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Original research article

Intrathecal chlorprocaine and chloroprocaine with fentanyl for short duration urological, perianal and lower limb surgeries; comparision of sensory parameters

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Abstract

Fentanyl, a lipophilic opioid, as compared to morphine is potent, has rapid onset of action with short duration of action and low CSF concentration, limited rostral spread of narcotic, lesser respiratory depression and early motor recovery. After obtaining the approval from institutional review board and the ethical committee, 60 ASA Grade I and Grade II patients who met inclusion and exclusion criteria who were undergoing short duration urology, lower limb and perianal surgeries were selected. The independent 't' test result shows that there is a significant difference in mean of time for regression to L1(min) between the groups with chloroprocaine with fentanyl group taking longer time to regress to L1(<0.001*). The independent 't' test result shows that there is a significant difference in mean of time for regression to S2(min) between the groups with Chloroprocaine with fentanyl group taking longer time to regress to S2(<0.001*).

Keywords: Chloroprocaine, fentanyl, sensory parameters

Introduction:

Opioids along with local anesthetics and non-steroidal anti-inflammatory drugs are the corner stone of effective pharmacologic management of postoperative pain. Opioids are considered as "gold standard" in clinical practice for the treatment of postoperative pain [1].

The ease of application of spinal opioids and their relatively high benefit to risk ratio, make them ideal for managing postoperative pain. Intrathecal opioids provide hemodynamic stability and postoperative analgesia by depressing the neuroendocrine response during the perioperative period with little effect on motor, sensory (e.g. pin-prick) and autonomic function (selective spinal analgesia). They enhance spinal anesthesia without prolonging motor recovery and discharge time. It is an attractive analgesic technique since the opioid is injected directly into the cerebrospinal fluid, close to the structures of the central nervous system where the opioid acts. This adjuvant analgesic technique is expected to decrease postoperative pain intensity and opioid requirements and to hasten recovery, it has been suggested that the optimal dose depends on the surgical setting and that there is a ceiling effect above which the risk of adverse effects outweighed the benefits of improved analgesia [2, 3].

Fentanyl, a lipophilic opioid, as compared to morphine is potent, has rapid onset of action with short duration of action and low CSF concentration, limited rostral spread of narcotic, lesser respiratory depression and early motor recovery.

Fentanyl is a commonly used intrathecal opioid. Many studies have been done in which fentanyl is added to other intrathecally used local anesthetic like lignocaine, bupivacaine and levobupivacaine. Studies of fentanyl added to intrathecal chloroprocaine are not many. This clinical study was conducted to compare the effects of spinal chloroprocaine and chloroprocaine with fentanyl for short duration procedures [4].

Methodology

After obtaining the approval from institutional review board and the ethical committee, 60 ASA Grade I and Grade II patients who met inclusion and exclusion criteria who were undergoing short duration urology, lower limb and perianal surgeries were selected.

Study Duration: From preanesthetic evaluation until complete regression of motor and sensory block.

Discontinuation criteria: Failed subarachnoid blocks, patients complaining of pain intraoperatively due to

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block regression before the surgery is completed.

Sample Size determination: To strengthen the power of the study the required sample size is rounded to 60; 30 for Chloroprocaine group and 30 for Chloroprocaine with Fentanyl.

Sampling Technique: These patients were randomly allocated into two groups by a computer generated randomization chart with 30 in each group

- **Group A:** Patients received 35mg of preservative free, isobaric 1% chloroprocaine hydrochloride with 0.5mL of sterile water intrathecally (4 mL).
- **Group B:** Patients received 35mg of preservative free, isobaric 1% chloroprocaine hydrochloride with Injection fentanyl 25mcg (0.5mL) intrathecally (4mL).

