Pre-operative dextrose infusion to diminish Post-operative stress and recovery in elective canine ovariohysterectomy - Evaluation of a novel approach

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Abstract

The present study was conducted to evaluate the effect of preoperative dextrose infusion in promoting post operative recovery. The bitches presented for panhysterectomy were divided into two groups consisting of six each. Physiological and Haematological Parameters were estimated before and after surgery. Cortisol concentration and glucose concentration were also estimated. Sedation score and pain score were recorded from immediately after surgery up to 3rd postoperative day. A significant reduction in stress in the immediate postoperative period was noted as indicated by lowered elevation of cortisol and glucose level, and early anaesthetic recovery in animals received dextrose infusion in the preoperative period. The positive benefits in terms of improved postoperative outcome and patient well being after elective surgery recommends preoperative dextrose infusion in dogs as a general protocol in future practice in animal surgery.
Keywords: Canine, Ovariohysterectomy, Stress, Pre-operative, Post-operative, Dextrose.

Introduction

Historically, patients have fasted 8-12 hr before surgery to reduce the volume of gastric contents and the risk of aspiration pneumonitis. The Latin word *Nulla per os* (NPO) or "nothing by mouth" after midnight was a time-honoured preoperative order and thus became a common medical practice (Agarwal *et al*., 1989). The traditional fasting routine was questioned and many anaesthesia societies have changed their recommendations. Preoperative carbohydrate treatment instead of fasting is a simple way of preparing the patient metabolically for elective surgery. Preoperative parenteral administration of dextrose has reported to be superior to fasted state in reducing the anxiety and consequent endocrine response to surgery in humans. The active preoperative preservation of carbohydrates has metabolic as well as clinical benefits (Ljungqvist *et al.,* 2000). The present study was conducted with the objective to evaluate the effect of preoperative dextrose infusion to promote postoperative recovery in dogs for elective surgery.

Materials and Methods

The study was conducted in twelve clinically healthy non descript bitches presented for panhysterectomy, to evaluate the effect preoperative dextrose infusion in promoting post operative recovery. The animals were divided into two groups consisting of six each (Group I and Group II) In Group I – Panhysterectomy was done under general anaesthesia after overnight fasting and Group II - Panhysterectomy was done under general anaesthesia after overnight fasting and administration of 12.5 per cent dextrose at the rate of 5 ml per kg bodyweight intravenously two hours prior to induction of anaesthesia. Physiological and Haematological Parameters were estimated before surgery, immediately after surgery, 24th hr, 4th day and 8th day. Cortisol concentration was estimated before surgery, immediately after surgery and 24th hour postoperatively in Group I, and before dextrose infusion, before surgery, immediately after surgery and 24th hour postoperatively in Group II using radioimmuno assay. Glucose concentration was estimated before surgery, immediately after surgery, 24th hour post operatively, 4th day and 8th day Total protein and albumin, Blood urea nitrogen, Sodium and potassium concentrations (Benjamin, 1985) were also estimated. Activity, alertness, feeding habits, behavioural changes, sedation score (Hardie *et al.,* 1997) and pain score (Väisänen *et al.* 2004) were recorded from immediately after surgery at 0th hour, 1st hour, 3rd hour, 6th hour, 12th hour, 24th hour, 2nd day and up to 3rd postoperative day. The physiological, haematological and biochemical parameters recorded were statistically analysed. Within group comparison of

data using Paired t-Test and between group comparison using Students t-Test were performed (Snedecor and Cochran, 1989).

Results and Discussion

Animals were observed for the behavioural signs of preoperative stress and found that all animals hospitalized for elective surgery exhibited preoperative stress behaviours due to separation anxiety and exposure to novel surroundings.

There was significant variation ($P<0.05$) in physiological and haematological parameters immediately after surgery compared to preoperative value in group I and group II, but no significant variation in these parameters could be observed between groups throughout the period of observation.

The cortisol concentration increased significantly ($P<0.05$) in group I and II immediately after surgery and returned to basal level 24th hour postoperatively. In group II, significant ($P<0.05$) decrease in elevation of cortisol concentration in the immediate postoperative period was noted compared to group I. Nygren *et al.* (1998) made similar observations in human patients received preoperative glucose infusion.

Comparison of cortisol concentration during observation period in group I and II : The glucose concentration was significantly ($P<0.05$) increased immediately after surgery compared to preoperative value in group I and group II and became normal level by 4th and 8th day postoperatively. In group I, glucose concentration remained in the lower level at 24th hour postoperatively. Group II showed significant ($P<0.05$) decrease in elevation of glucose concentration in the immediate postoperative period compared to group I. Similar observations were reported by Soop *et al.* (2001) in human beings. Animals in group I started feeding by 2nd day and reached normal appetite and feeding habits by 4th postoperative day, but in group II, resumed normal feeding habits by 2nd day itself. A faster return to normal greeting behaviour and self grooming was noted in group II. Faster recovery and early return to normal activity in animals of group II compared to group I suggest that animals of group II attained clinical well being by 2nd postoperative day compared to group I on 4th day.

Comparison of glucose concentration during observation period in group I and II : Animals in group I showed greater mean sedation scores up to 6th postoperative hour and it reduced by 24th hour postoperatively but animals in group II, sedation scores were reduced by 3rd postoperative hour and were able to walk from 6th hour onwards with minimum ataxia.

Comparison of sedation score in group I and II animals during postoperative period

The pain scores were greater during 12th hours from immediately after surgery and reduced at 24th hour postoperatively in group I. In group II, animals showed minimum pain behaviour during 6th hour postoperatively and were relatively painless from 2nd day.

Comparison of pain score in group I and II animals during postoperative period

Based on the observations, the following conclusions could be drawn from the study:

1. A significant reduction in stress in the immediate postoperative period was noted as indicated by lowered elevation of cortisol and glucose level, and early anaesthetic recovery in animals received dextrose infusion in the preoperative period.
2. Faster recovery and early return to normal activity and feeding habits were observed in animals received dextrose infusion in the preoperative period.
3. Less sedation score and pain sores attributing to improved clinical well being during postoperative observation period were recorded in animals received preoperative dextrose infusion.
4. The positive benefits in terms of improved postoperative outcome and patient well being after elective surgery recommends preoperative dextrose infusion in dogs as a general protocol in future practice in animal surgery.

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