HAEMODYANAMIC EVALUATION OF INTRASPINAL XYLAZINE AND KETAMINE COMBINATIONS IN BUFFALO CALVES

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ABSTRACT

Present study evaluates the xylazine-ketamine combination analgesia at the lumbosacral space, based on hemodynamic parameters in 12 buffalo calves. Clinically healthy, male buffalo calves ranging 6-8 months of age weighing 55-75 kgs were used. Ketamine 2.5 mg/kg + xylazine 0.05mg/kg was given intraspinally at lumbosacral space. Onset, duration of analgesia was measured and hemodynamics studies were carriedout by measuring MAP, CVP and ECG values before and after injection. The onset of analgesia took 2.6±0.4 min. Ketamine-xylazine produced a moderate analgesia of thorax, abdomen and flank and complete analgesia of digits, perineum, inguinal region, hind limbs and tail. Total duration of analgesia was 20 minutes. MAP reduced and CVP was not much affected, bradycardia and arrhythmia was noticed. Depressed ECG parameters were seen. It provides good spinal analgesia. Although it has a significantly depressing effect in the said dose over the heart functions. The changes were reversible with time and hence it can be used as a safe spinal analgesic but should be used with caution in cardiac patient.

KEY WORDS: Xylazine-Ketamine Combination; Spinal; Buffalo Calves; Analgesia

INTRODUCTION

Regional analgesia, like epidural /spinal analgesia has been shown to have less cardiopulmonary and other systemic side effects than general anesthesia in ruminants (Hall et al, 2001). When xylazine and ketamine combination was administered epidurally, both being acting at different sites, show synergism thereby inducing more profound and prolonged analgesia and had reduced cardiopulmonary depression in goats (Aithal et al, 1996) and cattle (Amarpal et al, 1997; Aithal et al, 2004).

Ketamine has been used to enhance the depth of epidural analgesia produced by xylazine in animals and that produced by local analgesia in human beings. Since this combination is very widely used, the present study therefore, was designed to evaluate the safety of this combination for spinal analgesia in buffalo calves based on haemodyanamic parameters because haemodyanamic parameters comprises of Mean arterial pressure (MAP), central venous pressure (CVP) and Electrocardiogram (ECG) which is a direct measurement of amount of cardiac depression.

MATERIAL AND METHODS

The study was conducted on experimental animals. Clinically healthy, male buffalo calves ranging from 6-8 months of age weighing between 55-75 kgs were used the study. The animals were dewormed and maintained under uniform feeding and managemental conditions. During the period of pre-experimental observation, temperature pulse and respiration were daily recorded for the clinical assessment of the animals. Animals were subjected to fasting for 24 hours and water was withheld for 12 hours prior to the start of the experiment. Ketamine 2.5 mg/kg + xylazine 0.05 mg /kg was given intraspinally at lumbosacral space in total of 12 animals.

The volume of the drug injected in the lumbosacral space was made to 6 ml in all the animals. The onset, duration of analgesia was assessed by pin prick method and haemodyanamic parameter

(MAP, CVP and ECG) were then measured using standard protocols. Mean arterial pressure (mm Hg) and Central venous pressure (cm H2O) was recorded as per the method described by Hall and Clarke (1983). The electrocardiograms were analyzed for Heart rate, rhythm, duration and amplitude of P-wave, QRS complex, amplitude and duration of T-wave, P-R and Q-T intervals. A lead II ECG was recorded at 1 mV and 25 mm/s. paper speed before and after injection of drug(s) at 5, 10, 15, 20, 30, 45, 60, 75, 90, 105, 120, 130 and 180 min. MAP and CVP was also measured at the same intervals. Paired t-test with Bonferroni correction was used for comparison of mean ± SE at different time intervals with the base values of the respective treatments as per the standard procedures (Snedecor and Cochouran, 1967).

