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Haemato-Biochemical Alterations After Epidural Administration of Dexmedetomidine Alone and in Combination with Bupivacaine in Buffalo Calves

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Abstract

The study was conducted on 12 healthy male buffalo calves weighing between 50 to 60 Kg to evaluate haemato-biochemical alterations after epidural injection of dexmedetomidine alone and in combination with bupivacaine. Haematological examination showed nonsignificant alterations. Biochemical examination showed significant increase in blood glucose, blood urea nitrogen and serum creatinine while there was nonsignificant alterations in total protein and alkaline phosphatase. All haemato-biochemical changes were transient and compensatory.

Key Words: Haemato-biochemical changes, Epidural Dexmedetomidine, Epidural Bupivacaine, Buffalo calves.

Introduction

Regional anesthesia produced by epidural injections of anaesthetic agents is most frequently employed in bovines. Ruminants are poor subjects for the general anesthesia as they are prone to regurgitation, ruminal tympany, respiratory embarrassment, hypoxia with uneven ventilation and other associated problems during general anesthesia (Hall *et al.,* 2001). Dexmedetomidine has 7-8 times more selectivity than clonidine, producing sedation, anxiolysis, sympatholysis and possess some analgesic properties without any respiratory depression (Cormack *et al.,* 2005). Bupivacaine is a long acting local anesthetic agent with 2-4 times more potent than lignocaine (Rayees and Shukla, 2013). Hence the present study was conducted to know the influence of these anaesthetic agents on haemato-biochemical parameters following the epidural administration of dexmedetomidine alone and in combination with bupivacaine in buffalo calves.

Materials and Methods

The study was conducted on 12 healthy male buffalo calves, weighing between 50 to 70 kg aged 4-6 months. The animals were divided into two groups of six animals each. The animals of group 1 received dexmedetomidine (@ 5 µg/kg body wt.), while animals of group 2 received bupivacaine (@ 0.15 mg/kg. body wt.) and dexmedetomidine (@ 5 µg/kg body wt.) simultaneously in the sacrococcygeal space. The haemato-biochemical alterations were recorded at different time intervals in both the groups. Blood samples from each animal for each treatment were collected

at 0 hrs, 1 hrs, 3 hrs, 6 hrs, 12 hrs, 24 hrs, 48 hrs, and 72 hrs for haemato-biochemical studies. Haemato-biochemical estimations were carried out following the standard methods in use.

Results and Discussion

Results on haemato-biochemical parameters are presented in Table.

Table:Effect of epidural dexmedetomidine alone and in combination with bupivacaine in buffalo calves on haemato-biochemical parameters at various time intervals.

Group	Time (hours)	Hb(g/dl)	PCV (%)	Blood glucose (mg/dl)	Total protein (g/dl)	Alk. Phosp-hatase (IU/L)	BUN (mg/dl)	Creati-nine (mg/dl)
Group I	0	11.56 ± 0.35	33.15 ± 1.43	66.89 ± 0.71	6.41 ± 0.07	247.30 ± 8.74	25.37 ± 0.56	1.41 ± 0.021
	1	10.24 ± 0.33	28.46 ± 1.80	77.45 ± 0.66*	6.50 ± 0.07	249.50 ± 8.63	36.80 ± 0.78*	1.47 ± 0.016*
	3	10.80 ± 0.38	30.35 ± 1.49	78.29 ± 1.54*	6.63 ± 0.07	250.0 ± 8.86	37.87 ± 0.45*	1.52 ± 0.011*
	6	11.07 ± 0.36	29.92 ± 0.75	77.45 ± 1.95*	6.69± 0.06	249.50 ± 8.78	34.60 ± 0.31*	1.55 ± 0.01*
	12	11.25 ± 0.37	30.76 ± 0.88	74.18 ± 1.84*	6.54 ± 0.06	248.80 ± 8.65	31.61 ± 0.30*	1.52 ± 0.022*
	24	11.41 ± 0.36	31.68 ± 0.83	71.30 ± 1.32*	6.49 ± 0.07	248.47 ± 8.59	28.71 ± 0.50*	1.46 ± 0.012*
	48	11.50 ± 0.35	32.41 ± 1.18	70.26 ± 1.20	6.44 ± 0.07	247.80 ± 8.66	28.08 ± 0.61*	1.44 ± 0.015
	72	11.56 ± 0.34	33.00 ± 1.43	67.41 ± 0.72	6.41 ± 0.07	247.34 ± 8.54	25.77 ± 0.44	1.41 ± 0.018
Group II	0	11.40 ± 0.61	32.96 ± 1.71	66.34 ± 1.18	6.46 ± 0.09	246.10 ± 7.33	25.37 ± 0.83	1.40 ± 0.019
	1	10.28 ± 0.74	28.66 ± 1.79	83.87 ± 3.34*	6.60 ± 0.08	247.44 ± 7.36	34.04 ± 1.55*	1.45 ± 0.014*
	3	10.82 ± 0.41	30.58 ± 1.46	86.11 ± 2.45*	6.71 ± 0.08	248.30 ± 7.28	39.99 ± 1.23*	1.49 ± 0.013*
	6	11.19 ± 0.55	29.83 ± 0.74	81.41 ± 2.07*	6.81 ± 0.09	248.50 ± 7.33	40.13 ± 1.43*	1.53 ± 0.014*
	12	11.35 ± 0.53	30.77 ± 0.88	77.73 ± 1.58*	6.86 ± 0.10	247.50 ± 7.32	36.75 ± 1.24*	1.53 ± 0.018*
	24	11.70 ± 0.41	31.72 ± 0.78	70.86 ± 0.71	6.57 ± 0.08	247.30 ± 7.77	32.15 ± 0.95*	1.46 ± 0.013*
	48	11.61 ± 0.51	32.36 ± 1.16	69.38 ± 0.74	6.52 ± 0.09	246.80 ± 7.45	28.23 ± 0.72	1.42 ± 0.015
	72	11.58 ± 0.47	32.86 ± 1.48	67.09 ± 0.96	6.47 ± 0.09	246.20 ± 7.45	26.32 ± 1.10	1.40 ± 0.018

