

## STUDY OF EFFECT OF EPIDURAL ADMINISTRATION OF BUPIVACAINE IN GIR BULL

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**Abstract:** The present study was carried out at Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Junagadh Agricultural University, Junagadh and different gaushalas in and around Junagadh district to evaluate the clinical efficacy of sacrococcygeal epidural analgesia using bupivacaine for open method of castration in 8 adult Gir bulls. All the bulls were kept off feed for 12 hours and off water for 6 hours prior to study. After proper restraining of the bull the epidural puncture site was prepared aseptically. All the animals were administered bupivacaine at the dose rate of 0.25 mg/kg b.wt. in sacrococcygeal epidural space. The average time taken for onset of analgesia was  $2.37 \pm 0.25$  minutes. Onset and depth of anaesthesia were assessed by pin pricks reflexes at the perineum, the inguinal region, the upper part of the hind limbs, the digits and ventral abdomen at every 5 sec. until sensation was totally lost. Tail reflexes, anal reflexes, pedal reflexes and various physiological parameters were taken at 0, 5, 10, 15, 30, 45, 60, 90 and 120 min. Peak time for analgesia was observed during 10 to 60 minutes after onset of analgesia. There were no significant differences observed in physiological parameters viz. rectal temperature, respiration rate, pulse rate, heart rate and  $SPO_2$  at any time interval during the analgesia. Average time taken for recovery of epidural analgesia induced by epidural bupivacaine was  $104.63 \pm 5.87$  minutes with mild to moderate degree limb ataxia. Some side effects viz. tympany, shivering, drowsiness and muscle tremor were found in some of the animals at around 30-60 minute interval after the onset of analgesia. Bupivacaine proved better as an epidural anaesthesia for longer duration of surgical innervations of caudal area of the large animals.

**Keywords:** Bupivacaine, epidural anaesthesia, Gir bulls.

### Introduction

General anaesthesia in ruminant having various anaesthetic complications such as pulmonary aspiration of ruminal contents due to regurgitation and excessive salivation thus local anaesthetic techniques are more preferred as compared to general anaesthesia (Hall and Clarke. 1991). Epidural anaesthetic technique is one of regional anaesthesia method that gives good degree of analgesia in the caudal aspect of body and helps to perform surgical as

well as obstetrical operations (Runa *et al.* 2008). It is commonly performed in farm animals at sacrococcygeal or lumbosacral region.

Bupivacaine is a long acting local anaesthetic having four times more potency than lignocaine hydrochloride (Hall *et al.* 2001). Bupivacaine has been used epidurally for prevention of post-traumatic pain in buffalo calves (Pathak *et al.* 2012). The present research work was clinical oriented and carried out to evaluate bupivacaine efficacy after epidural administration in adult Gir bulls.

### **Materials and Methods**

The present study was carried out at Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Junagadh Agricultural University, Junagadh, Gujarat and different gaushalas. Eight clinically healthy Gir bulls were selected for open method of surgical castration under epidural anaesthesia induced by bupivacaine hydrochloride. All the bulls were kept off feed for 12 hours and off-water was withheld for 6 hours prior to study. After proper restraining of the bull, epidural puncture site was prepared aseptically. All the animals were weighted on large animal weighing balance and administered bupivacaine at the dose rate of 0.25 mg/kg b.wt. in the sacrococcygeal epidural space. Preoperative medications like antibiotic (inj. Dicrysticin<sup>1</sup> 2.5 gm total dose I/M) and anti-inflammatory drugs (inj. Meloxicam<sup>2</sup> 0.2mg/kg b.wt. I/M), were given uniformly to all animals.

Onset of anaesthesia and depth of anaesthesia was assessed by pin pricks responses and reflexes. Pin pricks were done at the perineum, the inguinal region, the upper part of the hind limbs, the digits and ventral abdomen at every 5 sec. until sensation was totally lost. Tail reflexes, anal reflexes and pedal reflexes were taken at 0, 5, 10, 15, 30, 45, 60, 90 and 120 min. Depth of analgesia was graded on scale of 0-3.

