ISSN: 0975-833X

Availableonlineathttp://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 05, pp. 4124-4127, May, 2019

DOI: https://doi.org/10.24941/ijcr.35696.05.2019

INTERNATIONAL JOURNAL OFCURRENTRESEARCH

REVIEW ARTICLE

COMPARISON OF SEVOFLURANE VERUS HALOTHANE FOR INDUCTION IN KASHMIRI CHILDREN

***Kouser Benazir and Shazia Ashraf**

Postgraduate Department of Anaesthesiogy and Critical Care Medicine, Government Medical College, Srinagar Kashmir

ARTICLEINFO

Article History:
Received 22nd February, 2019
Received in revised form
29th March, 2019
Accepted 10th April, 2019
Published online 30th May, 2019

Key Words:
Propofol, Sevoflurane, Anaesthesiologists

**Corresponding author: Kouser Benazir*

ABSTRACT

Background: Among intravenous agents, propofol has been the drug of choice in view of better safety profile, relaxation and depression of upper airway reflexes. Sevoflurane on the other hand, with pleasant odor, nonirritating to the airways and with bronchodilator property are best among the volatile induction agents. **Objectives:** To compare the induction characteristics and ease of laryngeal mask airway insertion with halothane and sevoflurane in pediatric patients. **Methods:** A prospective randomized study of 200 American Society of Anaesthesiologists' Class I and II patients was conducted equal distribution among two groups with 50 each undergoing gynecological procedures under general anesthesia. Group *P* received injection propofol and Group S received sevoflurane. **Results:** Sevoflurane took a longer time for induction and jaw relaxation than propofol. There was no statistically significant difference between the two groups, with respect to LMA insertion time, and conditions. Apnea time was more in propofol group. Fall in heart rate and mean blood pressure was more in propofol. **Conclusion:** Propofol is associated with faster induction while sevoflurane is associated with good hemodynamic stability.

Citation: Kouser Benazir and Shazia Ashraf. **2019.** "Comparison of sevoflurane verus halothane for induction in kashmiri children", *Internationa Journal of Current Research*, 11, (05), 4124-4127.

INTRODUCTION

The laryngeal mask airway (LMA) has gained pervasive popularity and has become a valuable and important device for the airway management in anesthesia practice (Chmielewski, 2004). LMA is a supraglottic airway device; its design is such that it provides and maintains a seal around the larynx for spontaneous ventilation. It is also a safe device for controlled ventilation, where airway pressure is maintained at 15-20 cm of H_2O (Hagberg, 2015). LMA can be used safely in variety of age groups and in various surgical procedures.[3]It has the advantage of being minimally invasive, less traumatic, and having a relatively effortless insertion without muscle relaxants or laryngoscopy (Chmielewski, 2004). The ensuing airway stimulation is less, resulting in minimal hemodynamic changes, less coughing and agitation on awakening from anesthesia, and less severe postoperative sore throat (Smith, 1992). This has, therefore, found increasing use in ambulatory and day care surgeries, along with the added advantage of emergency and difficult airway management (Fredman, 1995; Benumof, 1996). The insertion of LMA is preceded by the administration of induction agents to attain sufficient depth of anesthesia and suppression of airway reflexes. Intravenous agents such as thiopentone, propofol, and ketamine and inhalational agents such as halothane and sevoflurane have been tried with varying success (Yurino, 1993; Thwaites *et al*., 1997; Yogendran *et al*., 2005; Brown, 1991).Among intravenous agents, propofol has been the drug of choice for LMA insertion in view of better safety profile, relaxation, and depression of upper airway reflexes and mild bronchodilation (Fredman *et al*., 1995; Thwaites *et al*., 1997). However, the free use is limited by adverse effects such as pain on injection, thrombophlebitis, cardiovascular, and respiratory depression (Yogendran *et al*., 2005). Sevoflurane, on the other hand, is a halogenated volatile anesthetic agent with pleasant odor, nonirritating to the airways and with bronchodilator property is best among the volatile induction agents. These properties of sevoflurane, along with faster induction, relative hemodynamic stability, and satisfactory recovery characteristics, have made it an increasingly popular choice for LMA insertion.[10]Side effects associated with sevoflurane induction are breath holding, coughing, and laryngospasm (Molloy *et al*., 1999; Jellish *et al*., 19996).

Objective: To compare the induction characteristics and ease of laryngeal mask airway insertion with halothane and sevoflurane in pediatric patients.

