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Original Research Article

Intrathecal 1% chloroprocaine with 25µg fentanyl during spinal anaesthesia for elective perianal surgeries: An observational study

[1]Dr. Jyothsna M, [2]Dr. Parimala, [3]Dr. Devaraj IC, [4]Dr. Pavitradevi

[1, 2]Associate professor, Department of Anaesthesiology and critical care, Vijayanagar institute of medical sciences, Ballari, Karnataka, India
[3]Assistant professor, Department of Anaesthesiology and critical care, Vijayanagar institute of medical sciences, Ballari, Karnataka, India
[4]Consultant Anaesthetist, Kalaburgi, Karnataka, India

Corresponding Author:
Dr. Pavitradevi

Abstract

Preservative free Chloroprocaine (CP) seems like a promising alternative, being a short acting agent of increasing popularity in recent years. While Chloroprocaine was withdrawn from the market in the 1980s because of concerns about neurotoxicity a new formulation without preservatives that has no longer been associated with neurotoxicity was introduced in clinical routine. After taking informed and written consent, 40 patients of either sex, aged between 18-60years, belonging to American Society of Anaesthesiologists Physical status I to III, undergoing elective perianal surgeries under spinal anaesthesia enrolled in this observational study. Our study showed mean time of onset of motor block was 8.38±1.25 minutes, mean time to achieve maximum motor block 9.45±0.71 minutes and mean time for motor regression to bromage scale 0 was 65.68±15.19 minutes. The time to void was 98.32±15.80 min and time to ambulation was 89±15.30 min the time of first postoperative analgesic requirements was 96.32±12.83 min.

Keywords: Chloroprocaine, fentanyl, spinal anaesthesia

Introduction

The search for the ideal local anaesthetic for short surgical procedures is ongoing. Lidocaine has been associated with a higher incidence of transient neurological symptoms and Bupivacaine produces motor and sensory blockade of longer duration.

Preservative free Chloroprocaine (CP) seems like a promising alternative, being a short acting agent of increasing popularity in recent years. While Chloroprocaine was withdrawn from the market in the 1980s because of concerns about neurotoxicity [1, 2] a new formulation without preservatives that has no longer been associated with neurotoxicity [3, 4] was introduced in clinical routine. CP is an amino-ester local anaesthetic with a very short half-life. [5]. Permitting a faster recovery from anaesthesia and also permitting a faster discharge from hospital.

Currently, 30 mg CP is considered to be in minimal effective dose for lower limb surgeries done under spinal anaesthesia [6]. Although no dextrose added, CP shows hyperbaric characteristics. Accordingly, lower doses may also provide sufficient blocks in the perianal region if patient remain sitting upright after spinal injections shown in study "Chloroprocaine

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10 mg/ml for low dose spinal anaesthesia in perianal surgery" [7]. However, it was noted that the failure rate was 3.3%.
Fentanyl, a short acting lipophilic opioid stimulates μ1 and μ2, it potentiates the afferent sensory blockade and facilitates reduction in the dose of local anaesthetics without intensifying the motor block or prolonging recovery [8].
The purpose of this study is to observe the characteristics of 2-chlorprocaine with fentanyl, when used for spinal anaesthesia in elective perianal surgeries

Methodology

The study was conducted in patients in the age group of 18 to 60 years of age, scheduled for elective perianal surgeries under spinal anesthesia.
The study was conducted in the department of Anaesthesiology, for the period of one year

Study design

An Observational Study

Sample size

Based on the previous records i.e. number of perianal surgeries performed in major OT annually were 36. Considering a drop out of 10% (Inadequate block, patient refusing to participate etc.) an additional number of 4 cases were included and a sample size of 40 was arrived at.
Patients were included in the study by applying the following criteria:

Inclusion criteria

- ASA I to III
- Age group of 18 to 60 years, of either sex,
- Scheduled for elective perianal surgeries (e.g.: hemorrhoidectomy, fistulectomy etc.)

