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A COMPARISON OF CLINICAL EFFECTS OF INTRATHECAL FENTANYL VS INTRAVENOUS FENTANYL AS ADJUNCT TO SPINAL ANAESTHESIA WITH LEVOBUPIVACAINE

Dr. Prithi Jain D.A, DNB, Associate Professor, Department of Anaesthesiology, Father Muller Medical College, Mangalore 575002

Dr. Lulu Sherif* M.D, DNB, Associate Professor, Department of Anaesthesiology, Father Muller Medical College, Mangalore 575002 *Corresponding Author

ABSTRACT This study compared effects of intrathecal fentanyl versus similar dose of intravenous fentanyl for lower abdominal and orthopaedic surgeries, with respect to the duration, and quality of Levobupivacaine induced spinal block. Patients were randomly allocated into 3 groups.

In Group IC (control) 2.5 ml of Levobupivacaine with 0.5 ml normal saline was given intrathecally and 0.5ml of NS was given IV immediately following spinal anaesthesia.

In Group IT along with 2.5ml of 0.5%Levobupivacaine, 0.5 ml of fentanyl (25 micrograms) was given intrathecally and IV 0.5 ml of NS was given.

In Group IV 2.5ml of Levobupivacaine 0.5 % with 0.5 ml normal saline was given intrathecally and 0.5ml of fentanyl (25 micrograms) was given IV

According to our observations, there was longer duration of motor blockade in group IT and IV compared to that of Group IC, results being statistically significant.

When comparing the duration of motor blockade in Group IT with Group IV the values were almost similar. Hence, we inferred that there is not much difference when fentanyl is administered intrathecally or intravenously.

KEYWORDS : Levobupivacaine, Intrathecal Fentanyl, Intravenous Fentanyl.

INTRODUCTION

Administration of fentanyl intrathecally is an established method for intraoperative anaesthesia[1]. Although opioids supplement spinal anaesthesia[2], that fact alone does not prove that the drug site of analgesic action resides only in the spinal cord. An experimental study showed that a significant amount of an intrathecally administered lipophilic opioid, such as fentanyl, is lost by diffusion into the epidural space and subsequently into the plasma [3, 4, 5], suggesting that it may induce analgesia by a systemic rather than by a spinal action.

In accordance to the above hypothesis, we hypothesise that fentanyl added intrathecally along with Levobupivacaine should give a fairly similar effect, as that of fentanyl administered intravenously along with spinal block with Levobupivacaine.

AIM

To compare the clinical effects of intrathecal fentanyl versus the same dose of intravenous fentanyl for lower abdominal surgeries, with respect to duration, and quality of Levobupivacaine induced spinal block.

MATERIALS AND METHODS

Ethical clearance was obtained from the ETHICAL COMITTEE of Father Muller Medical College After thorough pre anaesthetic evaluation, 90 consenting patients undergoing lower abdominal surgery were divided into three groups

- GROUP CONTROL(IC): Received IV: 0.5ml Normal Saline (NS) and Intrathecally: 2.5ml, 0.5% Levobupivacaine +0.5ml NS
- GROUP INTRATHECAL(IT): Received IV: 0.5ml NS and intrathecally:2.5ml , 0.5% Levobupivacaine +0.5ml (25 mcg) Fentanyl
- GROUP INTRAVENOUS (IV): Received IV: 0.5ml (25 mcg) Fentanyl and intrathecally : 2.5ml, 0.5% Levobupivacaine +0.5ml NS

All patients received –

- Pre medication: Midazolam 1 mg IV, 15 min before the beginning of surgery.
- Preloaded: Ringer Lactate 10 ml/kg, 20 minutes prior to the administration of spinal anaesthesia.
- Technique: The study drug was injected into L3-L4 subarachnoid space using 23G Quincke Babcock spinal needle, after confirming free flow of cerebrospinal fluid and the time of injection will be recorded as 0 minutes.

MONITORING:

Noninvasive blood pressure monitor, pulse oximeter and ECG leads were connected for all patients and baseline values were recorded parameters recorded for every 5 minutes for the first half hour and then every 10 minutes for 2hours

Post operatively bromage scale done for every half hour till bromage returns to score 1.

Post operative demand for rescue analgesia noted when VAS score >4 (visual analogue scale), being monitored every half hour after two hours.

Parameters compared:

- Duration of MOTOR BLOCK(Modified Bromage Score)
- Time for RESCUE ANALGESIA (VAS >4)
- Rescue analgesic: IV Butorphanol 1 mg
- ADVERSE EFFECTS ;Post op nausea vomiting (PONV), Sedation (Ramsay sedation scale), pruritis

RESULTS:

Analysis of data:

- Collected data was analyzed by mean, standard deviation, Post HOC test & analysis of variance (ANOVA) for repeated measures.
- The analysis was performed using SPSS software

DEMOGRAPHIC DATA

All the patients were comparable in terms of age, sex and gender
The surgeries were also of roughly similar duration
Age: 18 to 65 years (mean: 40.8043)
Weight: 40 to 70 kg (mean: 57.6304)
Gender distribution: 56 males and 34 females
Duration of surgery (DOS): Mean: 41.0326 +/-15.97625 minutes

