

Original Research Article

Assessment of cardiovascular parameters and oxygen saturation levels in induction of sevoflurane with or without nitrous oxide V/s propofol

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Abstract: The study was performed on the anaesthetic induction, cardiovascular parametric changes and patient satisfaction of sevoflurane with nitrous oxide or without nitrous oxide in related to a rapid intravenous anaesthetic agent propofol. A total three hundred patients belonging to physical status I or II of American society of Anesthesiologists were considered and were made into three groups i.e. with sevoflurane (100%) (n=50), sevoflurane (8%) with N₂O (n=50) and 1% propofol at a rate of 0.5ml/sec (n=50). Systolic and diastolic blood pressure and oxygen saturation was recorded before and after induction. Mean pre-operative pulse rate was 81.4 ±9.48 in group I, 80.45±9.23 in group II and 79.68±9.98 in group III. Mean pulse rate was increased in all the groups after induction. Mean SBP 121.9±11.71 in group I, 124.9±7.41 in group II and 124.4±7.19 in group III. Mean SBP was decreased in all the groups after induction. Mean DBP 76.8±6.62 in group I, 77.86±6.32 in group II and 77.37±5.66 in group III. Mean DBP was decreased in all the groups after induction. No arrhythmias were observed in any patient. Patient performance and patient satisfaction was pleasant. 8% of sevoflurane carried in nitrous oxide and oxygen is a rapid, reliable and safe method for induction of anaesthesia while using vital capacity technique.

Keywords: Propofol, Sevoflurane, Nitrous oxide, systolic blood pressure, Diastolic blood pressure.

INTRODUCTION

Over a century, use of inhalational agents in anaesthetic practice has become a standard technique but, it was abandoned due to its slow action, odor, excessive salivation and adverse effects like vomiting and coughing [1]. Different kinds of techniques exist for gaseous exchange in anaesthesia, vital capacity induction is effective one [2].

Sevoflurane is a popular agent for inhalation induction for anaesthesia, which has a low blood gas solubility, less cardiovascular side effects and relative absence of pungency and most suitable for choice for rapid vital capacity induction [3]. The blood: gas partition coefficient of sevoflurane is 0.69 which permits rapid induction of anaesthesia as it rapidly equilibrates with the inspired concentration in addition sevoflurane is pleasant smelling and relatively non-irritation to the airways permitting a high delivered concentration to be inhaled without side effects or discomfort [4, 5]. Propofol is an effective and faster in

recovery. However, it has few adverse effects like negative inotropic and respiratory depressant effect is more than of thiopentone [6, 7]. But a still situation where rapid induction is desirable, propofol is a drug of choice [8].

Halothane has been the agent of choice till recently but with the introduction of sevoflurane in anaesthesia practice, Inhalational induction seems more favorable with sevoflurane owing to its pleasant smell and low blood: gas solubility. With the above background, the present study was carried to assess the induction ability of sevoflurane with or without nitrous oxide in related to propofol.

MATERIALS AND METHODS

The present study was conducted in department of Anaesthesia, MNR Medical College and Hospital, Sangareddy. A total 300 patients between 20-40 years of both sex belonging to physical status I or II according to American society of Anesthesiologists.

Prior to the surgery complete history was collected, physical and systemic examination was conducted.

Patients with neurological disease, Family history of malignant hyperthermia, renal insufficiency, hypersensitive to propofol, upper respiratory tract infection, chronic sedative intake, smokers, pregnant and lacting women were excluded from this study.

Patients were divided randomly in to 3 groups. Informed consent was obtained from all the patients.

Group I: patients received sevoflurane (8%) in 100% O₂ by face mask.

Group II: Sevoflurane (8%) and 63% nitrous oxide in oxygen by face mask.

Group III: Injection of propofol 1% at a rate of 0.5ml/sec till various end points achieved.

2ml of 1% lignocaine was administered in all patients. In group I the circuit was primed with 8 Liters of oxygen and sevoflurane (8%) and in group II it was primed with 3 liters of oxygen, 5 liters of nitrous oxide and 8% sevoflurane. in group III no priming of the circuit was done. SBP, DBP and SpO₂ were recorded before and after induction.

RESULTS

The present work was carried out in department of Anaesthesia, MNR Medical College and Hospital, Sangareddy. The study includes 300 patients of age group 20-40 years. Mean age of patients was 26.42±6.35 in group I, 28.80±7.40 in group II and 27.62±6.77 in group III. Mean weight of the patients was 58.18±5.13 in group I, 59.18±6.29 in group II and 58.16±5.01 in group III.

No arrhythmias were observed in any patient. Patient performance was satisfactory in all the groups. All patients were described that induction procedure as pleasant and all are willing to undergo a similar induction technique again.

DISCUSSION

In the present study, the pulse rate was increased in all the patients after induction, which further increased after insertion of LMA. After that it decreased and dropped to baseline in sevoflurane groups but never dropped to baseline in propofol group (Table 1) which is similar to those observed by Hall et al who observed an increase in pulse rate in all the groups [9]. However, they observed a smaller in propofol group whereas in present study it was equal rise in all groups. In their study they observed that it did not drop to baseline, probably because they observed these three minutes only. The present study results [10].

In the present study there is a fall in systolic as well as diastolic blood pressure in all groups after induction which transiently increased after LMA insertion. Thereafter again it decreased till five minutes after LMA insertion. Fall in diastolic pressure was more in sevoflurane group as compared to propofol. (Table 2) These findings are similar to the study by Sivalingam *et al.*; who observed fall in blood pressure in all the groups [11]. They also observed transient increase in blood pressure after intubation which decreased to pre intubation level within 2 minutes.

