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The Effect of Lorazepam on the Horse

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Abstract: The effect of lorazepam on the central nervous system of the horse was studied. Groups of 5 horses were injected IV and IM with lorazepam. For each treated group there was a control injected with saline solution. When horses were injected with 0.1 and 0.2 mg kg^{-1} no changes in behavior, body temperature, blood pressure, respiratory and heart rates. When the dose of lorazepam was increased to 0.3 mg kg^{-1} an increase of temperature, heart and respiratory rates was observed. Horses showed various degrees of incoordination with a marked ataxia of the hind limbs, some were recumbent with efforts to stand. The padded walls of the observation room prevented physical harm. On this moment the experiment was terminated on the consideration that further increases in drug dose might be deleterious to the experimental animals. It was concluded that lorazepam alone should not be considered as tranquilizer or/and sedative in the horse.

Key words: Lorazepam, effect, tranquilizer

INTRODUCTION

During daily practice the Veterinary Surgeon is in need of restraining domestic animals for auscultation, transport or surgical procedures. Generally, domestic and wild animals do not cooperate for either of these manipulations. Therefore it is obligatory the use of tranquillizers or/and sedatives in order to permit handling with minimum risk both to the patient and to the attending veterinarian[1,2].

There is a continuous search for new drugs, including those affecting the Central Nervous System (CNS), in doing so; the pharmaceutical industry expends time and money to continue research and development (R and D) of new formulas with chemical structures that are devoid of side effects. These actions give way to new drugs, some derived from the basic chemical structures of the old ones. One example of the latter is Lorazepam. This drug is used in human medicine as a tranquillizer, premedication prior to anaesthesia and for the treatment of different malfunctions of the CNS. Lorazepam is a benzodiazepine derivative, with a direct action upon the ascending reticular system. And it is prescribed in humans for the treatment of anxiety[3].

In horses, several types of tranquillizers and analgesics are used; among this variety of drugs it is possible to mention the fenotiazine derivatives, xilazine, flunixin, detomidine and ethorpine[4-7].

Because lorazepam is used with good results as a depressor of the SNC and for the treatment of anxiety, in humans; It was considered of interest to study the effect of this drug on the CNS of the horse and the possibility of including this tranquilizer in daily horse practice.

MATERIALS AND METHODS

For this study, horses belonging to the Mounted Police force of the city of Mexico were used. During each trial, a group of 10 horses was chosen at random, divided into two groups of 5. One group (n = 5) was injected with Lorazepam, while the second group (n = 5) was used as control, receiving one injection of saline solution. When horses were selected to carry out the experimental observation, care was taken to avoid the administration of the drug to horses previously medicated with the same drug.

Lorazepam was administered by intramuscular and intravenous injections. The initial dose used was 0.1 mg kg^{-1}, thereafter it was increased to 0.2 mg kg^{-1} and 0.3 mg kg^{-1}.

All observations were carried out at 8:00 hs, before the administration of Lorazepam in heart and respiratory rates were noted, together with rectal temperature. Also an arbitrary assessment of pain[8] was used to observe the effect of Lorazepam on pain perception.

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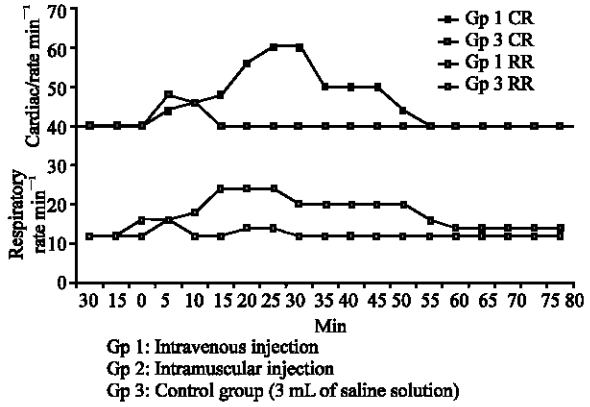

Fig. 1: The effect of lorazepam injection (1V) on the heart rate and respiratory rate on the hourse at 0.3 mg Kg^{-1}

RESULTS

The injection of Lorazepam both by the intravenous and the intramuscular routes at doses of 0.1 and 0.2 mg kg^{-1} produced no change in heart and respiratory rates and temperature remained at control levels. There was no sign of depression or/and sedation of the treated animals.

When Lorazepam was injected at a dose of 0.3 mg kg^{-1} Fig. 1, there was an increase in respiratory and heart rates Fig. 1, with a slight increase of temperature in treated horses, as compared with controls, horses medicated with lorazepam during this observation showed varied degrees of incoordination, with a marked tendency of ataxia in the hind legs. Two of the horses treated iv with 0.3 mg showed a high degree of incoordination of the hind legs and fell in recumbency, with continuous efforts to regain the standing position, thanks to the padded walls of the observation room these horses did not hurt them selves. In this moment it was decided not to continue observations using higher doses, due to possibility of inflicting serious injuries both to the experimental animals and to the observers.

DISCUSSION

The benzodiazepines as a group produces a depression of spinal reflexes and theses reflexes are modulated by the ascending reticular system in the brain stem. It is also mentioned that benzodiazepines increase the latency and therefore the stimulating effect of some of the central nervous system transmitters, the latter considered modulators of brain function. Gamma Amino Butyric Acid and Glycine are some of these such transmitters[3].

The effects of Lorazepam upon the cardiovascular system are considered as subjective, because after the administration of the drug heart rate can show an increase or no change whatsoever. Therefore, the effect of Lorazepam on the cardiovascular system is minimal[3]. If we postulate that these pharmacological effects can be traspolated to the horse, it might be possible to suggest that Lorazepam affected polysynaptic reflexes in the spinal cord, with very mild effects upon the sensorial levels related with the pharmacological effect of tranquilization and sedation. The latter explaining why tranquilization or/and sedation was not observed in horses medicated with Lorazepam. This assumption is based in the experimental observations where horses medicated with Lorazepam, showed a tendency to muscle relaxation. And furthermore, the observed incoordination of the hind legs, would have being due to secondary effects produced by lorazepam, like those reported in humans, including dizziness and ataxia[3].

In view of the findings of this study, it is possible to postulate that Lorazepam exerts a direct action on polysynaptic reflexes within the spinal nerves and on the ascending reticular system, explaining the effects of Lorazepam on the treated horses. We can conclude that Lorazepam a benzodiazepine derivative should not be contemplated as tranquilizer or/and sedative in the horse.

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