Various physiological parameters viz. heart rate, respiration rate, pulse rate, haemoglobin-oxygen saturation (SPO<sub>2</sub>) and rectal temperature were recorded at 0, 5, 10, 15, 30, 45, 60, 90 and 120 minutes after epidural administration of anaesthetic agents. Recovery of anaesthesia was assessed by pin prick responses, various reflexes (Viz. tail, anal and pedal) and degree of limb ataxia was also recorded. Limb incoordination/ limb ataxia was measured in all animals during recovery and graded on scale of 0-3.

### **Results and Discussion**

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<sup>1</sup> Inj. Dicrysticin- DS 2.5gm Vial, Zydus Animal Health, Ahmedabad, India.

<sup>2</sup> Inj. Melonex 100 ml vialIntas Pharmaceuticals Ltd., Matoda, Ahmedabad, India.

All the selected animals were weighted on large animal weighing balance prior to experiments. Average weight of all selected bulls were  $176.00 \pm 14.82$ . The onset of analgesia was measured by pinprick response and other reflexes (viz. tail reflexes, anal reflexes and pedal reflexes). Average time taken for onset of epidural analgesia (Mean $\pm$ SE) was  $2.37 \pm 0.25$  min. Peak period of analgesia was 10 – 60 minutes (Figure 1).

Rectal temperature decreased non-significantly up to 90 minutes but rectal temperature increased non-significantly during recovery due to struggling. All other physiological parameters viz. Respiration rate, pulse rate, heart rate and SPO<sub>2</sub> were remained within normal acceptable range as the bupivacaine did not produce any cardiopulmonary effect after epidural administration (Table-1).

Recovery of anaesthesia was assessed on base of pin prick response and other reflexes viz. tail, anal and pedal reflexes. Average time taken for recovery was  $104.63 \pm 5.87$  minutes. In all animals mild to moderate degree of limb ataxia was observed.

Some of the side effects viz. tympany, shivering, drowsiness and muscle tremor were found in some of the animals around 30-60 minute interval after the onset of analgesia induced by bupivacaine hydrochloride. However, no fatality was observed throughout this experiment. Lucky *et al.* (2007) reported the results in consonance with the present findings in sheep after epidural administration of bupivacaine.

No measurable changes in physiological parameters after epidural administration of bupivacaine was found in buffaloes by Mishra *et al.* (1993). Similarly DeRossi *et al.* (2010) observed all physiological parameters were remained within acceptable range with mild degree of limb ataxia during recovery after epidural bupivacaine administration.

### **Conclusion**

Epidural bupivacaine anaesthesia was better performed in large ruminants for surgeries of caudal areas including castration in male. Bupivacaine had fast onset of action, with great analgesia of whole posterior region. All the physiological parameters viz. respiration rate, heart rate, pulse rate and SPO<sub>2</sub> were observed within normal range, however the rectal temperature showed non-significant decrease until recovery started. Recovery was observed in all the animals with mild to moderate degree of limb ataxia. Bupivacaine can be used as an epidural anaesthesia for longer duration of surgical innervations of caudal area as well as obstetrical operations.

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**Table-1: Physiological parameters at different time intervals.**

Time interval	Rectal temperature (°F)	Respiration rate	Pulse rate	Heart rate	SPO <sub>2</sub>
0 min	101.68±0.23	24.25±1.86	50.63±1.45	53.13±0.91	90.13±3.16
5 min	101.51±0.37	23.38±1.61	49.38±1.40	51.00 ±1.18	88.50±3.28
10 min	101.48±0.54	23.00±1.52	51.63±1.81	52.38±1.69	91.00±4.07
15 min	101.30±0.51	23.00±1.75	51.13±1.59	51.75±2.00	87.88±3.79
30 min	101.21±0.45	21.75±2.02	49.63±2.28	50.50±1.86	87.63±4.91
45 min	101.23±0.38	22.50±1.75	49.38±2.28	50.00±1.88	87.75±3.47
60 min	101.18±0.37	22.38±2.04	49.38±1.82	50.00±1.68	87.13±3.23
90 min	101.20±0.27	23.50±1.34	49.63±1.91	49.63±1.81	86.25±2.86
120 min	101.45±0.26	24.88±1.56	52.89±2.34	52.38±1.22	87.13±2.54

**Figure 1: Various physiological parameters at different time intervals.**

