EFFECT OF ANAESTHETIC PROTOCOLS ON DAM IN CANINE EMERGENCY C-SECTION

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Abstract

The study was conducted to compare the effect of two anaesthetic protocols on physiological, clinical and haematological parameters of dam undergoing emergency Caesarean section (C-section) in dogs. Group I (n=6) received Total Intravenous Anaesthesia (TIVA) of propofol and Group II (n=6), a combination of propofol-isoflurane, which is commonly used in canine C-sections. The clinical parameters such as induction time, duration of surgical anaesthesia and total surgery time were similar in both the groups. Induction was rapid and recovery was smooth and early in both the groups; muscle relaxation was less with TIVA propofol compared to propofol-isoflurane.Haematological parameters were recorded before and after anaesthesia. Changes such as decrease in total leucocyte count, total erythrocyte count, haemoglobin concentration, granulocyte count and volume of packed red cells and increase in monocyte count were noticed after surgery in both the groups. The physiological parameters had slight variation but were within normal ranges during anaesthesia. It is concluded that the TIVA of propofol can be used as an alternative to the propofol -isoflurane anaesthesia combination in canine emergency C-section.

Keywords: *TIVA propofol, propofol-isoflurane, Canine C-section*

The information regarding the effects of anaesthetics on dam in canine C-section is limited.The anaesthetics used for other surgeries may not be effective in C-section because of the endocrinological and physiological changes that occur during pregnancy and parturition. Doebeli *et al*. (2013) reported that, nearly 16 per cent of all bitches suffer dystocia,

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of which 60 per cent require an emergency C-section. Hence, emergency C-section is the most common procedure in small animal practice. Various anaesthetic protocols have been followed by many veterinarians since centuries. All the anaesthetics used will cross the placental barrier and cause depression in the neonates or may even lead to mortality. Kuttan (2015) reported the highest neonatal mortality rate under Xylazine-ketamine anaesthesia. The anaesthetic selected has to be optimized to decrease the neurological and cardiopulmonary depression in both dam and foetus. Long-term neonatal outcomes are not influenced by the type of anaesthesia given to the mother. Propofol- isoflurane anaesthesia has been the anaesthetic protocol of choice for canine C-section. But it requires costly and cumbersome gaseous anaesthetic machine, which limits use of this protocol in field conditions. Since Total Intravenous Anaesthesia (TIVA) will overcome these limitations, this study was carried out with the objectives to determine the efficacy and safety of anaesthetic protocols on the health of dam undergoing C-section.

Materials and methods

The animals presented to the University Veterinary Hospital, Kokkalai and Mannuthy, Kerala Veterinary and Animal Sciences University with the history of dystocia were selected and subjected to the clinico-gynaecological examinations. The animals which did not respond to medical management were selected for the study and were randomly allocated to two groups with six animals each. All the animals were premedicated with inj. Glycopyrrolate (200 µg/mL) at a dose of 0.01mg/kg BW intramuscularly and anaesthesia was induced with inj. Propofol (10 mg/mL) at a dose of 5 mg/kg BW intravenously (Hall and Chambers, 1987). In group I (n=6), maintenance of anaesthesia was achieved by continuous rate infusion (CRI) of propofol (10 mg/mL) at dose of 0.04m g/kg BW intravenously, diluted with five per cent dextrose. Group II (n=6) was maintained with inhalant isoflurane anaesthesia initiated at three per cent in pure oxygen. Inj. Tramadol (50 mg/mL) was given at a dose of 0.5 mg/kg BW intramuscularly for analgesia and antibiotics were provided for both the groups.

After induction, all the animals were intubated and placed on the dorsal recumbency. C-section was performed by ventral midline incision, adopting standard surgical procedure. Physiological parameters of dam were noted at the time of induction and at 30 minutes intervals throughout the surgery. Clinical parameters such as induction time, duration of surgical anaesthesia, total surgery time, recovery time and muscle relaxation were also noted. Blood samples were collected before and after the surgery for haematological analysis. The data were analysed statistically using SPSS 21 statistics software.

