

The Study was Conducted Using Isobaric 0.75% Ropivacaine 3.5ml (26.25mg) Intrathecally for Lower Limb Surgeries to Evaluate Onset and Duration of Sensory Block & Onset and Duration of Motor Block

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Abstract

Background: This study was conducted at Civil Hospital, BJ Medical College, Ahmedabad, after approval from the ethical committee. Fifty patients admitted in our hospital undergoing lower extremity surgeries under spinal anaesthesia were included in the study. **Subjects and Methods:** Patients in the age group 18 – 60 years were selected including 45 males and 5 females. 39 patients had a ASA grade I and 11 patients had ASA grade II. Various lower limb and orthopaedic surgeries like arthroscopic ligaments repair, tibial and flap surgeries were included. **Result:** The duration of surgeries ranged from 45 to 270 minutes. 2% (1 patient) attained a maximum level of T4, 22% (11 patients) had a maximum level of T6, 26% (13 patients) had a maximum level of T8. Maximum number of patients, 44% (20 patients) had a level of T10. 6% (3 patients) had attained a maximum level of T12. Three patients did not achieve complete motor level. By the end of 15 minutes, 86% (43) patients had achieved a **complete** motor block. By the end of 20 minutes 94% (47) patients had attained a complete motor block. The mean time for complete motor block was 10.59 minutes (S.D.±4.7). **Conclusion:** A study was conducted in 50 patients belonging to ASA grade I and II posted for lower limb surgeries. They received 3.5ml of 0.75% isobaric Ropivacaine in L2-3 interspace. All patients were preloaded with 1000 ml of ringer lactate. Following institution of subarachoid block sensory characteristics such as onset of sensory block, maximum level achieved, duration of sensory block and request for first dose of rescue analgesics were studied. Motor blockade characteristics such as onset of motor block, duration and quality of motor blockade were studied. Onset of sensory block till T10 level was found to be 8.5 minutes with a complete regression in 229.28 minutes.

Keywords: Ropivacaine, Intrathecally, Lower Limb & Surgeries.

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Introduction

Ropivacaine, the S(-)-enantiomer of 1-propyl-2,6-pipecoloxylidide, is a new amino-amide local anaesthetic structurally related to bupivacaine and mepivacaine.^[1] Ropivacaine and levobupivacaine are newer, long-acting local anaesthetics which have been developed as an alternative to bupivacaine after reports of seizures and cardiac arrest.^[2]

Quinke in 1891 demonstrated a safe, predictable means of performing lumbar puncture. History of local anaesthesia begins with use of cocaine an ester derivative in 1899 by August Bier in order to produce operative anaesthesia in six patients, the first real spinal anaesthesia. That was associated with several side effects like nausea, vomiting, headache, restlessness and excitability.^[3] Soon in 1905, Heimrich Braun, reported the use of procaine for operative spinal anaesthesia.

Lidocaine was first used in 1945. It has quick onset with duration lasting 30-90 minutes. Lidocaine has been used for short to intermediate length surgeries. It was associated with transient neurologic symptoms (TNS), which presents as low

back pain and lower extremity dysesthesias with radiation to the buttocks, thighs, and lower limbs.^[4,5]

Subjects and Methods

This study was conducted at Civil Hospital, BJ Medical College, Ahmedabad from March 2012 to Feb 2013, after approval from the ethical committee. Fifty patients admitted in our hospital undergoing lower extremity surgeries under spinal anaesthesia were included in the study.

Inclusion Criteria

- Age- 18-60 years
- ASA Grade – I and II
- Lower limb surgeries
- Valid informed consent

Exclusion Criteria

- Hematologic disease
- Bleeding and coagulation abnormalities
- Cardiac and respiratory diseases
- History of allergy to local anaesthetics
- Pregnancy, paediatric age group, geriatric age group
- Local infection in lumbar region

Pre-anesthetic assessment was done prior to the day of surgery which included past history of chronic illness and medication, drug therapy (especially corticosteroids, anti-hypertensive, anti-coagulant, anti-diabetic, anti convulsant medications), drug sensitivity and past anesthetic experience along with routine investigations including, haemoglobin, random blood sugar, serum urea, serum creatinine, and serum electrolytes, chest X-ray, ECG.

Informed and written consent was obtained after explaining the procedure to the patients. A thorough general, airway and physical examination of all systems was carried out. The nature of study and the procedure were explained to the patients, informed and written consent was taken.

Results

The study population consisted of 50 patients posted for lower limb orthopaedic and plastic surgeries. They received isobaric 0.75% ropivacine 3.5cc (26.25 mg) in L2-L3 interspace.

Table 1: Demographic data

Parameters	No. of patients n = 50 (100%)
Age (mean)	18-60 (34.52)
Sex (M:F)	45:5 (90:10)
ASA Grade (I:II)	39:11 (78:22)
Arthroscopic ligament repair	12
Tibial surgeries	8
Flap surgeries	12
Others	18
Duration of surgery (in mins)	45-270 (114.66 mins) (S.D. 49.33)

Patients in the age group 18 – 60 years were selected including 45 males and 5 females. 39 patients had a ASA grade I and 11 patients had ASA grade II. Various lower limb and orthopaedic surgeries like arthroscopic ligaments repair, tibial and flap surgeries were included. The duration of surgeries ranged from 45 to 270 minutes.

