Nigerian Veterinary Journal 2008 Vol. 29(2): 15 - 19

COMPARISON OF XYLAZINE, LIGNOCAINE AND COMBINATION OF XYLAZINE AND LIGNOCAINE FOR EPIDURAL ANAESTHESIA IN GOATS

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SUMMARY

Epidural anaesthesia was achieved in 6 goats with 2% xylazine (0.1mg/kg), 2% lignocaine (2mg/kg) or a combination of xylazine (0.1mg/kg) and lignocaine (2mg/kg). The anaesthesia was achieved on 3 successive occasions at weekly intervals through the lumbosacral space. Significant differences (P<0.05) were observed between the 3 treatments. Time to the onset of analgesia was faster with lignocaine (3.5±0.8 min) and the combination of xylazine and lignocaine (4.8±0.7 min) than with xylazine(12.7±3.3 min). A longer duration of analgesia was produced with the combination of xylazine and lignocaine (131.3±11.8 min) compared to xylazine (112.2±10.5 min) or lignocaine (47.2±2.0 min).The duration of recumbency was longer with the combination of xylazine and lignocaine (138.2±8.6 min) than with xylazine (115.2±11.6 min) or lignocaine(49.8±3.4 min).The xylazine and the combination of xylazine and lignocaine injections produced sedation and a significant decrease in heart and respiratory rates in all goats . Results indicate that the combination of xylazine and lignocaine provided analgesia of faster onset than xylazine and of longer duration than of either agent administered alone. The effective analgesia produced could be used for rumenotomy, caesarean operation, uterine or rectal prolapse replacement, orchidectomy, closed reduction and external fixation of stable diaphyseal fractures in goats.

KEY WORDS: Xylazine, Lignocaine, Epidural anaesthesia, Goats

INTRODUCTION

Surgical and obstetrical procedures are frequently performed in ruminants using a combination of physical restraint, sedation or tranquilization and local or regional anaesthesia in preference to use of general anaesthesia (Skarda, 1987). Performing such procedures in perineal and caudal abdominal regions of sheep has been previously reported (Aminkov and Hubenov, 1995; Scott and Gessert, 1997a, b). Lignocaine has been widely used for local anaesthesia due to its high potency, ability to diffuse through tissues readily and a resultant rapid onset of analgesia (Skarda, 1987; Hall and Clarke, 1991). However, lignocaine is reported to produce a short duration of anaesthesia (Trim, 1989; Rehage *et al.*, 1994). The use of longer acting local anaesthetics and alpha-2 agonists to produce epidural block have been reported (Trim, 1989; Mohammed and Liman, 1998; Umar and Adetunji, 2000).

Xylazine an alpha-2 adrenoreceptor agonist has been used in cattle to produce epidural analgesia of long duration while allowing the animal to remain standing (Zaugg and Nussbaum, 1990; Riebold *et al.*, 1992; Caulkett *et al.*, 1993; Rehage *et al.*, 1994). Similarly in sheep, xylazine has been used to produce epidural block with resultant analgesia, sedation and recumbency allowing abdominal, perineal and hindlimb surgeries to be performed (Aminkov and Hubenov, 1995; Scott and Gessert, 1997a, b; Mohammed and Liman, 1998). There is paucity of data on the use of xylazine as an epidural agent in Sahel goats.

The purpose of this study is to compare the efficacy of xylazine, lignocaine and combination of xylazine and lignocaine for efficient epidural anaesthesia in Sahel goats.

MATERIALS AND METHODS

Six Sahel goats (4 bucks and 2 does) with a mean bodyweight of 14 kg (range 8 to 20 kg) 1 to 2years old was used for the study. The goats tested negative for both blood and gastrointestinal parasites based on laboratory analysis and 2 weeks was allowed for them to acclimatize. The goats were kept at the University of Maiduguri Veterinary Teaching Hospital pens and were fed bean offal, groundnut hay and cotton seed cake. Water was provided *ad libitum*.