Haemoglobin and PCV showed non-significant decrease in both treatments. In the present study decrease in haemoglobin and packed cell volume might be attributed to the sequestration of blood cells in spleen resulting into decrease in total erythrocyte count in circulation and simultaneous drop in the haemoglobin and packed cell volume. A gradual significant increase in blood glucose was observed in both treatments. The highest value of 78.29 ± 1.54 mg/dl was recorded at 3 hours as compared to basal value of 66.89 ± 0.71 mg/dl in treatment 1. The highest value of 86.11 ± 2.45 mg/dl at 3 hours of observations as compared control value of 66.34 ± 1.18 mg/dl was recorded in treatment 2 then declined and reached towards pre-treatment value at 72 hours. Hyperglycaemia might be attributed to alpha-2 adrenergic inhibition of insulin release from beta-pancreatic cells which increased glucose level in the liver (Gasthuys *et al.,* 1990). Total protein increased nonsignificantly in both treatments. The transitory increase in total protein values in the present study might have been due to effect of alpha-2 adrenergic agonist on liver during biotransformation of drug which might have caused to increase in total protein levels (Fayed *et al.,* 1989). Alkaline phosphatase also increased non significantly in both treatments. Campbell *et al.* (1977) and Kelly (1979) indicated that there is a possibility of leakage of serum alkaline phosphatase through plasma membrane of hepatic cell during the liver cell damage. A significant increase in blood urea nitrogen and serum creatinine was observed in both treatments. The initial increase in blood urea nitrogen could be attributed to the retardation of glomerular filtration rate (Garner *et al.,* 1997). Kalim *et al.* (2014) observed that the blood urea nitrogen and serum creatinine values increased in medetomidine-bupivacaine group.

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Conflict of Interest: All authors declare no conflict of interest.

References :

Campbell, E.J.M., Dickinson, C.J. and Slatter, J.D.H. (1977). The kidney, clinical physiology. 4th Edn. Publ. Blackwell Scientific Publications, Oxford, ppp 166-231.

Cormack, J.R., Orme, R.M. and Costello, T. (2005). The role of alpha-2 agonist in neurosurgery. Journal of Clinical Neuroscience, **12** (4): 375-8

Fayed, J.W., Williams, T.M., Thompson, J.J. and Hakeem, K.L. (1989). Effects of environmental temperature on pharmacokinetics and clinical responses to xylazine in goats. Canine Journal of Veterinary Medicine, **12**(11): 112-115.

Garner, H.W., Coffman, J.R. and Short, C.E. (1997). Anaesthesia. In: Oehme, F.W. and Prier, J.E. (Eds.), Textbook of Large Animal Surgery. Williams and Wilkins Publishing Co., Baltimore, pp 103-145.

Gasthuys, F., DeMoor, A. and Parmentier, D. (1990). Haemodynamics changes during sedation in ponies. Veterinary Research Communication, **14**(4): 309-327.

Hall, L.W., Clarke, K.W. and Trim, C.M. (2001). Veterinary Anaesthesia 10th Edn., Bailliere Tindall, London, 60.

Kalim, M.O., Kumar, T.S., Sharda, R. and Vishwakarma, P. (2014). Haemato-biochemical response to lumbar epidural anaesthesia using Bupivacaine alone and in combination with certain analgesics in buffalo calves. The Iranian Journal of Veterinary Science and Technology, **3**(2): 17-24.

Kelly, W.R. (1979). Veterinary clinical diagnosis. 2nd Edn. Publ. McMillan Publishing Co., Inc. New York. pp 147-300.

Rayees, A. and Shukla, B.P. (2013). Haemato-Biochemical changes following epidural analgesia by Bupivacaine, Ropivacaine and Ropivacaine-Xylazine combinations in goats. Indian Journal of Field Veterinarians, **8** (3).