Results

Table 1: Comparison of duration of surgery (min) between the two groups

Group	N	Mean	SD	t Value	P Value
Chloroprocaine	30	34.867	9.843	-1.716	0.092
Chloroprocaine with Fentanyl	30	39.333	10.317		

The independent 't' test results shows that there is no significant difference in mean of duration of surgery(min) with respect to the Group (t value=-1.716, P=0.092). Hence both groups are comparable with respect to duration of surgery

Table 2: Peak block height (level)

		Chloroprocaine (F(%)/Mean ± SD)	Chloroprocaine with Fentanyl (F(%)/Mean ± SD)	P Value
Peak block height(level)	T12	7 (23.3%)	0 (0%)	0.007*
	T10	14 (46.7%)	10 (33.3%)	
	T8	7 (23.3%)	14 (46.7%)	
	T6	2 (6.7%)	2 (20%)	

*-Significant

The chi-square result shows that there is a significant difference between the groups with respect to the peak block height (level). In chloroprocaine group 14 (46.7%) of the patient had T10 level. None of the patients in chloroprocaine with fentanyl had T12 level. All the patients had T10 or above level, with 14 (46.7%) of them had T8 level.

Table 3: Time to peak block height (min)

	Chloroprocaine (F(%)/Mean ± SD)	Chloroprocaine with Fentanyl (F(%)/Mean ± SD)	P Value
Time to peak block height(min)	7.67±1.493	13.47±3.481	<0.001*

*-Significant

The independent 't' test result shows that there is a significant difference in mean of time to peak block height(min) between the groups with chloroprocaine with fentanyl group taking longer time to reach peak block height(<0.001*).

Table 4: Time for regression to L1 (min)

Sensory Parameters	Chloroprocaine (F(%)/Mean ± SD)	Chloroprocaine with Fentanyl (F(%)/Mean ± SD)	P Value
Time for regression to L1(min)	58.33±6.989	72.33±6.789	<0.001*

*-Significant

The independent 't' test result shows that there is a significant difference in mean of time for regression to L1(min) between the groups with chloroprocaine with fentanyl group taking longer time to regress to L1(<0.001*).

Table 5: Time for regression to S2 (min)

Sensory Parameters	Chloroprocaine (F(%)/Mean ± SD)	Chloroprocaine with Fentanyl (F(%)/Mean ± SD)	P Value

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Time for regression to S2(min)	84.33±6.261	94.67±8.193	<0.001*

*-Significant

The independent 't' test result shows that there is a significant difference in mean of time for regression to S2(min) between the groups with Chloroprocaine with fentanyl group taking longer time to regress to S2(<0.001*).

Discussion

Table 6: Comparison of peak block height and time to PBH between different studies

Study	Drugs used	Peak block height (Level)	Time to PBH(min)
Kararmaz A *et al* [5],	4 mg B+ 25 µg F+DW	T10[T5-T12])	7.3 (1.9)
	7.5 mg 0.5% B	T10 [T7-T12]	7.7 (1.2)
Ozgun cuvas *et al*, [6]	12.5 mg 0.5%LB	T9 (T4-T10)	-
	11mg 0.5%LB+15 µgF	T6 (T3-T10)	-
Vaghadia *et al*, [7]	35 mg 2% L+15 F	T8(T4-L2)	22.2(16.6- 26.8)
	40 mg 2% CP+15 F	T8(T1-L2)	20(17.7- 29.9)
Lacasse *et al*, [8]	40 mg 2% CP	T7 (T1 to T10)	15 (8)
	7.5 mg 0.75% B	T7 (T1 to T11)	18 (11)
Vath and Kopacz [9]	40 mg 2%CP+saline	T8(T4- L1)	17 ± 6
	40 mg 2%CP+20 F	T5(T3- T7)	21 ± 11
Present study	35 mg 1%CP+0.5 mL SW	T9 (T6-T12)	7.67
	35 mg 1% CP+ 25 µgF	T8 (T6-T10)	13.47

PBH- Peak block height, CP- chloroprocaine, B-Bupivacaine, L-Lignociane, LB levobupivacaine, DW-Distill water, SW- Sterile water, F- Fentanyl

All the studies have described the peak block height attained. Most of the studies stated above have compared the time to peak block height.

