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Original Research Article

Bupivacaine versus 2 Chloroprocaine Spinal Anesthesia Comparison Study at a Tertiary Hospital

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Abstract

Introduction: Anesthesiologists are increasingly in need of a quick-acting, predictable anaesthesia and a quick discharge to deal with the rise in day care surgery. Due to the introduction of new pencil-point spinal needles, spinal anaesthesia has grown in popularity in nursery settings today. The purpose of the study is to compare 1% 2-Chloroprocaine with 0.5% Bupivacaine in spinal anesthesia with respect to effectiveness and time taken to attain discharge.

Methods: Hospital based Randomized, Double Blind, Interventional study conducted on patients undergoing for ambulatory surgery under subarachnoid block. One of two intrathecal injections of 2-Chloroprocaine or hyperbaric bupivacaine was given to 60 patients with ASA I-II. Chloroprocaine 40 mg 1% (4 ml) was given to Group C (n=30). Bupivacaine 7.5mg 0.5% (1.5 ml) was administered to Group B (n=30). Comparisons were made between the two drugs' side effects, recovery characteristics, and the onset and duration of sensory and motor blockage.

Results: When compared to Group B (4.46 ±1.58 sec), Group C's time of sensory block onset was faster (4.18 ± 1.43 sec). When compared to Group B (5.45 ± 0.37 sec), Group C's motor block began sooner (5.24 ± 0.52 sec). When compared to group C (154.28 ±18.35 minutes), the duration of the sensory block was longer in group B (196.27 ± 20.12 minutes). When compared to group C (168.48±18.93 minutes), group B's duration of the motor block was longer (196.48 ±20.48 minutes). When compared to Group C (154.04 ±2.49 minutes), Group B's time to ambulation was longer (166.40 ±4.50 minutes). When compared to Group C (1.32±0.51 days), Group B's length of stay was longer (1.53±0.45 days).

Conclusion: 2-Chloroprocaine has a quicker onset of action than bupivacaine, which aids patients having day surgery in recovering more quickly and leaving the hospital earlier.

Keywords: 2-Chloroprocaine, Bupivacaine, Spinal Anesthesia.

Introduction

Spinal anaesthesia is a tried-and-true, safe, and trustworthy anaesthetic method for surgery on the lower abdomen and lower limbs [1]. It is easy to use, works rapidly, provides little risk of infection, and has a low failure rate. [2].

Bupivacaine is most typically used in spinal anaesthesia. Spinal anaesthesia is a dependable and risk-free approach for lower-body surgeries. If some of its characteristics (delayed ambulation, urinary retention, pain after block regression) limit its use in ambulatory surgery [3-5], it is still useful. The advent of short-acting local anaesthetics has reignited interest in this approach in the context of short and ultra-short procedures. Chloroprocaine has an extremely short half-life when put into a chemical structure. Preservative-free formulation has been shown safe in animal trials. It has been extensively studied in both volunteer trials and clinical practise, with a favourable safety and effectiveness profile [6,7].

In comparison to Bupivacaine, Chloroprocaine demonstrated faster offset times, unassisted ambulation, and hospital discharge. The findings show that Chloroprocaine could be a good substitute for modest dosages of long-acting anaesthetics in ambulatory surgery. Chloroprocaine's safety profile also implies that it could be a viable substitute for intrathecal short acting local anaesthetics like Lignocaine [8,9].

The current study compared the effectiveness, readiness for discharge, and complications of two local anaesthetics used for spinal anaesthesia: 1% 2-Chloroprocaine and 0.5% Bupivacaine.

Materials and Methods

The present study was a hospital-based prospective randomised double-blind study conducted in the Anaesthesia department at VIMS, Salem. The research lasted 18 months. The study was authorised by the ethical committee.

Patients must meet the following requirements in order to be included in the study: they must be between the ages of 18 and 60, have an ASA score of 1 or 2, agree to take part in it, and be scheduled for elective ambulatory lower abdomen and lower limb surgery under subarachnoid block.