Results and Discussion

Physiological parameters of the dam

The observations on physiological parameters of dam during induction of anaesthesia at 30 minutes and 60 minutes of surgery are presented in Table 1. The respiratory rate was higher in group I than group II but similar respiratory rate was maintained throughout in both the groups at different time intervals. As reported by Duvaldestin (1987), the CRI of propofol has similar effect on animal during general anaesthesia by increasing respiratory rate by diminished tidal volume and hypercapnia. A decrease in respiratory rate of group II was noticed which was similar to the observations of Ramankutty (2008), as isoflurane is a profound respiratory depressant (Steffey and Howland, 1977). Blood pressure of both the groups was within normal ranges. The blood pressure did not alter significantly during anaesthesia in both the groups. But significant decrease in blood pressure was noticed in the group II compared to group I. Decrease in the blood pressure under isoflurane anaesthesia was observed by Pauca and Dripps (1973) and Steffey and Howland (1977), which was due to the decrease in the peripheral circulatory resistance. Ilkiw (2002) reported that propofol had no effect or may slightly decrease the blood pressure. The heart rate and pulse rate did not vary significantly between the groups and heart rate was more evenly maintained within groups at different time intervals. This was in agreement with Mohan (2006) and Ramankutty (2008). The conjunctival mucous

Table 1. Observations on physiological parameters of dam during induction of anaesthesia at 30 minutes and 60 minutes of surgery

Physiological parameters	Group (n=6)	Induction	30 minutes	60 minutes
Respiratory rate (BPM)	I	27.83 ± 50^{a}	28.17 ± 4.66^{a}	29.33 ± 4.49^{a}
	II	15.17 ± 1.22^{b}	13.67 ± 1.50^{b}	13.6 ± 0.89^{b}
Heart rate (bpm)	I	104.67 ± 6.29	106.83 ± 6.19	117 ± 12.37
	II	130.17 ± 11.16	116 ± 6.47	119.6 ± 10.71
Blood pressure (mm Hg)	I	125.64 ± 4.07/ 84 ± 5.83^{a}	125.67 ± 4.07/ 89.33 ± 3.68^{a}	143.33 ± 8.13/ 108.00 ± 6.83^{a}
	II	107.83 ± 7.42/ 62 ± 8.26^{b}	105.50 ± 5.37/ 62.17 ±6.26^{b}	114.2 ± 8.58/ 68.2 ± 8.02^{b}
Pulse rate (per minute)	I	137.33 ± 8.99	125.17 ± 9.08	138.50 ± 8.52
	II	128.83 ± 10.16	116.50 ± 6.09	119.40 ± 11.12
Temperature (°F)	I	99.59 ± 1.12^{x}	97.54 ± 0.4^{y}	97.21 ± 0.56^{z}
	II	99.70 ± 0.53^{x}	98.41 ± 0.68^{y}	97.66 ± 0.54^{z}
CRT (seconds)	I	0.71 ± 0.04^{x}	0.83 ± 0.05^{y}	0.88 ± 0.06^{z}
	II	0.92 ± 0.14^{x}	0.92 ± 0.14^{y}	0.90 ± 0.15^{z}
CMM colour	I	Congested	Congested	Congested
	II	Congested	Congested	Congested

ab- Means (±SE) with different superscripts within column varied significantly at 5% level
xyz- Means (±SE) with different superscripts within row varied significantly at 5% level
BPM=breaths per minute; bpm=Beats per minute; CRT= Capillary refill time;
CMM= conjunctival mucous membrane

membrane (CMM) was congested in both the groups before surgery and did not change throughout the surgery. Congested mucous membrane of dam during parturition was reported by Gowda (2014) and Kuttan (2015). The capillary refill time gradually increased during the anaesthesia without significant difference between groups and was with in the normal ranges. The increase in capillary refill time was due to peripheral vasodilation during general anaesthesia and blood loss during surgery (Slatter, 2003). Decrease in rectal temperature was significant during anaesthesia in both the groups. According to Muir and Gadawski (1998) propofol decreases body temperature which is attributed to the decrease in the skeletal muscle tone and shivering threshold, vasodilation and impairment of thermoregulatory control. Epstein *et al*. (2013) reported that during general anaesthesia with isoflurane, there will be hypothermia, which is due to induction of peripheral vasodilatation and muscle relaxation.

