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Original Research Article

A Hospital-Based Study Assessing the Efficacy of Hyperbaric Ropivacaine in Patients Undergoing Lower Abdominal and Perineal Surgeries under Spinal Anaesthesia

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Abstract

Aim: The aim of the present study was to assess the efficacy of hyperbaric Ropivacaine in patients undergoing lower abdominal and perineal surgeries under spinal anaesthesia.

Methods: The present study was prospective, observational study, conducted in the Department of Anaesthesiology & Critical Care, Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India. Study duration was of one years. In present study, 50 patients underwent spinal anaesthesia with ropivacaine for lower abdominal and perineal surgeries.

Results: Mean age was 47.33 ± 12.16 Years, mean weight was 64.86 ± 10.46 kgs, gender wise 44% were male while 56% were females, ASA class I were 72%, class II were 28% and mean duration of surgery was 64.6 ± 20.44 min. In present study, average time-to achieve sensory block at T10 level was 3.7 ± 0.46 minutes, average time to achieve maximum block was 5 ± 0.35 minutes, average time taken for Two segment regression was 128 ± 19.65 minutes, average total duration of sensory block was 229 ± 23.32 minutes, mean time for achievement of MBS Grade 3 was 3.7 ± 0.42 minutes and mean total duration (motor) (MBS grade 0) block was 245 ± 26.54 minutes. We noted maximum block at T6 level in 3 patient, 6 patients at T10 level and 21 patients at T8 level.

Conclusion: We observed that the variables assessed to achieve sensory and motor block were satisfactory, without any adverse effects intra and post-operatively. Hence, Ropivacaine (hyperbaric) 0.75% can be used for lower abdominal and perineal surgeries with desired motor and sensory effects with effective surgical time. It can be used successfully for Day care surgeries.

Keywords: sensory block, motor block, ropivacaine, abdominal surgeries, perineal surgeries

Introduction

Spinal anesthesia is a common, economical method of achieving rapid and reliable onset of analgesia with adequate muscle relaxation. Ropivacaine is a long-acting, amide local anesthetic developed and promoted as a potential replacement for bupivacaine, citing reduced cardiotoxicity and neurotoxicity. [1] Ropivacaine is more selective in inhibiting Aδ and C nerve fibers when compared to Aβ nerve fibers. This results in sensory analgesia with a motor blockade of reduced duration. [2] Ropivacaine is being extensively used for peripheral nerve blockade, epidural analgesia, and labor analgesia. Intrathecal administration of ropivacaine has attracted attention owing to its propensity to cause motor blockade of reduced duration, thereby facilitating early ambulation, a requisite for day care surgery.

The preliminary studies evaluated the efficacy and safety of isobaric ropivacaine for neuraxial blockade. [3,4] Intrathecal ropivacaine was found to be safe, having shorter duration of action than bupivacaine and lesser incidence of transient neurological symptoms (TNS) as compared with intrathecal lignocaine. [5,6] Intrathecal use of

hyperbaric LA agents have become more popular as they produce predictable block characteristics and reliable SA. [7,8] Presently only isobaric preparations of ropivacaine are commercially available for the reason of difficulty in maintaining the pharmacological stability of hyperbaric solutions for clinical use. Thus, the aim of this study was to compare the clinical efficacy of 0.5% ropivacaine (made hyperbaric by the addition of desired dose of dextrose from autoclaved 10 ml ampoule of 25% dextrose) with commercial hyperbaric 0.5% bupivacaine using equal doses (15 mg) of almost similar specific gravities and to assess the suitability of ropivacaine as an alternative to lignocaine for intermediate duration of surgeries under SA.

Ropivacaine is a long acting regional anaesthetic (structurally related to bupivacaine), developed to reduce potential toxicity and elicit better sensory and motor block profiles. Ropivacaine is a pure (-S-) enantiomer of bupivacaine. It is structurally similar to bupivacaine except it has a propyl side chain replacing the butyl group in bupivacaine. This smaller side chain contributes to less lipid solubility, less toxicity and increased separation of sensory and motor blockade as compared to bupivacaine. [9] It has selective action on pain transmitting Aδ and C fibres rather than Aβ fibres, thus sparing large myelinated motor fibres unlike other regional anaesthetics. [10] Due to its property of sensory motor dissociation (ability to block sensory nerves to a greater degree than motor nerves), it allows a faster recovery of motor function that occurs after the use of bupivacaine. [11]

The aim of the present study was to assess the efficacy of hyperbaric Ropivacaine in patients undergoing lower abdominal and perineal surgeries under spinal anaesthesia.

Materials and Methods

The present study was prospective, observational study, conducted in the Department of Anaesthesiology & Critical Care, Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India. Study duration was of 1 years. In present study, 50 patients underwent spinal anaesthesia with ropivacaine for lower abdominal and perineal surgeries.

Inclusion criteria: Patients of ASA grade I/II, posted for elective lower abdominal or perineal surgery under spinal anesthesia gave written informed consent to take part in the study.

Exclusion criteria: ASA physical status III and above, Pregnant patient, Diabetics and patients on beta blockers, Patients with medical complications like anaemia, heart disease, severe hypovolemia, shock, septicaemia, Local infection at the site of proposed puncture for spinal anaesthesia, on chronic anticoagulation or antiplatelet drugs, Patients having allergy to the study drugs, patients with spinal deformity/ previous spine surgery, any other contraindications to spinal anaesthesia, Patient refusal for surgery or study participation.

The patients were explained about the intrathecal use of drug and written consent was taken for participation in study. Complete pre-operative fitness was taken and as per SOPs, patients were kept NBM, shifted to OT, vitals were checked, hydration done. They were administered 3.5cc of Inj. Ropivacaine heavy 0.75% (26.25 mg) with glucose 80 mg at L3-L4 level via 25G Quincke's spinal needle in sitting position. Patient vitals were recorded at 0,5,10,15,20,25,30 and every 15 minutes by NIBP and Pulse oximetry. Sensory block was assessed by pin prick method.

