Section: Anaesthesiology

Original Research Article

# COMPARISON OF EFFICACY OF 0.5% BUPIVACAINE VERSUS 0.5% BUPIVACAINE WITH DEXMEDETOMIDINE IN PATIENT UNDERGOING INFRA UMBILICAL SURGERIES UNDER EPIDURAL ANAESTHESIA

*Manjula R[1], Pasumarthi Devi Venkata Satya Sri[2], Kurapati Venu Sasidhar[3], Vignesh.C.S[4]*

[1]*Professor, Department of Anaesthesiology, Aims Bellur, Karnataka, India.*
[2]*Assistant Professor, Department of Anaesthesiology, Maharaja Institute of Medical Sciences, Vizainagaram, India.*
[3]*Postgraduate, Department of Anaesthesiolgy, Aims, Bellur, Karnataka, India.*
[4]*Postgraduate, Department of Anaesthesiolgy Aims, Bellur, Karnataka, India.*

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**Corresponding Author:**
**Dr. Kurapati Venu Sasidhar,**
Postgraduate, Department of Anaesthesiolgy, Aims, Bellur, Karnataka, India.
Email: kurapativenusasidhar@gmail.com

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**ABSTRACT**

**Background:** Local anesthetics along with additives are used to prolong the duration of anaesthesia and analgesia in neuraxial anaesthetic techniques. commonly used additives are vasopressore like adrenaline, opioids etc. A newer class of selective α2 agonists like dexmedetomidine are being used now -a-days for the same. We intended to assess effect of dexmedetomidine addition on the block characterstics of bupivacaine in infraumblical surgeries performed under epidural anaesthesia. **Aims and Objectives:** our aim was to compare efficacy of 0.5% bupivacaine ,0.5% bupivacaine with dexmedetomidine 0.5mcg/kg in view of sensory and motor block onset &analgesic duration and motor block duration and hemodynamic characteristics.

**Materials and Methods:** Total 60 patients were divided in to two groups. which consists of 30 in each were included in the study. Group A received 20ml of bupivacaine0.5%, group B received bupivacaine 0.5% with 0.5mcg/kg dexmedetomidine to a total volume of 20ml.

**Results:** Group B had statistically significant early onset of sensory 11.53±4 minutes, motor block 15.13±7.12 minutes and prolonged duration of motor block197.2±30.99 minutes and post-operative analgesia 456±26.41 minutes compared to group A.

**Conclusion:** We concluded that dexmedetomidine addition to bupivacaine in epidural anaesthesia Significantly reduces the onset of sensory & motor block ,meanwhile it also extends the duration of analgesia & duration of motor block with minimal hemodynamic effects.

**Keywords:** Dexmedetomidine, Bupivacaine, neuraxial anaesthetic techniques, Hemodynamic. Epidural.

## INTRODUCTION

Epidural anaesthesia is flexible procedure for providing anaesthesia, analgesia. It can also be accompanied with spinal anaesthesia or general anaesthesia. It provides intraoperative hemodynamic stability, reduces stress response, complications, helps for better patient outcome, early ambulation of the patient by reducing post-operative pain, reduce incidence of thromboembolic events.[1] search for newer anaesthetic drugs have been primary need in anaesthesia practice. various modifications in regional anaesthesia procedures over past 20 years on introduction of new, safe local anaesthetics.[2,3] Efforts to look out for best additive in spinal, epidural anaesthia. Adding adjuvants (Opioid agents & sympatholytics) to local anaesthetic agents by epidural ,spinal routes , prolongs duration of analgesia.[4] Opioid agents such as fentanyl is on use since long decades with minimal amount of a locally acting anaesthetia drugs to attain desired effect.[5] Adding opioids gives a restrictive action om locally

acting anaesthetia agents &better analgesia but risk of incidence of depression of respiratory centers , pruritis.[6,7] The pharmacologic possessions of sympatholytics has been applied clinically in attaining desired actions in spinal, epidural cases. Dexmedetomidine 8 times much selective α2 receptor agonist than others so it allowed to use, more dose.[8] It is found to have stable vitals, anxiolysis, analgesia, sedation, neuroprotective, and anaesthetia sparing effects.

