Original Article

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Comparative Analysis of Different Doses of Intrathecal 1% Chloroprocaine in Patients Undergoing Short Duration Lower Limb Surgery

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Abstract

Background: Preservative free Chloroprocaine seems like a promising alternative, being a short acting agent of increasing popularity in recent years. Chloroprocaine has many advantages like quick onset, dense sensory and motor block of short duration hence this drug is considered as a preferred choice for patient undergoing short duration lower limb surgery. Present study was performed with an aim to study and compare intra operative quality and duration of anaesthesia and level of sub arachnoid block. **Subjects and Methods:** This study was planned to evaluate the effect of 3ml, 4ml and 5ml of chlorprocaine in subarachnoid block in patient undergoing short duration lower limb surgery umder spinal anesthesia. After obtaining approval from the institutional ethics committee and informed consent, 50 patients between age group 16- 47 years of either sex belonging to ASA grade I and II for elective short duration lower limb surgeries were included in the study. A specially design performa was used to collect the data patient allocated to either group A(3ml),group B(4ml),group C(5ml) of intrathecal chloroprocaine. **Results:** There is no significant difference in patient age, gender & ASA classification in three groups. There is no significant difference of systolic and diastolic blood pressure and heart rate between three groups. There is no significant difference in onset of sensory and motor block in these groups, but the duration of sensory block was shorter in group A (60.14±7.45) than group B (81.15±10.36) & group C (102.79±7.64). **Conclusion:** Intrathecal 1% is safe short acting local anesthetics for short or ultra-short surgical procedures. Onset and duration of sensory and motor block & time of recovery of ambulation were dose related.

Keywords: Blood pressure, Chloroprocaine, Heart rate, Short acting local anesthetics.

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Introduction

The search for the ideal local anaesthetic for short surgical procedures is ongoing. Lidocaine has been associated with a high incidence of transient neurological symptoms, and Bupivacaine produces motor and sensory blockade of long duration. Preservative free Chloroprocaine 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 was introduced into clinical routine in 2004.[3,4] Spinal anesthesia is a reliable and safe technique for procedures of the lower extremities. Nevertheless, some of its characteristics may limit its use for ambulatory surgery, including delayed ambulation, risk of urinary retention and pain after block regression. Current availability of short acting local anesthetics has renewed interest for this technique also in the context of short and ultrashort procedure. Chlorprocaine is an amino ester local anesthetic with a very short half life. All preservatives and antioxidant have been removed from currently available preparation of chlorprocaine, preservative free chloropracaine is available as 10mg/ml which is recently approved by European medicine agency. In comparison with bupivacaine, chloroprocaine showed faster offset times to end of anesthesia, unassisted ambulation and discharge from hostpital. These finding suggest that chloroprocaine may be suitable alternative to low doses of long acting local anesthetics in ambulatory surgery. Its safety profile also suggest that chloroprocaine could be a valid substitute for intrathecal short and intermediate acting local anesthetics such as lidocaine and mepivacaine often cause transient neurological symptoms.

Chloroprocaine has many advantages like quick onset, dense sensory and motor block of short duration hence this drug is considered as a preferred choice for patient undergoing short duration lower limb surgery.

Present study was performed with an aim to study and compare intra operative quality and duration of anaesthesia and level of sub arachnoid block.

Subjects and Methods

This study was planned to evaluate the effect of 3ml, 4ml

and 5ml of chlorprocaine in subarachnoid block in patient undergoing short duration lower limb surgery umder spinal anesthesia. After obtaining approval from the institutional ethics committee and informed consent, 50 patients between age group 16- 47 years of either sex belonging to ASA grade I and II for elective short duration lower limb surgeries were included in the study.

Inclusion Criteria:

1) ASA grade I and II
2) Age group between 16-47 years of both sexes.
3) Elective short duration lower limb surgeries under spinal anesthesia.

Patients with a history of allergy to the study drugs, history of psychiatric illness, coagulopathy, local infection at injection site and any spinal deformity were excluded from the study.

