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Research Article

PULSE OXIMETRY LED EVALUATION OF ANAESTHETIC HYPOXEMIC EFFECT USING PROPOFOL, THIOPENTAL SODIUM AND PROPOFOL-THIOPENTAL SODIUM MIXTURE IN TOTAL INTRAVENOUS ANESTHESIA (TIVA) IN CANINE BY SATURATION OF PERIPHERAL OXYGEN (SpO_2) ESTIMATION

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Abstract: In present study total 18 clinical cases of dogs in three groups were anesthetized by propofol, thiopental sodium and their mixture (1:1) separately. The Saturation of peripheral Oxygen study was done prior to anaesthesia (0 minute), after induction, after anaesthesia (15 minutes, 30 minutes and 45 minutes) and after recovery by using Multi Para Monitor EXCELLO (BPL LTD., BPL Towers, 13 Kasturba Road, Bangalore, 560001). Saturation of peripheral Oxygen decreased significantly ($P<0.05$) at 15 minutes, 30 minutes and 45 minutes after induction in all the three groups. There were non-significant changes between 5 minutes, 15 minutes, 30 minutes and 45 minutes after induction and it may be concluded that propofol, thiopental sodium and their mixture caused decrease of Saturation of peripheral Oxygen (SpO_2) level which were within manageable physiological range and anesthetics should consider supplemental oxygen during general anesthesia.

Keywords: *Saturation of peripheral Oxygen (SpO_2), Propofol, Thiopental sodium*

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Introduction

Improvement in Pulse oximetry is universally used for monitoring oxygenation in the critical care setting [1]. It provides an early warning of hypoxemia [2]. Saturation of peripheral Oxygen or SpO_2 or oxygen saturation is a measure of oxygen-carrying hemoglobin in the blood relative to the amount of hemoglobin not carrying oxygen estimated by pulse oximeter. Novel prognostic tools such as the 4Cscore have shown the importance of identifying hypoxia early [3] in high risk patients like suspected covid-19 patients. In the field of veterinary science Pulse oximetry during anesthesia and in recovery are performed to describe perioperative hypoxaemic events.

2, 6-diisopropylphenol, popularly known as Propofol is an ideal hypnotic/sedative is believed to be an ideal agent for TIVA [4]. But it is expensive with the side effects like apnoea, myoclonus [5], myocardial depression without much hypotension, bacterial contamination and failure to block autonomous response to noxious stimuli. Thiopental sodium, an ultrasound acting barbiturate is less likely to induce apnoea, does not trigger malignant hyperthermia, results tachycardia and inexpensive. Disadvantages of thiopental sodium include slow clearance, leading to prolonged, rough recovery and severe hypotension. In the present investigation, Saturation of peripheral Oxygen (SpO_2) estimation has been made to evaluate the hypoxaemic effect (if any) in dogs anesthetized by propofol, thiopental sodium and their mixture (1:1) separately.

Materials and Methods

The study was conducted on a total 18 clinical cases consisting of different breeds of dogs aged between 2 to 6 years. The anesthesia was induced by IV bolus which was one quarter of the total dose of Propofol (@8mg/ kg body weight in Group I), Thiopental sodium (@20mg/ kg body weight in Group II) and Propofol-Thiopental sodium mixture (@1ml/kg body weight in Group III, 1ml of mixture contains 5mg Propofol and 12.5 mg Thiopental sodium). Immediately after induction anaesthesia was maintained by repeated intermittent bolus injection of one quarter of the left dose. The animal was kept in right lateral recumbency and the estimation of Saturation of peripheral Oxygen was done prior to anaesthesia (0 minute), after induction, after anaesthesia (15 minutes, 30 minutes and 45 minutes) and after recovery by using Multi Para Monitor EXCELLO (BPL LTD., BPL Towers, 13 Kasturba Road, Bangalore-560001).

Result

The mean ± S.E values of Saturation of peripheral Oxygen or SpO_2 (%) are presented in [Table-1] and [Fi-1]. There was no significant variation of Saturation of peripheral Oxygen or SpO_2 (%) from preanaesthetic condition to postanaesthetic condition irrespective of any groups between the groups. Within the groups there was highly significant ($P<0.01$) altered Saturation of peripheral Oxygen or SpO_2 (%) was found during induction period.

Discussion / Conclusion

In the present study decreased trend of SpO_2 was noted upto 30 minutes after induction, thereafter it was increased and at the time of recovery values were nearly to the baseline value. Saturation of peripheral Oxygen (SpO_2) decreased significantly ($P<0.05$) at 15 minutes, 30 minutes and 45 minutes after induction in all the three groups. There were non-significant changes between 5 minutes, 15 minutes, 30 minutes and 45 minutes after induction.