MATERIALS AND METHODS

This prospective observational Study was conducted in the Postgraduate Department of Anesthesiology and Critical Care, Government Medical College, Srinagar and associated Hospitals after obtaining approval from Institutional Ethical

Committee. A total of 200 patients were studied. Patients receiving halothane designated "H" were compared with patients receiving sevoflurane designated "S". The study was conducted over a period of 3 years. Patients in the age group of 1- 12 years belonging to ASA I and II undergoes short elective operative procedures under general anaesthesia were included. Patients with ASA class III and above, patient's attendant refusal, patients with anticipated difficult airway and short surgical procedures which cannot be done using LMA were all excluded from the study. All the patients included in the study were pre-medicated with Injection glycopyrollate 6mcg/kg (im) and syrup Triclofos 20mg/kg (orally) one hour before surgery. Anaesthesia was induced using face mask of appropriate size and Jackson-Rees circuit or non-rebeathing circuit as per the weight of the patient, with 50% nitrous oxide in 50% oxygen and incremental concentrations of the volatile anesthetic agent to be studied. In patients receiving halothane, the inspired concentration was set at 0.5% initially followed by stepwise increase of 0.5% every 3 to 4 breaths up to a maximum of 3.5% until the loss of eyelash reflex occurred.

RESULTS

A total of 200 patients were studied. Patients receiving halothane designated "H" were compared with patients receiving sevoflurane designated "S". The following observations were made. Out of a total of 200 patients studied, the mean age of patients in group H was 6.30 and in group S it was 6.22 years. The mean weight in kilograms of patients in our study was 15.06 kgs in group H and 15.21kgs in group S. There were 80 (80%) male patients in group H and 20 (20%) female patients in group H. Similarly, 76 (76%) and 24 (24%) male and female patients respectively were in group S. 96 (96%) patients in group H and 94 (94%) in group S, had ASA I status, 4 (4%) and 6 (6%) patients had ASA II status in Group H and group S respectively. When we distributed patients as per surgical procedures, Orchidopexy was done in 32 (32%) and 28 (28%) patients in group H and group S respectively. Herniotomy was done in 24 (24%) patients in group H and 32 (32%) in group S. Herniotomy with circumcision was done in 10 (10%) and 4 (4%) patients followed by hydrocele repair in 10 (10%) and 8 (8%) patients respectively. Corneal tear repair, corneal suture removal, debridement, lipoma excision and scrotal trauma were the other surgical procedures done. The mean heart rate (beats/min) in both the groups before induction was 132.34 ± 3.55 (Group H) and 131.36 ± 3.71 (Group S). Before LMA insertion the mean heart rate in group H was 121.30 ±3.74 and in group S it was 128.22 ± 3.57. At LMA insertion the heart rate in group H was 125.28 ± 4.04 and in group S it was 129.60 ± 3.92. The heart rate at 1 minute, 3 minutes and 5 minutes after insertion was 113.54 ± 4.18, 108.08 ± 2.92 and 105.12 ± 4.08 in group S and in group H it was 127.34 ± 3.59, 125.08 ± 3.58 and 122.36 ± 3.72 respectively. The mean systolic blood pressure [SBP] (mmHg) in both the studied groups before induction was 101.54 ± 3.30 (Group H) and 102.28 ± 3.25 (Group S). Before LMA insertion the SBP in group H was 94.18 ± 2.78 and in group S it was 99.12 ± 3.34. At LMA insertion the mean SBP in group H was 96.34 ± 3.59 and in group S it was 101.46 ± 3.25. The SBP at 1 minute, 3 minutes and 5 minutes after insertion was 88.08 ± 3.36, 85.08 ± 3.06 and 82.46 ± 3.01 in group S and in group H it was 97.82 ± 2.70, 95.48 ± 2.76 and 92.90 ± 2.96 respectively. The mean diastolic blood pressure [DBP] (mmHg) in both the studied groups before induction was 70.22 ± 2.63 (Group H) and 70.78 ± 2.76 (Group S). Before LMA insertion the DBP in group H was 67.28 ± 2.66 and in group S it was 69.22 ± 2.63. At LMA insertion the mean DBP in group H was 68.48 ± 2.84 and in group S it was 69.80 ± 2.62. The DBP at 1 minute, 3 minutes and 5 minutes after insertion was 63.48 ± 3.17, 61.92 ± 3.53 and 60.42 ± 3.59 in group S and in group H it was 67.58 ± 3.01, 65.92 ± 2.83 and 64.72 ± 2.64 respectively. The mean oxygen saturation, SpO2 (%) in both the studied groups before induction was 98.82 ± 1.10 (Group H) and 98.76 ± 1.10 (Group S). Before LMA insertion the SpO2 in group H was 99.20 ± 0.83 and in group S, it was 99.10 ± 0.89. At LMA insertion the mean SpO2 in group H was 99.12 + 0.98 and in group S it was 99.10 ± 1.06. The SpO2 at 1 minute, 3 minutes and 5 minutes after insertion was 98.64 ± 0.84, 90.92 ± 3.53 and 60.42 ± 3.59 in group S and in group H it was 67.58 ± 3.01, 65.92 ± 2.83 and 64.72 ± 2.64 respectively. The mean time required from start of induction to onset of regular respiration (seconds) in group H was 79.08 + 10.66 and in group S was 43.24 ± 11.4. The results were statistically Start of induction to loss of eye lash reflex (in seconds)**.** The mean time required from the start of induction to loss of eye lash reflex (seconds) in group H was 109.28 ± 10.57 and in group S was 72.64 ± 11.30. The results were statistically significant with a p value of < 0.05. The mean time required from start of induction to jaw relaxation (seconds) in group H was 235.90 ± 17.64 and in group S was 149.76 ± 17.68. The results were statistically significant with a p value of < 0.05. The mean time required from start of induction to centralization of eye balls (seconds) in group H was 252.26 ± 17.10 and in group S was 166.62 ± 17.93. The results were statistically significant with a p value of < 0.05.

