COMPARISON OF CARDIOPULMONARY AND HAEMATOLOGICAL EFFECTS DURING SEVO FLURANE AND ISOFLURANE ANAESTHESIA WITH KETAMINE PREMEDICATION IN CATS

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Abstract

The study was carried out to evaluate the cardiopulmonary and haematological changes when sevoflurane (n=6) and isoflurane (n=6) was used as anaesthetic agents in ketamine (15mg/kg) premedicated healthy adult cat presented for elective surgery (spaying). Induction, maintenance and recovery quality were found to be similar in both the groups. Respiratory rate reduce significantly during the anaesthesia in both the groups. Pulse rate, rectal temperature and peripheral oxygen saturation were also changed significantly within the group but between groups all the parameters were found to be identical. Changes in haematological parameters were also observed during the course of anaesthesia but the difference was minimal between both of the groups the results of the present study indicated that the anaesthetic quality induces by sevoflurane and isoflurane are comparable to each other. But sevoflurane induce anaesthesia and recoveries were faster than of isoflurane and both the agents are found to be suitable for general anaesthesia in cats.

Key words: *Sevoflurane, isoflurane, cardiopulmonary and haematological effect, cat*

Sevoflurane is non-inflammatory isopropylic fluorited ether, which affects the cardiovascular system and reduces the mean arterial pressure and myocardial contractibility and also protects the myocardium against the catecholamine. But is low solubility helps in producing easy equilibrium between alveolar gas and blood (Haitjema and Cullen, 2001). Isoflurane has similar structural configuration with sevoflurane but it has higher blood gas partition co-efficient than that of sevoflurane (Stoelting *et al*.1999). There is rapid uptake of isoflurane from alveolar space to the blood, but the rate is reduce when it redistributed from blood to tissue (Zbinden *et al*., 1988) which makes the recovery with isoflurane longer than that of sevoflurane. For inducing anaesthesia in cats injectable as well as inhalant anaesthetics could be used. Inhalant anaesthetics have rapid induction better control over the anaesthetic depth with predictable recovery and physiological response (Sedgwick, 1986), which makes the

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maintenance and recovery from anaesthesia with volatile agents more attractive. So the present study was undertaken to compare the cardiopulmonary and haematological changes during sevoflurane and isoflurane anaesthesia in ketamine premedicated cats.

Materials and Methods

The anaesthetic study was conducted in 12 cats aged one to two years of mixed breed cats subjected to elective surgical procedures (spaying). These cats were divided into two Groups *viz*. Group I, II and consisting of six animal's each. All the cats were randomly assigned to the following anaesthetic protocols. In groups I and II ketamine was administered at the rate of 15 mg/kg body weight intramuscularly. After that, in Group I animals Induction and maintenance of anaesthesia were carried with sevoflurane by mask induction technique throughout the period of surgery "to effect", and in Group II, induction and maintenance of anaesthesia were carried with isoflurane. All the vital parameters were collected during sedation, anaesthesia, and recovery period. A lead II electrocardiogram (ECG) was taken during sedation and recovery period. Blood was collected during sedation and recovery time for haematological and serum biochemical examination. All the data was collected and subjected to statistical analysis (ANOVA)

Results and Discussion

Respiratory Rate

In Group I the mean respiratory rate (in minute) in six animals were recorded as 31.17 ± 2.13, 13.50 ± 1.50 and 16.50 ± 0.88, Group II the rate was 27.83 ± 1.60, 11.66 ± 1.05 and 18.83 ± 1.24. There was significant reduction ($p<0.05$) in respiratory rate between pre-anaesthesia and anaesthesia period. During the recovery period there was increase in the respiratory rate which was not significantly differ from the anaesthetic respiratory rate, whereas the recovery respiratory rate was also significantly less than that of preanaesthetic respiratory rate. The findings were in agreement with Hikasa *et al.* (1997), Vettorato *et al.* (2012), Hikasa *et al.* (1997) and Gokulakrishnan and Nagarajan (2014).