Patients with an ASA rating of 3 or 4, as well as those who are sensitive to or allergic to bupivacaine or chlorprocaine, those who are unable to endure spinal anaesthesia (INR > 1.3, platelets > 75 000, anticoagulant use). Patients with neurological diseases (spinal stenosis, multiple sclerosis, and symptomatic lumbar herniated discs). people with limited fluid intake (renal and heart impairment). expecting mothers are excluded from the study.

Each patient received reassurance, a detailed explanation of the procedure, and informed permission. Physical fitness was verified for every patient. Following the application of routine monitors (NIBP, ECG, PULSE OXIMETRY), IV line secured with 18 G IV cannula, the minimal fasting period is 8 hours. RL 10–12 ml/kg was preloaded onto all patients. The baseline heart rate, pulse, and Spo2 were recorded. Using a 25-G Quincke's needle, a subarachnoid block (SAB) is implemented at the L3-L4 or L4-L5 intervertebral space while the patient is seated. Patients were randomised into two groups at random and equally using the sealed envelope method: Group C (n=50); Chloroprocaine, 40 mg/1% (in 4 ml). 7.5 mg, 0.5% (1. 5 ml), Group B (n=50) Bupropion Oxygen The face mask delivered 6 L/min.

Patients received titrated dosages of Inj. Atropine 0.6 mg I.V. if Heart Rate 50 /min and Inj. Mephentermine 6 mg I.V. if Systolic BP 90 mm/Hg or 20% baseline. Using a 26 G pinprick in an auxiliary line, the sensory level of spinal anaesthesia was measured at baseline before spinal injection, then every 2 minutes for the first 15 minutes after injection, every 5 minutes for the following 30 minutes, and after 45 minutes. For the first 15 minutes, measurements of blood pressure, heart rate, and the degree of motor block were made every 2 minutes. 30 minutes later, at 45

minutes, 5 minutes. The surgeon was instructed to begin the procedure as soon as a T4-T6 level was obtained. Time to the beginning of a motor block and time to the end of a motor regression were noted. Patients were released from the PACU once they m *et al* of the following requirements: a minimum stay of 60 minutes, stable vital signs, signs of motor block regression (bromage 0), no analgesia during the last 20 minutes, and normal awareness.

After leaving the PACU, patients were sent to the ambulatory surgical unit, where they were instructed to walk independently once they could handle liquids by mouth and felt mild pressure on their legs. A successful attempt to void was made after succeeding in walking. Patients were eligible for discharge from the hospital when they m *et al* of the following requirements: full regression of the block to light touch, ability to urinate, ability to walk, stable vital signs, absence of motion sickness, pain managed with oral medication (last dose given at least one hour prior to discharge), and ability to tolerate liquids by mouth. Adverse reactions include hypotension, bradycardia, analgesic-required discomfort, and PONV were also noted to occur.

Data Analysis

SPSS 20 was used for the data analysis. Chi-square test was applied to categorical variables. The t-test for independent samples was employed for continuous variables. p-values lower than 0.05 were regarded as significant.

Result

There was no significant difference in Age, Gender & ASA distribution among the 2 groups.

Table 1: Demographics profile

Variable	Group C (n=30)	Group B (n=30)	P value
Age (years)	39.43±12.74	39.74±13.42	0.523
Gender			
Male	20	18	0.734
Female	10	12	
ASA			
I	17	18	0.623
II	13	12	

The mean time for the start of sensory block was 4.18± 1.43 seconds in group C & 4.46± 1.58 seconds in group B which was statistically significant. the mean time for the beginning of motor block In group C was 5.24± 0.52seconds & 5.45± 0.37 seconds in group B which was statistically significant. the mean time to reach the maximal sensory block in group C was 12.12± 3.52 minutes, & 13.28± 3.18 minutes in group B which was statistically significant. In group C, the mean time of the sensory block in group B was 154.28± 18.35 minutes &, 196.27± 20.12minutes in group B which was statistically significant. the mean time of the motor block was 168.48± 18.93 minutes in group C & 196.48±20.48 minutes in group B which was statistically significant.