Each goat was given a drug treatment at 7-days intervals. The treatments were xylazine hydrochloride (Chanazine 2%, Channelle, UK) at 0.1mg/kg bodyweight; lignocaine hydrochloride with adrenaline 1:100,000 (Lidocaine 2%, ASTRA Pharmaceutical Ltd, UK) at 2mg/kg and a combination of xylazine (0.1mg/kg) and lignocaine (2mg/kg). Xylazine alone treatment was further diluted with normal saline to 1ml for injection into the epidural space. Prior to each trial the lumbosacral space was aseptically prepared. The injections were administered through the lumbosacral space with the goats in sternal recumbency as described by Hall and Clarke (1991).

The goats were evaluated for time to onset and duration of analgesia. Analgesia was defined as lack of response (abdominal muscle contraction) to pinprick; which was applied at 10 minute intervals until recovery of sensitivity in the flank, ventral abdomen, perineum, thigh, udder, scrotum and thorax to determine the extent and duration. Onset and duration of recumbency was also noted. Effect of the treatments on heart and respiratory rates and temperature were measured before (baseline) and at 15 min intervals after epidural injection over 180 min period. Rumenotomy was performed on 2 goats given combination of xylazine and lignocaine.

Data obtained (mean ± SE) were analyzed using one-way analysis of variance (SAS, 1986) with significance at $P < 0.05$.

RESULTS

The mean indices of epidural anaesthesia with the 3 drug treatments are shown in Table1. A significantly faster recumbency of the goats was produced with lignocaine (1.7±0.4 min) than with the combination of xylazine and lignocaine (5.0±0.7 min) or xylazine (12.3±3.8 min). Flank, perineal, ventral abdomen and hindlimb analgesia were achieved with all the treatments and the insensitive area extended up to the thoracic vertebrae T_5 T_6.

Onset of analgesia was faster ($P<0.05$) with lignocaine (3.5±0.8 min) and with the combination of xylazine and lignocaine (4.8±0.7 min) than with xylazine (12.7±3.3 min); a significantly longer duration of analgesia was produced by the combination of xylazine and lignocaine (131.3±11.8 min) than with xylazine (112.2±10.5 min) or lignocaine (47.2±2.0 min). Duration of recumbency lasted longer ($P<0.05$) using the combination of xylazine and lignocaine (138.2±8.6min) than with xylazine (115.2±11.6 min) or lignocaine (49.8±3.4 min). During rumenotomy using the combination of xylazine and lignocaine, no reaction to pain was observed.

All the goats injected with xylazine and the combination of xylazine and lignocaine appeared sedated. The other clinical signs observed were decreased heart and respiratory rates throughout the observation period, ptyalism and frequent urination. Ataxia was also observed in the goats after recovery from the lignocaine and the combination of xylazine and lignocaine injections. Systemic effects were not observed in any goat 24 h after the drug treatments.

TABLE 1: Mean(±SE) time (in minutes) of indices of epidural anaesthesia after injection of lignocaine(2mg/kg), xylazine(0.1mg/kg) and combination of xylazine and lignocaine (0.1mg/kg and 2mg/kg, respectively) in goats

Anaesthetic Indices*(minutes)	Treatment		
	Lignocaine	Xylazine	Xylazine + Lignocaine
Time to recumbency	1.7±0.4c	12.3±3.8a	5.0±0.7b
Onset of analgesia	3.5±0.8b	12.7±3.3a	4.8±0.7b
Duration of analgesia	47.2±2.0c	112.2±10.5b	131.3±11.8a
Time to sternal recumbency	15.2±1.9b	92.5±16.7a	94.5±9.9a
Time to standing	33.8±3.4b	40.8±12.3a	29.8±13.7c
Duration of recumbency	49.8±3.4c	115.2±11.6b	138.2±8.6a

*Means with same letter for an anaesthetic index are not significantly different.
*Means with different letter(s) for an anaesthetic index are significantly different ($P<0.05$)

