NEUROLOGICAL, RESPIRATORY, BEHAVIOURAL AND ENDOCRINE EFFECTS OF TAIL DOCKING IN NEWBORN DOGS SUBMITTED TO EPIDURAL ANESTHESIA

EFEITOS NEUROLÓGICOS, RESPIRATÓRIOS, COMPORTAMENTAIS E ENDÓCRINOS DECORRENTES DA CAUDECTOMIA, EM CÃES RECÉM-NASCIDOS SUBMETIDOS À ANESTESIA EPIDURAL

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SUMMARY

Tail docking is performed in some dog breeds to prevent injuries and to improve appearance. It has been forbidden in some countries for ethical reasons. The aim of this study was to investigate the behavioural, endocrine, neurological and respiratory effects produced by tail docking in newborn dogs. Fifty-two puppies ranging from 2 to 7 days of age were used. Sacrococcigeal epidural anaesthesia was performed using a 27 G x ½`` needle and an insulin syringe filled with 0.2 mL of 0.5% lignocaine with adrenaline. Tail docking was performed in half of the puppies of each litter and the other half were used as controls. Plasma cortisol concentration, weight gain, respiratory rate, vocalization, defecation, urination, movement and suction, anogenital, magnum, flexor, vestibular and tactile reflexes were investigated both before and 1, 2, 3, 4, 8 and 24 hours after tail docking. Data were compared using ANOVA, followed by Student Newman Keuls, Friedman or Mann-Whitney tests where applicable. Tail docking after epidural anaesthesia did not modify respiratory rate, behaviour, neurological reflexes or plasma cortisol concentration up to 24 hours after surgery. It should be considered that epidural anaesthesia might have masked a possible harmful effect of tail docking on these variables.

KEY-WORDS: Cortisol. Epidural anaesthesia. Lidocaine. Puppies. Tail docking.

RESUMO

A caudectomia é realizada em algumas raças de cães visando prevenir traumas, além de uma questão de estética. O objetivo deste estudo foi avaliar os efeitos comportamentais, endócrinos, neurológicos e respiratórios produzidos pela caudectomia em cães recém-nascidos. Foram utilizados cinqüenta e dois filhotes de dois a sete dias de idade. A anestesia epidural sacrococígea foi realizada utilizando uma agulha 27 G x ½`` e seringa de insulina com 0,2 mL de lidocaína 0,5% com adrenalina. A caudectomia foi realizada em metade dos filhotes de cada fêmea e a outra metade foi utilizada como controle. A concentração de cortisol plasmático, ganho de peso, freqüência respiratória, vocalização, defecação, micção, movimentação, e reflexos anogenital, de sucção, magnum, flexor, vestibular e tátil foram avaliados antes e 1, 2, 3, 4, 8 e 24 horas após a caudectomia. Os resultados foram comparados utilizando ANOVA, seguidos de Student Newman Keuls, Friedman or Mann-Whitney tests. Não houve diferença em tempo ou entre os grupos em nenhuma variável. A caudectomia realizada após anestesia epidural não alterou frequência respiratória, comportamento, reflexos neurológicos e concentração de cortisol plasmático até 24 horas após a cirurgia. Deve ser considerado que a anestesia epidural pode ter mascarado um efeito prejudicial da caudectomia nestas variáveis.

PALAVRAS-CHAVE: Anestesia epidural. Cães. Caudectomia. Cortisol. Lidocaína.

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INTRODUCTION

Tail docking is a practice performed for almost 2000 years in some breeds of dogs, as it was a general belief that this practice would prevent rabies (MORTON, 1992). Before the 19th century, it was alleged that amputation of the tail could be useful to increase speed, to strengthen the back and to prevent dogs from being bitten when ratting or fighting (MORTON, 1992).

Nowadays, tail docking is performed to prevent tail injuries when the dogs are used for hunting or guarding, to improve the appearance of a particular breed of dog, making the dog more attractive, and also to promote better hygiene (MORTON, 1992). Some studies opposed to this practice claim that it is unnecessary, painful and unjustified (FRENCH et al., 1994a). An epidemiological study involving more than 12,000 dogs showed that tail docking could not be seen as a prophylactic procedure to prevent tail injuries (DARKE et al., 1985).

