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A study of Haemodynamic changes: A comparative pain score evaluation of lumbar epidural block using 0.5% bupivacaine and 0.5% bupivacaine with ketamine in Orthopaedic surgery cases

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Abstract

Epidural block using local anaesthetic drugs are used in clinical practice since many years. It further got revolutionized with the better understanding of opioid receptors by Martin & Coworkers in 1976. Intra spinal morphine was first used in 1979, which opened up a new exciting way of pain management.

Intrathecal and epidural administration of opioids are widely used even now. Opioid administration intrathecally or epidurally causes dependable method of pain relief without affecting motor functions or other sensory modalities such as touch sensation. This study is an effort to find the haemodynamic changes of lumbar epidural block using 0.5% bupivacaine vs 0.5% bupivacaine with ketamine.

Keywords: Epidural, bupivacaine, ketamine, haemodynamic changes

Introduction

Epidural ketamine was first used by a study in 1982 [1-5]. Ketamine hydrochloride 4mg in 10ml of 5% dextrose water was administered epidurally to 7 patients suffering from intractable pain in the back, lower abdomen and legs. Pain relief was obtained in all cases. Duration of action varied from half an hour to more than 6 hours. No adverse effects were noted and no detectable neurological damage resulted. Intra spinal ketamine offers the advantage over opiates in that delayed respiratory depression is unlikely to occur [6].

Epidural ketamine acts by depressing the excitation of a class of dorsal horn neurons classified as wide dynamic range neurons (WDR). These cells have been associated with central processing of pain [7-9]. There had been evidence to suggest that ketamine binds stereospecifically to opioid receptors in brain and spinal cord. Ketamine has local analgesic property. It acts as a non-competitive NMDA (N-Methyl-D-Aspartic acid) receptor antagonist and it plays a role in alpha adrenergic mediation and serotonergic mediation [10, 11].

This study was undertaken to compare the haemodynamic changes of lumbar epidural block using 0.5% bupivacaine with and without preservative free ketamine.

Aims and Objectives

This study is an effort to find the haemodynamic changes of lumbar epidural block using 0.5% bupivacaine vs 0.5% bupivacaine with ketamine.

Materials and Methods

A prospective randomized double-blind study was conducted in 60 patients admitted at for various elective surgical procedures during the period 2018-2019. Surgical procedures which required blockade below T6 dermatome was only selected.

Inclusion criteria

- ASA physical status-I- patients
- Both male and female
- 20-40 years age groups
- Weight 40 -90 kgs

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Exclusion Criteria

- Difficult airway
- Previous history of anaesthetic complications
- History of local anaesthetic allergy
- Spinal deformities
- Preexisting neurological deficits
- Cases with contra indication to regional anaesthesia

Total sample sizes of 60 patients were randomly allocated into two groups. Control groups-Group-I-received 0.5% bupivacaine, 1.5 ml. spinal segment to be blocked (n=30): (Not exceeding 2mg /kg body weight) and Group-II(n=30) received bupivacaine 0.5% 1.5ml.spinal segment to be blocked plus preservative free 1% ketamine in a dose of 0.5mg.kg body weight.

On the previous day of surgery, a detailed pre anaesthetic evaluation were done in all cases. Procedure was explained and written informed consent were obtained from the patients and relatives. All patients were kept nil per oral from 10.00 P.M on the previous day of surgery and premedicated with tablet. Diazepam 0.2mg.kg body weight.

