Original Research Article

Comparison of 1% Chloroprocaine and 1% Chloroprocaine with Clonidine In Day care Surgeries Under Spinal Anaesthesia: A Prospective, Randomized, Double Blind study

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Abstract

Background and Aims: Delayed ambulation due to prolonged residual blockade and urinary retention with Bupivacaine and Transient Neurological symptoms with Lignocaine have been the main limitation of spinal anaesthesia for day care surgery. Preservative free 1% Chloroprocaine is an alternative to Lidocaine in day care surgery. We compared the efficacy of 1% Chloroprocaine alone and with Clonidine in patients posted for day care surgeries under spinal anaesthesia**. Methods**: 60 patients were randomly divided into two groups (n=30 each). Group C patients received 30 mg of 1% Chloroprocaine and Group CC patients were given 30 mg of 1%Chloroprocaine with 30 mcg Clonidine intrathecally. Time for onset, duration of sensory and motor block, Peak level dermatome, duration of analgesia and time of first mobilization was noted**. Results**: Time of onset of sensory and motor block were faster in Group CC (P<0.05). Higher peak level dermatome achieved in Group CC. Duration of motor block was increased with addition of Clonidine (69 min.vs76 min;P=0.006),prolonged duration of analgesia in Group CC as compared to Group C (193 min vs100 min;P= 0.00) and prolonged time of first mobilization in Group C vs Group CC (120 min vs 210 min) were the main observations.. No subject reported any Transient Neurologic Symptom**. Conclusion:** Addition of Clonidine as an adjuvant to Chloroprocaine in low doses provides early onset and prolonged sensory and motor block, prolonged duration of analgesia along with improved quality of spinal anaesthesia in comparison to Chloroprocaine alone.

Keywords: Chloroprocaine, Clonidine, Daycare surgery, Lidocaine, Spinal anaesthesia.
Study design: Prospective, Randomised, Double Blind Observational Study.

Introduction

Spinal anaesthesia is one of the most commonly used anaesthetic technique for surgery on lower abdomen and lower limbs. However, delayed ambulation due to prolonged motor blockade, risk of urinary retention with Bupivacaine whereas Transient Neurological symptoms and severe pain after block regression with Lidocaine limits its use in short duration surgical procedures, therefore choice of local anaesthetic for spinal anaesthesia is crucial for the ambulatory surgery[1,2]. Advances in surgery, anaesthesia and pain management have allowed great expansion in day care surgery where patients are admitted, operated and then discharged on the same day with high quality care, excellent patient satisfaction, reduced hospital stay, lesser financial burden and minimum psychological disturbances to the patient and family. Chloroprocaine full fill all the requirements for short duration spinal anaesthesia. In 1952 Chloroprocaine was first introduced for the use in spinal anaesthesia. Later after addition of Sodium bisulfite as an antioxidant, several reports of neurological deficit in patients receiving accidently high dose of intrathecal Chloroprocaine during epidural labour analgesia were reported in literature[3]. Combination of antioxidant Sodium bisulfite and low pH were attributed to these persistent neurologic deficit. (Wang et al[4]) Recently, antioxidant and preservative free Chloroprocaine have resurged for intrathecal use for short duration surgical procedure[5].

Intrathecal Clonidine have been used with other local anaesthetic drugs as an adjuvant for providing better sensory blockade, prolonged analgesia, antiemesis and anxiolysis as compared to local anaesthetic alone[6]. Unlike opioids, Clonidine does not induce pruritis or respiratory depression.

On literature search we could not find much research paper on the use of 1% Chloroprocaine with Clonidine for the use in spinal anaesthesia. Hence we planned this study with the aim to evaluate the efficacy, duration and safety profile of 1% Chloroprocaine alone and 1% Chloroprocaine with Clonidine in short duration surgical procedures to be done under spinal anaesthesia in Indian population.

Methods

This prospective, randomised, double blind observational study was carried out from Jan 2018 to August 2019 at GRMC, Gwalior, Madhya Pradesh,after obtaining approval from the Institutional Ethics Committee and written informed consent, on 60 ASA Grade I /II patients between the age of 20-50 years of either sex and weighing between 40-60 Kg scheduled for elective infraumblical surgeries of less than 60 minutes duration. Any patient with refusal, uncooperation, infection at the site, coagulopathy or bleeding diathesis, cardiopulmonary/neurologic/hepatic/renal disease, pregnant and lactating women, patient with history of allergic or intolerance to local anaesthetic were not included in the study.

All the patients were examined a day before surgery to do complete general, physical and systemic examination. All the required routine and special investigations as per hospital protocol including complete blood count, random blood sugar, blood urea, serum creatinine, E.C.G. (above 30 years of age) and Chest x ray (above 30 year of age) as per hospital protocol were carried out.