**Aims & Objectives**

**Aim:** current study aims to compare analgesic efficacy by adding Dexmedetomidine to 0.5%bupivacaine solution in patients posted for elective infraumbilical surgeries by epidural anaesthesia

**Objectives**:

1. Arrival time of sensory block attained to T10
2. motor block arrival time
3. motor block duration
4. analgesic duration
5. Hemodynamics (pulse rate & blood pressure, spo2)
6. Adverse effects

## MATERIAL AND METHODS

A prospective observational study conducted on sixty patients age between 20 - 50 years of ASA physical status I and II planned for elective lower abdominal surgeries by epidural anaesthesia included after getting permission from institution ethics committee & obtaining oral & written consent for a 18 months period in **ADICHUNCHANAGIRI INSTITUTE OF MEDICAL SCIENCES, ACU,BG NAGARA,** Karnataka. The study population splitted to two groups (30 & 30) using a sealed envelope method.

GROUP A: 30 patients received total 20 ml of epidural 0.5% Bupivacaine.

GROUP B: 30 patients received dexmedetomidine 0.5mcg/kg plus 20ml of 0.5% bupivacaine.

**Inclusion Criteria**

- Male & female patients of age 20-50 years.
- ASA class (1 and 2)
- Patients posted for elective infraumbilical surgery.

**Exclusion Criteria**

- Patient denial.
- Patient with known local anaesthetics hypersensitivity.
- Block site infection
- Patient with coagulation disorders.
- Patients with spinal deformities
- Patient posted under emergency surgeries

**Methodology**

Pre-anaesthetic checkup included detailed medical & surgical, drug history, clinical evaluation, and airway assessment and VAS scoring system was explained to patients before procedure. Routine investigations were done for pre anaesthetic checkup for all patients including complete hemogram, random blood sugar, renal function test which includes urea, creatinine, chest xray electrocardiogram. written and informed consent will be taken from the patient andthe patient bystanders after explaining the epiduarl procedure. ASA guidelines were followed on NIL PER ORAL status before surgery. methods of motor and sensory block assessment will be briefed to the patients. All Patients are premedicated with Tab. Anxit 0.5mg night prior to surgery and Inj. Ondansetron 4mg/IV 30mins before surgery and Inj. Ranitidine 50mg/IV 30 minutes before surgery. Patient will be shifted to the operation theatre and IV line will be secured with 18G canula and Electrocardiogram, NIBP, and oxygen saturation will be connected to the patient and Baseline vitals will be noted. Ringer lactate of 10ml/kg will be used for preloading the patient. After placing the patient in sitting position lumbar epidural anaesthesia will be performed in L3-L4 space under strict aseptic precautions, Technique of LOR to air will be used to confirm the epidural space and test dose will be given with 2% lignociane with adrenaline (1;200000) of 3ml and cathetre will be secured. drug combination: will be prepared by using 20ml of 0.5% bupivacaine in a syringe in group A and 0.5µg/kg of dexmedetomidine and 0.5% bupivacaine to a total of 20ml in a syringe will be taken. 20 ml of 0.5 % bupivacaine in group A, (n=30),0.5% Bupivacaine 20ml with 0.5µg/kg of dexmedetomidine in (group B n=30), with equal amount of total volume in each groups. Oxygen will be provided via face mask throughout surgery and parameters of block will be noticed which includes Sensory, motor blockade and hemodynamic parameters were assessed at 0, 1, 5,10,20,30,45,60,80,100 and 120 mins and post operatively.

**Block Evaluation**

Onset, extent and quality of sensory & motor function blockade are assessed after administering the epidural anaesthesia sensory and motor blockade onset and extent and quality qill be assessed. assesment of sensory block will be done by using sterile pin prick method on either sides of chest in the mid axillary line. time of onset of motor sensory bloc will be assesed by time the at which the complete deposition of study drug and the time at which the patient doesnt feel pain for pin prick at the level of T10.motor block will be assessed by using modofied bromage scale.

**Modified Bromage scale**

1 =complete block (unable to move feet or knees)
2=Almost complete block (able to move feet only)
3=Partial block (just able to move knees)
4=Detectable weakness of hip flexion (between scores 3&5)
5=No detectable weakness of hip flexion while supine (full flexion of knees)
6=Able to perform partial knee bend

function of motor block onset is defined as time taken for the onset of motor blockade will be assessed by using modified bromage scale3 and durattion of motor blockade is taken frome the time of anesthetic