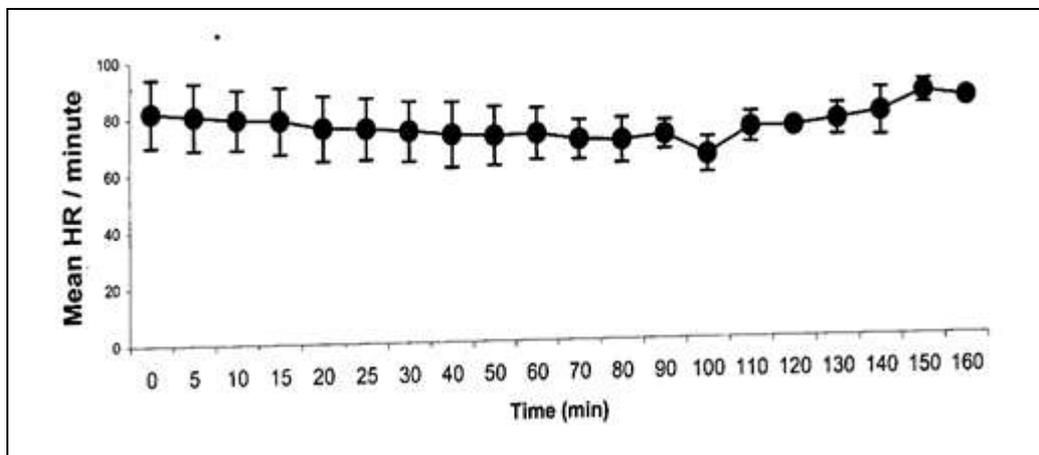
Procedure

On the day of surgery, in the operating room 18-gauge intravenous cannula was placed in a peripheral vein in the

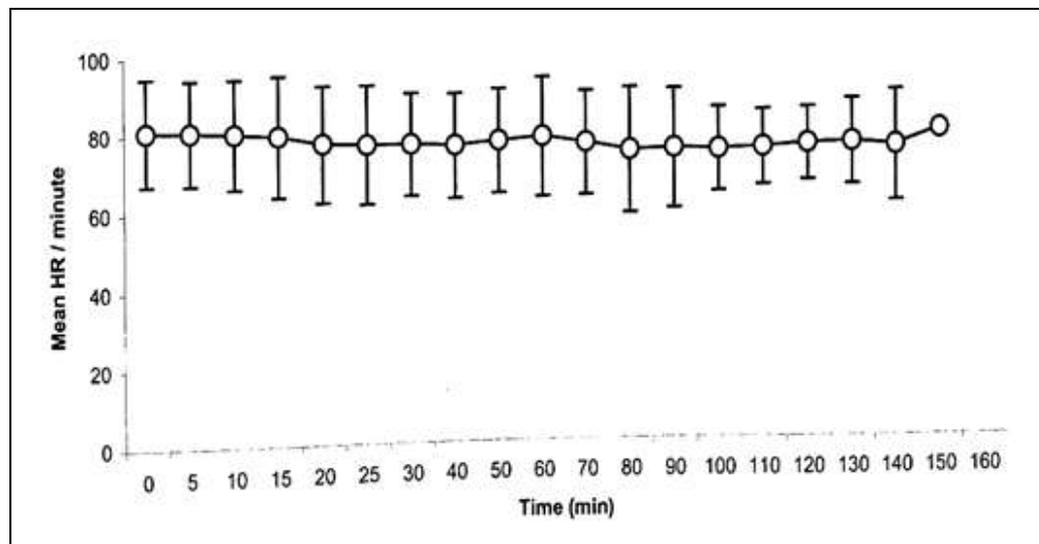
non-dominant upper limb and patients were connected to monitors. Non-invasive blood pressure (NIBP). Pulse oximetry and continuous ECG were recorded on Philips monitor. All patients received intravenous premedication with Injection diazepam 0.2mg.kg body weight mixed with 21.3mg of lignocaine 2% over 5 minutes. Base line blood pressure and heart rate were recorded. All patients were preloaded with intravenous fluid-ringer lactate 10ml.kg body weight before performing epidural block.

All patients were put in left lateral position and under all aseptic precautions lumbar L3-L4 interspace was identified and infiltrated with 1ml of 2% Lignocaine. Epidural space were identified by introducing a 18 gauge Tuohy needle using loss of resistance technique. Group-I-patients (n=30) received bupivacaine 0.5% 1.5ml. spinal segment to be blocked and Group-II-Patients (n=30) received bupivacaine 0.5% 1.5ml. spinal segment to be blocked plus preservative free ketamine 1%, 0.5mg.kg body weight as single shot epidurals. Patients were made to lie down supine and an independent fellow resident recorded the following study parameters. Post-operative pain score by modified visual analogue scale (VAS)

Results



A.