In the present study, oxygen saturation in group I and group II increased after induction, but it was decreased in propofol group after induction although not clinically significant. There was no incidence to fall in oxygen saturation below 96% in any group. In all groups, the oxygen saturation increased after insertion of LMA, it increased to 100% at 5 minutes in all the groups. (Table 3) These results are similar to those observed by Thwaites et al and those by Sivalingam *et al.*; [10, 11]. They observed that oxygen saturation never dropped below 96% in separate studies. The findings of present study were also similar to those observed by Yurino and Kiruma [12]. They also observed that oxygen saturation increased slightly after the application of anaesthetic mask.

Table-1: Showing observation of pulse rate at different time intervals.

| | Group I | Group II | Group III |
|---------------------------|-------------|-------------|-------------|
| Before induction | 81.4 ±9.48 | 80.56±9.18 | 79.84±9.98 |
| Before LMA insertion | 84.1±10.09 | 81.96±12.21 | 84.18±10.17 |
| After LMA insertion | 90.92±12.54 | 91.98±14.25 | 91.69±10.52 |
| 1 min after LMA insertion | 89.02±14.98 | 92.62±15.51 | 88.92±9.61 |
| 2 min after LMA insertion | 90.26±16.61 | 89.15±14.82 | 87.46±8.61 |
| 3 min after LMA insertion | 88.72±17.02 | 86.10±13.96 | 85.92±8.71 |
| 4 min after LMA insertion | 85.88±15.71 | 84.08±13.60 | 84.01±8.74 |
| 5 min after LMA insertion | 83.98±15.64 | 82.38±12.68 | 81.98±8.38 |

Table 2: Values of SBP and DBP at different intervals of time

| | Group I | | Group II | | Group III | |
|---------------------------|--------------|-------------|--------------|------------|-------------|------------|
| | SBP | DBP | SBP | DBP | SBP | DBP |
| Before induction | 121.9±11.71 | 76.8±6.62 | 124.9±7.41 | 77.86±6.32 | 124.4±7.19 | 77.37±5.66 |
| Before LMA insertion | 115.4±12.22 | 68.51±10.89 | 116.61±11.52 | 70.41±9.18 | 114.41±8.78 | 71.38±5.54 |
| After LMA insertion | 122.2±16.71 | 74.46±14.45 | 121.77±12.66 | 79.20±8.29 | 126.61±6.48 | 79.02±5.23 |
| 1 min after LMA insertion | 121.6±18.63 | 74.79±15.92 | 119.41±12.90 | 75.77±8.61 | 124.2±6.63 | 76.91±5.01 |
| 2 min after LMA insertion | 118.0±16.59 | 72.54±14.11 | 117.9±11.5 | 73.48±9.06 | 121.9±6.52 | 75.06±4.61 |
| 3 min after LMA insertion | 115.8±15.71 | 69.32±12.79 | 115.5±8.86 | 72.62±8.61 | 120.1±6.45 | 73.56±4.68 |
| 4 min after LMA insertion | 112.09±19.75 | 69.08±12.34 | 114.5±8.72 | 72.18±8.62 | 118.5±6.53 | 72.56±4.49 |
| 5 min after LMA insertion | 113.45±12.24 | 67.48±11.98 | 112.41±8.72 | 71.32±7.49 | 116.6±6.49 | 71.34±4.57 |

Table 3: observation O₂ saturation at different intervals of time

| | Group I | Group II | Group III |
|---------------------------|------------|------------|------------|
| Before induction | 99.32±1.74 | 99.25±0.57 | 99.12±0.22 |
| Before LMA insertion | 99.68±0.41 | 99.72±0.48 | 99.89±0.98 |
| After LMA insertion | 99.89±1.26 | 99.96±0.13 | 99.30±1.36 |
| 1 min after LMA insertion | 99.91±0.29 | 100.0±00 | 99.60±0.89 |
| 2 min after LMA insertion | 99.79±0.64 | 99.98±0.14 | 100.0±00 |
| 3 min after LMA insertion | 99.92±0.39 | 99.98±0.13 | 100.0±00 |
| 4 min after LMA insertion | 99.95±0.27 | 100.0±00 | 100.0±00 |
| 5 min after LMA insertion | 100.0±00 | 100.0±00 | 100.0±00 |

The patients in sevoflurane group found the smell of sevoflurane pleasant except the two in sevoflurane in oxygen group who found the smell unpleasant. Patients in all the groups were willing to undergo the same procedure again except the same two patients in sevoflurane in O₂ group who did not like induction procedure. These findings are comparable to those of Yuino and Kiruma, who observed that patient experience was pleasant in every patient and all of them would accept the inhalational technique again [13]. The present findings are contrary to those observed by Thwaites *et al.*; in this study 7 patients out of 51 described inductions by sevoflurane as unpleasant and significantly more patients (24%) were unwilling to receive the sevoflurane induction again [11]. This may attribute to tidal breath technique of induction whereas in our study we employed vital capacity breath for induction.

CONCLUSION

The results of above study can be concluded that 8% sevoflurane carried in nitrous oxide and oxygen is a rapid, reliable and safe method for the induction of anaesthesia when a vital capacity technique is used. The slightly slower induction time with sevoflurane as compared to propofol can be offset by reduced

incidence of breath holding and involuntary movements. Although the time taken for induction is significantly faster with the propofol, but the above technique can safely be uses as an alternative to intravenous induction in patients with needle phobias or difficult intravenous access.

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