The United Kingdom, Scandinavian countries, Switzerland and more recently Australia have banned all forms of cosmetic surgery in dogs for ethical reasons (ROYAL COLLEGE OF VETERINARY SURGEONS, 2000, SILLINCE, 2003). In Brazil, although not prohibited, tail docking is not recommended in veterinary practice, unless it has a clinical indication (BRASIL, 2008). The AVA (Australian Veterinary Association) position about surgical mutilation of animals suggests that it should be done only when there is a benefit to the animal, like in sheep, where tail docking has some advantages to the animal in the future (FRENCH et al., 1994b).

The position of the breeders is that it would be difficult to sell undocked puppies of breeds that are usually docked and some unsold puppies would have an uncertain destiny (MORTON, 1992). In two surveys performed in Australia, 84% of the breeders were in favour of docking, while 83%-86% of the veterinarians were against the practice (FRENCH et al., 1994a).

Cortisol, a well-accepted indicator of the stress response, increases in response to stimulation of the hypothalamic-pituitary-adrenocortical system. A correlation between high plasma cortisol concentration and abnormal behaviour associated with pain after tail docking was observed in lambs (MELLOR & MURRAY, 1989).

The aim of this study was to investigate the behavioural, endocrine, neurological and respiratory effects produced by tail docking of newborn dogs.

MATERIAL AND METHOD

This study was approved by the Ethical Committee for Animal Experimentation, from the Faculty of Veterinary Medicine and Animal Science, University of São Paulo State (protocol number of 64/2003). Fifty-two clinically healthy client-owned puppies from eight litters of different breeds (Pinscher, Cocker Spaniel, Rottweiller, Brazilian Fox, Weimaraner, Boxer and Neapolitan Mastiff) were used after written owner consent. Males and females, ranging from two to seven days of age were used according to Table 1.

As the puppies arrived in the experimental room, they were maintained with their mothers, labelled with numbered tags and left alone for at least an hour to settle down. Respiratory rate was measured by observation of chest movement. Neurological reflexes and physical condition were evaluated before the study and any showing clinical or neurological abnormality were removed from the study. The puppies were weighed and all of them were simultaneously removed from their mother. The area around the tail was clipped and prepared for surgery. Sacrococcigeal epidural anaesthesia was performed after palpation of the S5-C1 space, in all puppies, using a 13 x 4 (27 G x ½``) needle introduced from the dorsal to the ventral aspect of the tail with an insulin syringe filled with 0.2 mL of 0.5% lignocaine with adrenaline. Tail docking was performed according to Hedlund (2002) in half of the puppies from each litter[17]. The other puppies, used as controls, were manipulated and restrained in the same way for administration of epidural anesthesia. Anaesthesia and surgery were performed by the same person in all cases.

The following behavioural measurements were performed and classified as absent (0), present (1), or as otherwise stated: posture (1= lying down, still; 2= standing position); movement (1= without movement; 2= lying down with smooth movements of the head; 3= lying down with movement of the head and all limbs); vestibular straightness willingness of the puppies to return to sternal recumbence when placed in lateral recumbence); tactile (the puppies' eyes were closed, the dorsal area of the forelegs touched in the inferior part of the table: the normal response was considered when the puppy lift their legs and supported on the table); suction reflex (by introducing the little finger into the mouth and observing suction); magnum reflex (maintaining the neonate in dorsal recumbence and rotating the head to one side: the normal response was extension of the contralateral forelimb and flexion of the limb at the same side the head was rotated); anogenital reflex (by stimulating the neonate genital organs with a blunt pen and observing urination); flexion reflex (the neonate was held by the neck in the air: the normal response was flexion of the spinal column).

Blood samples (0.5 mL) were collected from the jugular vein using vacutainer (Vacuum II®, Labnew-Indústria e Comércio I) tubes with EDTA. Plasma was obtained by centrifugation (Centrífuga Excelsa Baby MOD 206, FANEM) and maintained at –20^{o}C (Freezer 260, Brastemp) for cortisol assay. Plasma cortisol concentrations were measured by solid phase radioimunoassay using a commercial kit (Coat-A-Count Cortisol- DPC®, FANEM). The sensitivity was 5.5 mmol/L and cross reactivity was 0.34% for corticosterone, 0.38% for cortisone and 11.4% for 11-deoxicortisol.

Except for cortisol and weight, which were measured before and 24 hours after tail docking, all other measurements were performed before and 1, 2, 3, 4, 8 and 24 hours after tail docking.

Statistical analysis was performed using Graphpad Instat software. Parametric data were compared using analysis of variance followed by the Student-Newman-Keuls Test. Non-parametric data were compared using analysis of variance followed by the Friedman test to compare differences in time in each group and Mann-Withney test to compare differences between groups at each time. A P value less than 0.05 was considered significant.