agent administration of epidural till to the regression of motor blockade to modified bromage. hemodynamic parameters include Heart rate(HR), blood pressure (systolic blood pressure (SBP),diastolic blood pressure(DBP) Mean arterial pressure (MAP), O2 saturation (SPO2) were monitored continuously & recordings noted every 5 mins for 10mins interval, thereafter every 10mins interval for 30 mins, thereafter at 15mins interval for 60mins and finally at 20mins up to 120 mins.Intra operatively ,incidence of (heart rate<50bpm) was treated using 0.6mg of inj. Atropine IV , hypotension (systolic blood pressure falling greater than 20% from base line ) was treated using 6mg of inj. ephedrine IV. During surgical procedure adverse effects like shivering Nausea and vomiting will be treated with Inj. Ondansetron 4 mg/IV. Tramadol 25mg iv in incremental dose will be used to subside the shivering. patient will be transferred to PACU after completion of operation providing epidural cathetre insitu and spo2,SBP,DBP,HR monitoring and recording will be done .

Pain will be assesed using Visual analogue score (VAS). visual analogue scale was shown to patients 0 cm “No pain” & 10 cm as “Maximum pain”. pain intensity gradually raises from “0” to “10”. Hourly pain score assessment will be done from the surgery completion time. once the vas score is >3 patient is instructed to point the pain scale.

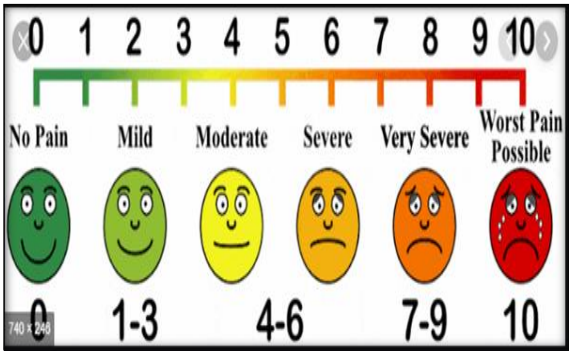


**Figure 1: Visual Analogue Scale**

Duration of analgesia calculated as time of supplementation of analgesic agent
to time when patient complaining of pain at surgical site with VAS score>3.

**Statistical Analysis**

In current study data will be qualitative or quantitative. mean and standard deviation will be used to present the descriptive statastics. For the comparision of two groups and to determine the significance, student unpaired t test was used with p value of <0.05.Numerous tables and charts were used to display by using Microsoft office and excel (windows 2008)

# RESULTS

**Hemodynamic parameters**

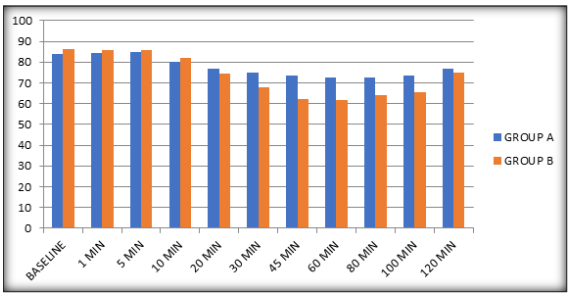


**Figure 1: Comparison of heart rate**

There is a remarkable decrease in heart rate in group B from 25 to 100 minutes.

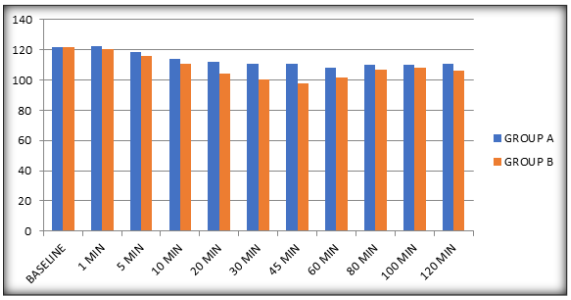


**Figure 2: Systolic blood pressure in both groups**

In this study SBP recorded at 20,30,45,60 mins were statistically significant.

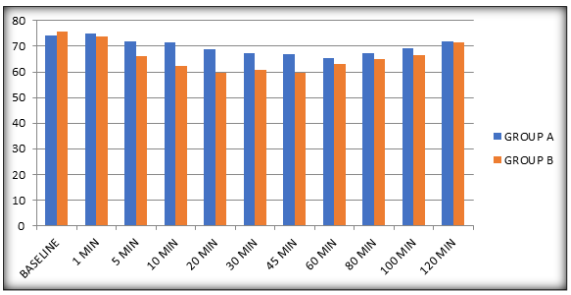


**Figure 3: Diastolic blood pressure in both the groups**

In this study DBP recorded at 5, 10, 20, 30, and 45 min significantly remarkably.