Table 2: Anaesthesia characteristics

Parameters	Group C	Group B	P value
Onset of Sensory block (sec)	4.18± 1.43	4.46± 1.58	0.002*
Onset of motor block (sec)	5.24± 0.52	5.45± 0.37	0.002*
Time to achieve maximum sensory block (minutes)	12.12± 3.52	13.28± 3.18	0.02*

Duration of sensory block (minutes)	154.28± 18.35	196.27± 20.12	0.001*
Duration of motor block (min)	168.48± 18.93	196.48±20.48	0.002*

1 patient from group C & 2 patients from group B had back pain which was not significant statistically. 1 patient from group B & 1 patient from group C had Headache which was not significant statistically. 1 patient from group B & 1 patient from group C had transient neurologic symptoms which was not significant statistically.

Table 3: Complications

Parameters	Group C	Group B	P value
Headache	1	1	0.08
Transient neurologic symptoms	1	1	0.2
Back Pain	1	2	0.3

The average length of stay in groups C and B was 1.32 ±0.51days and 1.53 ± 0.45 days, respectively which was significant statistically. The mean time to ambulation in group C was 224.23 ±52.78 minutes, while that in group B was 268.42 ±60.12 minutes. The time taken for ambulation in the two groups varied significantly.

Table 4: Hospital stay among various groups.

Stay	Group C	Group B	P value
Length of stay (Days)	1.32 ±0.51days	1.53 ± 0.45	0.01*
Time to ambulation (min)	224.23 ±52.78	268.42 ±60.12	0.002*

Discussion

For ambulatory procedures, spinal anaesthesia is a safe and dependable approach. Nonetheless, some of its characteristics, such as delayed ambulation, the risk of urinary retention, and pain after block regression, may limit its use for ambulatory surgery. The selection of the appropriate local anaesthetic for spinal anaesthesia is so critical in the mobile context. A good local anaesthetic should have a quick start and offset of its own effect, allowing for quick patient release with minimum side effects. Chloroprocaine was developed to fulfil the requirement for a short-acting spinal anaesthetic that is dependable and has a low risk profile to satisfy the growing need for day-care surgery. Demographic characteristics (age, gender, and ASA grading) were comparable in both groups. There was no statistically significant difference between them (p>.05). Marie Andre'e Lacasse *et al*.,[10], Ben Gys *et al*.,[11], and C Camponovo *et al*.,[12] discovered similar results.

In our study the start time of sensory block in both groups was 4.18± 1.43 minutes in the C group and 4.18± 1.43 minutes in the B group which was statistically significant & start time of motor block in both groups was 5.24± 0.52 minutes in the C group and 5.45± 0.37 minutes in the B group which was statistically significant. According to Ben Gys *et al*., the start time of sensory block in both groups was 10.8 minutes in the C group and 11.1 minutes in the B group, with a statistically significant difference between the two groups [13]. In An Teunkens *et al*.'s [14] study, the chloroprocaine group had a much faster time for motor block onset than the bupivacaine group.

The mean time of the sensory block in group C was 154.28± 18.35 minutes, while it was 196.27± 20.12 minutes in group B. The difference in average sensory block length

was statistically significant. (P <0.0001) Ben Gys *et al*. obtained similar results [11].

The average motor block in group C lasted 168.48± 18.93 minutes, compared to 196.48±20.48 minutes in group B. The statistical difference in the meantime for a motor block significant. According to Camponovo *et al*., Group C had faster motor block start (5 vs. 6 min), higher maximal sensory block level (8.5 vs. 14 min), and faster resolution of both sensory and motor blocks (105 vs. 225 min) [12].