Exclusion criteria

- Patient refusal for spinal anaesthesia
- Any bleeding disorders, and patients on anticoagulation
- Known allergy to chlorprocaine
- Neurologic disease: spinal stenosis, symptomatic lumbar herniated disc, multiple sclerosis

Methods of collection of data

After taking informed and written consent, 40 patients of either sex, aged between 18-60years, belonging to American Society of Anaesthesiologists Physical status I to III, undergoing elective perianal surgeries under spinal anaesthesia enrolled in this observational study.
All patients included in the study were undergone thorough pre anaesthetic evaluation.

Results

Our study showed mean time of onset of sensory block was 4.93±0.80 minutes, mean time to achieve maximum sensory block was 8.15±0.89 minutes and the mean time to complete sensory recovery was 90.75±14.58 minutes.

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Table 1: The sensory block characteristics in minutes

Sensory parameters among the study subjects					
Sensory parameters	Mean	SD	Min	Max	Range
Sensory block onset{min}	4.93	0.80	3	6	3
Sensory block peak {min}	8.15	0.89	7	78	71
Time to complete Sensory recovery{min}	90.75	14.58	56	120	64

Majority of patients had highest block level at T_{10} (45%) followed by T_8 (30%).

Table 2: Highest sensory block (T) among the study subjects

Highest sensory block(T) among the study subjects		
Sensory block(T)	**Frequency**	**Percent**
Level 8	12	30
Level 10	18	45
Level 12	10	25
Total	40	100

Our study showed mean time of onset of motor block was 8.38±1.25 minutes, mean time to achieve maximum motor block 9.45±0.71 minutes and mean time for motor regression to bromage scale 0 was 65.68±15.19 minutes.

Table 3: Motor parameters among the study subjects

Motor parameters among the study subjects					
Motor parameters	**Mean**	**SD**	**Min**	**Max**	**Range**
Motor block onset{min}	8.38	1.25	3	11	8
Motor block peak{min}	9.45	0.71	8	11	3
Motor regression to bromage scale 0	65.68	15.19	45	110	65

The measure of motor block by Modified Bromage score was done for all patients in the study. According to the modified Bromage score, 0= patient is able to move the hip, knee and ankle. 1= unable to move the hip but able to move knee and ankle. 2= unable to move hip and knee but is able to move ankle. 3= unable to move the hip, knee and ankle.

Table 4: Highest bromage scale achieved among the study subjects

Highest bromage scale achieved among the study subjects		
Bromage scale	**Frequency**	**Percent**
Scale 2	19	47.5
Scale 3	21	52.5
Total	40	100

Our study showed mean duration of surgery was 53.50±11.24 minutes and mean duration of anaesthesia was 89±15.30 minutes

Table 5: Duration parameters among the study subjects

Duration parameters among the study subjects					
Duration	**Mean**	**SD**	**Min**	**Max**	**Range**
Duration of surgery(minute)	53.50	11.24	35	80	45
Duration of anaesthesia{min}	89.00	15.30	56	120	64

The time to void was 98.32±15.80 min and time to ambulation was 89±15.30 min the time of first postoperative analgesic requirements was 96.32±12.83 min

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Table 6: Other parameters among the study subjects

Other parameters among the study subjects					
Other parameters	Mean	SD	Min	Max	Range
Time to ambulation(min)	89.00	15.30	56	120	64
First voiding time	98.48	15.80	60	125	65
Rescue analgesia	96.32	12.83	70	125	55

Discussion

Our results are consistent with prior findings showing improvement of local anaesthetic effect for use in spinal anaesthetics with the addition of intrathecal opioids. Animal models have similarly shown a synergistic relationship between opioids and local anesthetics in analgesia, allowing for adequate analgesia without motor blockade using sub therapeutic doses of local anesthetic. Although intrathecal local anesthetics are non-selective in their blockade of afferent and efferent pathways, the addition of opioids has an effect on sympathetic efferent

Our study showed mean time of onset of sensory block at T_{10} was 4.93±0.8 min. Similar findings was seen in a study done by Bhaskara B *et al*. [8] where CP with fentanyl showed faster onset than ropivacaine with fentanyl group (4.7±0.79 min vs. 4.8±0.74 min). Similar studies showed that the onset of sensory block is faster with chloroprocaine when compared to other local anaesthetics.

