

Pulsed-Wave Doppler Ultrasonographic Assessment of the Maximum Blood Velocity in Common Carotid Artery in Horses after Administration of Ketamine and Acepromazine

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Abstract : Pulsed-wave (PW) doppler ultrasonography is a non-invasive, relatively accurate imaging technique that can measure blood speed. The imaging could be obtained via the common carotid artery, as one of the main vessels supplying the blood of vital organs. In horses, factors such as susceptibility to depression of the cardiovascular system and their large muscular mass have rendered them vulnerable to changes in blood speed. One of the most important factors causing blood velocity changes is the administration of anesthetic drugs, including Ketamine and Acepromazine. Thus, in this study, the Pulsed-wave doppler technique was performed to assess the highest blood velocity in the common carotid artery following administration of Ketamine and Acepromazine. Six male and six female healthy Kurdish horses weighing 351 ± 46 kg (mean \pm SD) and aged 9.2 ± 1.7 years (mean \pm SD) were housed under animal welfare guidelines. After fasting for six hours, the normal blood flow velocity in the common carotid artery was measured using a Pulsed-wave doppler ultrasonography machine (BK Medical, Denmark), and a high-frequency linear transducer (12 MHz) without applying any sedative drugs as a control group. The same procedure was repeated after each individual received the following medications: 1.1, 2.2 mg/kg Ketamine (Pfizer, USA), and 0.5, 1 mg/kg Acepromazine (RACEHORSE MEDS, Ukraine), with an interval of 21 days between the administration of each dose and/or drug. The ultrasonographic study was done five (T5) and fifteen (T15) minutes after injecting each dose intravenously. Lastly, the statistical analysis was performed using SPSS software version 22 for Windows and a P value less than 0.05 was considered to be statistically significant. Five minutes after administration of Ketamine (1.1, 2.2 mg/kg) in both male and female horses, the blood velocity decreased to 38.44, 34.53 cm/s in males, and 39.06, 34.10 cm/s in females in comparison to the control group (39.59 and 40.39 cm/s in males and females respectively) while administration of 0.5 mg/kg Acepromazine led to a significant rise (73.15 and 55.80 cm/s in males and females respectively) ($p < 0.05$). It means that the most drastic change in blood velocity, regardless of gender, refers to the latter dose/drug. In both medications and both genders, the increase in doses led to a decrease in blood velocity compared to the lower dose of the same drug. In all experiments in this study, the blood velocity approached its normal value at T15. In another study comparing the blood velocity changes affected by Ketamine and Acepromazine through femoral arteries, the most drastic changes were attributed to Ketamine; however, in this experiment, the maximum blood velocity was observed following administration of Acepromazine via the common carotid artery. Therefore, further experiments using the same medications are suggested using Pulsed-wave doppler measuring the blood velocity changes in both femoral and common carotid arteries simultaneously.

Keywords : Acepromazine, common carotid artery, horse, ketamine, pulsed-wave doppler ultrasonography

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