DISCUSSION

Traditionally halothane has been a corner stone of pediatric inhalational induction despite its slightly pungent smell and propensity to cause bradycardia, hypotension and arrhythmias. Sevoflurane which is a recent addition to the inhalational agents with lack of pungency, low blood gas solubility and limited cardio respiratory side effects, is a desirable and suitable alternative for use in infants and children (Jerrold *et al*., 1994; Naito, 1991). In our study there was no significant difference between two groups as far as baseline parameters like age, gender, weight, ASA class and surgical procedure were concerned. In order to ease out parenteral separation besides averting complications like laryngospasm, bronchospasm and excitement a sedative premedication was used by Black *et al*., and Piot *et al*. (1996); Piat *et al*., 1994. In the present study Syrup Triclofos at a dose of 20mg/ kg was given 1 hr before induction as a premedication in both the groups. About 70% of the patients did not get sedated however acceptance of mask was comparatively better in sedated patients than in non-sedated patients. Overall there was no significant effect of sedation on outcome of induction. Injection Glycopyrolate 6mcg/kg (im) was also used 1 hour prior to induction as a premedication for decreasing the secretions in both the groups. In our study induction with halothane was started as 0.5% and increased stepwise by 0.5% every 3 to 4 breaths till the loss of eye lash reflex to a maximum of 3.5% in 50:50 oxygen and nitrous oxide, while sevoflurane was started at 1% and increased gradually to a maximum of 6% until the loss of eyelash reflex. This was done to obtain comparative values in terms of MAC for both halothane and sevoflurane respectively. Black *et al*.[15], had also used increments of 0.5 to 1% to a maximum of 5% for halothane and 1.5 to 2% increment to a maximum of 7% for

sevoflurance in their study. Gradual increase in concentration was carried out in our study to avoid excitement phase of induction. Sigston PE *et al*. (1997), used 8% sevoflurane after priming the circuit with sevoflurane which resulted in faster induction but it was associated with a considerable amount of excitement and adverse airway reaction. We did not encounter any case of excitement or any adverse airway reaction in our stepwise incremental strategy. In our study a struggling score of 2 was observed in 3 patients receiving halothane and a struggling score of 1 was observed in 1 patient receiving sevoflurane. Similar results were seen by Sigston *et al*. (1997), who found sevoflurane as more pleasant inhalational agent. Due to low blood gas solubility of sevoflurane, induction is faster with sevoflurane when compared with halothane. Time of loss of eyelash reflex, time of onset of regular respiration, time of adequate jaw relaxation, time of centralization of eye balls was uniformly lesser in sevoflurane group than in halothane group.

