

COMPARISON OF NALBUPHINE WITH 0.5% BUPIVACAINE AND NORMAL SALINE WITH 0.5% BUPIVACAINE FOR POST-OPERATIVE EPIDURAL ANALGESIAP. Sateesh Kumar¹, B. Annapurna Sarma², D. B. V. Madhusudhana Rao³, K. Aparanji⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: AIM: Our aim is to evaluate the role of Nalbuphine as an additive to Bupivacaine to increase the duration of analgesia postoperatively by epidural anaesthesia. **METHODS:** 60 patients randomly allocated into two groups, 30 patients in each of both sexes ranging from 18-50 yrs age group of ASA grade I and II, posted for lower abdominal surgeries using 0.2mg/kg of Nalbuphine (Made to 1ml) with 0.5% Bupivacaine 19ml in study group epidurally with control group 0.5% Bupivacaine with 1ml of normal saline. **RESULT:** Epidural Nalbuphine produces early onset of sensory blockade significantly at 3.23±0.97mins (Control group 15.30±2.97mins), and prolongs the duration of postoperative analgesia significantly up to 449.67±39.43mins. (Control group 185.93±32.43mins). **CONCLUSION:** In conclusion epidural Nalbuphine 0.2mg/kg with 0.5% Bupivacaine produces early onset of analgesia and prolonged duration of analgesia compared with 0.5% Bupivacaine with Normal saline.

KEYWORDS: Nalbuphine, Epidural analgesia, Bupivacaine, Post-operative pain.

INTRODUCTION: The quest for pain relief, following surgery continues from beginning of the history of surgery. Pain is defined by International association for the study of Pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage".

Pain following injury is a universal phenomenon and surgery is an intentional injury with an unwanted effect, pain, which is to be relieved for the better outcome of the surgery and anesthesia.

Pain has its effects on every system of the body-affecting both physiological and psychological functions of the individual. Autonomic nervous system is stimulated by pain leading to various stress responses which are deleterious to the patient.

Many drugs are tried by various routes including inhalational, intravenous, parenteral, intrathecal and epidural for the pain relief.

Post-operative analgesia is provided with NSAID & Opioids in repeated doses. Epidural administration of Nalbuphine provides prolonged post-operative pain relief by exerting its action on the opioid receptors. Because of its hydrophilic nature, it exerts prolonged action and in dose of 0.2mg/kg, the side effects like respiratory depression, nausea, vomiting and pruritus are kept to a minimum.

AIM OF STUDY: To study the efficacy of 0.5% Bupivacaine with Nalbuphine (0.2mg/kg) Vs Bupivacaine 0.5% with Normal Saline by Epidural route for providing postoperative analgesia in

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patients undergoing lower abdominal surgeries to observe the onset and duration of sensory blockade, effects on vital parameters, incidence of complications and side effects

MATERIALS AND METHODS: This study was carried out after obtaining approval by the institutional ethical committee and written informed consent, A total number of 60 patients, allocated randomly 30 in each group were selected for study. Patients ASA grade I and II physical status, aged between 18-50yrs belonging to both sex undergoing lower abdominal surgeries are included in the study. Patients with ASA Grade III, IV and V, history of hypersensitivity to local anaesthetics, dependent on opioids local infection at the site of injection and uncooperative patients were excluded from the study.

During preoperative visit patient's detailed history, general physical examination and systemic examination were carried out. Basic demographic data like age, sex, height and weight were recorded. Linear visual analogue scale (VAS) was explained to all patients using a 10cm scale. All the patients were pre medicated with Inj. Midazolam 0.1-0.5mg/kg I.M 45-60mins prior to procedure. Venous cannulation was done with 18 G IV cannula and all the patients were preloaded with 500 ml of Lactated Ringer's solution. For all patients epidural anaesthesia was administered. 18G epidural catheter was threaded through the epidural space for 3-4 cm, 3 ml of 1.5% Lignocaine with 15µgm Adrenaline was given as test dose and patient turned to supine position.