Variables measured were-

Sensory block- Onset of block up to T10 level, Time for maximum level of block achieved, two segment regression, Total duration of sensory block were measured in minutes. Maximum block achieved (dermatome level). Motor block- Time for Modified bromage scale (MBS) (grade 3), Total duration (MBS Grade 0) were measured in minutes.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

Results

Table 1: Demographic Profile

Age	47.33 ± 12.16 Years
Weight	64.86 ± 10.46 kgs
Gender	
Male	22 (44%)
Female	28 (56%)
ASA (I/II)	
I	36 (72%)
II	14 (28%)
Duration of surgery	64.6 ± 20.44 min

Mean age was 47.33 ± 12.16 Years, mean weight was 64.86 ± 10.46 kgs, gender wise 44% were male while 56% were females, ASA class I were 72%, class II were 28% and mean duration of surgery was 64.6 ± 20.44 min.

Table 2: Block characteristics

Block characteristics	Results (mean ± SD) (in mins)
Time to achieve sensory block at T10 level	3.7 ± 0.46
Time taken to achieve maximum block	5 ± 0.35
Time taken for Two segment regression	128 ± 19.65
Total duration (sensory block) (till the first request of analgesia)	229 ± 23.32
Time for achievement of MBS Grade 3	3.7 ± 0.42
Total duration (motor) (MBS grade 0)	245 ± 26.54

In present study, average time-to achieve sensory block at T10 level was 3.7 ± 0.46 minutes, average time to achieve maximum block was 5 ± 0.35 minutes, average time taken for Two segment regression was 128 ± 19.65 minutes, average total duration of sensory block was 229 ± 23.32 minutes, mean time for achievement of MBS Grade 3 was 3.7 ± 0.42 minutes and mean total duration (motor) (MBS grade 0) block was 245 ± 26.54 minutes. We noted maximum block at T6 level in 3 patient, 6 patients at T10 level and 21 patients at T8 level.

Discussion

Spinal anaesthesia is a common safe, economical, easy to perform and effective technique which provides rapid and reliable anaesthesia with muscle relaxation for patients undergoing lower abdominal surgery. [12] Various local anaesthetic commonly used for spinal anaesthesia are lignocaine, bupivacaine, levobupivacaine and ropivacaine. [13]

Ropivacaine in comparison to bupivacaine has been found to be 20% less potent when administered through epidural route and 50% when administered intrathecally. [14] Studies conducted in the past have primarily compared ropivacaine with bupivacaine in terms of quality and duration of analgesia and motor block achieved when administered through epidural route or intrathecally. [15] The spread of isobaric ropivacaine is primarily dependent on the local current generated by the speed of injection and diffusion. Most of the drug is restricted to the site of its deposition, the lumbar and sacral nerve making it reliable for perineal, lower limb, and lower abdominal surgery.[16] Mean age was 47.33 ± 12.16 Years, mean weight was 64.86 ± 10.46 kgs, gender wise 44% were male while 56% were females, ASA class I were 72%, class II were 28% and mean duration of surgery was 64.6 ± 20.44 min.

In present study, average time-to achieve sensory block at T10 level was 3.7 ± 0.46 minutes, average time to achieve maximum block was 5 ± 0.35 minutes, average time taken for Two segment regression was 128 ± 19.65 minutes, average total duration of sensory block was 229 ± 23.32 minutes, mean time for achievement of MBS Grade 3 was 3.7 ± 0.42 minutes and mean total duration (motor) (MBS grade 0) block was 245 ± 26.54 minutes. We noted maximum block at T6 level in 3 patient, 6 patients at T10 level and 21 patients at T8 level.

Chan-Jong Chung et al [17] also concluded that hyperbaric ropivacaine provided effective spinal anesthesia with shorter duration of sensory and motor block. All patients were observed peri and post- operatively for any adverse effects like hypotension, bradycardia, headache, nausea, vomiting and any other signs for Cardiac and CNS toxicity. None of the patients developed any adverse effects. Similar results have been seen in a study by Dene Simpson et al [18], In study by Ankur K et al [19] mean time for onset of sensory block to T10 dermatome level and motor block to Bromage Score 3 were 3.25 ± 0.84 mins and 5.12 ± 0.76 mins respectively. The median value of HSL was T5 (T4 - T6) and mean time to reach HSL was 9.08 ± 1.05 mins. The total duration of sensory and motor block (mean) were 132.22 ± 8.44 mins and 104 ± 8.56 mins respectively. The time needed to mobilize the patients and spontaneous voiding (mean) were 206 ± 9.26 and 230 ± 10.33 mins respectively. Based on Modified Post anesthesia Discharge Scoring System (PADS) in addition to spontaneous micturition, 61 (87.14%) patients were discharged on the same day of operation. Ropivacaine 15 mg in dextrose 8.3% provides reliable SA of shorter duration than bupivacaine 15 mg in 8% dextrose. 0.75% isobaric ropivacaine provided similar duration of analgesia with a shorter duration of motor block as compared to hyperbaric 0.5% bupivacaine and it also provided adequate level of sensory block for the surgery with minimal intraoperative and postoperative side effects and stable hemodynamics throughout the surgery. [20]

Conclusion

We observed that the variables assessed to achieve sensory and motor block were satisfactory, without any adverse effects intra and post-operatively. Hence, Ropivacaine (hyperbaric) 0.75% can be used for lower abdominal and perineal surgeries with desired motor and sensory effects with effective surgical time. It can be used successfully for Day care surgeries.

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