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Research Paper

Comparison of Airway Responses And Recovery After Sevoflurane Versus Desflurane Administration Via Laryngeal Mask Airway

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ABSTRACT
Background: *Inhalation anesthetic agents have played an important role in anesthesia practice and are the 'backbone' of modern anesthesia. The history of inhalational agents is also the quest for the perfect agent by which depth of anesthesia is rapidly achieved, which has a pleasant smell and is better accepted by the patient, devoid of major side effects and allows early and smooth recovery.*
Aim: *To compare airway responses and recovery after sevoflurane versus desflurane administration via laryngeal mask airway (LMA).*
Methods: *It was a randomized comparative study undertaking 60 patients of ASA I-II including both sexes between age of 18-50 years. After institutional ethical committee approval, the study groups were divided into two – Group S in which anesthesia was maintained with sevoflurane and Group D in which anesthesia was maintained with desflurane, with 30 patients in each group breathing spontaneously on a LMA. Hemodynamic parameters and airway responses in the form of cough response was recorded. Eye opening time after discontinuation of agent and time of discharge to wards from PACU was also noted.*
Results: *Both groups were comparable with respect to demographic data and hemodynamic parameters. There was only one incidence of coughing in Group S, which was statistically insignificant. The eye opening time in Group D was significantly lower and so was the time of discharge to wards.*
Conclusion: *Respiratory complications through a LMA are minor and the incidence does not differ for sevoflurane versus desflurane. Initial recovery as well as the timefor discharge to wards is more rapid with desflurane. Both agents can be used for short duration ambulatory surgeries.*
Keywords: *airway responses, desflurane, laryngeal mask airway, recovery, sevoflurane*

I. INTRODUCTION

Inhalation agents have played a pivotal role in anesthesia history. The research on inhalation agents continues till date in view of better chemical properties, rapid induction, limited side effects and pleasant acceptance when inhaled.In modern practice there is a need of limited hospital stay. With the introduction of minimally invasive surgical techniques, ambulatory surgeries are on the rise, leading to an increased demand for fast track anesthesia. This necessitates early recovery in the form of clear-headedness, control of protective airway reflexes and satisfactory relief from pain and emesis[1]. As a result, there is a need for the use of short-acting anesthetic drugs for a better quality of recovery.Desflurane and sevoflurane are widely used volatile anesthetic inhalation agents, which are relatively new and they both have properties of an ideal agent. Sevoflurane allows a smooth induction as it does not irritate the respiratory tract, whereas desflurane can do so at concentrations that exceed the minimum alveolar concentration (MAC)[2]. The airway responses are blunted at particular MAC, which is maintained with the proper dial concentration of the agent. Recently there is a widespread use of laryngeal mask airways (LMA) for delivery of anesthesia with the help of multiple inhalation agents.When delivering inhalation anesthetics through a LMA, as it stimulates the airway responses, the depth of anesthesia should be maintained to the extent that the patient should not have cough response or laryngospasm[3][4][5].

In our study we compared the airway responses at a particular MAC and the corresponding dial concentration as well as rapidity and quality of awakening with administration of desflurane and sevoflurane through LMA in spontaneously breathing patients undergoing short duration surgeries under general anesthesia.

II. MATERIAL AND METHODS

Sixty patients of ASA physical status I-II aged between 18-50 years scheduled for short duration surgeries lasting up to one hour under general anesthesia were selected. Obese patients, patients with difficult airway, allergic to inj. Propofol and patients with CVS, RS or CNS disorders were excluded. Thirty patients each were randomly allocated to – Group S in which anesthesia was maintained with sevoflurane and Group D in which anesthesia was maintained with desflurane.

All patients were pre-medicated with inj. Ondansetron 4mg, inj. Midazolam 0.03 mg/kg and inj. Fentanyl 1.5 - 2 micrograms/kg.Anesthesia was induced with inj. Propofol 2mg/kg or a dose sufficient to allow insertion of a LMA. After confirming and securing the LMA in position, anesthesia was maintained with 50% oxygen, 50% nitrous oxide and either sevoflurane or desflurane.The dial concentrations were maintained according to the depth of anesthesia (MAC value) and fresh gas flow was standardized and kept at 6L/min to 8L/min and patients were allowed to breathe spontaneously. Monitoring of vital parameters, duration of anesthesia, inhalation anesthetic agent dial concentration, MAC values, $EtCO_2$, drugs supplemented, surgical time and the incidence of coughing (if present) was monitored and recorded every 10 minutes after surgical incision till the end of procedure.Any incidence of coughing intra – operatively was graded with corresponding SpO_2 value.

