Veterinary
Anaesthesia and Analgesia
Formerly the Journal of Veterinary Anaesthesia

Veterinary Anaesthesia and Analgesia, 2014

LETTER TO THE EDITOR

Steep drop in hematocrit of sheep undergoing sedation with acepromazine-diazepam and epidural injections of ketamine, ketamine-morphine or ketamine-xylazine

The effects of acepromazine on hematocrit (Hct) values of domestic animals have been discussed by some authors (Leise et al. 2007; Ambrósio et al. 2012). We would like to report an observation during an experiment in which Santa Inês breed ewes were sedated with a combination of acepromazine and diazepam and afterwards received one of four epidural treatments.

Ten ewes were studied in a randomized crossover trial. A blood sample from the caudal auricular artery was collected percutaneously before administering any drug and analyzed in a portable blood gas analyzer (i-STAT; Abbott Laboratories, RJ, Brazil) with a CG8+ cartridge. This diagnostic test yielded 13 variables, including Hct. Shortly thereafter, another blood sample from the jugular vein was collected and analyzed with the i-STAT for comparison of results between variables from arterial and venous blood. There was no significant difference between the Hct obtained from arterial and venous samples ($p > 0.06$). After this baseline assessment (TB), the animals were sedated with acepromazine (0.1 mg kg^{-1}; Acepran; Vetnil, SP, Brazil) and diazepam (0.2 mg kg^{-1}; Diazepam; Teuto, GO, Brazil) intravenously. Ten minutes later, another arterial blood sample was collected and analyzed and the results were recorded as sedation time (TS). The animals underwent lumbosacral epidural injections 20 minutes after sedation. Four epidural protocols were used: 1) ketamine (2.0 mg kg^{-1}; Cetamin; Syntec, SP, Brazil); 2) ketamine (2.0 mg kg^{-1}) and morphine (0.1 mg kg^{-1}; Dimorf; Cristalia, SP, Brazil); 3) ketamine (2.0 mg kg^{-1}) and xylazine (0.05 mg kg^{-1}; Kensol; König, Argentina); and 4) saline (1.0 mL 7.5 kg^{-1}). The drug combinations for all treatments were diluted with saline to 1.0 mL for every 7.5 kg body weight. All animals underwent all treatments in a crossover study design, separated by a 2 week washout period. Arterial blood samples were collected for blood gas analysis and measurement of Hct at 15 (T15) and 30 (T30) minutes after the epidural administration (approximately 35 and 50 minutes after sedation, respectively).

Data were analyzed using ANOVA followed by Duncan's test. The Hct decreased in all animals reaching a 10% difference from baseline ($p < 0.01$). There were no significant differences between treatments at any time (Table 1), which led us to conclude that the observed effect was related to the

Table 1 Hematocrit (%, mean ± SD) measured in arterial blood samples of sheep before (TB) and 10 minutes after administration of acepromazine (0.1 mg kg^{-1}) and diazepam (0.2 mg kg^{-1}) IV (TS), 15 minutes (T15) and 30 minutes (T30) after epidural injection of saline (S), ketamine (K), ketamine and morphine (KM) or ketamine and xylazine (KX) ($n = 10$)

	Time points			
Treatment	**TB**	**TS**	**T15**	**T30**
S	29.1 ± 3.2*	23.9 ± 1.8†	20.3 ± 2.1‡	19.1 ± 2.1‡
K	26.6 ± 3.7*	23.5 ± 2.2†	20.2 ± 1.6‡	19.3 ± 2.2‡
KM	28.3 ± 3.1*	23.2 ± 1.9†	19.4 ± 1.7‡	19.1 ± 2.9‡
KX	29.0 ± 2.5*	24.1 ± 2.0†	18.9 ± 1.5‡	17.1 ± 1.6‡

Different symbols indicate significant difference among groups at each time point or within treatments ($p < 0.01$).

drugs administered for sedation and not the ones administered epidurally.

Systemic absorption of epidural xylazine in the sheep in this study was suggested by subsequent decreases in arterial oxygen tension (PaO_2) and hemoglobin oxygen saturation (SpO_2). However, the degree of sedation was not as severe as previously described (Kastner 2006). Also, the decrease in Hct was not more severe in this group compared to the others as we expected, suggesting that the systemic absorption of xylazine did not contribute to the Hct decrease.

Although a discrepancy has been described between Hct obtained by i-STAT and the Hct obtained by laboratory analyzers (Peiró et al. 2010), our data were collected with only one technology (i-STAT), revealing only differences between treatments and a change in Hct over time.

Acepromazine induces relaxation and vasodilation of the splenic capsule promoting sequestration of erythrocytes (Ambrósio et al. 2012). Nevertheless, a study in dogs showed no correlation between splenomegaly and decreased Hct, suggesting that the effect of the drug is not exclusively related to splenic size but also related to vascular smooth muscle within the splanchnic circulation (Wilson et al. 2004). Although the effect is known, there are few reports that objectively assess the magnitude of this reduction, especially in sheep. In horses sedated with acepromazine or xylazine and acepromazine, the Hct decreased 17% and 19%, respectively, and remained decreased for 180 minutes returning to baseline levels only 24 hours later (Ambrósio et al. 2012).

The evaluation of the effect of acepromazine on Hct was not the goal of this study. Therefore, it is not known for what period of time the Hct remained low. In healthy animals, a moderate, sedative-induced reduction in Hct does not result in significant clinical effects. The significance of the information in this letter arises from the effects of these sedative drugs in animals with preexisting diseases of oxygen delivery, such as anemia. These patients are at greater risk for significant morbidity following sedation with acepromazine and diazepam. Further studies should be done assessing the effects of acepromazine on Hct in sheep in order to evaluate the onset of this effect, and the degree and duration of reduction.

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References

Ambrósio AM, Ida KK, Souto MTMR et al. (2012) Significant hematocrit decrease in healthy horses during clinical anesthesia. Braz J Vet Res Anim Sci 49, 139–145.

Kastner SBR (2006) Alpha2-agonists in sheep: a review. Vet Anaesth Analg 33, 79–96.

Leise BS, Fugler LA, Stokes AM et al. (2007) Effects of intramuscular administration of acepromazine on palmar digital blood flow, palmar digital arterial pressure, transverse facial arterial pressure, and packed cell volume in clinically healthy, conscious horses. Vet Surg 36, 717–723.

Peiró JR, Borges AS, Gonçalves RC et al. (2010) Evaluation of a portable clinical analyzer for the determination of blood gas partial pressures, electrolyte concentrations, and hematocrit in venous blood samples collected from cattle, horses, and sheep. Am J Vet Res 71, 515–521.

Wilson DV, Evans AT, Carpenter RA et al. (2004) The effect of four anesthetic protocols on splenic size in dogs. Vet Anaesth Analg 31, 102–108.

doi:10.1111/vaa.12222

