



EFFECT OF SURGICAL STRESS ON PHYSIOLOGICAL, HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN ELECTIVE CANINE OVARIOHYSTERECTOMY*

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ABSTRACT

Elective surgeries in dogs are usually performed in the overnight fasted state so as to reduce the risk of aspiration of gastric contents during the induction of anaesthesia. Even a short period of fasting will change the metabolic state of the patient, as stress of fasting superimposes on stress of anaesthesia and surgery proper. The study was carried out in twelve clinically healthy nondescript bitches presented to the clinics of College of Veterinary and Animal Sciences, Mannuthy for pan hysterectomy to evaluate the physiological, haematological and biochemical changes. The study concluded that the animal subjected to the hysterectomy showed significant changes in the physiological, haematological and biochemical changes which were suggestive of surgical stress

INTRODUCTION

Anaesthesia and surgery even for elective procedures are stressful events. The stress response to surgery would depend on the extent of injury and duration. The stress response to surgery comprises a number of hormonal changes initiated by neuronal activation of the hypothalamic-pituitary-adrenal axis. This is a part of the systemic reaction to injury, which encompasses a wide range of endocrine, immunologic and haematologic effects. The net effect of the endocrine response to surgery is an increased secretion of catabolic hormones. Surgery causes a hypermetabolic state, which induces enzymatic changes favouring insulin resistance, gluconeogenesis, protein catabolism and muscle wasting. The present study was conducted with the objective to evaluate the effect of effect of surgical stress on elective canine ovariohysterectomy.

MATERIALS AND METHODS

The study was carried out in twelve clinically healthy nondescript bitches with age ranging from 8 months to 2.5 years presented to the clinics of College of

Veterinary and Animal Sciences, Mannuthy for panhysterectomy

The animals were admitted in kennels at the inpatient ward of the clinics one week before the date of surgery. They were dewormed, fed once a day and water provided *ad libitum*. Following general check up, the animals were fasted overnight, and were subjected for the study. The animals were anaesthetised after premedication with atropine sulphate (0.045 mg/kg bodyweight) and xylazine (1.5 mg/kg bodyweight) intramuscularly. Ten minutes later xylazine (20 mg/ml) and ketamine (50 mg/ml) combination was administered intravenously to effect anaesthesia for the surgical procedure

Rectal temperature (C), Pulse rate (per min), Respiration rate (per min), Colour of mucous membrane and Capillary refill time (sec) were recorded before surgery, immediately after surgery and at 24th hr.

The blood samples for haematological and biochemical parameters were collected from cephalic vein in heparinised syringes. Plasma for the estimation biochemical parameters, was separated by centrifuging at 5000 rpm for 10 minutes. Plasma

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for estimation of cortisol was stored at 20 °C until assayed.

Differential leucocyte count (DLC) (per cent), volume of packed red cells (VPRC) (per cent), white blood cell count (WBC) ($10^3/\text{Cu.mm}$), and haemoglobin (Hb)(g/dl) concentration¹ (Benjamin, 1985) were estimated before surgery, immediately after surgery and at 24th hr.

Cortisol concentration (ig/ml) was estimated before surgery, immediately after surgery and at 24th hour postoperatively using Clinical Assays GammaCoatCortisol ¹²⁵I RIA Kit² by radioimmuno assay.

Glucose concentration (mg/dl) Total protein (g/dl) and albumin (g/dl) Blood urea nitrogen concentration (mg/dl) Sodium and potassium concentrations (mEq/l) was estimated before surgery, immediately after surgery and at 24th hr.

RESULTS AND DISCUSSION

Several steps were taken to minimize variation associated with differences among subjects. Female dogs that were comparable in age, weight, and stage of reproductive cycle were selected for the study. Dogs were admitted one week prior to the scheduled day of surgery to the kennel and the procedure was performed on the morning hours to limit as well as to standardize, stress associated with hospitalization and to minimise the variations in behaviour.

The combination of intravenous xylazine and ketamine produces a good general anaesthesia and has several advantages, such as an easy administration, rapid onset or termination of anaesthesia and few apparent clinical complications

Duration for the time of induction, anaesthesia and recovery from anaesthesia were 2.08 ± 0.20 , 49.16 ± 1.52 and 85.0 ± 3.41 min. respectively. Panhysterectomy was selected as the elective surgery and performed through midline laparotomy. All the surgeries were scheduled and conducted in morning hours. The surgical procedures in all the animals were performed by the same surgical team to minimize variation within and between the groups. Duration of surgery was 41.66 ± 2.10 .