All the patients were uniformly managed with regards to preanaesthetic evaluation, investigations and pre medication. Pre operatively a peripheral venous access is secured through the large bore iv cannula. After proper pre-anesthetic check, all patients were given Alprazolam 0.5mg and Ranitidine 150mg orally on the day before surgery and were kept nil per orally for a minimum duration of 8 hours. Pulse oximetry, noninvasive blood pressure, ecg monitoring was instituted in all patients. A specially design performa was used to collect the data patient allocated to either group A(3ml),group B(4ml),group C(5ml) of intrathecal chloroprocaine.

The sub arachnoid block will be performed in all patients in sitting position under strict aseptic precautions using 25G Quincky needle in the midline, after observing the free flow of csf, either 3ml, 4ml or 5ml of the study drug chloroprocaine will be given and patient will immediately be moved to supine position. Parameters like heart rate, blood pressure, SPO2 will be monitored preoperatively, intraoperatively and post operative for two hours. Onset and duration of motor and sensory block is recorded.time of rescue analgesia is recorded postoperatively.

Statistical analysis

The data was coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) Windows software program. The variables were assessed for normality using the Kolmogorov-Smirnov test. Descriptive statistics were calculated.

Results

There is no significant difference in patient age, gender & ASA classification in three groups. There is no significant difference of systolic and diastolic blood pressure and heart rate between three groups. There is no significant difference in onset of sensory and motor block in these groups, but the duration of sensory block was shorter in group A (60.14±7.45) than group B (81.15±10.36) & group C (102.79±7.64). None of the patient reported any complaint suggestive of transient neurological symptoms. The post operative course was uneventful for all patients.

Discussion

Spinal anesthesia is a safe & reliable technique for short duration lower limb surgery .Some of its characteristics may limit its use for ambulatory surgery,[5,6] including delayed ambulation, risk of urinary 3 retention and pain after block regression. The choice of the correct local anesthetic for spinal anesthesia is therefore crucial in the ambulatory setting. The ideal anesthetic for short duration surgery should have minimal effect on haemodynamic parameter & allow rapid onset and offset of its own effect for fast patient discharge with 4 minimal side effect .Lidocaine has been the anesthetic of choice for years in the context of outpatient procedures. Nevertheless its use has been associated with a significant risk of transient neurological symptoms (TNS) & most anesthesiologist have therefore abandoned its use. The recent re-introduction of intrathecal articaine, chloroprocaine and prilocaine may offer a solution in the ambulatory setting, with a slightly faster profile for chlorprocaine.

Table 1: Demographic Data of Study participants

Variable	Group A	Group B	Group C	P value
Age (years)	34±9.10	36±8.14	37±5.45	1.0
Weight (kg)	58±2.78	59±1.22	56±4.78	0.54
Height (cm)	157±1.78	153±2.47	152±8.98	0.25

Statistically significance at p≤0.05
Test applied One Way ANNOVA

The use of preservative free chlorprocaine for spinal anesthesia has been studied both in healthy volunteers and in patient. Many author investigated the correct spinal dose of chlorprocaine to assure adequate efficacy and fast resolution of block in the ambulatory setting. Sell A (2008),[7] tested four different doses of spinal chlorprocaine (35, 40, 45&50mg) in a cohort of 64 patients scheduled for elective lower extremity procedures. The regression of sensory block & time to discharge were faster in the lower dose groups (35&45mg), although the higher level of block & time to complete block regression were comparable in all four groups. In an attempt to find the minimum effective dose for intrathecal injection, Kopacz tested 10 & 20 mg of plain chlorprocaine. The lower dose 10 mg should be considered the no effect dose for spinal anesthesia, though it provided some transient motor weakness. Similarly the 20 mg dose did not reliably produce dense motor block even though it was able to produce a cephalad level of sensory anesthesia of at least L1 in all subjects.