Conclusion

In comparison to 0.5% Hyperbaric Bupivacaine, intrathecal 1% 2-Chloroprocaine results in significantly faster recovery of sensory and motor blocks. 2-Chloroprocaine had a considerably quicker time to mobilisation and discharge than 0.5% Hyperbaric Bupivacaine. We found that 2-Chloroprocaine is a good choice for spinal blocks during surgical procedures.

References

1. Mulroy MF, Salinas FV, Larkin KL, Polissar NL. Ambulatory surgery patients may be discharged before voiding after short-acting spinal and epidural anesthesia. Anesthesiology. 2002; 97(2): 315–319.
2. Förster JG, Rosenberg PH. Revival of old local anesthetics for spinal anesthesia in ambulatory surgery. Curr Opin Anaesthesiol. 2011; 24(6):633– 637.
3. Liam BL, Yim CF, Chong JL. Dose-response study of lidocaine 1% for spinal anaesthesia for lower limb and perineal surgery. J Anaesth.1998;45:645-650.
4. Zaric D, Pace NL. Transient neurologic symptoms (TNS) following spinal anaesthesia with lidocaine versus other local anaesthetics. Cochrane Database Syst Rev. 2009; CD003006.
5. Schneider M, Ettlin T, Kaufmann M *et al*. Transient neurologic toxicity after hyperbaric subarachnoid anaesthesia with 5% lidocaine. Anesth Analg. 1993; 76:1154-1157.
6. Freedman JM, Li DK, Drasner K, Jaskela MC, Larsen B, Wi S. Transient neurologic symptoms after spinal anaesthesia: an epidemiologic study of 1,863 patient. Anesthesiology.1998; 89:633-634.
7. Nair GS, Abrishami A, Lermitte J, Chung F. systematic review of spinal anesthesia using bupivacaine for ambulatory knee arthroscopy. Br J Anaesth. 2009; 102:307-315.
8. Foldes FF, McNAll PG. 2-chloroprocaine: a new local anaesthetic agent. Anesthesiology. 1952; 13:287–64.
9. Kouri ME, Kopacz DJ. Spinal 2-chloroprocaine: a comparison with lidocaine in volunteers. Anesth Analg. 2004; 98:75–80.
10. Lacasse MA, Roy JD, Forget J, Vandenbroucke F, SealRF, Beaulieu D, McCormack M, Massicotte L. Comparison of bupivacaine and 2-chloroprocaine for spinal anesthesia for outpatient surgery: a double-blind randomized trial. Canadian Journal of Anesthesia/Journal canadiend' anesthésie. 2011 Apr 1;58(4):384-91.
11. Gys B, Lafullarde T, Gys T, Janssen L. Intrathecal prilocaine, 2-chloroprocaine and Bupivacaine for ambulatory abdominal wall herniorrhaphy: A prospective observational study. Ambul Surg. 2017 Jan 1; 23:8-12.
12. Camponovo C, Wulf H, Ghisi D, Fanelli A, Riva T, Cristina D, Vassiliou T, Leschka K, Fanelli G. Intrathecal1% 2-chloroprocaine vs. 0.5% bupivacaine in ambulatory surgery: a prospective, observer-blinded, randomized, controlled trial. Acta Anaesthesiologica Scandinavica. 2014 May;58(5):560-6.
13. Yoos JR, Kopacz DJ. Spinal 2-chloroprocaine for surgery: an initial 10-

month experience. Anesth Analg. 2005; 100:553–8.
14. Teunkens A, Vermeulen K, Van Gerven E, Fieuws S, Van de Velde M, Rex S. Comparison of 2-chloroprocaine, Bupivacaine, and lidocaine for spinal anesthesia in patients undergoing knee arthroscopy in an outpatient setting: a double-blind randomized controlled trial. Regional Anesthesia and Pain Medicine. 2016 Sep 1;41(5):576-83.