Grades of coughing:

Grade 0-No coughing

Grade 1-Single cough and $SpO_2 \geq 95\%$

Grade 2-Multiple coughs and $SpO_2 \geq 95\%$

Grade 3-Multiple coughs and $SpO_2 < 95\%$

Grade 4-Multiple coughs, $SpO_2 < 95\%$ and IV medication administered

After discontinuation of inhalation anesthetic agent, the time required for eye opening and total duration of anesthesia was estimated in each group. The time to shift the patient from post-operative room to the wards was alsorecorded in each group using Modified Aldrete's Score. A score of ≥ 9 was noted for the shifting of the patient.

III. OBSERVATION AND RESULTS

The demographic data of our study population i.e. age, gender, ASA grading, hemodynamic parameters, mean surgical time and MAC values did not show any significant statistical difference. Maximum patients in our study population belonged between 20-29 years of age. In both study groups patients with ASA physical status I were more.

Table 1 Demographic data, ASA grading, hemodynamic parameters, mean surgical time and MAC values between the two study groups

Variables	Group S (n=30)	Group D (n=30)	P-value [Inter-Group]
Age group (years) 20-29	14	10	0.302
Sex (M/F)	13/17	15/15	0.605
ASA grade (I/II)	23/7	23/7	0.999
Mean heart rate (per min)	77.24	77.84	0.703
Mean arterial pressure (mm Hg)	85.62	86.53	0.430
Mean surgical time (mins)	38.33	39.33	0.665
Mean MAC	1.040	1.055	0.291

Table 2 Incidence of coughing between the two study groups

Coughing	Group S (n=30)		Group D (n=30)		P-value [Inter-Group]
	n	%	n	%	
Grade 1	1	3.3	0	0.0	0.999
Nil	29	96.7	30	100.0	
Total	30	100.0	30	100.0	

Table 3 Mean eye opening time and mean time of discharge from PACU between the two study groups

Variables	Group S (n=30)		Group D (n=30)		P-value [Inter-Group]
	Mean	SD	Mean	SD	
Eye opening time (mins)	7.08	1.14	3.92	0.72	0.001
Time of discharge (mins)	33.00	5.35	28.17	6.76	0.003

In the 30 patients studied in Group S, 1 patient had incidence of Grade 1 cough response while Group D had no such incidence. The incidence of coughing between the two study groups was statistically insignificant and this may be attributed to our standardized protocol of pre-treatment with inj. Midazolam, inj. Fentanyl and inj. Propofol. The inter-group comparison of mean eye opening time after stoppage of inhalation agent and mean time of discharge from PACU to wards was significantly faster in Group D. None of the patients in our study experienced any major side effects and patients' satisfaction was adequate.

IV. DISCUSSION

In the present era, minimally invasive and ambulatory surgeries are on the rise. There is an increased demand for early recovery from anesthesia with minimum hospital stay. This necessitates the use of short-acting anesthetic drugs which allows early and better quality of recovery. Sevoflurane and desflurane have properties of an ideal anesthetic agent with desflurane having a lower blood gas solubility than sevoflurane resulting in rapid induction and emergence from anesthesia[6]. However, desflurane is pungent and can be irritant to the airway leading to coughing, breath holding, laryngospasm and copious secretions[7][8]. This property would make sevoflurane the agent of choice for cases on spontaneous respiration. The comparison of LMA with ETT in day care procedures under general anesthesia reduces airway complications[9]thus being a major advantage in early discharge.

A similar study like ours was conducted in 2001 by Mahmoud NA, et al.[10]who observed no significant difference in respiratory responses between desflurane and sevoflurane inhaled through a LMA with spontaneous respiration. Sixty day-care gynaecological patients were divided into two groups and maintained with either desflurane or sevoflurane and oxygen/nitrous oxide after intravenous induction. In desflurane group 5 patients had untoward airway responses in the form of coughing (3 patients) and hiccoughs (2 patients), while in sevoflurane group 3 patients had airway responses with 2 patients having hiccoughs and 1 patient having laryngospasm. Time to eye opening and orientation was significantly faster in desflurane group and so was the time to being ready for discharge home as compared to sevoflurane. They concluded desflurane to be a suitable agent for short gynaecological day-care procedures with a faster recovery profile than sevoflurane and with minimal airway problems.

