ASSESSMENT OF THE SEDATIVE EFFECTS OF XYLAZINE, DETOMIDINE AND ROMIFIDINE IN HORSES

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Summary
General anaesthesia in horses still presents a considerable challenge, and the search for improved methods continues. This paper is a summary of a clinical trial where were compared the sedative and some physiological effects of xylazine, detomidine and romifidine. We have compared one dose of xylazine (1 mg/kg) with two doses of detomidine (10 μg/kg and 20 μg/kg) and two doses of romifidine (40 μg/kg and 80 μg/kg) in five horses using a blind trial. Detomidine 20 μg/kg and xylazine both produced greater lowering of the head and a greater degree of ataxia than romifidine at either dose. Romifidine produced sedation which was, over the two rates administered, dose dependent in degree and duration of action and longer lasting than those of detomidine or xylazine. The character of the sedation was similar and the effect upon imposed stimuli was not significantly different between different anesthesia protocols.

Key words: detomidine, horse, romifidine, sedation, xylazine

Introduction
Equine practitioners are often required to perform surgical procedures under field conditions and although these surgical procedures are often similar to those performed in a hospital setting, management of general anesthesia may be quite different (Bohart, 1997). In equine practice, the use of α2-agonists for chemical restraint has gained wide acceptance (Rohrbach et al., 2009). The α2-agonists xylazine, detomidine and romifidine are widely used in equine medicine, producing central nervous system effects of sedation, analgesia and muscle relaxation (Moens et al., 2003). They are very good sedatives in horses, producing a lower head carriage, decreased locomotor activity and decreased response to touch, sound or visual stimulation (Harkins et al., 1997). Alpha2 receptors are present at diverse sites in the central and peripheral CNS, including brainstem nuclei, spinal cord laminae and sensory afferent terminals, and various organs (Doherty, 2006).

The aim of this study was to evaluate and compare the sedative effects of the three alpha-2 agonists: xylazine, detomidine and romifidine.

Materials and methods
The study was conducted on five horses with different age and gender. The animals were allowed access to hay and water ad libitum prior to sedation. The drug administered was unknown to the evaluator. The animals were subjected to each of the following protocols separated by at least six day.

1. xylazine (Xylazin Bio 2%, Bioveta, Cehia) 1 mg/kg intravenously
2. detomidine (Domosedan, Pfizer Animal Health, Belgia) 10 μg/kg intravenously
3. detomidine 20 μg/kg intravenously
4. romifidine (Sedivet, Boehringer Ingelheim Vetmedica GmbH, Germania) 40 μg/kg intravenously
5. romifidine 80 μg/kg intravenously
The animals were placed in wooden stocks and stood unrestrained. Drug administration was made via a 14G jugular catheter (Polyflon, Polymed, India). Animals were observed continually for 90 minutes, and then at 15 to 30 minute intervals until recovery were considered to be complete.

A variety of measurements designed to evaluate the degree of sedation were scored. The height of the head was measured as the distance from the muzzle to the floor. The degree of ataxia was scored on a scale of 0-3. A score 0 represented no change from the unsedated animal, and a score of 3 was given when the animal was swaying and leaning on the stocks. Imposed stimuli reactions were scored 0-3 in relation to the animal’s response. A score 0 represented no response, and a score of 3 represented a marked and rapid response. The stimuli tested were:

a) The visual response as the response to a cloth waved towards the animals head.

b) The auditory response as the response to clapping hands behind the animal.

c) The touch response when three areas were touched: the inside of the ear, and the front and hind coronet.

Other effects were noted as they occurred. Beside the degree of sedation heart rate was measured using a stethoscope.

**Results**

All drugs produced a similar type of sedation. There was rapid lowering of the head, drooping of the lower lip and slight closing of the eyes. Muscle twitching was not uncommon and the animals became ataxic.

In all groups was a significant reduction of distance of muzzle to floor distance. Xylazine and detomidine 10 μg/kg were not significantly different from each other but the distance was significantly less than for the other protocols in the first 15 minutes. Romifidine 80 μg/kg produced greater lowering at 45-90 minutes, after this time the sedation protocols were not significantly different. There were individual variations in the degree of ataxia; the maximum effect was noted 5 minutes after administration of all drugs. Xylazine and detomidine 20 μg/kg produced the greatest degree of ataxia within the first 15 minutes, but were not significantly different from each other. The lower dose of detomidine produced ataxia that was not significantly different from romifidine 40 μg/kg in speed of onset, degree and duration of action. The duration of ataxia was longer for animals given the high dose of romifidine compared with the low dose.

During the onset of sedation the animals were easily aroused. There was a significant reduction in touch response during the first 15 minutes. Detomidine 10 μg/kg produced the least effect although this was not significantly different from the other groups. The response to auditory and visual stimuli demonstrated no relationship to treatment.

Heart rate was significantly depressed within one minute of any drug administration. The shortest duration effect was produced by xylazine and although heart rates returned towards pre-sedation values, romifidine 80 μg/kg produced a significant effect for the duration of the study. Penile protrusion occurred following all sedation protocols, tending to occur sooner (5-30 minutes) after administration of detomidine or xylazine than romifidine (30-90 minutes).

Sweating and urination were noted with equal frequency in each group. After removal of all horses from the stocks, the animals given either xylazine or detomidine 10 μg/kg were considered to be normal in attitude and response to handling. Two horses sedated with detomidine 20 μg/kg were considered to be quiet for a further 20 minutes and three given romifidine 40 μg/kg were quiet for a further 120 minutes. All animals given romifidine 80 μg/kg were considered to be quiet for an average of 160 minutes. During this time there were no changes in the scored parameters from
presedation the animals stood quietly, exhibited decreased response to handling and occasionally scuffed their toes when walking.

**Discussions**

Alpha, 2-adrenoceptor agonists produce central effects of sedation, analgesia, bradycardia, respiratory depression, mild hypotension and a reduction in circulating antidiuretic hormone. They also produce peripheral effects of vasoconstriction which may lead to a transient hypertension and a reduction in gut activity. The actions of romifidine are typical of this group and are similar to those of xylazine and detomidine. After the administration of romifidine horses appeared similarly sedated to when given either detomidine of xylazine. Romifidine produced sedation which was over the two rates administered, dose dependent in degree and duration of action. All drug regimes produced profound bradycardia and heart block. Minimum heart rates reached following each regime were similar; the lowest was recorded at 5 minutes after administration.

A prolonged action of romifidine was noted in the degree of ataxia and of head lowering. This was also noted on subjective assessment after the continuous observation period. This greater period of action may be useful when it is necessary to control patients for longer periods of time.

**Conclusions**

The intravenous administration of romifidine produced dose related sedation in the horse. The use of 40 µg/kg appeared similar to 10 µg/kg detomidine, whilst 80 µg/kg romifidine appeared similar in potency to 1 mg/kg xylazine and 20 µg/kg detomidine.

All three drugs produced similar sedation and side effects, although following romifidine there was a longer period of residual sedation. In the clinical situation it is likely that romifidine would be distinguished from detomidine and xylazine since it produces less lowering of the head during sedation and a longer period of residual sedation.

**References**


