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BEHAVIOURAL ALTERATIONS DUE TO PAIN, AND ANALGESIC ROLE OF BUPRENORPHINE AND CARPROFEN AS PRE-EMPTIVE ANALGESIC IN DOGS UNDERGOING ELECTIVE ABDOMINAL SURGERY

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ABSTRACT
The study was conducted in 12 healthy dogs irrespective of age, sex and breed were presented for elective abdominal surgery in TVCC to investigate the postoperative behaviour for assessing the postoperative pain. These 12 dogs were randomly divided into 2 groups and administered with Buprenorphine (0.01 mg/kg I/M repeated every 12 hours) /Tab. Carprofen (4 mg/kg orally repeated every 8 hours) as analgesic, 60 minute preoperatively and repeated up to 48 hour. Pain assessment was made adopting a multifactorial numerical rating Scale (NRS) with MTPS of 20. All the assessments during postoperative period (extended up to 48 hr). In both groups highest pain score occurs after recovery 4.83 and 3.83, respectively. There was a clear decreasing trend and the mean values obtained at the end of study (0.33 and 0.16 respectively). The MTPS were below the 5.2 in both groups but buprenorphine had more MTPS as compared to Carprofen.

KEYWORDS: abdominal surgery, TVCC, Buprenorphine, MTPS, Pain.

INTRODUCTION

Pain has been defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage (Merskey, 1979; Hellyer *et al*., 2007; Vedpathak *et al*., 2009; Maticic *et al*., 2010). Pain is a complex phenomenon involving pathophysiological and psychological components that are frequently difficult to recognize and interpret in animals. Suffering is a term frequently used in conjunction with pain, implying the conscious endurance of pain or distress. Many surgical procedures are associated with extreme painful conditions which are associated with physical, psychological and immunological depression. The field of postoperative pain management is being given more and more attention as it is an essential component of the care of surgical patients. Animals are incapable of describing pain, the change in the physiological and behavioral parameters are helpful in determining the presence of pain (Caroll, 1996). All the surgical procedures cause pain and severe prolonged pain would lead to increased sympathetic activity, metabolic rate, protein catabolism and mobilization of free fatty acids (Nimmo and Duthie, 1987). A protective approach in the form of pre-emptive analgesia helps blunt the stress response and the adverse sequelae. Pre-emptive analgesia, which involves initiation of an analgesic therapy prior to the onset of noxious stimuli is more effective and requires decreased amount of medication than that initiated after surgery (Shafford *et al*., 2001). It inhibits the transmission of nociceptive impulse and initiation of windup (Gottschok and Smith, 2001) thus preventing the central sensitization. Buprenorphine hydrochloride, a derivative of thebaine, is a semi-synthetic opioid analgesic. It has a slow onset and longer duration of action due to its slow dissociation from μ receptors with minimal side effects (Bailey and Stanley, 1994). Carprofen, a recently developed derivative of propionic acid, is a non-narcotic, non-steroidal anti-inflammatory (NSAID) agent with characteristic analgesic and antipyretic activity. Carprofen is a reversible inhibitor of cyclo-oxygenase (COX-2) and a moderately potent inhibitor of phospholipase.

MATERIALS & METHODS

The present study was conducted on 12 clinical case of elective abdominal surgery in dogs presented for treatment at TVCC. These dogs randomly divided into two groups. In group I, buprenorphine was administered (0.01 mg/kg, I/M) and in group II, carprofen administered (4 mg/kg, orally) as pre-emptive analgesics 60 minute prior to premedication. All the animals were kept off-feed for 24 hours prior to surgical intervention. The animal was premedicated with Inj. atropine sulphate @0.02mg/kg b.wt. I/M, after 5 minute was administered with Inj. xylazine @1 mg/kg b.wt. I/M. The induction was done after 15 minutes by Inj. ketamine @10 mg/kg b.wt. I/M. Buprenorphine were repeated at same dose rate after every 12 hours and carprofen was repeated at same dose rate after every 8 hours up to 48 hours. Pain assessment was made adopting a multifactorial numerical rating scale (0-20) (Table 1) to record mean total pain score (MTPS). Seven behaviours included in the scale were: posture, vocalization, appetite and thirst, temperament, response to palpation, facial expression and mental status. The pain score system was based on the observation of Firth and Haldane (1999), Grisneaux *et al.* (1999) and Hellyer (1999). A score of zero to three were assigned for different

behavioural parameters to ascertain the level of postoperative pain in both group. If MTPS = 0 indicate 'no pain' if MTPS ≥ 5.2 and ≤ 7.4 indicate 'moderate pain' and if MTPS = 20 indicate 'maximum pain'. MTPS (mean total pain score) were calculated at the end of study. The following behavioral parameters was studied preoperative (1 hour before surgery), immediate post recovery, 8, 24 and 48 hours postoperatively. The data analysis was done as for the standard statistical method, with the use of completely randomized design (CRD) as described by Snedecor and Cochran (1994).