B.

Fig 1(A): Mean heart rate per patient (HR) at base line and during intra operative period. Error bars show standard deviation. (A) Group I=Bupivacaine 0.5% only. (B) Group II= Bupivacaine 0.5% with preservative free 1% Ketamine

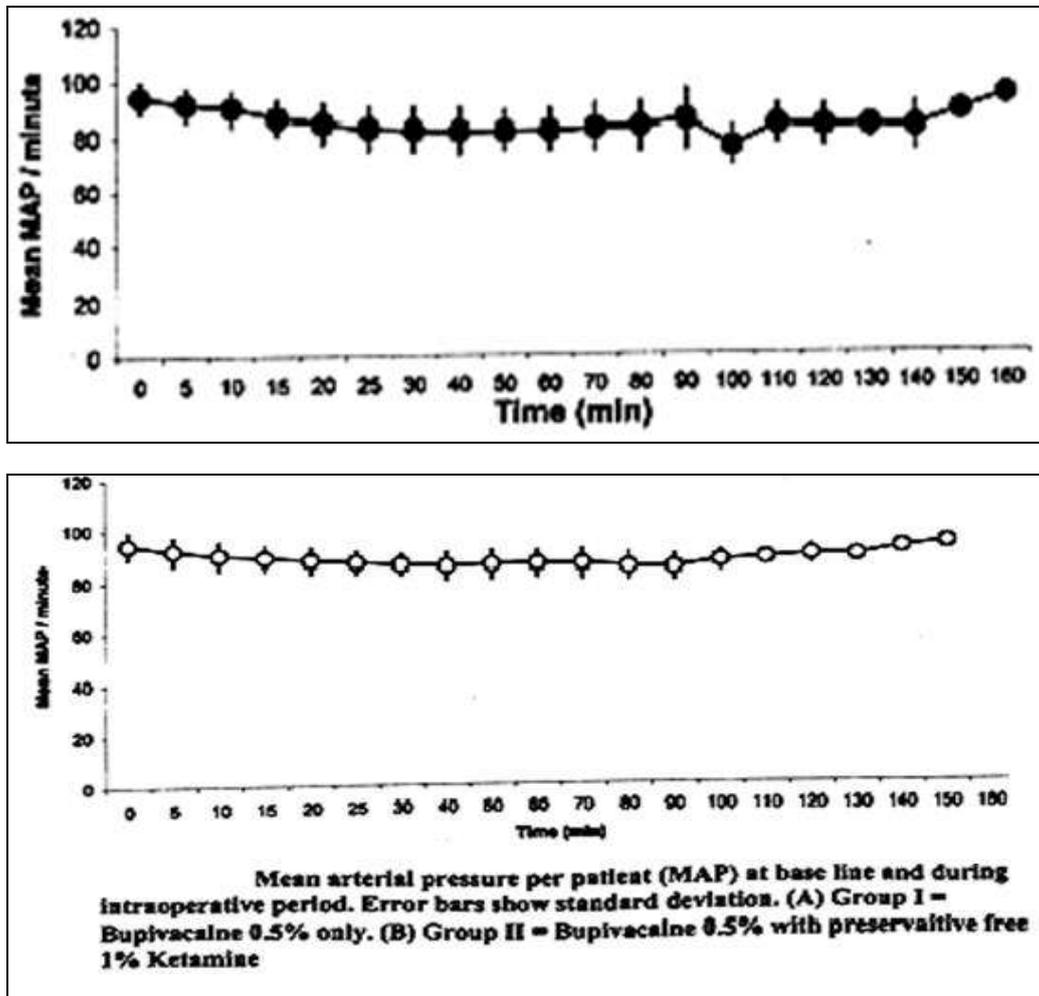
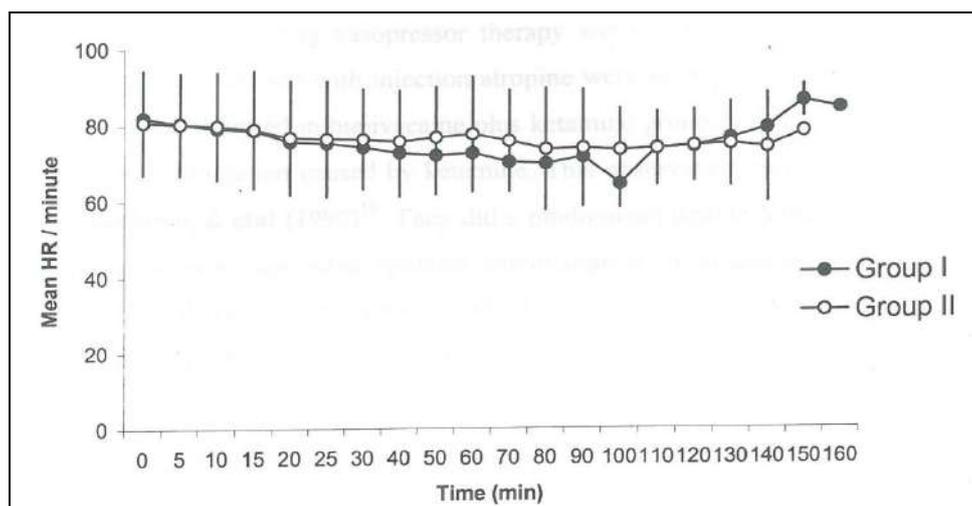


