HAEMATO - BIOCHEMICAL CHANGES FOLLOWING EPIDURAL ANALGESIA BY UPIVACAINE , ROPIVACAINE AND ROPIVACAINE – XYLAZINE COMBINATION IN GOATS

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ABSTRACT

A study was conducted on 6 healthy bucks of non descript breed weighing between 10-12 kg. Each experimental animal was subjected to 3 treatments **.** The haematological parameters like Hb and PCV showed significant decrease in treatment III, but there was no alteration of Hb and PCV along with other parameters such as TEC and DLC in other treatment groups. Glucose significantly increased in all the three treatment groups. ALT and BUN increased significantly only in treatment I and III. Total protein, creatinine and ALP showed significant increase in treatment III only.Bilirubin remained unchanged in all the three treatment groups.

KEY WORDS : Lumbosacral space, Bupivacaine , Ropivacaine, Xylazine

INTRODUCTION :

Epidural analgesia is considered safest in goats. Because of its tendency to block sensory fibers preferentially with relative sparing of motor fibers Bupivacaine hydrochloride is widely used local analgesic. (Alvarez *et al.*, 1983).Ropivacaine is a newer and potent long acting local anaesthetic agent, which has been used for epidural analgesia in dogs. (Otero and Bonafine, 2000) and buffalo calves (Amarpal et al ., 2002).It has minimal effects on cardiovascular and renal functions. Epidural xylazine hydrochloride inhibits impulse conduction at adrenoreceptors in the spinal cord and central nervous system (Yakash, 1979). Epidural use of xylazine can enhance the analgesic effects of other agents . The present study was therefore , designed to evaluate the haematobiochemical alterations following epidural administration of bupivacaine alone, ropivacaine alone and ropivacaine + xylazine combination in goats.

MATERIALS AND METHODS :

The study was conducted on 6 healthy bucks of non descript breed weighing between 10-12 kg. All the bucks were dewormed with Fenbendazole (5 mg/ kg of body weight orally) and were maintained under similar standard managemental conditions and feeding schedule. Each experimental animal was subjected to 3 treatments and each treatment lasted for 3 days. Each animal was subjected to the following three treatments at an interval of 8 days. The epidural catheter was placed at the lumbo-sacral space for the delivery of bupivacaine, ropivacaine and ropivacaine – xylazine combination.

In Treatment I Bupivacaine hydrochloride alone @ 1.7mg/kg b.wt. In Treatment II , Ropivacaine hydrochloride alone @ 0.6mg/kg b.wt., and in Treatment III, Ropivacaine hydrochloride @ 0.6mg/ kg b.wt. and xylazine hydrochloride @ 0.5 mg/kg b.wt. simultanously were administered in the lumbo-sacral space. Five ml blood was collected from each animal through jugular vein. Two ml blood was kept for hematological studies. Remaining three ml blood was allowed for clotting .The clotted blood was centrifuged @ 2500 rpm for 10 minutes and the serum was separated and kept in sterile vials at -20^0 C till biochemical estimation. Blood samples from each animal for each treatment was collected at 0 hrs,15 min, 3 hrs, ,6hrs, 12 hrs, 24hrs, 36hrs. and 72 hours for estimation of hemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC), total leukocyte count (TLC) and differential leukocyte count (DLC) by standard methods. Blood glucose

(GOD – POD method), total protein (Biuret method), ALT (IFCC method), ALP (Tris – Carb method), total bilirubin (Jendrassic and Grof method), BUN (Young's method) and serum creatinine (GLDH –Urease method) were also estimated at same intervals. The data was analyzed by employing completely Randomized Design (CRD) as described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION :

The haemoglobin concentration and PCV did not vary significantly (P>0.05) in treatment I and II. In treatment III, after epidural administration of drugs, there was a significant (P<0.05) decrease in Hb concentration and PCV up to 6 hours and 24 hours respectively , thereafter values started increasing, reaching close to control value (11.38 ± 0.30) at 72 hours. These findings of epidural xylazine are in accordance with finding of Kinjavadker *et al.* (2000) , Pratab *et al.* (2000) and Singh *et al.* (2005) who used 0.2% epidural ropivacaine in goats and also observed non significant changes in Hb concentration and PCV. Dhage and Pawshe (2008) also observed non significant decrease in Hb after using epidural bupivacaine in goats. The reduction in Hb concentration and PCV after ropivacaine - xylazine administration might be due to shifting of fluid volume from extravascular compartment to intravascular compartment in order to maintain the normal cardiac output of pooling of circulation blood cells in the spleen or other reservoirs secondary to sympathetic tone (Pratab *et al.*, 2001 and Wagner *et al.*, 1991). TEC, TLC and DLC did not show any significant changes in all the three treatments.