Our study stands unique by evaluating three different dose (30, 40 & 50 mg) of intrathecal chlorprocaine in short duration lower limb surgery with an average duration of 45-60 min. Finding of the study suggest that the duration of sensory & motor block was shorter in group A (60.14±7.45) (55.21±09.18) compared to group B (81.15±10.36) (76.47±9.32) and Group C (102.79±7.64) (97.14±10.14). The 30 mg dose of chloroprocaine was associated with a significant increase in the number of patients requiring fentanyl supplementation before the end of surgery because of inadequate duration of surgical block as compared with the duration of surgery itself. This occurred more frequently with 30mg less frequently with 40mg & never with 50 mg (p≤0.05). This finding is related to the duration of surgery,

wnich in present study range between 30 to 60 min, rather than efficacy of the anesthetic drug itself. Hence 30 mg dose may not be suitable for lowerlimb procedure lasting ≤60 min. however correct patient and surgery selection allow a successful use also of the 30mg dose. Unless the surgeon is confident that the considered procedure will be completed within 20-30 min, the 30 mg dose should not be recommended. The three doses(30,40 &50mg) of intrathecal chlorprocaine provided a high degree of cardiovascular stability with no incidence of transient neurological symptoms using totally preservative & antioxidant free 2-chloroprocaine.this finding is in 8,9,10 agreement with findings reported in volunteer studies which did not report any case of transient neurological symptoms after spinal chloroprocaine. Surgery lasted a mean time of 50±22min. The postoperative course was uneventful in all patients.

Conclusion

Intrathecal 1% is a safe short acting local anesthetics for short or ultra short surgical procedures. Onset and duration of sensory and motor block & time of recovery of ambulation were dose related. There is no significant difference of systolic blood pressure, diastolic blood pressure and heart rate between these groups. The intraoperative haemodynamic parameter remained stable in all the three groups. 40 to 50 mg of plain chloroprocaine 1% provided adequate spinal anesthesia for lower limb outpatient procedures lasting 45 to 60 min. Reducing the dose of 2-chloroprocaine to 30 mg resulted in a spinal block of insufficient duration and had no advantages in terms of home discharge. Adverse effect such as hypotention, bradycardia and neurological deficts does not occur in any of the patients

References

1. Forster JG. Short acting spinal anesthesia in the ambulatory setting. Curr Opin Anaesthesiol.2014;27(6):597-604.
2. Alley EA, Mulory MF. Neuraxial anesthesia for outpatients. Anesthesiol Clin.2014;32(2):357-369.
3. 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):315-310.
4. Forster JG, Rosenberg PH. Revival of old local anesthetics for spinal anesthesia in ambulatory surgery. Curr Opin Anaesthesiol.2011;24960:633-637.
5. Reisner LS, Hochman BN, Plumer MH. Persistent neurologic deficit and adhesive arachnoiditis following intrathecal 2-chloroprocaine injection. Anesth Analg. 1980;59:452–454.
6. Ravindran RS, Bond VK, Tasch MD, Gupta CD, Luerssen TG. Prolonged neural blockade following regional analgesia with 2-chloroprocaine. Anesth Analg. 1980;59:447–451.
7. Sell A, Tein T, Pitkanen M. Spinal 2-chloroprocaine: effective dose for ambulatory surgery. Acta Anaesthesiol Scand 2008; 52: 695–9.
8. Hemping-Bovenkerk A, Moellmann M. Anaesthesia in ambulatory surgery. Anaesth Intensivmed 2014; 55: 228–44.
9. Luck JF, Fettes PD, Wildsmith JA. Spinal anaesthesia for elective surgery: A comparison of hyperbaric solutions of racemic bupivacaine, levobupivacaine, and ropivacaine. Br J Anaesth 2008;101:705-10.
10. Palumbo P, Tellan G, Perotti B, Pacilè MA, Vietri F, Illuminati G. Modified PADSS (post anaesthetic discharge scoring system) for monitoring outpatients discharge. Ann Ital Chir. 2013 Nov 1;84(6):661-5.

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