Pulse Rate

The mean pulse rate (in minute) in the six animals of Group I was recorded as 195.66 ± 3.80, 164.66 ± 5.74 and 172.16 ± 5.98 and in Group II, it was 194.16 ± 4.31, 157.83 ± 5.16 and 174.83 ± 3.18 during preanaesthesia, anaesthesia and recovery period respectively. There was significant reduction ($p<0.05$) in pulse rate between pre-anaesthesia and anaesthesia period. During the recovery period there was increase in the pulse rate which was also significantly differ ($p<0.05$) from the anaesthetic pulse rate, whereas the recovery pulse rate was also significantly less than that of preanaesthetic pulse rate. Similar findings were also reported by Souza *et al.* (2005), Vettorato *et al.* (2012), Poterack *et al*. (1991) and Hikasa *et al.* (1997)

Rectal Temperature

The mean rectal temperature (°F) observed in all the cats of Group I was 102.10 ± 0.21, 97.95 ± 0.21 and 96.91 ± 0.33 and in Group II was 102.03 ± 0.29, 98.93 ± 0.14 and 97.70 ± 0.20 respectively during sedation, anaesthesia and recovery period. The rectal temperature decreased significantly ($p<0.05$) during anaesthesia and recovery period from the pre anaesthesia period. The results were in agreement with the findings of Vettorato *et al.* (2012), Poterack *et al*. (1991) and Hikasa *et al.* (1997).

Capillary Refill Time

The mean capillary refill time (in seconds) was in six animals of Group I was 1.58 ± 0.20, 1.9 ± 0.20, and 1.91 ± 0.83 during preanaesthesia, and anaesthesia and recovery period respectively. Similarly in Group II was 1.56 ± 0.16, 2.0 ± 0.22 and 2.00 ± 0.00. The capillary refill time increase during anaesthesia and recovery period and the increase was not significantly differ with in the same group of animal. A similar finding was also reported by Poterack *et al*. (1991) and Hikasa *et al.* (1997).

Pulse Oximetry

The oxygen saturation (SpO_2) level (%) was in Group I animals 92.67 ± 2.25, 99.5 ± 0.22

and 97.33 ± 0.84. And in Group II animals was 95.83 ± 2.04, 99.17 ± 0.40 and 98.00 ± 0.51 during pre- anaesthesia, and anaesthesia and recovery period respectively. There was significant increase ($p<0.05$) in oxygen saturation between pre-anaesthesia and anaesthesia period as reported by Poterack *et al*. (1991) and Hikasa *et al.* (1997).

Electrocardiogram

Abnormal pattern of electrocardiogram observed in the study, include some changes like negative T weave (I_6), increased P duration, electrical alteration (II_4), increased Q depression (II_5) which become normal at the time of recovery Poterack *et al*. (1991) and Hikasa *et al.* (1997).

Haematological Observations:

Haemoglobin Concentration

The haemoglobin concentration (g/dl) was recorded as 12.21 ± 0.94 and 10.60 ± 0.67 in Group I animals, 10.73 ± 0.77 and 9.30 ± 0.28 in Group II animals during anaesthesia and recovery period respectively. The haemoglobin concentration during the anaesthesia to recovery shown reducing tendency, but the reduction was not found to be significantly differ between both of the period.

Volume of packed red cells (VPRC) (%):

Volume of packed red cells (VPRC) (%) in Group I was 37.17 ± 3.11 and 35.67 ± 1.91, in Group II was 35.17 ± 1.74 and 36.00 ± 2.13 during anaesthesia and recovery period respectively The Volume of packed red cells during the anaesthesia to recovery shown reducing tendency, but the reduction was not found to be significantly differ between both of the period.

Total Leukocyte Count

Total leukocyte count (TLC) (10^3/ mm^3) in Group I was 10.59 ± 0.81 and 13.20 ± 0.76 during anaesthesia and recovery period respectively, similarly in Group II was 8.8 ± 0.44 and 11.18 ± 0.69, The Volume of packed red cells during the anaesthesia to recovery shown increasing tendency, but the increase was not found to be significantly differ between both of the period.

Neutrophils

The neutrophil count in Group I (%) was 61.66 ± 3.88 and 64.16 ± 2.52, and then in Group II was 61.50 ± 1.36 and 59.16 ± 1.49 during anaesthesia and recovery period respectively. The neutrophil during the anaesthesia to recovery in Group I and III shown increasing tendency, but the increase was not found to be significantly differ between both of the period

Lymphocytes

The lymphocyte count (%) was 33.83 ± 3.21 and 30.16 ± 2.54, in group I and 35.66 ± 1.73 and 34.66 ± 1.11 in Group II.

Eosinophil

The eosinophil count (%) was 0.28 ± 0.04 and 0.15 ± 0.002 during anaesthesia and recovery period respectively in Group I and in Group II. The change in the haematological parameters were found to be in agreement with the findings of Hikasa *et al.* (1997).

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