

COMPARATIVE STUDY OF EPIDURAL BUPIVACAINE AND BUPIVACINE WITH NEOSTIGMINEI. Pavani¹, Varaprasad Raghupatruni², B. Jaya Kumari³**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Many drugs have been used to prolong analgesic effects of epidural local anesthetics. These are called adjuvants. We studied the epidural effect of Neostigmine when administered with Bupivacaine in comparison with Bupivacaine. **OBJECTIVE:** The objective for the study was to find a drug which enhances the onset of action, increases the duration of action of the local anesthetic with minimal or no side effects, instead of increasing the dose of local anaesthetic. **MATERIALS AND METHODS:** A prospective study was conducted on 100 adult patients, selected at random of either sex, of age between 20-65 years and belonging to ASA grade I or II. The study was designed to compare the effects of epidural Neostigmine with Bupivacaine and epidural Bupivacaine used alone with regard to onset, duration of analgesia, hemodynamic stability and level of anaesthesia. Patients were divided into two groups of 50 each. Group I received 19ml of 0.5% Bupivacaine+1ml of normal saline. Group II received 19ml of 0.5% Bupivacaine+100µg of Neostigmine in 1ml of normal saline. In the operating room the patients were assessed for time of onset of analgesia, duration of anaesthesia, level of analgesia and complications. **RESULTS:** The addition of Neostigmine resulted in significant rapid onset of action, longer duration of analgesia and motor blockade. There was no incidence of respiratory depression, pruritus, fluctuations in blood pressure, or change in pulse rate, except one patient who developed bradycardia. **CONCLUSION:** Co administration of epidural Neostigmine and Bupivacaine appears to be a useful technique for epidural anaesthesia as it provides faster onset, longer duration of action and haemodynamic stability.

KEYWORDS: Anesthesia, epidural analgesia, Bupivacaine, Neostigmine.

INTRODUCTION: Neuroaxial technique of anesthesia for relieving pain either during operation or in the post-operative period is well established. Different drugs are being added to the local anaesthetic agents to enhance their actions.

MATERIAL AND METHODS: This prospective study was conducted on 100 patients of either sex of age between 20 and 65 years and belonging to ASA grade I and II.

Patients who were posted for general surgery, Gynaecological, Urological and Orthopaedic surgeries were studied.

After obtaining Ethical Committee Approval, informed written consents were taken from the patients and their attendants. Patients with contraindication to epidural analgesia, allergy to local anaesthetics, pregnant women and children were excluded from the study.

Patients were divided into two Groups:

Group I: patients received 19ml of 0.5% Bupivacaine + 1ml of normal saline

Group II: patients received 19ml of 0.5% Bupivacaine +100µg of Neostigmine in 1ml of normal saline.

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NUMBER OF PATIENTS IN EACH GROUP:

SPECIALITY	GROUP I (50)	GROUP II (50)
General surgery	17	15
Gynaecology	11	13
Orthopaedics	16	18
Urology	06	04

SEX OF THE PATIENTS IN EACH GROUP:

	Male	Female
General surgery	10	05
Gynaecology	-	13
Orthopaedics	04	-
Urology	11	07
GROUP I		

	Male	Female
General surgery	12	05
Gynaecology	-	11
Orthopaedics	06	-
Urology	11	05
GROUP II		

After starting on intravenous drip with Ringers lactate solution, monitors were attached to observe the pulse rate, BP and Spo₂, Epidural injection was given at L2 – L3 interspace by loss of resistance technique, with the table remaining horizontal. Bupivacaine 0.5% in group I or Bupivacaine 0.5% and Neostigmine 100µg in group II patients was given. Paramedication with Midazolam 1mg IV was given to allay anxiety.

ONSET OF ANALGESIA IN MINUTES:

GROUP I (BUPIVACAINE)	18±3 mins
GROUP II (BUPIVACAINE+NEOSTIGMINE)	5±2 mins

Oxygen was supplemented by an oxygen mask. Vital parameters were recorded every 5 minutes throughout surgery. Patients were observed for respiratory depression, bradycardia, hypotension, nausea, vomiting and pruritus.