RESULTS AND DISCUSSION

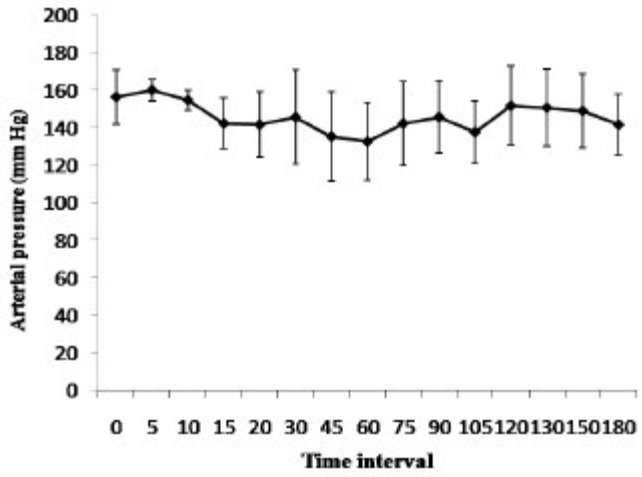

Fig.1. Mean arterial pressure (mm Hg) recorded

It took 2.6±0.4 min. for the onset of the analgesia which remained for 120 min. Ketamine-xylazine produced a moderate analgesia of thorax, abdomen and flank and complete analgesia of digits, perineum, inguinal region, hind limbs and tail. MAP recorded revealed significant ($p<0.05$) reduction as compared to the base values (Fig.1).

Bradycardia was pronounced after an initial tachycardia. Arrhythmia was also noticed. Significant bradycardia has also been reported with epidural xylazine and ketamine (De Rossie et al, 2003; Pathak et al, 2003). Reduction in arterial pressure has been attributed to stimulation of central alpha-2 adrenergic receptors; peripherally mediated sympatholytic actions and enhanced parasympathetic outflow (Tibirica et al, 1991). The findings are in consistent with the findings of Picavet et al. (2004). There was no much change in the CVP (Fig.2) which indicated that none of the drugs produced alteration in myocardial contractility and an increase in after load (Serteyn et al, 1993). There was a significant reduction in the amplitude of P wave which indicates that depolarization atrium is reduced. A non significant decrease in P wave- duration was seen as compared to the base values. This is in accordance with the findings of Tiwari et al. (1999). A significant increase in the QRS amplitude was recorded throughout the observation period. The QRS complex pattern was predominantly QS in most of the animals irrespective of the drugs injected. A non significant ($P>0.05$) increase was recorded at different time intervals. The significant increase ($P<0.01$) in QRS amplitude and duration shows that ventricular depolarization time increased and area depolarized increased. Decrease in conduction velocity in AV node due to vagal activity after xylazine has been reported in buffaloes by Peshin and Kumar (1979). The values for PR interval fluctuated near the base line except for a non-significant ($P > 0.05$) increase at a few intervals during the post-injection period. P-R interval is the time required for the transmission of cardiac impulse from SA node to AV node. It usually varies inversely with the heart rate and is generally longer when the heart rate is slow. Because PR interval changes are dependent on conduction velocity between SA node and AV conduction system, prolonged PR interval would indicate that these drugs might have caused a decrease in conduction velocity within the atrial muscle, the SA conduction system or both (Venugopalen et al, 1994). The increase in P-R interval might be due to corresponding increase in oxygen requirement of the heart (Peshin and Kumar, 1979). The animals showed an increase ($p<0.5$) in the QT interval. QT interval is the summation of ventricular depolarization and repolarization which represents

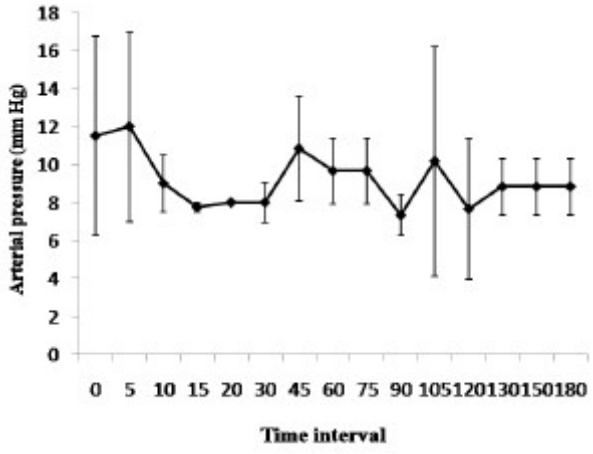

Fig.2. Central venous pressue (cm H2O) recorded

ventricular systole (Tilley, 1985). It varies inversely with heart rate. No significant (P>0.05) change in T-wave amplitude and a significant increase (P<0.01) in T wave duration was observed was due to slow repolarization of ventricles (Tilley, 1985). Similar changes were noted in buffaloes (Peshin and Kumar, 1979), during xylazine analgesia in goats (Kinjavdekar et al, 1999).

It can be concluided from the above study that intraspinal xylazine-ketamine provides a good and complete analgesia of digits, perinieum, inguinal, hind limbs and tail with a longer duration. Further the hemodynamic parameters are refelected as depressed MAP, arrhythmias, decreased atrial depolarization, increased ventricular depolarization and repolarization time and area, decrease in assay conduction system and bradycardia.

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