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A PRELIMINARY STUDY ON THE EFFECT OF XYLAZINE BY CAUDAL EPIDURAL ADMINISTRATION IN CATTLE

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دراســـــة أولية عن تأثير الزيلازين بعد الحقن الخلفي
فـوق الأمجافية فى الأبقـــار

مجـدى سـليم ، ابراهيم حسـين ، صفـوت المختـــــار

يستخدم التخدير الخلفي في الأبقار في كثير من حالات التوليد والجراحة والزيلازيـــن كبديـه للمستقبلات ألفـا ـ ٢ حقن حول الأمجافيه في المكان الزيلي ونتج عن ذلك نوعين من التخدير وهما : مايسمى تخدير عالي ومنخفض للأمجافيه وذلك حسب الجرعة التي استخدمـت في الحالتين وهي ٠٫٠٥ مجم ٠٫٠٢٥ مجم لكل كيلو جرام من وزن الحيوان بالترتيب مـع فتـرة أطول للمفعول المخدر عند استخدام الليجنوكايـين.

SUMMARY

Caudal epidural analgesia in cows is indicated for various gynacologic, obstetric and surgical manipulations.

Xylazine, an α 2 adrenergic receptor agonist was injected into the caudal epidural space of cows produced a safe and effective high and low caudal epidural analgesia in a dose rate of 0.05 mg and 0.025 mg/Kg B.W. respectively, whith prolonged duration of action than lidocaine.

INTRODUCTION

Caudal regional analgesia is produced by intrathecal and epidural injection of local anaesthetic drugs for a number of diagnostic and surgical procedures in human beings and animals. In addition to eliminating nociceptive input, however, this means of producing analgesia also eliminates nearly all sensory input, sympathetic outflow, and motor output, resulting in cardiovascular changes and somatic motor paralysis (BRIDENBAUGH and KENNEDY, 1987).

Recent studies of KURAISHI et al. (1985), and DURANT and YAKSH (1986), indicated that the intrathecal injection of opiate analgetics produce clinically useful relief of pain without loss of either ambulation or symptathetic nervous activity. In addition to the opiates, intrathecally administered α -2- adrenergic agonists also produce antinociception in a number of species (GORDH et al., 1986; POST et al.,

1987; EISENACH and GRICE, 1988 and OSSIPOV et al., 1988).

This antinociceptive effect is mediated by spinal α -2- adrenergic receptors because the analgesia is antagonized by α 2 but not α 1 or B blokers (FLEETWOOD-WALKER et al., 1985). Alpha 2 receptors inhibit the release of a spinal neurotransmitter (substance P) beliveved to be important in pain perception (PERNOW, 1983). Thus inhibition of spinal transmission of painful stimuli is possible, using spinal or epidural α -2- adrenergic agonists. Spinal and epidural α -2- induced analgesia has been achieved with clonidine Hcl and guanfacine (GORDH and TAMSEN, 1983; COOMBS et al., 1985; EISENACH and GRICE, 1988; OSSIPOV et al., 1988 and POST et al., 1987).

Xylazine is closely related to clonidine, an α 2-adrenergic receptor agonist used as an antihypertensive drug in human medicine. Xylazine and clonidine induce sedation via centrally located postsynaptic α 2-adrenergic receptors (HEDLER et al., 1981 and HEATCH et al., 1982). Xylazine, an α 2-adrenergic receptor agonist, is used extensively parentrally as a sedative-analgesic in domestic and wild animal species (KNIGHT, 1980 and GREENE and THURMON, 1988). Xylazine was injected epidurally in horses (LeBLANC et al., 1988) and intrathecally in rats and mice (OSSIPOV et al., 1988).

LeBLANC et al. (1988) concluded that epidural administration of xylazine results in perineal analgesia in the horse, with the absence of behavioral effects commonly associated with systemically administered durgs.

The present study was undertaken to evaluate the antinociceptive and behavioral effects of xylazine in comparison to lidocaine after their epidural administeration in cows.

MATERIAL and METHODS

This study was conducted on nine adult cows of native breed (weighing from 200 to 350 Kg). These animals were treated in a cross-over study at three times. They were injected xylazine in two different doses or lidocaine epidurally, with two weeks intervals between each experiment. The drugs were injected epidurally in the first coccygeal intervertebral space with a 20-gauge, 3.8-cm long needle. Confirmation of proper needle placement was based on evidence of negtive pressure (hanging drop technique) and negligible resistance to injection.