All selected patients were randomly divided into two groups (n=30 each) by envelope method as below:

GROUP C (n=30): 30 mg of 1% Chloroprocaine with 0.2 ml Normal saline.

GROUP CC (n =30): 30 mg of 1% Chloroprocaine with 30 mcg Clonidine (0.2 ml).

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All the patients were kept nil orally for at least 6 hours before the procedure.Upon arrival of the patient in the operation theatre all the baseline (B0) vitals parameters including pulse rate (PR), non invasive systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial blood pressure (MAP) were recorded preoperatively.Spo2 was also measured as minimum standard monitoring protocol but was not included for our study purpose.

After intravenous access with 18 G cannula preloading was done with lactated ringer solution approximately (10ml/kg). Under all aseptic precautions Subarachnoid block (SAB) was performed with the study drug and then patient was put in supine position for the remaining of the study period. Following parameters were observed and recorded for data collection and statistics:

- **Time for onset of sensory level of the block upto T10 (min)**

This was assessed by loss of pinprick sensation with 23 gauge hypodermic needle after injection of the study drug.

Time for onset of motor block Bromage 3 (min)

This was assessed by the **modified Bromage scale** as

0= no motor block
1= able to bend the knee (hip blocked)
2=able to dorsiflex the foot (hip and knee blocked)
3=complete motor block (hip, knee and ankle blocked).

- **Peak level dermatome**

Highest level dermatome was assessed by 23 gauge hypodermic needle after obtaining complete sensory block.

- **Duration of motor block(min)**

Time from end of anaesthetic injection to motor block regression (Bromage 0).

- **Duration of Analgesia(min)**

Time of onset of analgesia after spinal anaesthesia to onset of pain was recorded.

- **Time of first mobilization**

Time from end of anaesthetic injection to the first mobilization by the patient.

- **Haemodynamic parameters**

PR, SBP,DBP and MAP were recorded after 3, 5,10,15 ,30,60,90,120 and 150 min of study drug injection.During surgery, any fall in MAP below 20% of baseline value was treated with bolus dose of inj. Mephenteramine 6 mg i.v. PR <60 beats /min was treated with inj. Atropine sulphate 0.3-0.6 mg i.v. Total dosage of bolus drugs were recorded.

- **Side effects and complication** of the study drugs and technique including hypotension, hypertension, bradycardia, tachycardia, postoperative nausea vomiting (PONV), sedation, shivering and Transient Neurological Symptoms (TNS) were recorded if occurred.

Statistical analysis

Data was composed in suitable spreadsheet i.e., EXCEL and SPSS. Statistical tests used were Student t-test (paired and unpaired) and Chi square test. Significance level will be 95% confidence level ($p<0.05$). Data was described as a frequency (Percentage) distribution as well as in Mean±SD.

Results

Successful spinal anaesthesia was obtained in all the patients. Demographic data was comparable in both the groups($P>0.5$) as shown in Table 1. Time of onset of sensory and motor block were faster with addition of Clonidine (GroupCC) ($P<0.05$). Higher percent of patients had attainment of T6 T-9 level block in group CC as compared to Group C (63.33% Vs 33.33%; $P<0.05$) . Prolonged duration of motor block ,time for early mobilisation and post op analgesia were observed in group CC as compared to group C (Table 2).No significant differences were observed in PR and all three parameters of blood pressure in both group C and CC($P>0.05$). (Fig 1).

2 patients (6.66%) in group CC had Ramsay Sedation Score II. No other side effects or complications were observed throughout the study period.

Table 1: Demographic profile of the study groups

	GROUP C	GROUP CC	P VALUE
AGE in years	37.63±9.32	37.1±7.92	0.812
WEIGHT in kg	56.33±10.96	57.43±4.93	0.616
MALE:FEMALE	22:8	24:6	0.381
DURATION OF SURGERY(min)	33.33±9.49	34.50±8.93	0.662

Statistically significant=$P<0.05$; Statistically insignificant= $P>0.05$

Table 2: Clinical Parameter of the study groups

Clinical Parameter	Group C (Mean±SD)	Group CC (Mean±SD)	P value
Time of onset of sensory block upto T10 in min	9.7±2.86	7.96±2.08	0.015
Time of onset of motor block (Bromage 3) in min	11.31±2.94	9.73±1.72	0.016
Peak level dermatome Above T6 T6-T9 T10-T12	 Nil (0%) 9 (33.33%) 21 (70.66%)	 1 (33.33%) 19 (63.33%) 10 (33.33%)	 0.014
Duration of motor block (minutes)	69.93±7.62	76.37±9.48	0.006
Duration of Analgesia (minutes)	100.1±15.23	193.63±12.05	0.00
Time of first mobilization (minutes)	120.7±14.72	210.5±17.75	0.00