In our study the mean time for peak sensory block was 9.93±11.07 min. Bhaskara B *et al*. [8] in their study comparing 2-CP with bupivacaine in spinal anaesthesia using fentanyl as adjuvant noticed that the mean time for peak block was 6.2±.76 min and 6.48±.68 min respectively. Camponovo *et al*. [9] in their study comparing 2-CP (group C) with plain 0.5% bupivacaine (group B) in lower abdominal and lower limb surgeries noticed the time required for maximum sensory block in group C was 8.5min and in group B was 14 min and study done by Lacasse er al. which showed CP to be better than bupivacaine, time to maximum sensory block (15 vs. 18min) [9].

The mean maximum sensory level attained in our study was T_{10} followed by T_8. Jessica Yoos *et al*. [10] in their study noticed the peak block height with 40mg of 2-CP was T_7 (T_3-T_{10}) and with 7.5 mg of bupivacaine was T_9 (T_4-L1).

In our study the mean time of onset of motor block was 8.38±1.25 min, mean time for peak motor block was 9.5±0.71 min. Similar findings were observed by Camponovo *et al*. [11], the onset of motor block was faster in chloroprocaine group when compared to bupivacaine group (5 min vs 6 min).

Motor block was measured by Modified Bromage scale.

In our study we noticed that the time to end of sensory block was 90.75±14.58 min and time to end of motor blockade was 65.68±15.19 min. Lacasse *et al*. [11] in their study comparing 2 –CP and bupivacaine reported the mean time for sensory regression was faster in 2-CP group when compared to bupivacaine group (146±38 min vs 329±82 min) and mean motor block regression time was faster in 2-CP group as compared to bupivacaine group (76±25 min vs 119±93 min). Our findings were similar to findings in the study done by Camponovo *et al*. [9], where the regression of sensory block was faster in 2-CP group when compared to bupivacaine group (105 min vs 225 min) and mean time of motor block regression time was faster in 2-CP group as compared to bupivacaine group (76±25 min vs 119±93 min). Yoos *et al*. [10] in their study reported the mean sensory regression time in 2-CP group was 64±10 min and in bupivacaine group was 87±41 min.

In our study, mean duration of anaesthesia was 89±15.30 min, first voiding time was 98.48±15.80 min. This similar result of time of voiding by addition of Intrathecal opioids was also found by Vath *et al*. [12] when they added fentanyl intrathecally to 2-chloroprocaine. Time to void urine in few studies was found to be 198 (120-271) minutes, 271±96 minutes, 204±61.8 minutes, and 306±114 minutes. The urodynamic effects of intrathecal opioids are

mainly caused by the action of the opioid receptors on the spinal cord and the cerebral structures. Rescue analgesic time was 96.32±12.83 and Time to ambulation was 89±15.30 min.

3 patients (7.5%) had hypotension after spinal anaesthesia. Patients with hypotension were treated with intravenous fluids followed by graded doses of Injection mephentermine and 3 patients had incidence of bradycardia after spinal anaesthesia. All patients with bradycardia were treated with 0.6mg of atropine.

Thus we conclude that 1% 2-Chloroprocaine used as spinal anaesthetic for perianal surgeries provides faster onset of sensory and motor block with shorter duration of action and faster regression of both motor and sensory block with stable intraoperative hemodynamics. Thus 1% 2-chloroprocaine can be used as an alternative to 0.5% bupivacaine heavy as spinal anaesthetic for shorter duration, ambulatory and day care surgeries.

Conclusion

We found that 2-CP has fast onset, predictable duration, and adequate potency for use in spinal anaesthesia. The addition of intrathecal fentanyl significantly prolonged sensory blockade while only minimally extending the time to ambulation, void, and discharge. This makes the combination of 2-CP (20mg) and fentanyl (25µg) an attractive choice for spinal anaesthesia in the outpatient setting.

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