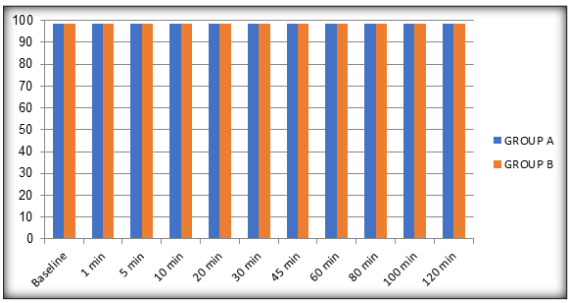


**Figure 4: Comparison of Spo2 in Both Groups**

No statistically significant change in spo2 in 2 groups.

Sensory block onset was noted early in group B (11.53mins) in comarison to group A (15.4mins). The difference in onset was highly statistically significant with p value being <0.001. [Table 1]

Early motor blockonset was seen in group A (21.17±3.72 mins ) contrast to group B(15.13±7 mins).The difference in onset was noted to be more statistically relevant withvalue of p being <0.001. [Table 2]

Prolonged time of motor block noted with group B (197.3±29.37 mins) compared to group A(113.2±30.99 mins) & is statistically remarkable with a p value of <0.001. [Table 3]

Duration of analgesia was prolonged in group B (456±22.33 minutes) compared to group A (341±26.41minutes) & it is more relevant statistically with p value of <0.001. [Table 4]

**Table 1: Time of Onset of Sensory Block to T10 in minutes**

| GROUP | MEAN±SD | P VALUE |
|---|---|---|
| A | 15.4 | <0.001* |
| B | 11.53±4. | |

*Highly Significant

**Table 2: Time of onset of motor blockade in minutes**

| GROUP | MEAN±SD | P VALUE |
|---|---|---|
| A | 21.17±3.72 | <0.001* |
| B | 15.13±7.12 | |

**Table 3: Duration of motor blockade in minutes**

| GROUP | MEAN±SD | P VALUE |
|---|---|---|
| A | 113±29.37 | <0.001* |
| B | 197.2±30.99 | |

**Table 4: Duration of analgesia**

| GROUP | MEAN±SD | P VALUE |
|---|---|---|
| A | 341±22.33 | <0.001* |
| B | 456±26.41 | |

*Highly Significant

## DISCUSSION

Even though epidural anaesthesia with local anaesthetics provides sufficient anaesthesia, it does not reduce anxiety caused by fear of surgical procedures & alien environment

To control these effects there is always a search for drugs with sedation effects Additive drugs like opioids and α2 agonists have been studied as adjuncts to local anaesthetics in epidural anaesthetic procedures each having its own pharmacological profile & adverse effects. The main aim of postop analgesia is to provide subjective comfort, along with inhibition of pain impulse due to surgical stress & also to blunt all reflexes due to pain.

Usage of opioid agents for regional anaesthesia leads to few adverse effects such as nausea, pruritis, respiratory depression &retention of urine, so other drugs like α2 agonists being extensively used as alternatives to opioid agents. α2 agonists pharmacological properties are extensively studied and used effects are extensively studied & used in regional anesthesia clinically to achieve desired effects.[10] epidural administration of these drugs associated with sedation, anxiolysis, analgesia, hypnosis & sympatholysis.[11] earlier onset of local anaesthetic effect, fastest onset of both sensory & motor action block, long-lasting post-operative analgesia, reducing dose of local anaesthetic & stable cardiac respiratory vitals make these drugs highly effective additive in regional anaesthesia (spinal, epidural anaesthesia).[12-13] dexmedetomidine introduction has further broaden the scope of α2 agonist in regional anaesthesia.[14]

Therefore, current study performed to compare 0.5%bupivacaine & 0.5% bupivacaine with addition of dexmedetomidine in their efficacy as additive agent in epidural anaesthesia.