Xylazine was injected in a dose of 0.05 mg/Kg B.W. which is the lowest dose used intramuscularly in cattle (GLEED, 1984), in all animals then followed by lidocaine in a dose of 0.2 mg/Kg B.W. (SKARDA, 1987). In group III experiment, the cows were injected xylazine in a lower dose of 0.025 mg/Kg B.W. The doses were given in equal volumes, diluted to 5 ml normal saline.

After injections, the animals were observed for signs of overt behavioral effects such as ataxia, salivtion, tail flaccidity and anal dilatation. The analgesic effects

of the drugs were tested by skin pin prick. Onset, duration of analgesia and the margins of desensitized area were recorded in all animals. At 5 minutes intervals after injections, the animals were allowed to walk to observe the motor effects of the drugs (ataxia of the hind limbs) except in cases of recumbency and inability to stand.

RESULTS

The mean time of onset in group I was 6.4 minutes (3-10) and in group II, 11.8 minutes (5-20). The mean duration of analgesia after xylazine, 0.05 mg/Kg B.W. was 148, 3 minutes (11-210) versus, 77.5 minutes (30-120) after lidocaine.

In group III, where the same cows were injected xylazine epidurally in a dose of 0.025 mg/Kg B.W., the onset and duration were nearly similar to group I, means were 6 minutes and 120 minutes respectively.

In group I six cows (66.7%) had marked ataxia with dragging of hind limbs, at a mean time of 9.2 minutes after xylazine injection. From these, five (55.6%) became recumbent after 20 minutes mean of time after injection, for a mean time of 40 minutes. However no apparent locomotor effects were observed in group II & III except in one cow in group III which had, mild ataxia (11.1%). The area of desesitization to skin prick was markedly extended cranially including the flank and a part of thethoracic wall and distally till the lower parts of the hind limbs in animals in group I, in comparison to group II & III, where the area was localized around the anus and the lips of valva except in one animal (11.1%) in group III in which the area of analgesia was extended distally near the hock joint. Sedation and obvious salivation were observed in all cows of group I, 1 to 5 minutes after xylazine administration.

DISCUSSION

Recent studies have demonstrated that injection of spinal and epidural α_2 agonist drugs induce analgesia with attenuation of supraspinal side effects (sedation and respiratory, and cardiovascular depression) prolonged duration of action (EISENACH et al., 1987) and absence of diminished hind limb strength (REDDY et al., 1980 and YAKSH and REDDY, 1981).

In the present study, epidural administration of 0.05 mg xylazine/Kg B.W. which is the lowest dose used clinically intramuscularly in cows (GLEED, 1984), induced prolonged analgesia. Furthermore, it resulted in extraspinal side effects, "sedation and pronounced salivation" in all animals. This dose was considered a high dose for caudal (low) epidural analgesia in cattle due to the extension of the local analgesic effect cranially and distally. Therefore, a lower dose (0.025 mg/Kg) of xylazine was injected epidurally in cows of group III. This dose induced analgesia for about 120 minutes, which seemed to provide a safe and effective perineal (caudal or low

epidural) analgesia with a longer duration of action than that after lidocaine, about 77,5 minutes.

Recent studies have demonstrated an intraspinal site of action for α_2 2-adrenergic mediated analgesia. In those studies ionophoretic application of α_2 2 agonists to neurons of the lumbar spinal dorsal horn inhibits the response to noxious cutaneous stimulation in various species (SATOH et al., 1979; FLEETWOOD-WALKER et al., 1985 and SULLIVAN et al., 1987). Furthermore, BOUCHENAFA and LIVINGSTON (1987) demonsterated the autoradiographic localalization of α_2 2 adrenoceptors binding sites in the spinal cord of the sheep.

However, the locomotor effect of a high dose epidural (group I) can be explained by the local anaesthetic properties of xylazine (AZIZ and MARTIN, 1978). LeBLANC et al. (1988) observed also motor involvement after high doses of epidural xylazine in horses. It had been suggested that xylazine would extend sufficiently cranially in the spinal cord to block the spinal segments (L4 to S1), from which the motor innervation (femoral & sciatic nerves) to the hind limbs originated.

This investigation documented that xylazine can be used for a safe and effective high and low epidural analgesia in cows in a dose rate of 0.05 mg and 0.025 mg/B.W. respectively. The analgesic effects of epidural xylazine may be potetiated by use of other α_2 2 adrenergic agonists or narcotics in combination with xylazine. This needs further investigation.

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