DURATION OF ANALGESIA:

GROUP I (BUPIVACAINE)	180±20 mins
GROUP II (BUPIVACAINE+NEOSTIGMINE)	300±20 mins

In the Recovery room Patients were Observed for:

1. Duration of analgesia.
2. Motor blockade (Bromage scale).
 - 0= no motor blockade.
 - 1=inability to raise extended hip.
 - 2=inability to flex the knee.
 - 3=inability to flex the ankle joint.
3. Sedation by the following sedation course.
 - 0= awake.
 - 1= drowsy but responding to verbal stimuli (Mild).
 - 2= responding to moderate touch (Moderate).
 - 3= responding to firm touch (Severe).

RESULTS: The patient's height and weight were comparable. There was no significant difference in height and weight in the two groups.

In this study onset of analgesia, duration of analgesia and cardiovascular stability of the patients were taken into consideration:

- A- Time taken to reach maximum level of sensory blockade in group I is from 20 to 30 minutes and in group II was from 8 to 13 minutes.
- B- Duration of analgesia.
 - Group I (Bupivacaine):180±20 minutes.
 - Group II (Bupivacaine+Neostigmine):300±20 minutes.
- C- Level of analgesia.
 - Group I (Bupivacaine): T8 – T10.
 - Group II Bupivacaine+Neostigmine): T3 – T5.
- D- Haemodynamic changes.
 - Group I- There was 5 to10% fall in pulse rate from the baseline.
 - Group II. There was no significant change in the pulse rate and blood pressure throughout the operation. Only one patient (2%) developed bradycardia which was treated successfully.

Other complications like respiratory depression, nausea, vomiting pruritus were not noticed in any of the patients throughout the operation.

Advantages of Neostigmine in Epidural Anaesthesia:

1. Faster onset–ensures success of epidural injection.
2. Surgeon can start and position the patient without wasting time.
3. Duration–long duration ensures prolonged surgery, like Orthopaedic and plastic surgery without difficulty.
4. Cardiovascular stability found in majority of the patients.
5. Level of analgesia noted to be much higher than usual epidural block level to enable upper abdominal surgeries. Usual level obtained was from T3–T5.

DISCUSSION: Epidural block is used worldwide for anaesthesia (Regional) and for post-operative analgesia. Many adjuvants like Fentanyl, Morphine, Clonidine,⁽¹⁾ and other opioids⁽²⁻⁶⁾ and

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epinephrine have been investigated in epidural space and they showed improvements in duration, intensity of analgesia and reduction in local anaesthetic dose. Now the study is on analgesic effectiveness of Neostigmine used in conjunction with Bupivacaine. The results showed improvement in the clinical performance.

The current study proved by adding 100µg of Neostigmine to Bupivacaine 0.5% increase the speed of onset, duration of analgesia and improvement in haemodynamic stability in comparison with control group.

Epidurally administered Neostigmine causes analgesia in animals and humans by preventing breakdown of synaptically released Acetylcholine which acts on Muscarinic receptors and Nicotinic receptors.⁽⁷⁾

Acetylcholine induces analgesia by increasing cGMP by generating NO.^{8,9} Neostigmine produces analgesia but causes severe nausea and vomiting in subarachnoid block probably due to cephalad spread and action in the brain stem.⁽¹⁰⁾ But no such side effects were observed when it was given epidurally.

Since α_2 adrenergic agonists and Neostigmine act through the same mechanism, additive analgesic enhancement has been observed with combination of epidural Neostigmine in volunteers. In addition Neostigmine increases sympathetic outflow, thus counteracting the hypotension of local anaesthetics. Neuroaxial administration of this cholinesterase inhibitor inhibits breakdown of the endogenous spinal neurotransmitter acetylcholine which has been shown to produce analgesia.⁽¹¹⁾

Epidural neostigmine combined with sufentanyl or clonidine initiates labour analgesia without side effects but intrathecal neostigmine although has analgesic effects produces gastrointestinal side effects.⁽¹²⁾ Epidural neostigmine offered better analgesia in labour.⁽¹³⁾ Sedation was dependant on the dose of neostigmine.⁽¹⁴⁾

In the present study mean arterial pressure and heart rate were assessed in both groups at every 5 minutes. None of the patients had fall in blood pressure or change in the heart rate. Bradycardia of less than 50/min was noticed in one patient (2%) and it was successfully treated.

There were no other side effects like pruritus, nausea, vomiting.

CONCLUSION: It may be concluded that Neostigmine as an adjuvant to epidural Bupivacaine (0.5%) enhances onset of action, prolongs duration of analgesia and produces higher level of anaesthesia with negligible associated side effects.

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