Original Research Paper

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Economy of VIMA Versus Propofol Induction

Medical Science

KEYWORDS :

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ABSTRACT

BACKGROUND

Newer inhalational agents such as sevoflurane offer several advantages over older agents but are comparatively more expensive .There is incresing concern about the cost effectiveness of using sevoflurane versus the conventional use of propofol for induction of anaesthesia.This study was done to compare the cost effectiveness of the two methods of induction.

AIM

To compare the cost effectiveness of propofol induction versus sevoflurane induction

STUDY DESIGN

Observational study

MATERIALS AND METHODS

Adult patients scheduled for thyroidectomy under general anaesthesia were divided into two groups (=30each), to receive anaesthesia using one of the following techniques: low flow technique involving induction with propofol, followed by sevoflurane delivered using initial fresh gas flows of 6 L/min till MAC reached 1.5 and then reduced to 2 L/min; second technique involving use of sevoflurane for both induction and maintenance of anaesthesia

CONCLUSION

Intraoperative physiological variables were comparable in both group. Sevoflurane induction was found to be more cost effective than propofol induction

INTRODUCTION

Sevoflurane like newer inhalational agents are considered costly for induction. As an induction agent, sevoflurane is not associated with pungent odor or airway irritation,and thus it is widely accepted by anesthesia providers and patients. But using Sevoflurane as an induction agent is considered costly.We need to develop techniques that can minimize the cost of anaesthesia .In this study we are comparing the economic benefits of volatile induction and maintainence with sevoflurane versus propofol induction and maintainence with sevoflurane

AIM

To compare the cost effectiveness of volatile induction and maintainence with sevoflurane versus propofol induction and maintainence with sevoflurane for one hour anaesthesia.

MATERIALS AND METHODS

STUDY DESIGN

Observational study

STUDY SETTING

Sree Gokulam Medical College and Research Foundation, Venjarammoodu, Trivandrum

STUDY POPULATION

Patients 20 -60 years of age undergoing Thyroidectomy

SAMPLE SIZE

Total sample size of 60 ,30 in each group.

DURATION OF STUDY

10 months from September 2014 to June 2015

INCLUSION CRITERIA

- ASA I/II
- Consent from patient
- Patients posted for thyroidectomy
- Age group - 20 to 60years

EXCLUSION CRITERIA

- Those not willing to participate in the study
- ASA III/IV
- Known allergy to study drug
- Age <20 or >60 years
- BMI>30

METHODOLOGY

After getting institutional ethical committee clearance and informed consent from the patient, the patient was kept nil per oral for 8 hours. The patients were randomly divided to two groups .Group P was induced with propofol and Group V with sevoflurane. After shifting into the operating room, intravenous access using 18G cannula was secured and monitoring including lead II electrocardiography, pulse oximetry, noninvasive blood pressure measurements, and respiratory gas analysis was instituted. Both group of patients were premedicated with Midazolam 0.02mg/kg ,Glycopyrrolate .004mg/kg,Ondansetron 0.15mg/kg and Fentanyl 2 ◎g/kg iv. Subsequent anaesthetic technique was as per the group to which the patient was randomized

GROUP P

Induction

After preoxygenation with oxygen 6L & lignocaine 1.5mg/kg iv anaesthesia was induced with propofol 2-3mg/kg i.v. in titrated doses and manual ventilation was initiated using a face-mask and rebreathing system with a carbon dioxide absorber, at a fresh gas flow rate of 6 L/minute (3-3 : oxygen-nitrous oxide).

Intubation
Atracurium 0.5 mg/kg i.v. was administered after induction of anaesthesia with propofol and intubation was performed three minutes later

Maintenance of anaesthesia
Initial fresh gas flow rate of 6 L/minute (3:3 -Oxygen:Nitrous oxide) was reduced to 2L (1:1 -Oxygen:Nitrous Oxide) and a dial setting on sevoflurane vaporizer to maintain intraoperative MAC of 1.5. Intraoperative mechanical ventilation was initiated with a tidal volume of 8 mL/kg and a respiratory rate of 12 breaths/minute, with the rate titrated to maintain end tidal carbon dioxide of 35 to 40mm Hg. To maintain intraoperative MAC of 1.5 dial setting of the sevoflurane vaporizer was increased or decreased.

GROUP V (SEVOFLURANE INDUCTION)
Induction
After preoxygenation with oxygen 6L anaesthesia was induced with sevoflurane with fresh gas flow of 6L(3:3 oxygen:N_2O) to achieve a MAC of 2-3.

Induced with sevoflurane for 4 minutes
1st min-8% concentration
2nd min-6% concentration
3rd -4th min-4% concentration

Intubation
Muscle relaxant used for intubation was atracurium 0.5mg/kg.It was given in the second minute and ventilation was assisted. Intubation done at the end of 4th minute.