DISCUSSION

The study revealed that the combination of xylazine and lignocaine provided analgesia of faster onset ($P<0.05$) than xylazine that is of significantly longer duration than either xylazine or lignocaine injected alone. The onset (4.83±0.70 min) and duration (131.33±11.79 min) of analgesia obtained after the injection of combination of xylazine and lignocaine is similar to those reported in sheep with onset of prolapse replacement possible 7-10 min after the injection (Scott and Gessert, 1997a); in cattle, 5.1± 0.9 min (Riebold *et al.*, 1992) and in horses, 5.3±1.1 min (Grubb *et al.*, 1992). However the duration of analgesia is not as prolonged as reported in cattle, 302.8±11.0 min (Riebold *et al.*, 1992) and in horses, 329.8±6.2 min (Grubb *et al.*, 1992). The discrepancy in the duration of analgesia between these studies may be related to either species effect, whether lumbosacral or sacrococcygeal epidural injection, dose rate, or a combination of these factors. Combined xylazine and lignocaine epidural anaesthesia has been used in ewes to manage uterine, cervical, vaginal or rectal prolapses (Scott *et al.*, 1995; Scott and Gessert, 1997a) and also in cattle (Riebold *et al.*, 1992).

Xylazine epidural block produced onset and duration of analgesia comparable to other reports. In cattle, Rehage *et al.* (1994) observed the onset of analgesia 10 20 min after administration with a duration of 150 180 min. Caulkett *et al.* (1993) also reported onset of flank analgesia of 22.6±4.7 min, while Zaugg and Nussbaum (1990) observed onset of action at 10 min following xylazine epidural injection. In sheep, Aminkov and Hubenov (1995) achieved hindlimb and perineal analgesia after 2-3 min with a duration of 120-140 min (mean 128±2.54 min). Also following xylazine epidural injection, Mohammed and Liman (1998) reported onset of analgesia after 10 15 min. Alpha$_2$ agonists inhibit the release of the excitatory neurotransmitter norepinephrine to produce analgesia and sedation (Hendrix and Hansen, 2000). Alpha$_2$ receptors were also said to inhibit the release of a spinal neurotransmitter (substance P) which is important in pain perception (Pernow, 1983). Furthermore, alpha$_2$ adrenoceptor agonists like xylazine are reported to activate alpha$_2$ receptors located in the spinal cord and brainstem, resulting in sedation and analgesia (Buerkle and Yaksh, 1998; Lamont and Tranquilli, 2002).

The level of analgesia provided by epidural combination of xylazine and lignocaine was adequate for rumenotomy, orchidectomy, vasectomy, udder and teat surgery and caesarean operation. Epidural xylazine produced very effective analgesia during abdominal and hindlimb surgery in rams (Aminkov and Hubenov, 1995) and for Caesarean operation in ovine dystocia cases (Scott and Gessert, 1997b) and also abdominal and udder surgery in cattle (Zaugg and Nussbaum, 1990).

The lignocaine injection provided good onset and duration of analgesia similar to that reported in goats with onset of analgesia of 4.17±0.75 min and duration of 64.67±6.09 min (Umar and Adetunji, 2000).

All the drug treatments induced recumbency in the goats with the longest recumbency produced by the combination of xylazine and lignocaine. In sheep, Aminkov and Hubenov (1995) observed hindlimb motor block lasting for 224±14 min (range, 180 280 min) following xylazine epidural injection in rams.

The bradycardia observed after xylazine and combination of xylazine and lignocaine epidural injections is a typical reaction. There are similar reports of decreased heart and respiratory rates in cattle (Rehage *et al.*, 1994) and in sheep (Waterman *et al.*, 1987; Aminkov and Hubenov, 1995) after xylazine injection. The decrease in heart rate may be a result of direct or indirect increase in vagal tone, enhanced baroreceptor reflex activity or a decrease in sympathetic activity (Schmidt and Fournadjiev, 1970; Timmermans *et al.*, 1983).

It was concluded that the combination of xylazine and lignocaine administered epidurally produced analgesia of faster onset than xylazine and of longer duration than xylazine or lignocaine administered alone. The level of analgesia obtained is sufficient to perform rumenotomy. Furthermore, the xylazine and combination of xylazine and lignocaine be the drugs of choice for epidural anaesthesia in the Sahel goats because of the lack of need for additional physical restraint on the goats and longer duration of analgesia sufficient for clinical procedures than with lignocaine.

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