Blood glucose level was increased significantly (P<0.05) in all the three treatment groups. In the present study increase of glucose concentration, may be due to effects of stress induced secretion of cortical hormones from adrenal gland under ACTH. Secreted cortical hormones might have stimulated gluconeogenesis and also reduced consumption of glucose by cells, and both resulted in increased blood glucose concentration (Guyton and Hall, 2006). Kumar *et al.* (1997) recorded significant increase in glucose after epidural use of xylalzine and detomibine in goats. Singh *et al.* (2002) recorded hyperglycemia in goats after use of Xylazine and ketamine. This may be due to transient hypoinsulinemia which causes higher glucose levels. Dadafarid and Najafpour (2008) used epidural bupivacaine in sheep and observed significant increase in blood glucose level.

There was non significant (P>0.05) increase and subsequent decrease in total protein values in treatment I and II. In treatment III there was a significant (P<0.05) increase in total serum protein after 15 minutes of epidural analgesia to 6 hours and thereafter showed a decline trend and reached down to base value at 72 hours. Singh *et al.* (2005) reported non-significant changes in total protein value after epidural administration of ropivacaine in goats. Ropivacaiane did not change total protein values significantly at any time interval and hence the drug seemed to have no effect on protein metabolism. The transietry increase in total protein values in the present study might have been due to effect of Xylazine on liver during biotransformation of drug which might have caused increase in total protein levels (Fayed *et al.*, 1989)

There was non significant (P>0.05) increase in alkaline phosphatase level in treatment I and II. In treatment III, there was a significant (P<0.05) increase in alkaline phosphatase level upto 6 hours, after that values started decreasing significantly up to 72 hours. Campbell *et al.* (1977) and Kelly (1979) indicated that there is a possibility of leakage of serum alkaline phosphatase through plasma membrane of hepatic cells during the liver cell damage. Vickers *et al.* (1984) reported that there is a possibility of transient liver damage during biotransformation of Xylazine, which may be the cause of rise in ALP values in the present study.

There was non significant (P<0.05) increase in total bilirubin values in treatment I, II and III. Non significant rise in serum bilirubin level was reported by Singh *et al.* (1999) following the use of bupivacaine in combination with diazepam and orazepam in goats. In the present study, there is possibility that the metabolism of these drugs in the liver might have caused some disruption in

the liver parenchymal cells leading to non significant increase in the serum bilirubin level (Chang and Glazko, 1974).

The mean value of ALT was increased significantly (P<0.05) up to 3 hour in treatment I. In treatment II, there was non-significant (P>0.05) increase in ALT values.In treatment III, there was significant (P<0.05) increase in ALT values upto 6 hours. Tripathi *et al.* (1988) also reported similar increase in level of ALT following epidural use of bupivacaine in dogs. Pandey and Sharma (1994) reported significant increase in the level of serum ALT following parenteral administration of Xylazine - ketamine anaesthesia in goats. In the present study there is possibility that during the process of metabolization of drugs . there might have been some disruption in liver parenchymal cells which might have increased the cell membrane permeability leading to elevation in the level of ALT in the blood (Pandey and Rao, 2000).

There was significant (P<0.05) increase in blood urea nitrogen values in treatment I upto 3 hours after administration of the drug. In treatment II, there was non significant (P>0.05) increase in blood urea nitrogen values after epidural administration of ropivacaine. In treatment III, there was significant (P<0.05) increase in BUN values upto 3 hours and thenafter value started decreasing and reached to base value at 72 hours. Various authors (Jodhan *et al.,* 1995; Sharma *et al.,* 1997 and Singh *et al.,* 1999) recorded significant increase in the levels of blood urea nitrogen following epidural administration of Xylazine in goats.

There was non significant (P>0.05) increase in serum creatinine values in treatment I and II. However, there was significant increase (P<0.05) in serum creatinine values in treatment III upto 3 hours. Bisen *et al.* (1994) and Pandey and Rao (2000) reported significant elevation in serum creatinine levels following parenteral administration of opioids like pentazocine in goats. Buola and Singh (2003) reported significant increase in serum creatinine following parentral use of bupivacaine in dogs. Singh *et al.* (2005) reported non significant increase in creatinine and BUN values after using epidural ropivacaine in goats and it matched to the finding of present study. The increase in creatinine and BUN may be attributed to the temporarily inhibitory effect of Ropivacaine on the renal blood flow, which in turn might have caused a rise in serum creatinine and BUN values. However, the possibility of renal damage could be ruled out because all the values were under normal physiological limits.

It is therefore, presumed that the increase in BUN and creatinine in treatment III could be as a result of decrease in glomerular filtration rate due to reduction in renal blood flow, disturbance in urine output leading to urinary retention and other alteration in urinary function. The decrease in glomerular filtration rate would result into increased concentration of creatinine in blood (Wright, 1965). Similarly any retardation in glomerular filtration rate will cause high concentration of blood urea nitrogen (Garner *et al.*, 1997).

In the present study, significant increase in the levels of blood urea nitrogen and creatinine was only for a short duration. It is thus presumed that the epidural administration of drugs caused some alterations in glomerular filtration rate leading to significant increase in blood urea nitrogen in group I, III and creatinine in group III but for short duration of period. The values of group II suggested that ropivacaine caused no stress to the kidney function.

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