



## “EFFECT OF FENTANYL AS AN ADJUVANT WITH INTRATHECAL 2-CHLOROPROCAINE VS PLAIN 2 CHLOROPROCAINE FOR BELOW KNEE DEBRIDEMENT PROCEDURE”

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### ABSTRACT

**Background:-** More procedures are usually conducted in an ambulatory environment, and many of them are performed under spinal anaesthesia. 2-Chloroprocaine is classified by both a rapid onset and a rapid recovery period. Attempts have been made to add adjuvants like fentanyl to enhance the characteristics of spinal anaesthesia and post-operative analgesia. The aim of our research is therefore to determine the effect of added fentanyl to 2-Chloroprocaine in providing optimal analgesic requirements in an outpatient setting such as below knee wound debridement surgery.

**Material and methods:** The study was observational, hospital based analytical study conducted on 30 patients scheduled for below knee wound debridement surgery under spinal anaesthesia. Patients in either sex between 18 to 60 years of age belonging to ASA class 1 and class II, divided in to two groups of 15 patients each. Group A received 40mg of 1% chloroprocaine and Group B received 40mg of 1% chloroprocaine plus 25 mcg of fentanyl for spinal anaesthesia.

**Results:** Time to attain sensory block L4-L5 was 4.6 min in Group A and 4.7 min in Group B which is statistically insignificant. Though Group B attained peak sensory block T6 in 15.6 min and Group A T8 in 19.9 min, which was statistically significant. Duration of sensory blockade was more in Group B 108.5 mins compared to Group A 95.4 mins which was statistically significant. Onset of motor blockade in Group A 4.7 min and Group B 4.8 min which was statistically insignificant. Duration of motor blockade in Group B 83.5 min and Group A 69.1 min which was statistically significant.

**Conclusion:** Spinal anaesthesia with 40 mg of 1% chloroprocaine plus 25 mcg of fentanyl provides better and longer postoperative analgesia compared to plain 1% chloroprocaine which is desirable in ambulatory below knee debridement surgeries.

**KEYWORDS :** 1% 2-chloroprocaine, fentanyl , spinal anaesthesia , below knee debridement surgeries

### INTRODUCTION

Spinal anaesthesia is most suitable modality of anaesthesia for lower limb surgeries. As compared to other techniques it is reliable, easy to perform, has rapid onset of action, cost effective achieves autonomic, motor and sensory blockade depending on dosage and concentration of the drug and the level administered.<sup>(1)</sup> With increasing preference for regional blocks spinal anaesthesia has become a safe technique which is widely practiced for surgeries of lower limb example below knee wound debridement procedures. With the introduction of preservative free 2-Chloroprocaine, it is now possible to provide short duration spinal anaesthesia that shows faster onset and quicker recovery, producing an excellent sensory and motor block.<sup>(2)</sup> Hence, considering the nature and duration of the procedure, spinal anaesthesia with 2-Chloroprocaine would be a suitable choice.

In the past, several studies have evaluated spinal block characteristics of 2-chloroprocaine, supporting its potential usefulness for outpatient surgery and day care surgeries owing to faster motor recovery<sup>(2)</sup>. However, there are studies which show that addition of adjuvants such as clonidine, opioids such as buprenorphine or fentanyl can prolong the sensory component of the block. Therefore, the purpose of our study is to find the effect of added fentanyl to 2-Chloroprocaine in providing optimal analgesic requirement in an ambulatory setting such as below knee wound debridement surgery<sup>(3,4,5)</sup>.

### METHODS AND MATERIALS

After institutional ethics committee approval and written informed consent was obtained an observational analytical study was conducted for 30 patients of either sex between 18 to 60 years of age ASA 1 and 2 scheduled for lower limb below knee wound debridement surgery under spinal anaesthesia. Patients with contraindication to spinal anaesthesia, patients with known allergy to local anaesthetic, patients with history of neuromuscular diseases of lower limbs were excluded from the study.