Fig 2(A, B): Mean arterial pressure

Discussion

In our study Haemodynamic paramentes like heart rate and mean arterial pressure do not differ significantly between the groups. Changes in this parameter statistically were insignificant ($P>0.05$). This finding correlated with the study of Shighare A *et al.* (1995) [1]. They evaluated efficacy of thoracic epidural ketamine (0.1mg.kg, 0.3mg.kg and 0.5mg.kg) along with 0.25% bupivacaine 5ml compared with plain 0.25% bupivacaine 5 ml. They observed that in ketamine injected groups blood pressure

and heart rate were unchanged. Our study also correlated with the observations of Marhofer P *et al.* (2000) [11]. They observed that caudal ketamine did not cause any haemodynamic changes. Further, Nagib M *et al.* (1986) [12] also observed no hemodynamic instability with epidural ketamine when used for postoperative analgesia. Figure Mean heart rate per patient (HR) at base line and during intraoperative period. Error bars show standard deviation. Group I = Bupivacaine 0.5% only. Group II = Bupivacaine 0.5% with preservative free 1% Ketamine



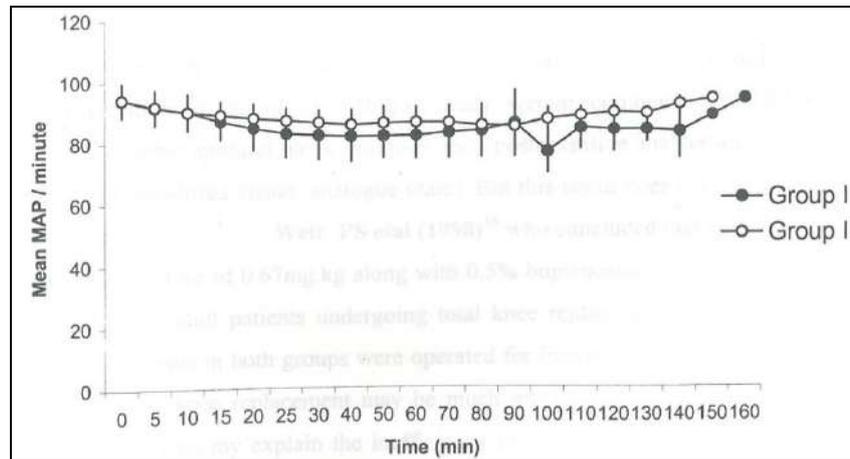


Fig 3 (A, B): Mean arterial pressure per patient (MAP) at base line and during intraoperative period. Error bars show standard deviation. Group I: Bupivacaine 0.5% only. Group II: Bupivacaine 0.5% with preservative free 1% Ketamine

Conclusion

In our study Haemodynamic parameters like heart rate and mean arterial pressure do not differ significantly between the groups.

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