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The Effect of Xylazine on Femoral Arterial Flow Determined by Doppler Sonography in Dogs

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Abstract: The objective of this study was to determine spectral changes in femoral arterial flow in response to administration of Xylazine (XYL) for sedation. Ten adult dogs weighing between 9 and 16 kg were used in the study. Doppler imaging were performed before and 15-20 min after intramuscular administration of XYL (2% solution, 2.2 mg kg^{-1}, i.m). For the color-coded doppler sonography, a doppler system was used. Once, right femoral artery was localized, the following parameters measured: Peak Systolic (PSV), End Diastolic Velocity (EDV) and Resistive Index (RI). RI was calculated. Duplex scans of femoral artery showed the characteristic triphasic velocity waveform. The mean PSV before sedation was 0.35±0.019 m sec^{-1}. After administration of XYL the mean PSVs significantly decreased to 0.26±0.016 m sec^{-1}, whereas EDV and RI values showed no significant differences.

Key words: Xylazine, arterial, flow, doppler, sonography, dog

INTRODUCTION

Vascular blood flow in the extremities, normally has been subjectively evaluated by palpation of pulses (Cochard *et al*., 2000). Doppler ultrasonography, a noninvasive method, provides neutral information on peripheral arteries (Zwiebel, 1992; Raisis *et al*., 2000). Until recently, the use of duplex ultrasonography for the assesment of the peripheral arteries has received little concern in animals, because noninvasive methods to study circulatory patterns were not available (Cochard *et al*., 2000).

During doppler imaging, detecting the appropriate doppler beam angulation requires probe manipulation or electronic beam steering. Limb movement sometimes interrupt this process, prolonging the examination. Furthermore, in dogs with high respiratory and heart rate, it is difficult to separate the effect of heart beat and respiration on the doppler signal (Cochard *et al*., 2000; Szatmari *et al*., 2001). For this reason, it may be necessary to induce sedation. Xylazine (XYL), is the first α_2 adrenoceptor agonist to be coomonly used in dogs for sedation (Hall *et al*., 2001). To the researcheres knowledge, no study was conducted using doppler ultrasonography to evaluate influence of XYL on femoral arterial blood flow in clinically normal dogs. The purpose of the study, reported here was to determine spectral changes in femoral arterial flow in response to administration of XYL for sedation.

MATERIALS AND METHODS

Ten adult dogs weighing between 9 and 16 kg were used in the study. Doppler imaging were performed before and 15-20 min after intramuscular administration of XYL. Each dog was injected 2% solution of XYL (Rompun; Bayer) at a dose rate of 2.2 mg kg^{-1}. For the color-coded doppler sonography, a doppler system (Toshiba SSA/240 A) with a 7.5 MHz-linear transducer was used. The sedated dog was positioned in lateral recumbency. Once right femoral artery was localized, the following parameters measured: Peak Systolic (PSV), End Diastolic Velocity (EDV) and Resistive Index (RI). RI was calculated from spectral tracings using internal software of the ultrasound unit. Doppler angles were kept between 50 and 60 degree. Intragroup comparisons between baseline and XYL conditions were made using paired student's t-test.

RESULTS AND DISCUSSION

XYL produced sedation within 10 min of administration. The sedation lasted on average 30-65 min. Duplex scans of femoral artery showed the characteristic triphasic velocity waveform. The initial high velocity, forward flow phase that results from cardiac systole is followed by a brief phase of reverse flow in early diastole and a final low-velocity, forward flow phase in late diastole. XYL changed this normal flow pattern that

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Table 1: Influence of xylazine sedation on doppler parameters

Parameters (m sec^{-1})	Before sedation	During sedation	p-value
PSV	0.35±0.019	0.26±0.016	***
EDV	0.051 ±0.003	0.048±0.009	-
RI	0.85±0.014	0.82±0.018	-

-: Nonsignificant, ***: $p<0.001$

produce decrease of systole number in spectral area and disritmia, disproportional lengthening of distances between two systoles. The parameters examined in the femoral artery before and after sedation are shown in Table 1. As shown in Table 1, the mean PSV before sedation was 0.35±0.019 m sec^{-1}. After administration of XYL the mean PSVs significantly decreased to 0.26±0.016 m sec^{-1}, whereas EDV and RI values showed no significant differences.

PSV is the primary duplex parameter used to define the severity of luminal obstruction in arterial stenosis cases. In moderate to high grade stenoses the flow velocity increases a high plane (Jager *et al*., 1985; Cossman *et al*., 1989; Zwiebel, 1992). If the velocity of blood flow decreases when dogs become sedated the potential exists therefore, reaching a false diagnosis for detecting of stenosis degree.

CONCLUSION

As a result, PSV in femoral artery was significantly reduced in dogs due to xylazine premedication, but statistically significant changes did not occur in EDV or RI. It is concluded that sonographer should take into consideration sedation related spectral changes, especially in determining the degree of stenosis detected by PSV changes.

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