Table 2: Maximum height of sensory block.

Level of block	No. of patients (n=50)	% of patients
T4	1	2
T6	11	22
T8	13	26
T10	22	44
T12	3	6

Table 3: Onset of complete motor block

Time (in mins)	No. of patients (n=50)	% of patients
0-5	7	14
6-10	26	52
11-15	9	18
16-20	4	8
21-25	1	2

2% (1 patient) attained a maximum level of T4, 22% (11 patients) had a maximum level of T6, 26% (13 patients) had a maximum level of T8. Maximum number of patients, 44% (20 patients) had a level of T10. 6% (3 patients) had attained a maximum level of T12.

Three patients did not achieve complete motor level. By the end of 15 minutes, 86% (43) patients had achieved a complete motor block. By the end of 20 minutes 94% (47) patients had attained a complete motor block. The mean time for complete motor block was 10.59 minutes (S.D.±4.7).

Table 4: Duration of sensory block

Time (in mins)	No. of patients	% of patients
120-150	4	8
151-180	12	24
181-210	8	16
211-240	11	22
241-270	5	10
271-300	6	12
301-330	2	4
331-360	2	4

Sensory block persisted for 2 hours in all patients. By 3 hours, 32% of patients had recovered from motor block. By 4 hours, 69% of patients had complete regression of sensory blockade. By 5 hours, 96% of patients had complete regression of sensory blockade. The mean duration of sensory block was 229.28±54.91 minutes.

Table 5: Duration of motor block

Time (in mins)	No. of patients	% of patients
120-150	13	26
150-180	11	22
181-210	10	20
211-240	8	16
241-270	4	8
271-300	4	8

Motor block persisted for 2 hours in all the patients. By 3 hours, 47% patients had recovered from motor block. By 4 hours, 84% patients had complete regression of motor blockade. The mean duration of motor block was 200.61±56.79minutes.

Discussion

Van Kleef et al in their comparative study on isobaric 0.5% and 0.75% ropivacaine for lower limb surgeries observed that the median time to reach the highest level of analgesia was 15 mins in 0.5% and 18.8mins in 0.75% group. The upper level of analgesia was T11 in 0.5% group and T10-T11 in 0.75% group. Both were not significant. The analgesic spread was extremely variable with both the solutions being restricted to the lumbosacral segments or extending to the upper thoracic segments which suggests that the dose of glucose free ropivacaine has no effect on the spread of analgesia.^[6]

Jean Marc Malinosky et al in the comparative study of isobaric ropivacaine versus isobaric Bupivacaine for TURP the onset of anesthesia at T10 in study was 13±8mins to pinprick, 9±5mins to cold as compared 11±7mins to pinprick, 8±7mins to cold. The cephalad spread of sensory blocks was higher with bupivacaine(Pinprick T7 and cold T4) than with ropivacaine (Pinprick T9 and cold T6).^[7]

In Ph E. Guatier, De Kock et al in their comparison between isobaric bupivacaine 8mg and intrathecal ropivacaine 8mg, 10mg, 12mg and 14mg found the time to maximum motor block as 15±9, 20±11, 20±11, 20±11 and 18±13 minutes

respectively. There was a significant difference in the percentage of patients attaining maximum motor block between 8mg bupivacaine and 8mg,12mg and 14mg ropivacaine which means that ropivacaine produces less motor impairment at the same dose as bupivacaine.^[8]

Helena Kallio et al in their study of plain solutions of Ropivacaine 20mg, 15mg and bupivacaine 10 mg for lower limb surgeries found the median duration of complete motor block as 100, 40 and 100 minutes respectively.^[9]

In comparison of 0.5% and 0.75% isobaric ropivacaine for lower limb surgeries by Van Kleef et al the onset of motor block was 8.5(2-21)mins and 6(2-21)mins and duration to achieve maximum block was 21(8.5-28.5)mins and 16(6-31)mins respectively. Both these were not significant. However only 53% of 0.5% ropivacaine and 90% of 0.75% ropivacaine achieved complete block. The lesser lipid solubility of ropivacaine may cause this drug to penetrate large myelinated A fibers more slowly than the more lipid bupivacaine.^[10]

Conclusion

A study was conducted in 50 patients belonging to ASA grade I and II posted for lower limb surgeries. They received 3.5ml of 0.75% isobaric Ropivacaine in L2-3 interspace. All patients were preloaded with 1000 ml of ringer lactate. Following institution of subarachoid block sensory characteristics such as onset of sensory block, maximum level achieved, duration of sensory block and request for first dose of rescue analgesics were studied. Motor blockade characteristics such as onset of motor block, duration and quality of motor blockade were studied.

Onset of sensory block till T10 level was found to be 8.5minutes with a complete regression in 229.28minutes.

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