The study was commenced with preoperative patient visit, examination, and review of necessary investigation. Routine investigations like haemoglobin, blood grouping, blood urea, serum creatinine, coagulation profile, and blood sugar will be done. ECG, Chest X-ray and 2D ECHO will be considered wherever indicated.

On the day of surgery patients were shifted to operation theatre where monitors such as pulse oximeter, electrocardiogram and non-invasive

blood pressure (NIBP) was connected and preoperative blood pressure, heart rate and oxygen saturation was recorded as baseline. Venous access was secured with 18G IV canula and preloaded with Ringer's lactate or normal saline 10ml/kg.

Under aseptic precaution, with the patient in either right or left lateral position, L<sub>3</sub>-L<sub>4</sub> interspace will be palpated. After local infiltration of the skin with 2ml of 2% lignocaine, 25G Quincke Babcock spinal needle will be introduced into the space using midline approach. Patient received an intrathecal injection of either 4ml (40mg) Group A or 4.5ml Group B (40mg Chloroprocaine with 25mcg Fentanyl) after confirming free flow of CSF. The drug was injected slowly over 10-15 seconds with bevel pointing towards the caudal end. All the patients were immobilized for 5 minutes till drug gets fixed after which the surgical procedure was allowed to commence following confirmation of adequate anaesthesia. Intraoperatively, vital parameters like heart rate, non-invasive blood pressure, SpO<sub>2</sub> were recorded every minute for the first 10 minutes, every 15 minutes till completion of surgery and postoperative recovery and till the patient complains of pain.

### PARAMETERS TO BE EVALUATED

**Assessment of sensory blockade – tested by pin prick test using hypodermic needle.**

Onset of sensory blockade: It is the time taken from injection of study drug till the patient does not feel the pin prick at L<sub>4</sub>-L<sub>5</sub>, L<sub>5</sub>-S<sub>1</sub> level.

*Duration of sensory blockade:* It is measured by time to two segment regression and complete S<sub>2</sub> recovery.

*Maximum height of sensory blockade:* It is defined as the time taken from injection of the study drug to the maximum sensory blockade attained.

**Assessment of motor blockade - by Bromage scale.**

#### BROMAGE SCALE

- 0 - Full flexion of knees and feet.
- 1 - Just able to flex knees, full flexion of feet.
- 2 - Unable to flex knees, but some flexion of feet possible.
- 3 - Unable to move legs or feet.

Onset of motor blockade: Is defined as time taken from injection of the study drug till the patient develops Bromage scale grade 3 motor blockades.

• Duration of motor block: Is defined as the time taken from onset of

motor block till the patient attains complete motor recovery (Bromage scale grade 0)

### STATISTICAL ANALYSIS

Data was entered in Microsoft Excel 2007 & analyzed using SPSS version 22. A sample size of 30 with 15 in two groups Group A received 40mg of 1% 2-chloroprocaine Group B received 40mg 1% 2-chloroprocaine plus 25 mcg of fentanyl were included in the study with 95% confidence interval & 80% power.

Collected data was analyzed by Mean, standard deviation, student t test for comparison of the two groups. Significance was assessed using ANOVA for repeated measures, chi-square test. The results were considered significant statistically, if P value was less than 0.05.

### RESULTS

Group	N	Mean	Std. Deviation	t test	p value
AGE	Group A	15	36.40	2.60	NS
	Group B	15	45.06		
WEIGHT	Group A	15	60.26	0.907	NS
	Group B	15	58.53		
HEIGHT	Group A	15	161.66	0.295	NS
	Group B	15	162.2		
BMI	Group A	15	23.14	0.395	NS
	Group B	15	21.802		

#### Demographic Data

The study population consisted of 30 patients, 15 were given spinal anaesthesia with 40 mg of 1% 2-chloroprocaine with 25 mcg of fentanyl (Group B) and remaining 15 with 40 mg of 1% 2-chloroprocaine plain (Group A). The age, weight, height and BMI of the patients were comparable in both the groups without any statistical significance (Table no. 1).

