

Efficacy of Intrathecal Neostigmine with Intrathecal Dexmedetomidine in Postoperative Analgesia

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Abstract

Background: The present study was conducted to compare the efficacy of intrathecal neostigmine with intrathecal dexmedetomidine in postoperative analgesia. **Subjects and Methods:** The present study was conducted in the department of Anesthesia involving 100 patients belonging to ASA grade I and II, posted for elective Sub umbilical surgeries, under spinal anaesthesia. Group I patients received 3.0ml of hyperbaric solution of 0.5% bupivacaine + 50mcg (0.5ml) of Neostigmine. Group II patients received 3.0ml of hyperbaric solution of 0.5% bupivacaine + 10mcg (0.5ml) of dexmedetomidine. **Results:** The maximum patients were seen in age group 18-30 years ie 10 in group I and 16 in group II and minimum in 41-50 years ie 6 in group I and 4 in group II. The mean time for onset of sensory block in group I was 1.43 ± 0.53 min and in group II was 2.319 ± 0.44 min. The mean time for onset of peak sensory block in group I was 5.48 ± 0.43 min and Group II was 7.31 ± 0.44 min. Time for two segment regression was significantly higher in dexmedetomidine group as compared to neostigmine group, the mean time for two segment regression in group I was 124.98 ± 21.48 min and group II was 165.24 ± 14.45 min. The mean time for onset of motor block was 3.079 ± 0.44 min in group I and 4.0454 ± 0.38 min in group II. The mean duration of motor block in group I was 191.58 ± 26.81 min and 324 ± 36.8 min in group II. The difference was significant ($P < 0.05$). The mean sedation score in group I was 1.03 and in group II was 2.07. The difference was significant ($P < 0.05$). **Conclusion:** Authors recommend the use of dexmedetomidine as an adjuvant to bupivacaine in subarachnoid block.

Keywords: Bupivacaine, Dexmedetomidine, Subarachnoid block

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Introduction

Spinal anesthesia is the most commonly used technique for lower abdominal surgeries as it is very economical and easy to administer. However, postoperative pain control is a major problem because spinal anesthesia using only local anesthetics is associated with relatively short duration of action, and thus early analgesic intervention is needed in the postoperative period.^[1] Many adjuvants are commonly used to prolong the duration of analgesia. The addition of opioids to local anesthetic solution has disadvantages, such as pruritus and respiratory depression.^[2]

Neostigmine is an anticholinesterase agent, which inhibits the hydrolysis of acetyl choline. Spinal neostigmine apparently activates descending pain inhibitory systems that rely on a spinal cholinergic interneuron, probably exacerbating a cholinergic tonus that is already activated during the post-

operative period and seems to be extremely efficient for alleviating somatic pain.^[3]

Bupivacaine is the most commonly employed local anaesthetic for subarachnoid block, but has limited duration of action. Perioperative haemodynamic status is also a concern. Opioids, though useful as adjuvants, are associated with undesirable side effects. Hence ideal adjuvants that can be used with bupivacaine for stable intraoperative conditions and prolonging the post-operative analgesia with minimal side effects are being investigated.^[4]

Dexmedetomidine, a new highly selective α_2 -agonist, acts by binding to presynaptic C- fibers and postsynaptic dorsal horn neurons. Their analgesic action is a result of depression of the release of C-fiber transmitters and hyper polarisation of postsynaptic dorsal horn neurons.^[5] This study aims to determine the effect of intrathecal administration of neostigmine

and dexmedetomidine as adjuvants on the onset and duration of sensory and motor block and postoperative analgesia produced by spinal bupivacaine.^[6] The present study was conducted to compare the efficacy of intrathecal neostigmine with intrathecal dexmedetomidine in postoperative analgesia.

Subjects and Methods

The present study was conducted in the department of Anesthesia involving 100 patients belonging to ASA grade I and II, posted for elective Sub umbilical surgeries, under spinal anaesthesia. Written permission was obtained from all involved patients and ethical clearance was taken from ethical committee. Group I patients received 3.0ml of hyperbaric solution of 0.5% bupivacaine + 50mcg (0.5ml) of Neostigmine. Group II patients received 3.0ml of hyperbaric solution of 0.5% bupivacaine + 10mcg (0.5ml) of dexmedetomidine.

