

Study of spinal anaesthesia with Ropivacaine for lower abdominal and perineal surgeries

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Abstract

Background: Ropivacaine is a long-acting regional anaesthetic (structurally related to bupivacaine), developed to reduce potential toxicity and elicit better sensory and motor block profiles. In present study, efficacy of hyperbaric Ropivacaine in patients undergoing lower abdominal and perineal surgeries under spinal anaesthesia was studied. **Material and Methods:** Present study was prospective, observational study, conducted in patients of ASA grade I/II, posted for elective lower abdominal or perineal surgery under spinal anaesthesia gave written informed consent to take part in the study. **Results:** In present study, 30 patients underwent spinal anaesthesia with ropivacaine for lower abdominal and perineal surgeries. Mean age was 46.31 ± 13.14 Years, mean weight was 63.84 ± 10.48 kgs, gender wise 40 % were male while 60% were females, ASA class I were 70 %, class II were 30 %/ and mean duration of surgery was 66.5 ± 20.43 min. Average time-to achieve sensory block at T10 level was 3.9 ± 0.43 minutes, average time to achieve maximum block was 5 ± 0.39 minutes, average time taken for Two segment regression was 129 ± 18.68 minutes, average total duration of sensory block was 228 ± 22.31 minutes, mean time for achievement of MBS Grade 3 was 3.6 ± 0.41 minutes and mean total duration (motor) (MBS grade 0) block was 243 ± 25.56 minutes. We noted maximum block at T6 level in 3 patient, 6 patients at T10 level and 21 patients at T8 level. **Conclusion:** 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

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INTRODUCTION

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.¹ Various local anaesthetic commonly used for spinal anaesthesia are

lignocaine, bupivacaine, levobupivacaine and ropivacaine.² 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.³ It has selective action on pain transmitting A δ and C fibres rather than A β fibres, thus sparing large myelinated motor fibres unlike other regional anaesthetics.⁴ 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.⁵ In present study, efficacy of hyperbaric Ropivacaine in

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patients undergoing lower abdominal and perineal surgeries under spinal anaesthesia was studied.

MATERIAL AND METHODS

Present study was prospective, observational study, conducted in department of anaesthesiology, at JIIU's Indian Institute of Medical Sciences and Research Centre And Noor Hospital, Warudi, Aurangabad-Jalna Road, Badnapur, Jalna-431202, INDIA. Study duration was of 1 year (January 2021 to December 2021). Study was approved by institutional ethical committee.

Inclusion criteria: Patients of ASA grade I/II, posted for elective lower abdominal or perineal surgery under spinal anaesthesia 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 23G 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

In present study, 30 patients underwent spinal anaesthesia with ropivacaine for lower abdominal and perineal surgeries. Mean age was 46.31 ± 13.14 Years, mean weight was 63.84 ± 10.48 kgs, gender wise 40 % were male while 60 % were females, ASA class I were 70 %, class II were 30 %/ and mean duration of surgery was 66.5 ± 20.43 min.

Table 1: Demographic Profile

Parameters	Value (No. of cases/ Mean \pm SD)
Age	46.31 ± 13.14 Years
Weight	63.84 ± 10.48 kgs
Gender (M/F)	
Male	12 (40 %)
Female	18 (60 %)
ASA (I/II)	
I	21 (70 %)
II	9 (30 %)
Duration of surgery	66.5 ± 20.43 min

In present study, average time-to achieve sensory block at T10 level was 3.9 ± 0.43 minutes, average time to achieve maximum block was 5 ± 0.39 minutes, average time taken for Two segment regression was 129 ± 18.68 minutes, average total duration of sensory block was 228 ± 22.31 minutes, mean time for achievement of MBS Grade 3 was 3.6 ± 0.41 minutes and mean total duration (motor) (MBS grade 0) block was 243 ± 25.56 minutes. We noted maximum block at T6 level in 3 patient, 6 patients at T10 level and 21 patients at T8 level.

Table 2: Block characteristics

Block characteristics	Results (mean \pm SD) (in mins)
Time to achieve sensory block at T10 level	3.9 ± 0.43
Time taken to achieve maximum block	5 ± 0.39
Time taken for Two segment regression	129 ± 18.68
Total duration (sensory block) (till the first request of analgesia)	228 ± 22.31
Time for achievement of MBS Grade 3	3.6 ± 0.41
Total duration (motor) (MBS grade 0)	243 ± 25.56

DISCUSSION

Various studies have found spinal anesthesia to be superior to general anaesthesia as it is associated with less blood loss, less need of blood transfusion, less risk of pneumonia, early recognition of signs and symptoms in TURP syndrome, early return of gastrointestinal function following surgeries, blunting of stress response due to surgery, lower incidence of deep vein thrombosis, reduce cost, early ambulation thus reduces the hospital stay.^{6,7} The newer drug ropivacaine being comparatively less cardio toxic, produces minimal motor blockade of shorter duration, relieves the psychological distress of being immobile for a longer period of time after perineal surgeries.⁸ Ropivacaine is less lipophilic than bupivacaine and less likely to enter large myelinated motor fibers, which in turn produces relatively lower motor block and hence has a better motor sensory differentiation with hemodynamic stability.⁹ The purpose of this study was to evaluate the clinical efficacy and safety of spinal anesthesia with 0.75% hyperbaric ropivacaine. We found out that all of our patients achieved rapid and satisfactory sensory and motor block required for lower abdominal or perineal surgeries with good surgical relaxation. This observation is in line with a randomized control trial by Rajni Gupta *et al.*⁴ All patients achieved excellent peri-operative anaesthesia with early post-operative recovery from sensory and motor blockade. Chan-Jong Chung *et al.*,¹⁰ 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.*,¹¹ In study by Ankur K *et al.*,¹² 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. Kulkarni KR *et al.*,¹³ compared ropivacaine with bupivacaine and noted that, ropivacaine produced a slower onset of sensory block (ropivacaine 4.5 min; bupivacaine 3.2 min; $P < 0.05$) and the mean total duration of sensory block was significantly lesser (ropivacaine 155 min; bupivacaine 190.5 min; $P < 0.05$). Patients in the

ropivacaine Group R had significantly more rapid recovery from the motor blockade (ropivacaine 120 min; bupivacaine 190 min; $P < 0.05$) and passed urine sooner than the patients in bupivacaine Group B (ropivacaine 257 min; bupivacaine 358 min; $P < 0.05$). 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.¹⁴ Because of sensorimotor dissociation Ropivacaine should be a favorable drug for day care surgeries and could be associated with early post-operative mobilization.⁴ Regional anesthesia with use of agents such as ropivacaine is associated with early recovery of motor function and ability to void urine, therefore making them ideal for day care surgery.¹⁵

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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