Maintenance of anaesthesia
After intubation fresh gas flow rate was reduced to 2 L/minute (1 : 1 -oxygen-nitrous oxide) and a dial setting on sevoflurane vaporizer to maintain intraoperative MAC of 1.5 . Intraoperative mechanical ventilation was initiated with a tidal volume of 8 mL/kg and a respiratory rate of 12 breaths/minute, with the rate titrated to maintain end tidal carbon dioxide of 35 to 40mm Hg.

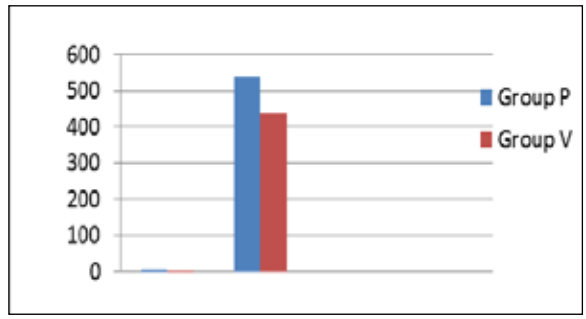
To allow for comparison of the two study groups demographic characteristics including age, gender, weight of the patient, Intraoperative characteristics such as pre- and postintubation heart rate and mean arterial pressure were also recorded. ECG, Pulse oximetry, NIBP, EtCO2, Et agent & MAC monitoring were done during the period of anaesthesia.

STATISTICAL ANALYSIS
Statistical Analysis was done using SPSS version 16.0. P values were found out using Students T test

RESULTS
There was no statistically significant difference with respect to the demographic parameters amongst the two groups. The difference between preinduction and postintubation heart rate as well as mean arterial pressure was statistically similar amongst the two groups .

Characteristics	Group P (◎ = 30)	Group V (◎ = 30)	P value
Age (years)	37±12	39±11	0.764
Weight (kg)	62±9	63±9	.999
HR difference	11.33±3.7	10.8±3.6	.737
MAP difference(mmHg)	8±2.4	8±2.6	.357

Characteristics	Group P (◎ = 30)	Group V (◎ = 30)	P value
Cost of anaesthesia	538.85±24.35	437.45±41.5	.001



The total cost of anaesthesia,was significantly lesser with Group V as compared to Groups P(◎ = 0.001)

DISCUSSION
It was observed that cost of anaesthesia,was significantly lesser with sevoflurane induction compared with propofol induction.The cost of volatile induction and maintenance with sevoflurane was significantly less(INR 437.45±41.5) compared to conventional propofol induction and maintenance with sevoflurane(INR 538.85±24.35).It was found that there is a cost saving of 18 % when cost of anaesthesia was calculated for the first hour of surgery. When considered in terms of total savings for a particular institute over months or a year, the amount can be expected to be substantial.

Previously also, the cost of VIMA using sevoflurane was noted to be cheaper as compared to induction with propofol followed by maintenance with sevoflurane or induction as well as maintenance with propofol . Studies that have compared propofol and sevoflurane for induction only have also noted lower costs with sevoflurane induction

In this study we used propofol manufactured by Fresenius Kabi (Fresofol) which cost Rs.286 for 20ml which means 1ml will cost about Rs.14.30.In this study only the cost of used propofol in millilitres was calculated. In this study we used sevoflurane manufactured by Abbott (Sevorane) which costs Rs.7629.52 for 250 ml.We used the Dions formula to calculate the amount of sevoflurane used during anaesthesia. The Dion formula has already been validated previously in multiple cost analyses. Using the Dions formula we can calculate the amount of sevoflurane used in millilitres.

The major limiting factor in the use of sevoflurane has been the economic factors associated with the agent. Multiple studies have compared costs associated with the use of different inhalation agents, and further comparisons have been made between inhalation and intravenous anesthesia.

An ideal inhalation induction technique besides being rapid and comfortable for the patient should be economical. Sevoflurane used in high concentrations is known to be safe and is not associated with substantial hemodynamic instability

There was no significant difference in heart rate or mean arterial pressure changes following intubation amongst the two techniques. Previously also, the technique of VIMA was associated with similar hemodynamic consequences as compared to intravenous induction with propofol followed by maintenance of anaesthesia with sevoflurane

This study does not take into account the costs of anaesthesia related to other agents such as the fresh gas flow mixture. The cost analysis pertains to the consumption of sevoflurane and propofol only, when using two different

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anaesthetic techniques. Addition of the cost of disposables, other drugs used to counter clinical side effects of sevoflurane or propofol, or the implications of these drugs in the duration of hospitalization-related expenses have not been considered.

CONCLUSION

Intraoperative physiological variables were comparable in both group .Cost incurred was less than Rs 100 in group V using sevoflurane both for induction and maintenance of anaesthesia for 1 hour compared to group P using propofol

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