Clinical parameters of the dam

The induction time with propofol was similar in both the groups with overall mean of 2.50 ± 0.28 minutes. The total time taken for the surgery and duration of the surgical anaesthesia were also statistically similar in both groups. The mean (±SE) duration of surgical anaesthesia was 79.00 ± 4.47 and 74.33 ± 10.60 minutes in group I and II, respectively. The mean (±SE) of total surgery time was 70.83 ± 4.36 and 66.00 ± 10.30 minutes in group I and II, respectively. In both the groups, a smooth and rapid recovery was observed after anaesthesia. Similar observations were reported by the Kuusela *et al*. (2003) with propofol and propofol-isoflurane combination in general surgeries. The animal attaining sternal recumbency after surgery was considered to assess the recovery time, which was statistically similar in both the groups with mean (±SE) of 28.33 ± 12.69 and 37.67 ± 17.40 minutes in group I and II, respectively. Good muscle relaxation was observed in group

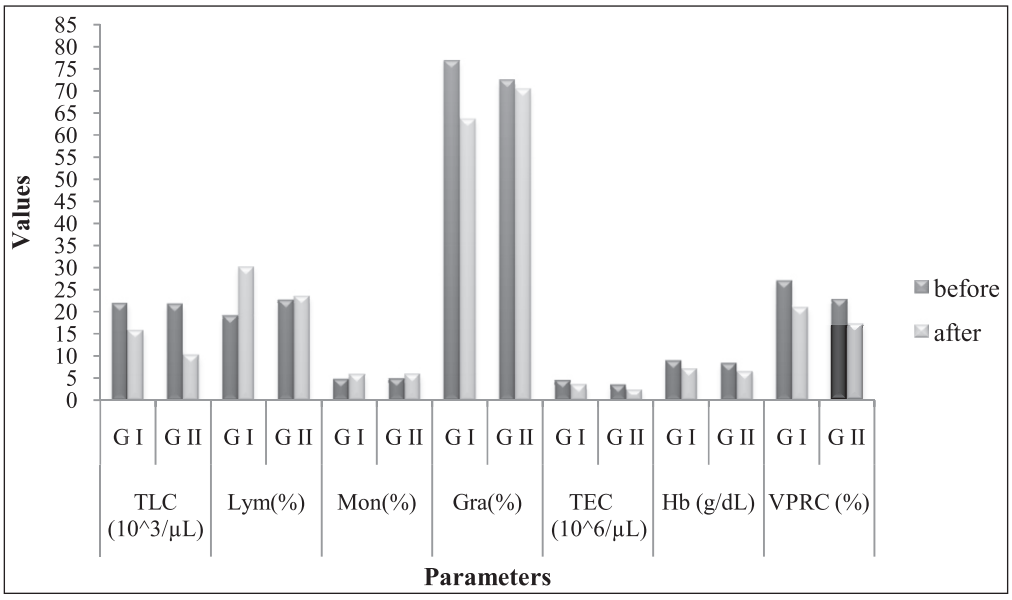

Fig.1. Haematological parameters of dam before and after surgery

l using TIVA propofol which was reported earlier by the Hall and Chambers (1987) and Short and Bufalari (1999). The muscle relaxation in the group II was excellent. This was reported earlier by many workers (Pauca and Dripps, 1973; Wade and Stevens, 1981 and Ramankutty, 2008). Smooth and early recovery from anaesthesia in both the groups assures early neonatal care and colostrum feeding by the mother, which is critical for neonatal survival.

Haematological parameters of dam

Decrease in total leucocyte count (TLC), total erythrocyte count (TEC), haemoglobin concentration (Hb), granulocyte count (Gra) and volume of packed red cells (VPRC); increase in monocyte count (Mon) and lymphocyte count (Lym) after surgery was noticed in both the groups (Fig.1). Similar observations were reported by Mohan (2006) with propofol anaesthesia and Ramankutty (2008) with propofol isoflurane anaesthesia. Decrease in the haematological values like TLC, TEC, Hb, Gra and VPRC could be due to vasodilation induced by propofol and propofol isoflurane combination and blood dilution caused by infusion of crystalloid solution in dogs. (Tomihari *et al.,* 2015). Monocytosis could be as a result of surgical stress (Ono *et al*., 2001) and lymphocytosis could be due to the administration of tramadol. Sacerdote *et al*. (1999) reported that, acute administration of tramadol increases lymphocyte proliferation in mouse.

It was concluded that TIVA of propofol is equally effective as propofol-isoflurane combination and can be adopted under field situations as an alternative anaesthetic protocol in emergency C-section of dogs.

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