International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article.

Evaluation of Efficacy of Sevoflurane as an Adjuvant to Propofol Based Total Intravenous Anesthesia in Eye Surgery: An Institutional Based Study

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ABSTRACT

Background: It has been previously reported that some patients had secretions toward the eye, resulting in contamination of surgical field in propofol-based total intravenous anesthesia (TIVA) during ophthalmic surgery, and it is more common in adults and in prolonged procedures. Hence; under the light of above mentioned data, the present study was undertaken for assessment of efficacy of Sevoflurane as an Adjuvant to Propofol Based Total Intravenous Anesthesia in patients undergoing eye surgery.

Materials & Methods: A total of 60 patients scheduled to undergo ocular surgeries were enrolled in the present study. All the patients were randomly and broadly divided into two study groups as follows with 30 patients in each group: Group 1: Patients receiving propofol-based total intravenous anesthesia (TIVA), Group 2: Patients receiving propofol/sevoflurane anesthesia. All the hemodynamic parameters were regularly monitored. Induction of general anesthesia was done with fentanyl, propofol, and rocuronium in all patients followed by intubation and maintain ace with propofol or propofol/sevoflurane. Postoperative care was done and efficacy of anesthesia in both the study groups was assessed and compared. All the results were summarized in Microsoft excel sheet and were analyzed by SPSS software.

Results: Mean awakening effect-site concentration among patients of Group 1 and group 2 was 0.98 µg/mL and 0.76 µg/mL respectively. Mean maintenance effect-site concentration among patients of Group 1 and group 2 was 2.91 µg/mL and 2.38 µg/mL respectively. Significant results were obtained while comparing the mean maintenance effect site concentration and mean awakening effect site concentration among the two study groups.

Conclusion: Combination with 1% sevoflurane anesthesia reduces the secretions under propofol-based TIVA during ocular surgery.

Key words: Anesthesia, Ocular Surgery, Sevoflurane.

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Article History:

Received: 24-05-2018, **Revised:** 21-06-2018, **Accepted:** 17-07-2018

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2018.4.4.076	

INTRODUCTION

Anesthesia-controlled time (ACT) is one of the most important factors that regulate operating room efficiency. Extubation time is of special interest because it could be affected by different anesthetic agents or techniques. Evidence showed that prolonged extubation decreases operating room (OR) efficiency and slows workflow due to the surgeon and OR staff staying idly waiting for extubation.[1-3] Accordingly, an appropriate anesthetic technique to provide faster extubation time from GA is essential for anesthesiologists in order to improve the efficiency of OR. It also has been previously reported that some patients had secretions toward the eye, resulting in contamination of surgical field in propofol-based total intravenous anesthesia (TIVA) during ophthalmic surgery, and it is more common in adults and in prolonged procedures.[4, 5] Sevoflurane anesthesia can inhibit the pulmonary irritant receptors and attenuate cough reflex. Unfortunately, sevoflurane anesthesia was associated with a higher incidence of postoperative nausea and vomiting (PONV) compared with propofol-based total intravenous anesthesia (TIVA) in patients undergoing ambulatory surgery.[6-8] Hence; under the light of above mentioned data, the present study was undertaken for assessment of efficacy of Sevoflurane as an Adjuvant to Propofol Based Total Intravenous Anesthesia in patients undergoing eye surgery.

MATERIALS & METHODS

The present study was conducted in Department of Anesthesiology, Saraswathi Institute of Medical Sciences, Pilkhuwa, Hapur, Uttar Pradesh (India) and it included evaluation

of efficacy of Sevoflurane as an Adjuvant to Propofol Based Total Intravenous Anesthesia in patients undergoing eye surgery. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 60 patients scheduled to undergo ocular surgeries were enrolled in the present study. All the patients were randomly and broadly divided into two study groups as follows with 30 patients in each group:

Group 1: Patients receiving propofol-based total intravenous anesthesia (TIVA)

