of consciousness in around 2 minutes. Although not statistically significant, there was a trend for various recovery metrics to be quicker in the desflurane-treated patients. They concluded that Desflurane would be a suitable agent for day care anaesthesia providing for a rapid recovery.

Between 0 and 60 minutes after extubation and during the patient's hour-long stay in the recovery room, the modified Aldrete score was substantially higher in the Desflurane group compared to the Propofol group ($p <0.05$). From 0 to 30 minutes, Desflurane group's RASS score was noticeably higher than Propofol group's, but from 40 to 60 minutes, there was no discernible difference between the two groups' RASS scores. This was in line with research done by Dajun Song, et al.(2018)[9] who compared Desflurane, Sevoflurane, and Propofol for maintaining anaesthesia and discharge criteria upon arriving in the after anaesthesia care after Laparoscopic tubal ligation surgery. In a systemic study, Gupta et al. (2008)[10] evaluated the recovery profiles following ambulatory anaesthesia with propofol, isoflurane, sevoflurane, and desflurane and discovered no differences between the two anaesthetics in the early stages of recovery. But with desflurane compared to propofol and isoflurane, and with sevoflurane compared to isoflurane, early recovery was more rapid ($p<0.05$).

Our research was in agreement with Wai May Leong and Ee Lyn Ong's prospective investigation of LMA insertion during desflurane induction Leong WM, Ong EL (2015).[6] Eighty patients scheduled for elective surgery were divided into two groups and randomly assigned to receive either an induction with tidal breath desflurane (n = 40) or 2.5 mg/kg propofol (n = 40) before LMA installation. Five percent of patients experienced coughing and airway excitation, which were major concerns during desflurane induction. Several reasons[6] possibly account for the difference in the incidence of airway irritation when compared to other research (reported rates of 26%–59%). Fentanyl has been shown to reduce the irritation of the airways[7]. Desflurane is more readily absorbed when combined with nitrous

oxide, so using both gases instead of simply desflurane in oxygen may have helped shorten the coughing and excitement period.[10]

Conclusion

Desflurane and propofol both have superior induction properties, but desflurane also offered suitable LMA insertion conditions and stable hemodynamic stability during anaesthesia. When inhalational induction is necessary, desflurane can be used as an alternate induction agent, although it should still be handled with caution.

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References

1. Graham SG. New drug in volatile anesthesia - desflurane. Ann Acad Med Singapore. 2014; 23: 510–518.
2. Rapp SE, Conahan TJ, Pavlin DJ, Levy WJ, Hautman B, Lecky J et al. Comparison of desflurane with propofol in outpatients undergoing peripheral orthopedic surgery. Anaesthesia Analgesia. 2012; 75: 572–579.
3. Graham SG, Aitkenhead AR. A comparison between propofol and desflurane anaesthesia for minor gynaecological laparoscopic surgery. Anaesthesia. 2013;48: 471–475.
4. Jones RM, Cashman JN, Mant TG. Clinical impressions and cardiorespiratory effects of a new fluorinated inhalation anesthetic, desflurane (I-653) in volunteers. British Journal of Anaesthesia. 2015;64: 3–6.
5. Kong CF, Chew ST, Ip-Yam PC. Intravenous opioids reduce airway irritation during induction of anaesthesia with desflurane in adults. Journal of Anaesthesia. 2008; 85(3): 364-7.
6. Leong WM, Ong EL. Laryngeal mask airway can be inserted with inhaled desflurane induction. Journal of Anesthesia. 2015;19: 112–7.
7. Wrigley SR, Fairfield JE, Jones RM, Black AE. Induction and recovery characteristics of desflurane in daycare patients: a comparison with propofol. Anaesthesia. 2011; 46: 615–22.
8. Stoelting R K. Inhaled Anaesthetics. In Stoelting RK pharmacology and physiology in Anaesthesia practice. 4th edition. Philidelphia, Lippincott Williams and Wilkins. 2006; 42-82.
9. Song D, Joshi PG, Farcy F, White PF. Fast –track eligibility after ambulatory anaesthesia: A comparison of Desflurane, Sevoflurane and Propofol. Anaesthesia Analgesia. 2018; 86: 267-73.
10. Anil Gupta, Tracey Stierer, Rhonda Zuckerman, Neal Sakima, Stephen D. Parker et al. Comparison of Recovery Profile after Ambulatory Anesthesia with Propofol, Isoflurane, Sevoflurane and Desflurane: A Systematic Review. Anaesthesia Analgesia. 2008;98: 632-641.