Table 1 - Breeds, number and age of the neonates submitted to tail docking.

N° of litter	Breed	N° of animals	Age (days)
1	Pinscher	3	4
2	Cocker Spaniel	3	7
3	Cocker Spaniel	9	6
4	Rottweiller	11	2
5	Neapolitan Mastiff	6	4
6	Weimaraner	8	5
7	Boxer	7	3
8	Brazilian Fox	5	3
Total		52	

RESULTS

Respiratory rate was not modified by tail docking (Fig. 1) there was no effect of time of recording on values or treatment means. There was no difference in either weight or weight gain between the groups. The puppies submitted to tail docking gained 35 g and the puppies that were not submitted to tail docking gained 32 g (Fig. 2). All puppies vocalised during tail amputation even with local anaesthesia performed from the dorsal to the ventral region of the tail. There was no significant difference in plasma cortisol concentrations either between the groups or before and after 24 hours of tail docking (Fig. 3). There was no statistical difference between the groups for behavioural and all other neurological reflexes.

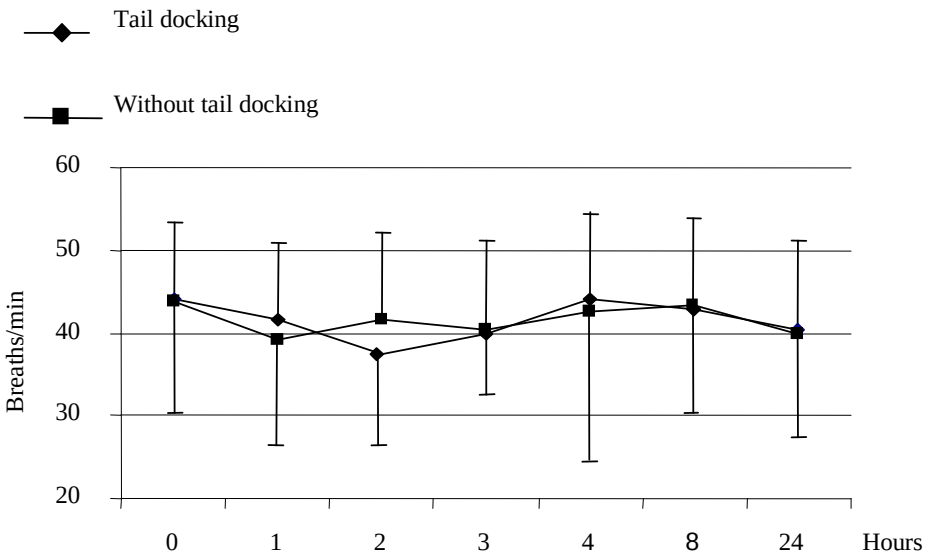

Figure 1 - Mean (SD) of respiratory rate of dog neonates before and during the first 24 hours after tail docking

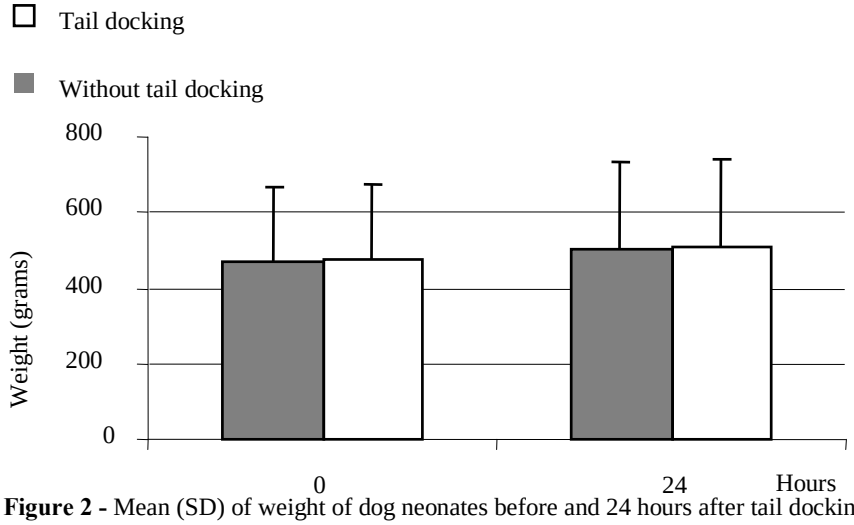

Figure 2 - Mean (SD) of weight of dog neonates before and 24 hours after tail docking