The mean peak block height attained in the present study was T9 in chloroprocaine group and T8 in chloroprocaine with fentanyl group. This was comparable to the study done by Ozgun cuvas *et al* and Vath and Kopacz.

The present study had shown the time to peak block height in the chloroprocaine with fentanyl group (13.47 minutes) to be slightly longer than that seen in the chloroprocaine group (7.67 min) which is statistically significant. This was comparable to the study done by Vath and Kopacz [10].

Table 7: Comparison of time to regression to L1, time to regression to S2 and time to bromage 0

Study	Drugs used	Time to regression L1 (min)	Time to regression to S2 (min)	Time to bromage 0 (min)
Kararmaz A *et al* [5],	4 mg B+ 25 F+DW	-	92.8	134.2
	7.5mg 0.5% B	-	88.4	105.6
Ozgun cuvas *et al*, [6]	12.5 mg 0.5%LB	-	376.75± 80.03	291.0± 81.08
	11 mg 0.5%LB+15	-	337.25± 61.29	213.75± 59.49
Vaghadia *et al*, [7]	35 mg 2% L+15 F	71 ± 41	-	120 ±35
	40 mg 2% CP+15 F	81 ± 41	-	117 ±36
Lacasse *et al*, [8]	40 mg 2% CP	82	146	76
	7.5 mg 0.75% B	160	329	119
Vath and Kopacz [9]	40 mg 2%CP+saline	53± 19	95± 9	67 ± 13
	40 mg 2%CP+20F	77± 7	104± 7	81 ± 16
Present study	35 mg 1%CP+0.5mL DW	58.33±6.989	84.33±6.261	68.67±6.288
	35mg 1%CP+ 25µg F	72.33±6.789	94.67±8.193	82.67±6.915

CP- chloroprocaine, B-Bupivacaine, L-Lignociane, DW- Distill water, F- Fentanyl, SW- Sterile water, LB-Levobupivacaine.

Some of the studies stated above have compared time to regression L1 and time to regression to S2. All the studies have described the time to bromage 0.

In the present study, time to regression to L1 in chloroprocaine group is 58.33±6.989 min which is comparable to study conducted by Vath and Kopacz. Time to regression to L1 in chloroprocaine with fentanyl group is 72.33±6.789 study. In the study conducted by Vaghadia *et al*, it is 81±41 min. The difference probably is due to higher dose of local anesthetic used in Vaghadia *et al*, study [11, 12]

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Time to regression to S2 is in the present study in chloroprocaine group is 84.33±6.261min and chloroprocaine with fentanyl group is 94.67±8.193 which is comparable to Vath and Kopacz study.
In the present study, the time to motor bromage 0 was longer in the chloroprocaine with fentanyl group and was statistically significant similar to study done by Vath and Kopacz. In studies done by Kararmaz A *et al*, Ozgun cuvas *et al*, local anesthetic added to fentanyl group had shorter time to bromage 0 which may be explained by the lower dose of local anesthetic used with fentanyl compared to only local anesthetic group.

Conclusion

- In the present study, the mean peak block height attained was T9 in chloroprocaine group and T8 in chloroprocaine with fentanyl group which was statistically significant.
- The present study had shown the time to peak block height in the chloroprocaine with fentanyl group (13.47 minutes) to be slightly longer than that seen in the chloroprocaine group (7.67 min) which is statistically significant
- In the present study, time to regression to L1 in chloroprocaine group is 58.33±6.989 min and in chloroprocaine with fentanyl group is 72.33±6.789 study which is statistically significant.
- Time to regression to S2 in the present study in chloroprocaine group is 84.33±6.261min and chloroprocaine with fentanyl group is 94.67±8.193 which is statistically significant

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