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Original Article

Intrathecal isobaric ropivacaine plus dexmedetomidine and isobaric ropivacaine plus clonidine for elective lower abdominal and lower limb surgeries

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ABSTRACT:

Background: Ropivacaine lower propensity for motor block and reduced potential for CNS toxicity and cardiotoxicity, appears to be an important option for regional anaesthesia and management of postoperative and labour pain. The present study compared 0.75% intrathecal isobaric ropivacaine plus dexmedetomidine and 0.75% isobaric ropivacaine plus clonidine for elective lower abdominal and lower limb surgeries. **Materials & Methods:** 120 patients undergoing lower abdominal and lower limb surgeries under intrathecal anesthesia were divided into groups. Group I (60) patients received isobaric ropivacaine 0.75% 15 mg + 30 mcg clonidine and group II (60) patients received isobaric ropivacaine 0.75% 15 mg + 10 mcg dexmedetomidine. Evaluation of sensory blockade, motor blockage, Modified Bromage scale, VAS and analgesia was performed. **Results:** There were 35 males and 25 females in group I and 32 males and 23 females in group II. The mean duration of surgery was 102.1 mins in group I and 108.9 mins in group II. The mean time to onset of sensory analgesia was 6.4 minutes in group I and 3.2 minutes in group II. The time taken for regression of sensory block to t12 was 148.2 minutes in group I and 196.7 minutes in group II. The mean time to first postoperative analgesic requirement (in minutes) was 262.4 in group I and 352.4 in group II. The mean time taken to achieve complete motor blockade was 12.2 minutes in group I and 11.8 minutes in group II. The mean VAS in group I was 4.3 and in group II was 3.7. The difference in VAS score among both group ($P< 0.05$) was significant. **Conclusion:** Dexmedetomidine with ropivacaine showed earlier sensory blockade, prolonged duration of sensory and motor blockade for patients under intrathecal anesthesia for lower limb surgeries.

Key words: Dexmedetomidine, ropivacaine, limb surgeries

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INTRODUCTION

Ropivacaine an amide local anesthetic which was approved by the Food and Drug Administration (FDA) in 1997 but used extensively in India since 2009 which is with a high pKa and low lipid solubility has gained popularity as an intrathecal agent. It may be a suitable alternative as long-acting local anesthetic because it is considered to be less cardiotoxic and has a significantly higher threshold for central nervous system (CNS) toxicity on a milligram basis than bupivacaine.

The efficacy of ropivacaine is similar to that of bupivacaine and levobupivacaine for peripheral nerve blocks and, although it may be slightly less potent than bupivacaine when administered epidurally or intrathecally, equi-effective doses have been established.[3] Thus, ropivacaine, with its efficacy, lower propensity for motor block, and reduced potential for CNS toxicity and cardiotoxicity, appears to be an important option for regional anaesthesia and management of postoperative and labour pain.[4]

Clonidine, a selective partial α2 -adrenergic agonist, is being extensively evaluated as an adjuvant to intrathecal local anaesthetics and has proven to be a potent analgesic free of opioid-related side effects.[5] It is known to increase both sensory and motor blockade of local anaesthetics. The present study compared 0.75% intrathecal isobaric ropivacaine plus dexmedetomidine and 0.75% isobaric ropivacaine plus clonidine for elective lower abdominal and lower limb surgeries.

MATERIALS & METHODS

The present study was conducted on 120 patients undergoing lower abdominal and lower limb surgeries under intrathecal anesthesia. A written informed consent was obtained from all the patients.

Demographic data was recorded. Patients were divided into groups. Group I (60) patients received isobaric ropivacaine 0.75% 15 mg + 30 mcg clonidine and group II (60) patients received isobaric ropivacaine 0.75% 15 mg + 10 mcg dexmedetomidine. The level of Hb, PCV, BT, CT, RFT, blood sugar, ECG, CXR etc. was recorded. History of hypotension, tachycardia and bradycardia was recorded. Evaluation of sensory blockade, motor blockage, Modified Bromage scale, VAS and analgesia was performed. Results of the study

was statistically analyzed using chi- square test. P value less than 0.05 was considered significant (P< 0.05).