A thorough pre- anaesthetic evaluation was carried out in all patients. All the patients were investigated pre-operatively and the following routine investigations, complete blood count, random blood sugar, RFT, Serum electrolytes and ECG were done.

Parameters such as time of onset of sensory blockade, maximum level of sensory blockade, duration of sensory and motor blockade, time of onset of motor blockade, duration of motor blockade and post op analgesia duration was recorded. Results were subjected to statistics for analysis.

Results

Table 1: Distribution of patients

Age groups (years)	Group I	Group II
18-30 yrs	10	16
31-40 yrs	11	12
41-50 yrs	6	4
51-60 yrs	13	8
61-75 yrs	10	10
Total	50	50

[Table 1] shows that maximum patients were seen in age group 18-30 years ie 10 in group I and 16 in group II and minimum in 41-50 years ie 6 in group I and 4 in group II.

[Table 2 & Figure 1] shows that the mean time for onset of sensory block in group I was 1.43 ± 0.53 min and in group II was 2.319 ± 0.44 min. The mean time for onset of peak sensory block in group I was 5.48 ± 0.43 min and Group II was 7.31 ± 0.44 min. Time for two segment regression was significantly higher in dexmedetomidine group as compared to

neostigmine group, the mean time for two segment regression in group I was 124.98 ± 21.48 min and group II was 165.24 ± 14.45 min. The mean time for onset of motor block was 3.079 ± 0.44 min in group I and 4.0454 ± 0.38 min in group II. The mean duration of motor block in group I was 191.58 ± 26.81 min and 324 ± 36.8 min in group II. The difference was significant ($P < 0.05$).

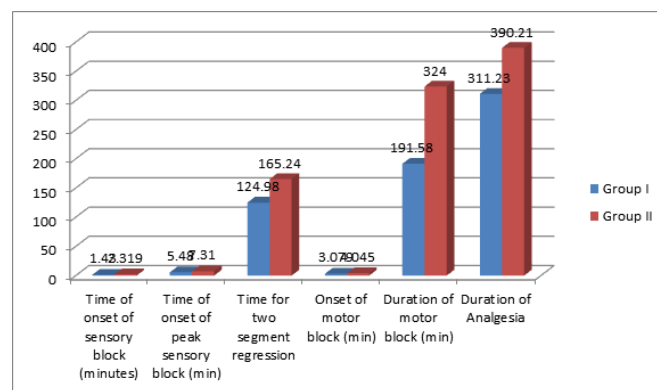


Figure 1: Comparison of parameters

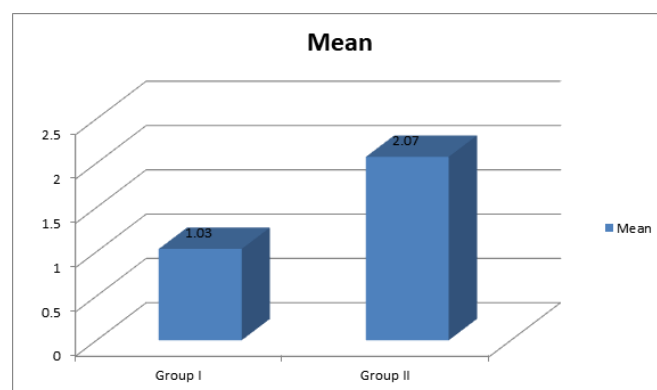


Figure 2: Comparison of sedation score

[Figure 2] shows that mean sedation score in group I was 1.03 and in group II was 2.07. The difference was significant ($P < 0.05$).