The study was designed as a prospective, randomized, double-blind, placebo-controlled trial. Patients were randomly allocated in this double blind study (Using an opaque sealed envelope technique) into two groups of 30 each. The drug solutions were prepared by an anesthesiologist not involved in the study. The anesthesiologist performing the epidural block and observing the patient was blinded to the treatment group. Data collection was done by the same anesthesiologist who was unaware of the group allocation.

Group A (n=30) were given 19ml of 0.5% Bupivacaine with 1ml of Normal saline. Group B (n=30) were given 19ml of 0.5% Bupivacaine with 0.2mg/kg Nalbuphine (Made as 1 ml) was injected through the epidural catheter. The syringes were loaded with drug by another author not involved in administering the injections and in further evaluation of the patients.

Level of sensory block was assessed by pinprick and the onset of blockade was noted. Intra operatively no opioids or analgesics were administered and if administered the patients were excluded from the study.

In both the groups the time of injection was recorded as zero hour and onset of blockade, level of sensory blockade, quality of motor blockade by BROMAGE SCALE, 2-segment regression time, the time at which rescue analgesic was given are noted. Continuously SPO2 was monitored and pulse rate, blood pressure (NIBP), respiratory rate were recorded once in every 5 mins. Side effects like nausea, vomiting, pruritis, respiratory depression and degree of sedation are noted in both the groups.

Bromage Scale:

1. Full leg movement.
2. Inability to raise extended leg, can bend knee.
3. Inability to bend knee, can flex ankle.
4. No movement.

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Sedation Was Assessed by Wilson's Sedation Scoring:

1. Awake and alert.
2. Awake but drowsy.
3. Eyes closed but arousable to command.
4. Eyes closed but arousable to mild physical stimulation.
5. Eyes closed but unarousable to mild physical stimulation.

If the surgical procedure is prolonged and patient requires further blockade, 10-12ml of 0.5% Bupivacaine is given by epidural route. In both the groups postoperative analgesia is provided by 0.125% Bupivacaine with 10mg Nalbuphine.

Patients were monitored every 30 mins for the first 6hrs and thereafter once in every 3 hrs up to 24 hours postoperatively. If the respiratory rate was below 10 /min respiratory depression was diagnosed. The duration of analgesia was calculated when the Visual analogue scale reached 5 or more or when the patient complained of moderate to severe pain.

At the end of study all data is compiled and statistically analyzed by paired or unpaired "t" test, Chi-square test to assess the statistical difference between the 2 groups.

OBSERVATIONS AND RESULTS: AGE DISTRIBUTION: The age distribution in both the groups was 18 to 50 years. The mean age and the age distribution in both groups were comparable and there is no statistical significance.

Age in years	Group A	Group B
18-30	11	8
31-40	12	17
41-48	7	5
Total	30	30
Mean	33	32.50
S.D	21.21	17.68

Table 1

$t = 0.0992$, P value equals 0.9213.

TYPES OF SURGERIES: The surgeries done were similar in both the groups, statistically comparable in both the groups.

Type of surgery	Group A	Group B
Herniorrhaphy	10	8
Eversion of sac	3	6
Appendicectomy	6	5
Amputation of pennies	1	2
Abdominal hysterectomy	3	4
Vaginal hysterectomy	4	3
Ovariectomy	3	2
Total	30	30

Table 2

$P > 0.05$ there is no statistical significance.

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ONSET OF ANALGESIA: The mean time of onset of analgesia in group A was 15.30 ± 2.97 min and in group B was 3.23 ± 0.97 mins.

The statistical analysis by "t" test, showed that there is a statistically significant difference ($P < 0.0001$) between the two groups.

	Group A	Group B
Range (mins)	10-22	2-5
Mean (mins)	15.30	3.23
Sd	2.97	0.97

Table 3

$P < 0.0001$.