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Agent	isobaric ropivacaine 0.75% 15 mg + 30 mcg clonidine	isobaric ropivacaine 0.75% 15 mg + 10 mcg dexmedetomidine
M:F	35:25	32:23

Table I shows that there were 35 males and 25 females in group I and 32 males and 23 females in group II.

Table II Comparison of parameters

Parameters	Group I	Group II	P value
Duration of surgery (mins)	102.1	108.9	0.12
Onset of sensory analgesia (mins)	6.4	3.2	0.001
Time taken for regression of sensory block to t12	148.2	196.7	0.05
Time to first postoperative analgesic requirement (in minutes)	262.4	352.4	0.01
Time taken to achieve complete motor blockade (in minutes)	12.2	11.8	0.03

Table II, graph I shows that mean duration of surgery was 102.1 mins in group I and 108.9 mins in group II. The mean time to onset of sensory analgesia was 6.4 minutes in group I and 3.2 minutes in group II. The time taken for regression of sensory block to t12 was 148.2 minutes in group I and 196.7 minutes in group II. The mean time to first postoperative analgesic requirement (in minutes) was 262.4 in group I and 352.4 in group II. The mean time taken to achieve complete motor blockade was 12.2 minutes in group I and 11.8 minutes in group II. The difference was significant (P< 0.05).

Graph I Comparison of parameters

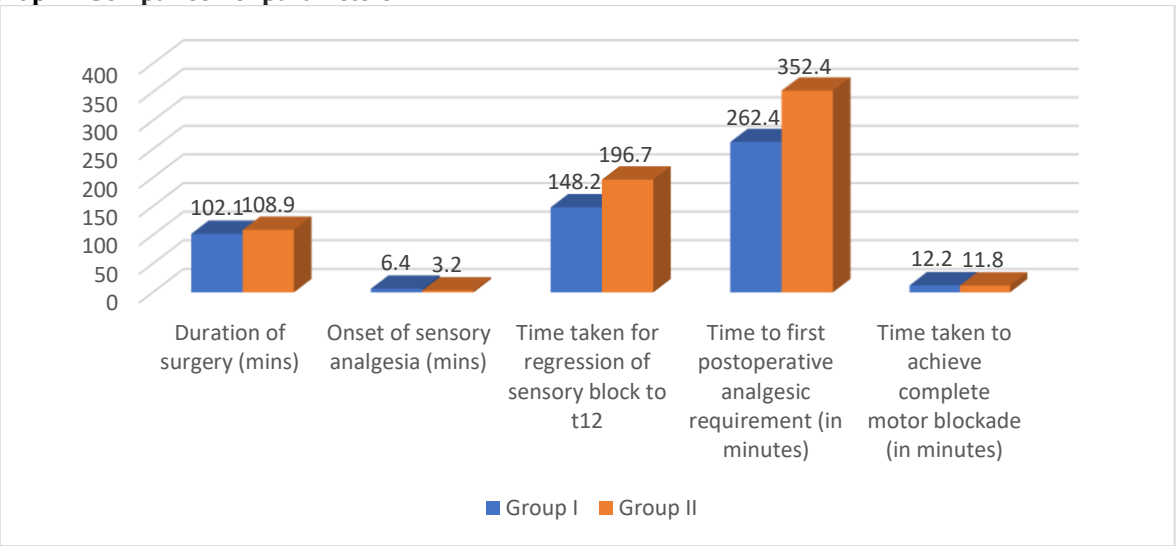

Table III Assessment of VAS

Groups	Mean	P value
Group I	4.3	0.05
Group II	3.7	

Table III, graph II shows that mean VAS in group I was 4.3 and in group II was 3.7. The difference in VAS score among both group (P< 0.05) was significant.

DISCUSSION

Pain is one of the most noxious stimuli a living being perceives; the most painful moments are the surgical procedure.[1] With the advances in the field of anesthesia various techniques are being used to alleviate pain in the peri-operative period. Intrathecal anaesthesia has replaced general anesthesia as the first-line method to provide anaesthesia for lower abdominal and lower limb surgeries as it is very economical and easy to administer.[2] Local anaesthetics are the commonest agents used for spinal anaesthesia. Ropivacaine is a new local anaesthetic which combines the anaesthetic potency and long duration of action of bupivacaine with a toxicity profile intermediate between bupivacaine and lidocaine and has advantage of faster recovery.