Statistically significant=$P<0.05$; Statistically insignificant= $P>0.05$

Discussion

Recently preservative free 1% Chloroprocaine has been reintroduced in clinical practice which provides faster resolution of sensory and motor blockade, early mobilization and hospital discharge. Despite of short duration and early mobilisation the early onset of postoperative pain limits its use in short duration surgeries. Clonidine (1-2 mcg/kg) has been used as an adjuvant with other local anaesthetic agents for increasing the quality of spinal anaesthesia, but with these doses hypotension, bradycardia and sedation[7]. We could not find many studies on the use of Clonidine as an adjuvant with Chloroprocaine by intrathecal route.In our study, demographic data are comparable in both groups ($P>0.05$). Both the study groups are showing male preponderance as most of the surgeries in our study are the male urological procedures although it had no clinical significance.Time for onset of sensory block (upto T10) and motor block (Bromage 3) were statistically faster ($P<0.05$)in group CC as compared to group C.(7.96±2.08 vs 9.7±2.86 and 9.73±1.72 vs 11.31±2.94 min respectively).Gordh T Jret al[8] and Gaumann DM et al[9] also observed faster onset of sensory block with Clonidine and Chloroprocaine combination. They attributed this to clonidine induced presynaptic inhibition of transmitter release and postsynaptic hyperpolarisation effects. In group CC, higher number of patients had block level of T6-T9 as compared to group C. (63±33% vs 30±33; $P<0.05$). We opine that higher doses of Clonidine (30mcg) used in our study produced this effect as Davis BR et al[10] did not observed any difference with addition of lower dose of Clonidine(15 mcg) with Chloroprocaine. Kock MD et al[11] also observed higher level of block with Clonidine and Ropivacaine combination as compared to

Ropivacaine alone. Duration of motor block (Time for regression to Bromage 0) was significantly higher in Chloroprocaine with Clonidine group when compared to Chloroprocaine alone($P<0.05$). Our finding are similar to that of Davis BR et al[10] who also found statistically significant difference in duration of motor block between Chloroprocaine and Chloroprocaine with Clonidine ($P=0.0038$). Prolongation of the duration and intensity of motor blockade with addition of Clonidine intrathecally to local anaesthetics possibly due to α2 adrenorecepter agonists induce cellular modification in ventral horn of spinal cord resulting in hyperpolarisation of motor neuron thus result in facilitation of local anaesthetic action[12-14]. Dobrydnjov I et al[7] also observed statistically significant prolonged duration of motor block with Clonidine(30mcg)and Bupivacaine combination. Duration of analgesia (Mean±SD) was found to be significantly prolonged ($P<0.05$) in group CC as compared to group C (193.63±12.05 min vs 100.1±15.23 min).Similarly, Dobrydnjov I et al [7]observed prolonged duration of analgesia ofanalgesia with the addition of Clonidine but they concluded that increasing the dose of Clonidine from 15 mcg to 30 mcg did not prolonged the duration of analgesia. Intrathecal administration of Clonidine lead to activation of post synaptic α2-receptor in substansia gelatinosa of spinal cord. Clonidine also has cholinergic effect and increases the amount of acetylcholine available for modulating analgesia[15-19].We did not observed any statistically significant difference in any of the haemodynamic parameters throughout the study period between two study groups. ($P<0.05$)We observed prolonged time for first mobilization (210.5±17.75 minutes) in group CC as compared to group C(120.7±14.72 minutes). This observation is in accordance with the study done by Davis BR et al[10]. They also mentioned that all the patients could only be mobilized once level of block regressed to S2 dermatome. In our study we did not observed any side effects. We did follow the patients up to 72 hours and did not observed the incidence of TNS in any of the patient. This could be because we used preservative free Chloroprocaine and Clonidine. Limitations of our study is that except Davis BR et al[16] study, there is no other study available in the literature on Chloroprocaine and addition of Clonidine as an adjuvant with Chloroprocaine so that we had to face many problems in collection of data regarding the study.

Scope of improvement and future

Addition of Clonidine or any other adjuvant with Chloroprocaine are still underexplored in clinical practice. Hence we suggest that more and more clinical studies must be done with Chloroprocaine alone or with adjuvant to declare Chloroprocaine a safe drug for intrathecal use in short duration of surgeries.

Conclusion

Addition of preservative free Clonidine (30mcg) to preservative free 1% Chloroprocaine by intrathecal route provides excellent spinal anaesthesia with prolonged duration of analgesia and haemodynamic stability in short duration day care surgeries.

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