A recent study conducted in 2017 by Dalal KS, et al.[11] compared the recovery profile and airway responses of desflurane and sevoflurane in 94 adult patients spontaneously breathing on LMA-Proseal undergoing hysteroscopic surgeries. They observed adverse airway events in 3 patients receiving sevoflurane and 6 patients receiving desflurane, while additional observations such as mean time to eye opening, obeying verbal commands, orientation and time to sit with support were found to be lesser with desflurane as compared to sevoflurane. Thus, the conclusion was stated that desflurane has better quality of early recovery as compared to sevoflurane with minimum airway morbidity. Our findings corroborate with the above study as observed in Table 2 and Table 3.

There are limited studies on desflurane with spontaneous breathing on LMA.

V. CONCLUSION

We found that the respiratory complications that arise during maintenance delivery of anesthesia through a LMA were minor, their incidence was minimal and the incidence did not differ for sevoflurane versus desflurane. Initial recovery as well as the time to be fit for discharge to wards was more rapid with desflurane as compared to sevoflurane. Thus, we concluded that both sevoflurane and desflurane can be used for maintenance of anesthesia for short duration ambulatory surgeries. Deficiencies in study design may have limited the interpretation of our results. Higher cost of desflurane may have increased the cost of anesthesia during our study. Our study did not include smokers, obese patients and patients with reactive airway, further studies can be carried out to find out the effect on airway and recovery profile of the volatile anesthetic agents in these patients.

REFERENCES

[1]. Joshi GP. Fast-tracking in outpatient surgery. Current Opinion in Anesthesiology. 2001 Dec 1;14(6):635-9.
[2]. Ter Riet MF, DeSouza GJ, Jacobs JS, Young D, Lewis MC, Herrington C, Gold MI. Which is most pungent: isoflurane, sevoflurane or desflurane?. British Journal of Anesthesia. 2000 Aug 1;85(2):305-7.

[3]. Ashworth J, Smith I. Comparison of desflurane with isoflurane or propofol in spontaneously breathing ambulatory patients. Anesthesia & Analgesia. 1998 Aug 1;87(2):312-8.
[4]. Tang J, White PF, Wender RH, Naruse R, Kariger R, Sloninsky A, Karlan MS, Uyeda RY, Karlan SR, Reichman C, Whetstone B. Fast-track office-based anesthesia: a comparison of propofol versus desflurane with antiemetic prophylaxis in spontaneously breathing patients. Anesthesia & Analgesia. 2001 Jan 1;92(1):95-9.
[5]. Tang J, Chen L, White PF, Watcha MF, Wender RH, Naruse R, Kariger R, Sloninsky A. Recovery profile, costs, and patient satisfaction with propofol and sevoflurane for fast-track office-based anesthesia. Anesthesiology: The Journal of the American Society of Anesthesiologists. 1999 Jul 1;91(1):253-61.
[6]. Yasuda N, Lockhart SH, Eger 2nd EI, Weiskopf RB, Johnson BH, Freire BA, Fassoulaki A. Kinetics of desflurane, isoflurane, and halothane in humans. Anesthesiology. 1991 Mar;74(3):489-98.
[7]. Arain SR, Shankar H, Ebert TJ. Desflurane enhances reactivity during the use of the laryngeal mask airway. Anesthesiology: The Journal of the American Society of Anesthesiologists. 2005 Sep 1;103(3):495-9.
[8]. Stevanovic A, Rossaint R, Fritz HG, Froeba G, Heine J, Puehringer FK, Tonner PH, Coburn M. Airway reactions and emergence times in general laryngeal mask airway anesthesia: a meta-analysis. European journal of anesthesiology. 2015 Feb;32(2):106.
[9]. Forman SA, Ishizawa Y. Inhaled anesthetic pharmacokinetics: uptake, distribution, metabolism, and toxicity, Miller's Anesthesia, Edited by Miller RD.
[10]. Mahmoud NA, Rose DJ, Laurence AS. Desflurane or sevoflurane for gynaecological day-case anesthesia with spontaneous respiration?. Anesthesia. 2001 Feb 1;56(2):171-4.
[11]. Dalal KS, Choudhary MV, Palsania AJ, Toal PV. Desflurane for ambulatory anaesthesia: A comparison with sevoflurane for recovery profile and airway responses. Indian journal of anesthesia. 2017 Apr;61(4):315.

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