Mean time required for loss of eyelash reflex was 109.28 for group "H" and 72.68 for group "S". The difference observed between the two study groups was statistically significant (p value < 0.001). Similar results were noted by Black *et al*. (1996), where sevoflurane caused a loss of eyelash reflex more quickly than halothane by approximately 40 seconds. Mean time required for jaw relaxation was 235.90 seconds for group H and 149.76 seconds for group S. The difference observed was statistically significant with p value <0.001. Similar findings were observed by Dr. Kajal N Dedhia *et al*. (2016), in their study. Centralization of eye ball was considered to be the end point of LMA insertion in our study. Mean time for centralization of eyeball was 252.26 seconds for group H and 166.62 seconds for group S. The difference observed between the two groups was statistically significant (p value < 0.001). Dr. Kajal N Dedhia *et al*.[18], in their study also found induction with sevoflurane to be faster (164.8 + 39.73) than halothane (249.83 + 40.58) with a p value of < 0.001. Black *et al*. (1996), also found that time required for centralization of eye balls was faster with sevoflurane. In the present study, successful LMA insertion was achieved in the first attempt in 49 and 47 patients in group H and group S respectively. The difference observed between the two groups was statistically insignificant (p value 0.617). Manish Patel *et al*. (2016), in their study observed that all patients in sevoflurane group were incubated in first attempt whereas in Halothane group 90% of patients were incubated in first attempt and rest in second attempt. In the present study, the mean baseline heart rates of the two groups before induction were comparable and the difference was not statistically significant (group H 32.34, group S 131.36, p value 0.180).

The mean heart rate before LMA insertion and 1 min, 3 min, 5 min after insertion was less in group H as compared to group S. The differences between the mean heart rate of the two groups were statistically significant before LMA insertion and 1, 3, 5 minutes after insertion with a p value < 0.005. However there was slight increase in heart rate in both the groups at the time of LMA insertion. Clinically significant bradycardia was seen in 4 patients in group H and 1 patient in group S. In a study by Woody E *et al*.[20], sevoflurane did not alter heart rate while halothane causes a reduction in heart rate. Black *et al*.[15], found that both agents caused similar effect on heart rate during the course of induction. None of our patients in either of the groups had any arrhythmia during induction. Johannesson *et al*. (1995) and Lerman *et al*. (1996) noted that the incidence of arrhythmia was higher in halothane group than in sevoflurane group. In a study conducted by Girotra, (1999) there was no change in cardiac rhythm in sevoflurane group but in halothane group 60% of children had arrhythmias. The results in their study were significant with a p value of < 0.001. The occurrence of arrhythmias was probably because of the higher concentration of the drugs used in their study. In the present study, mean baseline systolic arterial blood pressure of the two groups was comparable and the difference was not statistically significant (group H 101.54, group S 102.28, p 0.261). The systolic blood pressure before LMA insertion and 1, 3, 5 min after insertion was less in group H as compared to group S. The difference of mean systolic blood pressure of the two groups was statistically significant before LMA insertion and 1, 3, 5 min after insertion (p value < 0.001). However, there was slight increase in mean systolic BP at the time of LMA insertion.

The mean baseline diastolic blood pressure of the two groups was comparable and the difference was not statistically significant (group H 70.22, group S 70.78, p < 0.001). The mean diastolic BP before LMA insertion and 1, 3, 5 min after insertion was less in group H as compared to group S. The difference between the mean diastolic BP of the two groups was statistically significant (p <0.001) before LMA insertion and 1, 3, 5 min after insertion. However there was slight increase in mean diastolic blood pressure at the time of LMA insertion in both the groups. Saturation remained 97-100% in both the groups, 1 patient in group H had a saturation of 87%. In a study conducted by Dr. Kajal Dedhia *et al*. (2004), oxygen remained between 95-100% with desaturation in 2 patients of sevolfurane group, Koprulu AS *et al*. (1997), did not encounter any desaturation in their study. No laryngospasm, coughing, phonation was seen in either of the groups, however head and limb movements were seen in 3 patients in group H and 1 patients in group S during induction. Dr. Kajal N Dedhia *et al*. (2016), reported no significant laryngospasm, coughing phonation and purposeful movement in either of the two groups at the time of LMA insertion in their study.

Conclusion

We conclude that sevoflurane is a suitable alternative to halothane for inhalational induction of anaesthesia especially in children. As sevoflurane is both appreciably quicker than and safe as halothane, it should be preferred for induction.

REFERENCES

Benumof JL. 1996. Laryngeal mask airway and the ASA difficult airway algorithm. *Anesthesiology*. 84: 686-99.

Black A., Sury MR., Haemington L., Howard RF., Mackerise AM., Hatch DJ. 1996. A comparison of the induction characteristics of sevoflurane and halothane in children. *Anaesth*. 51: 539-542.