The same result was also observed by Bennett, *et al*., (1998) [6] in propofol anaesthesia. But Klc and Erhardt, (2004) [7] found that SpO_2 values did not change significantly over time in thiopental anaesthesia.

Table-1 *Mean with standard error of Saturation of peripheral Oxygen or SpO_2 (%) in different time intervals using various combination(s) of anaesthetic(s)*

Group	Before anaesthesia	After induction	15min. after induction	30 min. after induction	45 min. after induction	After recovery
I n=6	$97.50^{a}\pm0.43$	$92.67^{abc}\pm1.20$	$90.17^{b}\pm1.33$	$91.00^{b}\pm1.44$	$91.67^{bc}\pm1.66$	$96.33^{ac}\pm0.99$
II n=6	$97.83^{a}\pm0.40$	$92.50^{ab}\pm1.23$	$89.00^{b}\pm1.57$	$89.17^{b}\pm1.81$	$90.50^{b}\pm2.03$	$97.17^{a}\pm0.40$
III n=6	$97.67^{a}\pm0.42$	$92.50^{b}\pm1.23$	$89.50^{b}\pm1.28$	$91.67^{b}\pm1.14$	$91.50^{b}\pm1.67$	$97.36^{a}\pm0.43$

Mean with the different superscripts (a, b…) differ highly significantly (P<0.01) within the group. No significant variation (P>0.05) between the group

Ko, *et al*., (1999) [8] noted that SpO_2 did not differ after 1:1, volume mixture of propofol (1%) and thiopental (2.5%) anaesthesia. Propofol decreases mean arterial pressure and systemic vascular resistance but doest not change HR [9], Cardiac output or oxygen delivery after induction. The nonsignificant decrease of oxygen saturation during maintenance might be contributed by decrease in tissue blood flow resulted from hypotension or decreased cardiac output caused by propofol. All treatments cause some degree of apnea, hypoventilation and hypoxemia [10]. Thiopental attenuates neuronal depolarization, an increase in cellular sodium and calcium concentration and a decrease in cellular potassium and ATP concentration during hypoxia [11]. These changes were probably due to hypoventilation and consequently hypoxemia [12] which was evident in propofol-thiopental mixture group also.

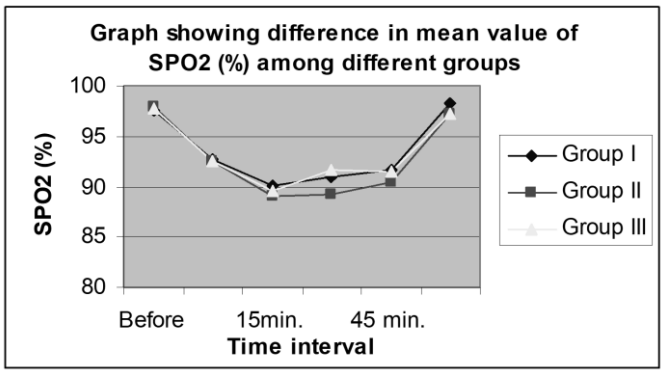

Fig-4 Graph showing Saturation of peripheral Oxygen or SpO_2 (%) in different time intervals using various combination(s) of anaesthetic(s)

Hypoxemia is defined as low level of oxygen in blood and the incidence of hypoxemia during anaesthesia is high and risk factor includes general anaesthesia [13]. As the change or decrease of Saturation of peripheral Oxygen (SpO_2) was within manageable physiological range, the combinations were said to be safe but anesthetics should consider supplemental oxygen during general anesthesia.

Application of research: Establishing Perfect and suitable anesthetic effect on clinical parameters like SPO_2 using anesthetics like Propofol, Thiopental sodium and their mixture in canine

Research Category: Clinical Veterinary Research

Abbreviations: SPO_2- arterial blood oxygen saturation, I.V./ i.v.- intravenous

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Research project name or number: Clinical trial

Author Contributions: All authors equally contributed

Author statement: All authors read, reviewed, agreed and approved the final manuscript. Note-All authors agreed that- Written informed consent was obtained from all participants prior to publish / enrolment

Study area / Sample Collection: Veterinary Clinical Complex, Kolkata, 700037

Breed name: Dogs

Conflict of Interest: None declared

Ethical approval: As the Clinical trial was done by established medicines with prior approval so no ethical approval was required.
Ethical Committee Approval Number: Nil

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