Intrathecal clonidine has been used as an adjuvant to local anaesthetics in various surgical procedures without any clinically significant side effects. Previous studies have described the use of clonidine in a wide range (15—150 mcg).[6] Dexmedetomidine is new, highly selective α_2 adrenoceptor agonist that has been approved by the Food and Drug Administration (FDA) as an intravenous sedative and analgesic drug in intubated patients in the intensive care settings. Its α_2:α_1 selectivity is eight times higher than that of Clonidine.[7]

Spinal adjuvants decrease the dose of local anaesthetics, improve the quality of intraoperative anaesthesia without altering the height of the block, provides effective postoperative analgesia.[7]The anaesthetic and analgesic requirements gets reduced by the use of alpha 2 adrenergic agonists.[8] Besides analgesia and sedation they decrease sympathetic tone and attenuate stress response to anaesthesia and surgery. Till recently dexmedetomidine was not available in India though it is being used in other countries since many years. Since it has been recently introduced in India and not many studies have been done in India regarding its use as an adjuvant to local anaesthetic agents for intrathecal purpose hence there is a need to study its effectiveness for spinal anaesthesia. However, only a few studies are currently available in literature evaluating the efficacy of intrathecal Dexmedetomidine in prolonging the duration of spinal block.[9] The present study compared 0.75% intrathecal isobaric ropivacaine plus dexmedetomidine and 0.75% isobaric ropivacaine plus clonidine for elective lower abdominal and lower limb surgeries.

In present study, there were 35 males and 25 females in group I and 32 males and 23 females in group II. Ravipati et al[10] compared efficacy of dexmedetomidine and fentanyl when given intrathecally as an adjuvant to 2.5 ml of 0.75% isobaric ropivacaine. Sixty selected patients were randomized to receive 2.5 ml of 0.75% isobaric ropivacaine with dexmedetomidine 5 mcg (Group RD) or 20 mcg of fentanyl (Group RF) intrathecally for lower limb surgeries, block characteristics, hemodynamic changes, and adverse effects were compared. Efficacy of both the drugs when given intrathecally was studied. Mean time needed for sensory blockade at T10 was 156.4667 ± 33.78 seconds in group RD and 185.2000 ± 35.17 seconds in group RF. The results are clinically and statistically significant. The mean of total duration of sensory block in Group RD was 194.400 min while it was 139.9000 min in Group RF which was clinically and statistically significant. Time taken for onset of motor block was almost same in both groups. The mean of total duration of motor block in Group RD was 136.7333 min while it was 94.8667 min in Group RF which was clinically and statistically significant (P - 0.000).

We found that mean duration of surgery was 102.1 mins in group I and 108.9 mins in group II. The mean time to onset of sensory analgesia was 6.4 minutes in group I and 3.2 minutes in group II. The time taken for regression of sensory block to t12 was 148.2 minutes in group I and 196.7 minutes in group II. The mean time to first postoperative analgesic requirement (in minutes) was 262.4 in group I and 352.4 in group II. The mean time taken to achieve complete motor blockade was 12.2 minutes in group I and 11.8 minutes in group II. Mahendru et al[11] compared intrathecal administration of clonidine and dexmedetomidine with hyperbaric ropivacaine in fifty patients for lower abdominal surgeries found that dexmedetomidine group had a longer duration of analgesia when compared with clonidine and this difference was statistically significant.

We found that mean VAS in group I was 4.3 and in group II was 3.7. Martin et al[12] who used Clonidine with ropivacaine intrathecally in three different doses of 15, 45, and 75 µg for ambulatory knee arthroscopy, observed that a small 15 µg dose of Clonidine significantly improves the quality of anaesthesia without delaying sensory and motor recovery. They also noted that a 45 µg dose of Clonidine prolongs the sensory blockade without any influence on motor blockade, but a dose of 75 µg is associated with delayed sensory and motor recovery as well as detectable side effects such as hypotension and sedation.

CONCLUSION

Authors found that dexmedetomidine with ropivacaine showed earlier sensory blockade, prolonged duration of sensory and motor blockade for patients under intrathecal anesthesia for lower limb surgeries.

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