Group 2: Patients receiving propofol/sevoflurane anesthesia

Inclusion Criteria

- Patients within the age group of 25 to 55 years
- Patients with ASA grade of I and II
- Patients with negative history of any systemic illness,
- Patients with any known drug allergy

Overnight fasting of all the patients was done one day before surgery. Before the induction of anesthesia, no premedication was given. All the hemodynamic parameters were regularly monitored. Induction of general anesthesia was done with fentanyl, propofol, and rocuronium in all patients followed by intubation and maintain ace with propofol or propofol/sevoflurane. Bispectral index (BIS) was used for monitoring in all the patients. In group 1, induction of anesthesia was done using intravenous (IV) fentanyl (2 µg/kg) and 2% lidocaine (1.5 mg/kg). In group 2, induction of anesthesia was done in the similar way as in Group 1, only maintained of anesthesia was done using propofol infusion and 1% sevoflurane (inhaled concentration) with an oxygen flow of 1 mL/min. Postoperative care was done and efficacy of anesthesia in both the study groups was assessed and compared. All the results were summarized in Microsoft excel sheet and were analyzed by SPSS software. Chi- square test was used for assessment of level of significance.

Table 1: Demographic data

Parameter		Group 1	Group 2
Age group (years)	**25 to 35**	8	9
	36 to 45	12	11
	46 to 55	10	10
Gender	**Males**	16	13
	Females	14	17
ASA grade	**Grade I**	18	16
	Grade II	12	14
Mean BMI (Kg/m2)		23.48	24.76

Table 2: Comparison of outcome

Parameter	Group 1	Group 2	p- value
Mean operative time (minutes)	59.6	63.1	0.34
Mean anesthesia time (minutes)	89.4	93.8	0.18
Mean awakening effect-site concentration (µg/mL)	0.98	0.76	0.02 (Significant)
Mean maintenance effect-site concentration (µg/mL)	2.91	2.38	0.03 (Significant)
Postoperative nausea and vomiting	0	1	0.82

RESULTS

In the present study, a total of 60 patients were analyzed and divided broadly into two study groups; Group 1 and Group 2. Mean age of the patients of Group 1 was 39.5 years and that of group 2 patients was 37.1 years. Majority of the patients of both the study groups belonged to the age group of 36 to 46 years. There were 16 males and 14 females in group 1 and 13 males and 17 females in group 2. Mean BMI of the patients of Group 1 and Group 2 was 23.48 Kg/m^2 and 24.76 Kg/m^2 respectively.

In the present study, mean operative time among the patients of Group 1 and group 2 was 59.6 minute and 63.1 minutes respectively. Mean anesthesia time among the patients of Group 1 and Group 2 was 89.4 minutes and 93.8 minutes respectively. Mean awakening effect-site concentration among patients of Group 1 and group 2 was 0.98 µg/mL and 0.76 µg/mL respectively. Mean maintenance effect-site concentration among patients of Group 1 and group 2 was 2.91 µg/mL and 2.38 µg/mL respectively. Significant results were obtained while comparing the mean maintenance effect site concentration and mean awakening effect site concentration among the two study groups.

DISCUSSION

Ophthalmic surgery is one of the common operations performed worldwide. In ophthalmic surgery, especially in children's ophthalmology, the operation time is short, and the patient's self-control ability is weak, so the quality of anesthesia is required to be high. It is a necessary condition for the operation to effectively inhibit the stress response and oculocardiac reflex caused by the operation under the anesthesia.[8- 10]