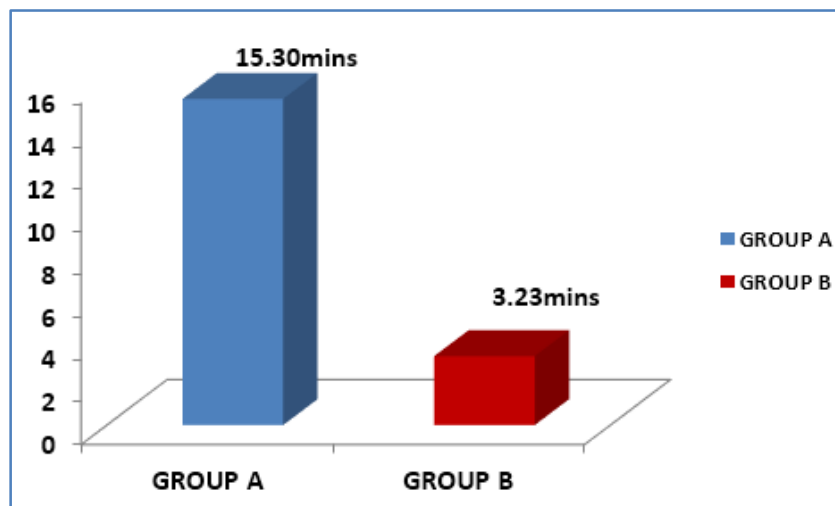


Fig. 1: Onset of Analgesia

DURATION OF ANALGESIA: The duration of analgesia in group A was 185.93 ± 32.43 mins and in group B was 449.67 ± 39.43 mins. The statistical analysis by "t" test, showed that there is a statistically significant difference ($P < 0.0001$) between the two groups.

	Group A	Group B
RANGE (mins)	120-260	360-510
MEAN (mins)	185.93	449.67
SD	32.43	39.43

Table 4

$P < 0.0001$.

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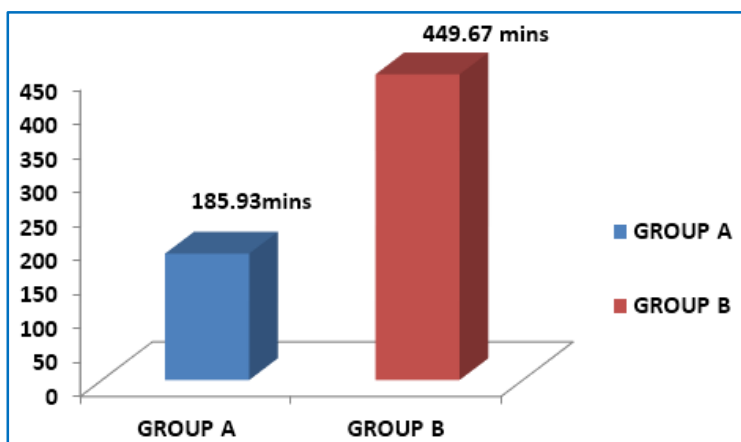


Fig. 2: Duration of Analgesia

LEVEL OF CONSCIOUSNESS (SEDATION): None of the patients in group A had sedation. In group B, after half an hour and 1 hour of giving the drug 15(50%), after 2 hours about 12(40%) of patients had the Wilson's sedation score of 2. None of the patients in group B had sedation score of 3 or 4. Sedation score was higher and was maximum at 1 hour with group B which was statistically highly significant (P 0.0006).

Sedation Score	After 1/2 hour				After 1 hour				After 2 hours			
	1	2	3	4	1	2	3	4	1	2	3	4
Group - A	28	2	-	-	28	2	-	-	30	-	-	-
Group - B	15	15	-	-	15	15	4	-	18	12	-	-
Chi-square Test (X^2)	$X^2 = 11.81$				$X^2 = 11.81$				$X^2 = 20.49$			
Test of significance	P=0.0006				P=0.0006				P=0.001			

Table 5

There is no significant difference in relation to hemodynamics (H.R, B.P, SPO₂), Degree of Motor Blockade.

OTHER SIDE EFFECTS:

Complications	Group A (n=30)		Group B (n=30)	
	Patients	%	Patients	%
Respiratory depression	-	-	-	-
Pruritis	-	-	2	6.6
Nausea, Vomiting	-	-	2	6.6
Hypotension	3	10	3	10
Urinary retention	1	3.3	2	6.6

Table 6

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Epidural Nalbuphine 0.2mg/kg enhances the duration of analgesia with less side effects. The incidence of pruritis, urinary retention and hypotension are almost similar in both the groups, which was statistically not significant ($p>0.05$). Nausea/vomiting is easily controlled by Inj. Ondansetron 4 mg slow I.V.