Black A., Sury MR., Hemington L., Howard R., Mackersie A., Hatch DJ. *et al*., 1996. A comparison of the induction characteristics of sevoflurane and halothane in children. Anaesthesia. 51: 539-42.

Brown GW., Patel N., Ellis FR. 1991. Comparison of propofol and thiopentone for laryngeal mask insertion. Anaesthesia. 46: 771-2.

Chmielewski C., Snyder-Clickett S. 2004. The use of the laryngeal mask airway with mechanical positive pressure ventilation. AANA J. 2004; 72: 347-51.

Fredman B., Nathanson MH., Smith I., Wang J., Klein K., White PF. *et al*., 1995. Sevoflurane for outpatient anesthesia: A comparison with propofol. Anesth Analg., 81: 823-8.

Girotra S., Singh A., Mehta Y., Iyer KS., Trehan N. 1999. Comparison of sevoflurane and halothane for induction and intubation in pediatric cardiac surgical patients. Anesth Analgesia. 88.

Hagberg C., Artime C. 2015. 8th ed. Philadelphia: Churchill Livingstone. Airway management in the adult. In: Miller's Anesthesia; pp. 1647-58.

Jellish WS., Lien CA., Fontenot HJ., Hall R. 1996. The comparative effects of sevoflurane versus propofol in the induction and maintenance of anesthesia in adult patients. *AnesthAnalg.,* 82: 479-85.

Jerrold L., Sikich N., Kleinman S., Yentis S. 1994. The pharmacology of sevoflurane in infants and children. *Anesthesiol*. 80: 814-824.

Johannesson GP., Florén M., Lindahl SG. 1995. Sevoflurane for ENT-surgery in children.A comparison with halothane.ActaAnaesthesiol Scand. 39: 546-550.

Kajal N. Dedhia, Kudalkar A. 2004. Comparison of sevoflurane and halothane for induction of anaesthesia and laryngeal mask airway insertion in pediatric patients. *Indian J Anaesth.,* 48: 465-468.

Koprulu AS., Dogruer K., Karpat H. 1997. Sevoflurane versus halothane for Laryngeal Mask Airway (LMA) insertion. *Br J Anaesth*., 78: 8.

Lerman J., Davis PJ., Welborn LG., Orr RJ., Rabb M., Carpenter R. *et al*., 1996. Induction, recovery, and safety characteristics of sevoflurane in children undergoing ambulatory surgery. A comparison with halothane. *Anesthesiol*. 84: 1332-1340.

Manish P., Sachin P. 2016. Comparison of sevoflurane with halothane as inhalational anesthetic agent in neonate and pediatric patients. *Int Contemp Med Res.* 3: 1884-1887.

Molloy ME., Buggy DJ., Scanlon P. 1999. Propofol or sevoflurane for laryngeal mask airway insertion. *Can J Anaesth.,* 46: 322-6.

Naito Y., Tamai S., Shingu K., Fujimori R., Mori K. 1991. Comparison between sevoflurane and halothane for paediatric ambulatory anesthesia. *Br J Anaesth*. 67: 387-389.

Piat V., Dubois MC., Johanet S., Murat I. 1994. Induction and recovery characteristics and hemodynamic responses to sevoflurane and halothane in children. *Anaesth Analg*., 79: 840-844.

Sigston PE., Jenkins AM., Jackson EA., Sury MR., Mackersie AM., Hatch DJ. 1997. Rapid inhalation induction in children: 8% sevoflurane compared with 5% halothane. *Br J Anaesth.* 78: 362-325.

Smith I., White PF. 1992. Use of the laryngeal mask airway as an alternative to a face mask during outpatient arthroscopy. Anesthesiology. 77: 850-5.

Thwaites A., Edmends S., Smith I. 1997. Inhalation induction with sevoflurane: A double-blind comparison with propofol. *Br J Anaesth. ,* 78: 356-61.

Wodey E, Pladys P, Copin C, Lucas MM, Chaumont A, Carre P, *et al*. Comparative hemodynamic depression of sevoflurane versus halothane in infants: an echocardiographic study. Anesthesiol. 1997; 87: 795-800.

Yogendran S., Prabhu A., Hendy A., McGuire G., Imarengiaye C., Wong J. *et al*., 2005. Vital capacity and patient controlled sevoflurane inhalation result in similar induction characteristics. *Can J Anaesth.,* 52: 45-9.

Yurino M., Kimura H. 1993. Vital capacity rapid inhalation induction technique: Comparison of sevoflurane and halothane. *Can J Anaesth*., 40: 440-3.

****