DURATION OF BLOCK

Comparing the duration of block in 3 groups
The overall mean difference of duration when comparing
IT and IC was -47.20430 min
IV and IC was -35.58065min
IT and IV was +/- 11.6231
* Mean difference significant at 0.05 levels

Table 1: Block Duration Bonferroni

(I) grp	(J) grp	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound

IC	IT	-47.20430*	4.26556	.000	-57.6126	-36.7960
	IV	-35.58065*	4.23045	.000	-45.9032	-25.2580
IT	IC	47.20430*	4.26556	.000	36.7960	57.6126
	IV	11.62366*	4.26556	.023	1.2154	22.0319
IV	IC	35.58065*	4.23045	.000	25.2580	45.9032
	IT	-11.62366*	4.26556	.023	-22.0319	-1.2154
*. The mean difference is significant at the 0.05 level.						

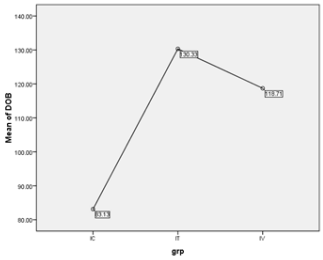

Figure 1: Block duration

TIME FOR RESCUE ANALGESIA:

Comparing time for rescue analgesia
The overall mean difference of duration when comparing
IT and IC -52.18280 min
IV and IC -50.93548 min
IT and IV +/- 1.24731

Table 2: Total number of rescue analgesic

Bonferroni						
(I) grp	(J) grp	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
IC	IT	-52.18280*	7.94116	.000	-71.5598	-32.8058
	IV	-50.93548*	7.87580	.000	-70.1530	-31.7180
IT	IC	52.18280*	7.94116	.000	32.8058	71.5598
	IV	1.24731	7.94116	1.000	-18.1297	20.6243
IV	IC	50.93548*	7.87580	.000	31.7180	70.1530
	IT	-1.24731	7.94116	1.000	-20.6243	18.1297
*. The mean difference is significant at the 0.05 level						

Adverse Effects:

- PONV : 2 patients in Group IT
- PRURITUS : 1 patient in Group IT
- SEDATION: Similar in all three groups

There was no statistically significant difference in any particular group regarding any adverse effect.

DISCUSSION:

Bupivacaine, the widely used local anesthetic in regional anesthesia is available as a racemic mixture of its two enantiomers, Levobupivacaine, and Dextrobupivacaine. Severe central nervous system (CNS) and cardiovascular adverse reactions reported in the literature after inadvertent intravascular injection or intravenous regional anesthesia have been linked to the R (+) isomer of bupivacaine. The levorotatory isomers were shown to have a safer pharmacological profile6, 7with less cardiac and neurotoxic adverse effects8, 9 the pure S (−) enantiomers of bupivacaine, i.e., ropivacaine and levobupivacaine were thus introduced into the clinical anesthesia practice.

It has been often found that intrathecal opioids added to low dose local anesthetics in spinal anaesthesia intensifies sensory block without affecting sympathetic blockade.10, 11 Among them, Fentanyl has rapid onset of action, binds strongly to plasma proteins and potentiates the afferent sensory blockade thus facilitates reduction in the dose of local anesthetics.

Although intrathecal opioids supplement spinal anesthesia, that fact alone does not prove that the drug site of analgesic action resides in the spinal cord 5. An experimental study showed that a significant amount of an intrathecally administered lipophilic opioid, such as fentanyl, is lost by diffusion into the epidural space and subsequently into the plasma 4, suggesting that it may induce analgesia by a systemic rather than by a spinal action.

Very few studies have compared the effects of intravenous and intrathecal fentanyl in Levobupivacaine spinal anaesthesia and hence we decided to assess the same.

We compared a control group with another receiving IV fentanyl and a third group receiving intrathecally. When comparing the three groups, the groups receiving Fentanyl IV and intrathecal have a longer duration of block when compared to the control group. Our study can be compared to Loper KA et al which concluded that when compared with continuous intravenous fentanyl infusion, continuous epidural fentanyl infusion offered no clinical advantages for the management of postoperative pain after knee surgery.4

In this study we also observed that, the duration of post-operative analgesia, i.e., the time to first request of post-operative analgesia was prolonged in both groups receiving fentanyl, with not much statistically significant difference. This is unlike the findings of Siddik-Sayyid et al.3 but may be explained by the study done by Wolfgang C et al. who compared the distribution of different opioids in intrathecal space, and found that fentanyl distributed rapidly into the epidural space and fat and subsequently into the plasma. 5

The incidence of adverse effects like nausea, vomiting and pruritis were more common when fentanyl was given intrathecally but was statistically not significant.

CONCLUSION

Whether the opiod fentanyl given intrathecally or intravenously, the duration of analgesia is prolonged after spinal block with levobupivacaine and the action of the opioid appears to be mostly by systemic absorption of the drug

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