In current study comparitive 0.5mcg/kg of dexmedetomidine added to 0.5% bupivacaine (so that total volume 20ml) and 20ml of 0.5% bupivacaine and its efficacy as an additive in post-operative epidural analgesia was studied in 60 patients who underwent elective infraumbilical surgery. parameters of demographic such as age, sex & weight have no difference between two groups statastically. The time from the deposition of local anaesthetic till the loss of pin prick sensation at T10 level is taken as the time of sensory onset. In current study, mean time for sensory blockade arrival to T10 level was 11.53 minutes for group B 15.4 minutes for group A. which shows onset was early with group B and also noted as statistically significant. (p value <0.001). This shows correlation with the study done by Karthik G.S et al in 2015. They have found that dexmedetomidine addition to Levobupivacaine resulted in early onset (8.14± 1.17) of sensory block at T10 when compared to clonidine addition (10.35±1.22) and was statistically relevant with P<0.001. Similarly, Sidharth S.R et al in 2015 conducted a study in that mean duration of arrival of sensory block is 6.54±2.51 mins in dexmedetomidine group and

8.15±2.84mins in clonidine group, which was shorter when compared to present study. This might be due to the lower doses of dexmedetomidine in this study. Similarly Seemashreepad karhade et al 2015 conducted a study in that dexmedetomidine 0.5 µg/kg addition in epidural anesthesia is a better additive which provides early sensory and motor block onset, adequate sedation and prolonges postoperative analgesia with less adverse -effects, it is similar to our present studyonset time to motor block has been defined as time taken to achieve motor blockof Bromage scale 2 from time of deposition of local anaesthetic. A modified Bromage scale 2 observed in every patients prior to start of surgery .This study found the mean time to arrival of motor blockade is 15.13 minutes in group B as opposed to 21.17 minutes in group A which is statistically highly relevant p value of <0.001.This correlates with the studies conducted by Kiran D Marothia et.al in 2016 conducted a study in that total block of motor function attained was earlier in levobupivacaine with dexmedetomidine group (18.02±2.73 mins) patient compared to group levobupivacaine (27.90±3.81 mins) (P<0.01),in present study arrival of blockade of motor activity is earlier. similarly RashpalSingh Gill et al in 2016 noted that achievement of complete block of motor function was relevantly earlier in Group RD (dexmedetomidine1 µg/kg +0.75% ropivacaine) on comparison with group RF (fentanyl 1 µg/kg +0.75% ropivacaine). Narayan Acharya et al in 2017 investigated that epidural dexmedetomidine produced longer duration of motor blockade (284.52±25.44mins) than clonidine (251.22±28.26mins Karthik G.S et al in 2015conducted a study & found that mean time to regression to Bromage one was more in dexmedetomidine group (252.44±12.48 mins) compared to clonidine group (229.80±11.37 mins),[16] Our study showed that dexmedetomidine addition to 0.5%bupivacaine in group B extends the analgesic duration and prolongs the patient first analgesic request,456minutes, when compared to 0.5%bupivacaine in group A 341.1±26.41 mins.

This result was correlated with following studies naraayan Acharya et al in 2017studied on the postop analgesic potency dexmedetomidine via epidural route and clonidine as additive to Levobupivacaine in eighty adult patients undergoing infra umbilical surgeries,[17,18] They observed that time for first rescue analgesia was shorter in clonidine group (319.18±24.81 mins. Rashpal Singh Gill et al in 2016 where they concluded that dexmedetomidine addition to epidural ropivacaine prolong the time to first analgesic use and also in studies conducted by Sarabjit Kaur et al, Salgado PF et al and Bhawana Rastogi et al.[19,20] Seema shreepad karhade et al 2015 conducted a study and finalisedthat epidural dexmedetomidine 0.5 µg/kg is a good adjuvant providing early onset of sensory and motor block, adequate sedation and prolonged postoperative analgesia with minimal side-effects

When comes to the hemodynamic parameters. The drop in heart rate in group B was maximum between 25 minutes to 100 minutes which showed significant statistical difference when compared to group A, Similarly fall in systolic, diastolic in group maximum from 5 to 60 minutes with statistical significance compared to group A. side effects were noted in group A in which 5 out of 30. and in group B 9 patients which is not significant statistically.

## CONCLUSION

The current study comes to the conclusion that adding dexmedetomidine o.5mcg/kg with bupivacaine o.5% in the epidural space helped to acheive quick onset of blockade of both sensory and motor. Both motor and sensory blockade were extended for longer period when there is an addition of dexmedetomidine in the epidural space. when it comes to the dexmedetomidine group hemodynamic changes were negligible. Hence addition of dexmedetomidine o.5mcg/kg in the epidural space with o.5% bupivacaine gives better outcomes in many aspects of study with minimal adverse effects than bupivacine of 0.5% in the epidural space alone.

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