There was significant ($P < 0.05$) decrease in rectal temperature immediately after surgery compared to preoperative value. There was reduction in pulse rate immediately after surgery compared to preoperative value and it returned to normal value and remained in the normal range throughout the period of observation. There was significant ($P < 0.05$) decrease in respiration rate immediately after surgery compared to presurgical value.

There was significant ($P < 0.05$) increase in the mean neutrophil count and significant ($P < 0.05$) decrease in the mean lymphocyte count at 24th hour postoperatively compared to preoperative value. Eosinophil and monocyte count revealed marginal variation throughout the period of observation. The mean white blood cell count significantly ($P < 0.05$) decreased immediately after surgery, then increased significantly at 24th hour postoperatively compared to preoperative value. There was significant ($P < 0.05$) reduction in haemoglobin concentration immediately after surgery and there after the level improved to normal physiological range throughout the period of observation. The mean volume of packed red cells decreased immediately after surgery compared to preoperative value. Significant changes in the mean volume of packed red cells could not be observed between animals during the observation period and remained in the normal physiological level.

Table-1. Observations on physiological parameters (Mean \pm SE) (n=12)

Parameters with units	Preoperative	Postoperative	
		Immediate	24 th hour
Rectal Temperature(^o C)	39.03 \pm 0.71	38.08 \pm 0.14*	38.80 \pm 0.16
Pulse (Per min)	81.67 \pm 2.20	78.33 \pm 2.21	82.67 \pm 2.45
Respiration (Per min)	35.67 \pm 11.70	17.00 \pm 1.91*	20.66 \pm 2.10
Mucous membrane	Pale roseate	Pale roseate	Pale roseate
Capillary refill time (Sec)	<2	<2	<2

* Significant at 5% level with preoperative value ($P < 0.05$)

**Table-2.** Observations on haematological parameters (Mean±SE) (n=12)

Parameters with units	Preoperative	Postoperative	
		Immediate	24 th hour
Neutrophils (%)	63.83±1.77	65.50±1.64	75.83±0.79*
Lymphocytes (%)	33.16±2.24	32.67±0.66	23.5±0.80*
Monocytes (%)	1.5±0.91	1.1±0.67	0.56±0.33
Eosinophils (%)	0.33 0.33	0.5 0.33	0.33 0.20
Basophils (%)	0.00	0.00	0.00
White blood cell count (10 ³ /cu.mm)	10.56±0.71	7.02±0.80*	13.59±0.71*
Haemoglobin (g/dl)	13.23±0.59	12.66±1.43*	13.67±0.96
Volume of packed red cells (%)	41.5±3.04	40.5±3.35	42.0±4.36

* Significant at 5% level with preoperative value (P<0.05)

Table 3. Observations on cortisol concentration in Group I animals (Mean±SE) (n=12)

Parameters with units	Preoperative	Postoperative	
		Immediate	24 th hour
Cortisol (g/dl)	3.50±0.34	10.48±0.74*	2.83±0.61
Glucose mg/dl)	72.87±0.90	163.48±11.11*	73.49±0.93
Total protein(g/dl)	7.05±0.38	6.71±0.37*	6.9±0.37
Albumin (g/dl)	3.40±0.41	3.30±0.77	3.20±0.33
Globulin (g/dl)	3.61 ± 0.09	3.40±0.17	3.70±0.14
Blood urea nitrogen(mg/dl)	9.67±0.69	11.49±0.88*	14.11±1.44*
Sodium (mEq/l)	146.4±0.51	145.1±0.65	144.3±0.61
Potassium (mEq/l)	4.22±0.11	4.48±0.11	4.32±0.08

*Significant at 5% level with preoperative

There was significant (P<0.05) increase in the cortisol concentration immediately after surgery and returned to basal level by 24th hour postoperatively. There was significant (P<0.05) increase in the glucose concentrations immediately after surgery and became near normal level by 24th hour postoperatively compared to preoperative value.

There was significant (P<0.05) decrease in the total protein content immediately after surgery. There was a significant (P<0.05) increase in the blood urea nitrogen level immediately after surgery and 24th hour. There was decrease in sodium concentration and an increase in potassium concentration immediately after surgery and there after variations were marginal and within the normal physiological limit.

Based on the observations, the study conclude that the significant changes in the physiological, haematological and biochemical parameters indicate the presence of surgical stress during elective surgical procedures.

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