DISCUSSION: This study deals with the efficacy of Epidural Nalbuphine 0.2mg/kg combined with 0.5% Bupivacaine in providing postoperative analgesia compared to the Placebo- Normal saline combined with 0.5% Bupivacaine, in lower abdominal surgeries by epidural route.

Considerable evidence exists to implicate the role of opioids in the spinal inhibition of nociceptive transmission. Dorsal horn nociceptive neurons exhibit wind up – a frequency dependent potentiation of their responses to repeated “C” fibre stimulation. Opioids reduce the release of primary afferent transmitters via inhibitory pre synaptic opioid receptors on “C” fibre terminals. Thus reducing or blocking “C” fiber stimulation of the dorsal horn nociceptive neurons and delaying the onset of wind up. In combination with a small dose of opioids, threshold doses of local anaesthetics markedly reduce the “C” fibers evoked response compared with either drug alone.

The synergistic effect is the result of opioids reducing the noxious stimuli arriving at the dorsal horn neuron and the ability of local anaesthetic to reduce the excitability of these cells.

Nalbuphine is a potent analgesic with a low side effect and dependency profile. It is distinguished from other agonist/antagonist analgesics in having greater antagonistic activity and fewer behavioural effects. Nalbuphine admixture with other Opioids has a potential to attenuate the μ opioid effects and enhance the κ opioid effects. Analgesic effect is additive and decrease the incidence of pruritis and also antagonize the respiratory depressant activity of other narcotics.^(1,2,3,4,5)

Nalbuphine is a partial agonist and has its effects at the kappa receptors. This is important as it suggests a ceiling effect is be present in the response produced.⁽⁶⁾

Nalbuphine is as effective as Ondansetron (4-8mg I.V) for the prevention of epidural Morphine induced pruritis which occurs via agonism at the μ receptors and thus does not cause any pruritis. Absence of pruritis with nalbuphine has also been reported by other authors.^(4,7,8,9)

In this study, 60 patients were made into 2 groups, each comprising of 30 and of both sex ranging from 18- 50 yrs age group with ASA grade I and II, selected for lower abdominal surgeries.

They were subjected to 0.2mg/kg of Nalbuphine (Made to 1 ml) with 0.5% Bupivacaine 19ml in study group epidurally, with control group 0.5% Bupivacaine 19 ml with 1ml of Normal saline.

Demographic data comparing age, sex, height, and weight shows no statistically significant difference ($P<0.05$) among both the groups.

The mean time of onset of analgesia in group A was 15.30 ± 2.97 min and in group B was 3.23 ± 0.97 mins. The statistical analysis by “t” test, showed that there is a statistically significant difference ($P < 0.0001$) between the two groups.

The duration of analgesia in group A was 185.93 ± 32.43 mins and in group B was 449.67 ± 39.43 mins. The statistical analysis by “t” test, showed that there is a statistically significant difference ($P < 0.0001$) between the two groups.

As there was no need to administer any analgesic in postoperative period in Nalbuphine group, Nalbuphine can be considered cost effective as it produces prolonged postoperative analgesia.

It was found that Nalbuphine was effective as postoperative analgesic with no incidence of pruritis.⁽¹⁰⁾

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In group B, after half an hour and 1 hour of giving the drug 15(50%), after 2 hours about 12(40%) of patients had the Wilson's sedation score of 2. None of the patients in group B had sedation score of 3 or 4. It is highly desirable to have the patient with mild to moderate sedation during regional analgesia. The incidence of pruritis, urinary retention and hypotension are almost similar in both the groups, which was statistically not significant ($p>0.05$). Only 6.6% of study group patients had nausea and vomiting, which could be controlled with 4mg of I.V Ondansetron.

CONCLUSION: In conclusion, epidural Nalbuphine 0.2mg/kg with 0.5% Bupivacaine produces early onset of analgesia and prolonged duration of analgesia compared with 0.5% Bupivacaine with Normal saline. The addition of Nalbuphine produces significantly prolonged post-operative analgesia with very minimal incidence of adverse effects in patients with lower abdominal surgeries, with desirable sedation.

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