P value > 0.05 which is statistically insignificant

#### Sensory and Motor Blockade Comparison

Time to attain sensory block L4-L5 was 4.6 +/- 0.47 mins in Group A and 4.7 +/- 0.44 mins in Group B with p value (0.35) which is > 0.05, statistically insignificant. Though Group B attained peak sensory block (T6) in 15.6 +/- 1.08 mins and Group A (T8) in 19.9 +/- 0.57 mins, with p value (0.0001) which was < 0.05, statistically significant. Duration of sensory blockade was more in Group B 108.5 +/- 2.84 mins compared to Group A 95.4 +/- 1.08 mins with p value (0.0001) which was < 0.05, statistically significant. Onset of motor blockade in Group A 4.7 +/- 0.44 mins and Group B 4.8 min +/- 0.4 mins with p value (0.33) which was > 0.05 statistically insignificant. Duration of motor blockade in Group B 83.5 +/- 1.74 mins and Group A 69.1 +/- 0.88 mins with p value (0.0001) which was < 0.05 statistically significant.

**Table 2:- Showing Sensory and Motor characteristics of the study**

	Group	Mean duration (minutes)	N	SD	Significance
Motor Block	A	69.13	15	0.88	t=-27.52 p<0.0001, significant
	B	83.53	15	1.74	
Sensory Block	A	95.46	15	1.08	t=-16.03 p<0.0005, significant
	B	108.53	15	2.84	
		Onset (mins)	N	SD	Significance
Sensory	A	4.6	15	0.47	P=>0.35, not significant
	B	4.7	15	0.44	
Motor	A	4.7	15	0.44	P=>0.33, not significant
	B	4.8	15	0.44	
		MHSB (mins)	N	SD	Significance
Sensory	A	19.5	15	0.57	P<= 0.001, significant
	B	15.6	15	1.08	

### DISCUSSION

With the increasing trauma and chronic ulcers of foot as a result of diabetic complications, venous insufficiency and peripheral vascular disease. there has been an increase in the number of debridement procedures of the lower limb. Most often debridement's need a short acting anaesthesia for the procedure but on the analgesia for a longer duration.

The purpose of this study was to compare 40mg of 1% 2-Chloroprocaine plain with 40 mg of 1% 2-chloroprocaine plus 25 mcg of fentanyl for spinal anaesthesia in ambulatory below knee debridement surgeries in terms of onset of block, duration of sensory

and motor blockade and time to attain maximum sensory blockade. This study demonstrated that spinal anaesthesia with chloroprocaine and fentanyl as an adjuvant provides adequate onset of surgical block in terms of both sensory and motor blockade with increased post-operative analgesia.

On comparing the onset of sensory and motor blockade in our groups mean value 4.6 +/- 0.47 min and 4.7 +/- 0.44 min for sensory and 4.7 +/- 0.4 mins and 4.8 +/- 0.4 mins for motor was observed in both groups which were statistically insignificant. On comparing the duration of both sensory and motor blockade, Group B has prolonged sensory blockade compared to Group A 108.53 +/- 2.84 min vs 95.46 +/- 1.08 mins which was statistically significant similar finding was noted in Julie S Vath et al in 2005 and Brad R Davis et al in 2005.

Maximum height of sensory blockade was achieved in Group B (T6) as compared to Group A (T8) 15.6 +/- 1.08 mins vs 19.5 +/- 0.57 mins with significant p value with similar finding noted in Vath et al study.

### CONCLUSION

In conclusion, 40mg of 1% 2-chloroprocaine provides adequate surgical block for lower limb debridement procedures addition of fentanyl as an adjuvant increases the duration of sensory blockade which was helpful in post-operative analgesia with minimal increase in motor blockade duration.

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