TABLE 1. Multifactorial Numerical Rating Scale (Behavioural Parameters)

a. Posture	**Scores**
Sitting or standing head up	0
Lateral recumbency	1
Standing, head down	1
Restlessness	2
Tucked up appearance	3
b. Vocalization	
Not vocalization	0
Vocalization when touched	1
Intermittent	2
Continuous	3
c. Activity level/Appetite & thirst	
Taking food and water	0
Taking liquid only	1
Not taking anything	2
d. Personality/Attitude	
At rest	0
Quite/ docile animal become aggressive & vice-versa	1
Licking/biting/scratching the painful area	2
Self-mutilation	3
e. Response to Palpation	
No change	0
Guards or react when touched	2
Guards or react before touched	*3*
f. Facial Expression	
Active	0
Dull eye	1
Staring in space /Appears sleepy	2
Photophobic appearance	3
g. Mental Status	
Submissive	0
Over friendly	1
Wary	2
Aggressive	3

Total score (Minimum =0; Maximum= 20

RESULTS & DISCUSSION

Recognition and assessment of pain have always been an integral part of animal care and veterinary clinical practice. The ethical mandate to justify the value of animal research and to guarantee that every effort is made to limit pain and distress codified in the Animal Welfare Act (1966). Now veterinary practitioners also have more insight into how most drugs work to modulate pain and how a combination of therapies can benefit patients. Abdominal surgery generally produces more pain than do superficial soft tissue procedures and orthopedic procedure can cause severe and prolong pain. Untreated pain decreases quality of life in all patients and prolongs recovery from surgery. Preventing and managing pain has become a fundamental part of quality and compassionate patient care in veterinary medicine. NRS is most suitable of the three scales for assessing pain in dogs (Robertson, 2003). Anticipated levels of pain associated with different surgical aliments vary considerably (Mathews, 2000). Pain scale that is developed must be specific for the type of noxious stimulus or injury (Fazili, 2008).

All the operation was successful without any major complication and all animals recovered smoothly. No adverse reaction was observed in any animal after administration of buprenorphine or carprofen. Among the various behaviours examined in present study highest mean values were detected in facial expression (1.16 and 0.83) and appetite/thirst (1.33 and 1.16) in animals of group I and II, respectively during after recovery. Thus facial expression and response to palpation seemed to be the best indicators of pain. This finding is almost consistent with the observation of Deneuche *et al. (2004)* who reported facial expression,

response to palpation and response to manipulation as the best indicators of pain.

In present study, both groups had significant (P<0.01) high mean total pain score at after recovery (4.83 ± 0.54 and 3.83 ± 0.40 respectively) and 8 hours postoperative (3.66 ± 0.55 and 2.16±0.3 respectively) as compared to their preoperative score but there was no significant difference in MTPS values between the groups at any stage. This suggested that maximum pain after surgical procedures was present at after recovery and 8 hours postoperative which was in declining state around 24 hours. MTPS are less than 5.2 in both groups during the study period which showed both drugs are effective for controlling the postoperative pain as pre-emptive analgesic. MTPS of carprofen group is less than the buprenorphine group at after recovery and 8 hours postoperativly. NSAIDs may be helpful in ameliorating the cascade of inflammatory products of tissue breakdown contributing to the shock syndrome. Pre-emptive analgesia has been shown to be highly effective in preventing wind-up (Thurmon *et al.*, 1996).

TABLE 2. Mean (± S.E.) values of individual behaviours of multifactorial N.R.S. used to assess pain in both groups at various observation stages

Behaviour	Group	MTPS of individual animal				
		Preoperative	Postoperative			
		1 hours before surgery	after recovery	8 hours postoperative	24 hours postoperative	48 hours postoperative
	Buprenorphine	0.00±0.00	1.00±0.14	0.83±0.16	0.50±0.22	0.16±0.16
Posture	Carprofen	0.00±0.00	0.83±0.16	0.33±0.21	0.16±0.16	0.00±0.00
	Buprenorphine	0.00±0.00	0.33±0.33	0.16±0.16	0.16±0.16	0.00±0.00
Vocalization	Carprofen	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	Buprenorphine	0.00±0.00	1.33±0.42	1.00±0.25	0.16±0.16	0.16±0.16
Appetite /Thirst	Carprofen	0.00±0.00	1.16±0.30	0.50±0.22	0.33±0.21	0.16±0.16
	Buprenorphine	0.00±0.00	0.66±0.42	0.16±0.16	0.00±0.00	0.00±0.00
Personality/Attitude	Carprofen	0.00±0.00	0.66±0.42	0.50±0.34	0.16±0.16	0.00±0.00
Response to palpation	Buprenorphine	0.00±0.00	0.33±0.33	0.66±0.42	0.33±0.33	0.00±0.00
	Carprofen	0.00±0.00	0.33±0.33	0.33±0.33	0.00±0.00	0.00±0.00
Facial expression	Buprenorphine	0.00±0.00	1.16±0.16	0.83±0.16	0.33±0.21	0.00±0.00
	Carprofen	0.00±0.00	0.83±0.16	0.50±0.22	0.33±0.21	0.00±0.00
Mental status	Buprenorphine	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	Carprofen	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
TTotal Score	Buprenorphine	0.00±0.00	4.83±0.54*	3.66±0.55*	1.50 ±0.42	0.33± 0.21
	Carprofen	0.00±0.00	3.83±0.40*	2.16±0.30*	1.00 ±0.25	0.16 ± 0.16

*(P<0.01) significant

CONCLUSION

Therefore it is concluded that the newer drug Carprofen is comparatively more effective than Buprenorphine. The Carprofen is available in injectable as well as tablet presentation, and can be used parental or oral route to achieve, pre-emptive analgesia in dogs, it is also helpful in reducing the post-operative pain.

RECOMMENDATION

The Carprofen is very effective in pre operative and post operative pain management and can be given by owner itself.

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