In the present study, a total of 60 patients were analyzed and divided broadly into two study groups; Group 1 and Group 2. Mean age of the patients of Group 1 was 39.5 years and that of group 2 patients was 37.1 years. Majority of the patients of both the study groups belonged to the age group of 36 to 46 years. There were 16 males and 14 females in group 1 and 13 males and 17 females in group 2. Mean BMI of the patients of Group 1 and Group 2 was 23.48 Kg/m^2 and 24.76 Kg/m^2 respectively. Lai HC et al investigated the effect of sevoflurane combination with propofol-based TIVA on nasopharyngeal secretions and postoperative nausea and vomiting (PONV) in ocular surgery. Fifty patients undergoing ocular operations were randomly assigned for

propofol-based TIVA or propofol/sevoflurane anesthesia. In the TIVA group (n = 25), anesthesia was induced and maintained with propofol and fentanyl; in the propofol/sevoflurane group (n = 25), 1% sevoflurane anesthesia was added. Nasopharyngeal excretion volume was significantly higher in the propofol-based TIVA group than in the propofol/sevoflurane group (31.0 ± 18.1 vs 13.7 ± 12.6 ml; P < .001). No significant difference in extubation time was noted (propofol-based TIVA: 6.4 ± 3.6 vs propofol/sevoflurane: 7.4 ± 3.0 minutes; P = .34). No postoperative endophthalmitis or PONV in both groups was observed. Sevoflurane attenuated secretions under propofol-based TIVA and did not increase the incidence of PONV or prolonged extubation in ocular surgery.[10]

In the present study, mean operative time among the patients of Group 1 and group 2 was 59.6 minute and 63.1 minutes respectively. Mean anesthesia time among the patients of Group 1 and Group 2 was 89.4 minutes and 93.8 minutes respectively. Mean awakening effect-site concentration among patients of Group 1 and group 2 was 0.98 µg/mL and 0.76 µg/mL respectively. Mean maintenance effect-site concentration among patients of Group 1 and group 2 was 2.91 µg/mL and 2.38 µg/mL respectively. Significant results were obtained while comparing the mean maintenance effect site concentration and mean awakening effect site concentration among the two study groups. Wu ZF et al performed a retrospective analysis using hospital databases to compare the anesthesia-controlled times of ophthalmic surgery patients receiving either TIVA via target-controlled infusion with propofol/fentanyl or desflurane/fentanyl-based anesthesia. The various time intervals (surgical time, incision to surgical completion and application of dressings; anesthesia time, start of anesthesia to extubation; extubation time, surgery complete and dressings applied to extubation; time in OR, arrival in the OR to departure from the OR; postanesthetic care unit (PACU) stay time, arrival in the PACU to discharge from the PACU to the general ward; and total surgical suite time, arrival in the OR to discharge from the PACU to the general ward) that comprise a patient's hospital stay and the incidence of postoperative nausea and vomiting were compared between the 2 anesthetic techniques. They included data from 1405 patients, with 595 patients receiving TIVA and 810 receiving desflurane anesthesia (DES). The extubation time was faster and the PACU stay time was shorter in the TIVA group than in the DES group. However, there was no significant difference in total surgical suite time between groups (TIVA-DES = -5.03 minutes, 99.2% CI, -11.75 to 1.69 minutes). They performed the random-effects analyses while stratifying for procedure and showed that the extubation time in the TIVA group was faster by 14% relative to the DES group, and the PACU stay time was faster by 5%. Significantly fewer patients suffered postoperative nausea and vomiting and required rescue therapy in the TIVA group than in the DES group. In their hospital, the use of TIVA reduced the mean time to extubation by at least 9% and PACU stay time by more than 1% when compared with the use of DES anesthesia for ophthalmic surgery.[11]

CONCLUSION

From the above results, it can be concluded that combination with 1% sevoflurane anesthesia reduces the secretions under propofol-based TIVA during ocular surgery. However; further studies are recommended.

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Source of Support: Nil.

Conflict of Interest: None Declared.

Cite this article as: Sumit Beniwal. Evaluation of Efficacy of Sevoflurane as an Adjuvant to Propofol Based Total Intravenous Anesthesia in Eye Surgery: An Institutional Based Study. Int J Med Res Prof. 2018 July; 4(4): 320-22. DOI:10.21276/ijmrp.2018.4.4.076