Discussion

Subarachnoid block has been most extensively used for lower abdominal and lower limb surgeries because of its simplicity, speed, reliability and minimal exposure to depressant drugs.^[7] The aim of good postoperative analgesia is to produce a long lasting, continuous effective analgesia with minimum side effects. Intrathecal administration of neostigmine produces

Table 2: Comparison of parameters

Parameters	Group I	Group II	P value
Time of onset of sensory block (minutes)	1.43 ± 0.53	2.319 ± 0.44	0.01
Time of onset of peak sensory block (min)	5.48 ± 0.43	7.31 ± 0.44	0.01
Time for two segment regression	124.98 ± 21.48	165.24 ± 14.4	0.02
Onset of motor block (min)	3.079 ± 0.44	4.045 ± 0.386	0.04
Duration of motor block (min)	191.58 ± 26.81	324 ± 36.8	0.05
Duration of Analgesia	311.23 ± 34.43	390.21 ± 25.33	0.02

well-known side effects of nausea and vomiting perioperatively due to rostral spread of neostigmine to the brainstem site.^[8] Dilution of drug with local anaesthetic has probably reduced the incidence in our study. Keeping the patients in sitting posture while administering the drug or by diluting the drug with hyperbaric solution prevents the rostral spread.^[9] The present study was conducted to compare the efficacy of intrathecal neostigmine with intrathecal dexmedetomidine in postoperative analgesia.

In present study, maximum patients were seen in age group 18-30 years ie 10 in group I and 16 in group II and minimum in 41-50 years ie 6 in group I and 4 in group II. Sapna Joshi et al,^[10] in their study evaluated the addition of 15 mcg of dexmedetomidine to 0.5% hyperbaric bupivacaine 3 ml intrathecally for elective abdominal and lower limb surgeries. The study concluded that intrathecal dexmedetomidine in the dose of 15 µg significantly prolongs the anesthetic effects of bupivacaine and can be beneficial in surgeries of long duration, precluding the need for an epidural or general anesthesia.

We found that the mean time for onset of sensory block in group I was 1.43 ± 0.53 min and in group II was 2.319 ± 0.44 min. The mean time for onset of peak sensory block in group I was 5.48 ± 0.43 min and Group II was 7.31 ± 0.44 min. Time for two segment regression was significantly higher in dexmedetomidine group as compared to neostigmine group, the mean time for two segment regression in group I was 124.98 ± 21.48 min and group II was 165.24 ± 14.45 min. The mean time for onset of motor block was 3.079 ± 0.44 min in group I and 4.0454 ± 0.38 min in group II. The mean duration of motor block in group I was 191.58 ± 26.81 min and 324 ± 36.8 min in group II. Shagufta Naaz et al,^[11] in their study on optimal dose of intrathecal dexmedetomidine in lower abdominal surgeries included adult ASA I and II patients. Groups were designed as 2.5ml hyperbaric bupivacaine with 0.5ml saline (Control) or 0.5ml dexmedetomidine: 5mcg (D1), 10mcg (D2), 15 mcg (D3) and 20 mcg (D4). They concluded that 10 mcg of dexmedetomidine is optimal intrathecal dose.

We found that mean sedation score in group I was 1.03 and in group II was 2.07. SS Nethra et al,^[12] investigated the effects

of addition of dexmedetomidine to hyperbaric bupivacaine on duration of analgesia, sensory and motor block characteristics for ambulatory surgeries. Forty adult patients between 18 and 55 years of age were divided into 2 groups. Group D received intrathecal 0.5% hyperbaric bupivacaine 6 mg (1.2 ml) with injection dexmedetomidine 5 µg in 0.5 ml of normal saline and Group N received intrathecal 0.5% hyperbaric bupivacaine 6 mg (1.2 ml) with 0.5 ml of normal saline. The parameters assessed were time to regression of sensory blockade, motor blockade, ambulation, time to void, first administration of analgesic. The study concluded that addition of 5µg intrathecal dexmedetomidine to intrathecal bupivacaine 6 mg as adjuvant provides prolonged post-operative analgesia and it also prolongs the duration of motor blockade, time for ambulation and time to void which can be a hindrance to its routine use in ambulatory care.

The shortcoming of the study is small sample size.

Conclusion

Authors found that the use of intrathecal neostigmine added to hyperbaric bupivacaine significantly hastens the onset of sensory and motor block. Dexmedetomidine when used intrathecally along with bupivacaine significantly prolongs the duration of motor blockade. Authors recommend the use of dexmedetomidine as an adjuvant to bupivacaine in subarachnoid block.

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