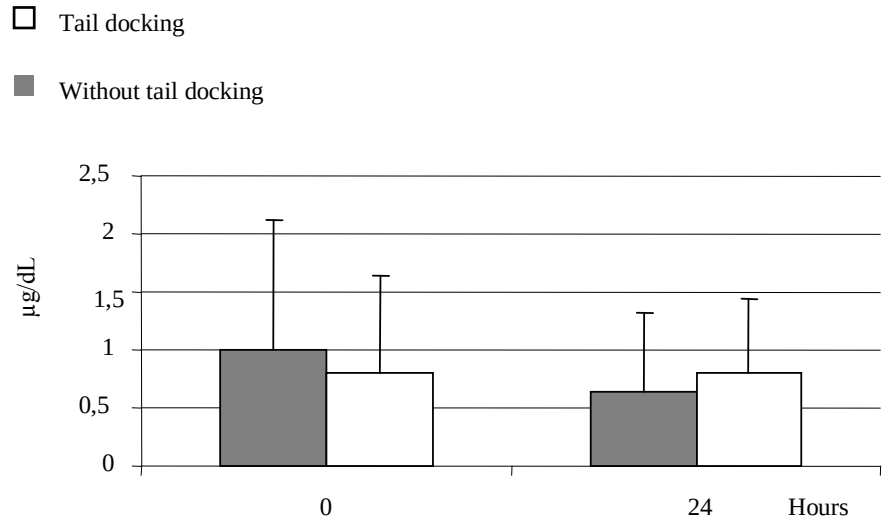

Figure 3 - Mean (SD) of plasma cortisol concentration of dog neonates before and 24 hours after tail docking.

DISCUSSION

Although tail docking is usually performed in clinical practice without local anaesthesia, local anaesthesia was used in this study for ethical reasons, as a request from the Ethical Committee for Animal Experimentation. Puppies of both groups received epidural anaesthesia in order to avoid differences in behaviour or in physiological and neurological variables due to manipulation and possible effects of anaesthesia itself in only one group. However, the puppies vocalised during tail amputation even with local anaesthesia, probably due to manipulation and/or pain associated with the surgery. As soon as the procedure was over and they were placed with the bitch, they started sucking. This sucking behaviour has previously been described as displacement behaviour to minimise the perception of pain (WIEPKEMA, 1987), as sucking stimulates the release of endorphins from the brain, producing analgesia (BLASS et al., 1987, NOONAN et al., 1996).

Our data indicate that tail docking did not modify behavioural, physiological and neurological signs. It is of note, however, that in this study the animals were observed for only 24 hours, and differences might be observed after a longer period of evaluation; hence long-term changes should be further investigated. Late complications might be related to the surgery itself, such as neuroma formation and post-operative complications, which have been described in docked lambs (FRENCH & MORGAN, 1992). The occurrence of sepsis resulting from tail infection and the possibility of anal sphincter damage (GROSS & CARR, 1990) are consequences that need further

investigation. Another point in the adverse effects of tail amputation is that the association between docking and incompetence of the urethral sphincter was consistent, not as a causal relationship, but rather as an indication that docked breeds may develop more urinary incontinence than undocked breeds, either because of breed predisposition or because docking can affect urethral nerve supply (HOLT & THRUSFIELD, 1993).

Cortisol is a hormone responsible for the increase in metabolism of proteins, carbohydrates and fats and it also minimises any over reaction of the defence mechanisms activated by stress that could be harmful to body homeostasis. Plasma cortisol concentrations are not necessarily a pain reflex *per se*, but may simply indicate stress associated with restraint and handling (GUYTON & HALL, 2000, JONGMAN et al., 2000). However, a correlation between high plasma cortisol concentration and abnormal behaviour associated with pain after tail docking was observed in lambs (MELLOR & MURRAY, 1989).

In our study all animals were restrained in the same way for administration of epidural anaesthesia and for simulation of tail docking, even in the puppies that were not docked. Epidural anaesthesia may have blocked a surgical stress response caused by tail amputation, as there was no increase in plasma cortisol concentrations after this procedure. Another possible approach would be to measure plasma cortisol concentration immediately after tail docking and repeat thereafter, as a possible cortisol increase could have disappeared by 24 hours. However the restraint of the puppy and the volume of blood in small breed dogs might be a limiting factor.

Although tail docking did not modify the endocrine, behavioural, physiological and neurological variables in newborn dogs for 24 hours, epidural anaesthesia may have masked a potentially harmful effect of tail docking on these variables.

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