Original Research Paper

Volume - 13 | Issue - 04 | April - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anaesthesiology

A COMPARISON OF INTRATHECAL HYPERBARIC BUPIVACAINE AND HYPERBARIC BUPIVACAINE WITH FENTANYL IN LSCS FOR POST OPERATIVE ANALGESIA

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ABSTRACT **Introduction:** Postoperative pain by virtue of its unique transient nature is more amenable to therapy. Spinal anaesthesia is preferred in LSCS. Intrathecal opioids to increase analgesic effect of bupivacaine during caesarean section and are used worldwide. The present study was conducted to elucidate the comparison between intrathecal bupivacaine and bupivacaine with fentanyl for postoperative analgesia. **Materials and methods:** 160 pregnant patients between 18 to 35 yrs of age were seleted .Group F received: Bupivacaine 0.5% with 10 microgram fentanyl and Group B received Bupivacaine 0.5 % alone. **Results:** Onset of sensory and motor block was comparable in both groups. Two segment regression and the duration of analgesia was significantly prolonged in group F (360 ± 53.15 min) as compared with Group B (219.75 ± 39.29 min). There was no significant statistical difference in the incidence of side effects in either group. **Conclusion:** It can be concluded that fentanyl (10 mcg) as an adjuvant to spinal bupivacaine in caesarean section reduces the dose of local anaesthetic agent and significantly prolongs the postoperative analgesia with no significant maternal and neonatal side effects.

KEYWORDS : Caesarean delivery. Bupivacaine, Fentanyl, Postoperative analgesia.

Introduction:

Pain has been a scavenge for human kind and much efforts have been taken to understand and thereby control it. Postoperative pain by virtue of its unique transient nature is more amenable to therapy.

LSCS is commonly performed under spinal anaesthesia[4,7,8] with bupivacaine. Spinal anaesthesia carries high efficiency, involves less drug doses, minimal neonatal depression[2]. The relatively short duration of action of local anaesthetics requires supplementation of local anaesthetics with adjuvants like opiods[1]. This reduces the dose of local anaesthetic, minimizes side effects and prolongs the duration of anaesthesia[6].

Fentanyl is an agonist opioid, about hundred times more potent than morphine. It is centrally acting lipid soluble Phenylperidine derivative with both spinal and supraspinal components of analgesia. In addition it has ceiling effect on respiratory depression but not on analgesia. Its high lipid solubility, high affinity for opioid receptors, and long duration of action makes fentanyl a good choice as an adjuvant to intrathecal LA for managing moderate to severe postoperative pain[9]. Intrathecal opioids increase analgesic effect of bupivacaine during caesarean section and are being used worldwide. Fentanyl a short-acting synthetic opioid is particularly suited for this purpose in doses from 10 to 30 μg[10]. A lower dose of bupivacaine with an adjuvant is used as a reliable combination which produces synergistic effect, prolonging the duration of sensory block without increasing sympathetic block or delaying recovery[11]. Several studies have demonstrated efficacy of fentanyl as an adjuvant to LA in SAB; however, optimal dose which provides a balance between analgesia and adverse effects has not been described and also there are very limited studies in patients for LSCS. The aim of this study was to compare the efficacy of Fentanyl as an adjuvant to hyperbaric bupivacaine for postoperative analgesia in LSCS.

AIMS AND OBJECTIVES

The study was designed to compare onset and duration of sensory block, onset and duration of motor block, duration of postoperative analgesia, haemodynamic stability of fentanyl as an adjuvant vs plain Bupivacaine and post op complication if any.

MATERIALS AND METHODS:

After approval from hospital ethical committee a randomised prospective single blind comparative study was carried out at tertiary care centre with 160 patients.

Inclusion and exclusion criteria : Pregnant females undergoing elective LSCS surgery, ASA grade 1 & 2, Age 18-35 years, Weight 40-70 kg, BMI< 30 whereas patients refusal for procedure, history of allergy to drugs, Infection on back, patients with Uncontrolled hypotension, cardiovascular disease, hepatic or renal disease, bronchospastic disease, ASA Grade 3 or more, emergency surgeries, patients taking any psychotropic drugs, Seizure disorder, Coagulopathy, morbid obesity, BMI>30 were excluded from the study. Patients were randomized in 2 groups with 80 patients in each group. Group F received 1.8ml Bupivacaine 0.5% with 10 microgram fentanyl (Total dose 2 ml) and Group B received 1.8ml Bupivacaine 0.5 % with NS 0.2ml (Total dose 2 ml). All patients underwent pre anesthetic evaluation with thorough general and systemic examination. Written informed consent was obtained . All routine investigations were done. Pre operative preparation was done in the form of measuring the base line Pulse rate, Blood pressure, RR, ECG, SPO2. On arrival in Operation Theatre after confirming patient's nil by mouth status, patient's baseline heart rate, mean arterial blood pressure, oxygen saturation, respiratory rate, ECG were monitored. Intravenous (IV) Line was secured with angiocath number 20 G and ringer lactate solution at 10 ml/kg was started. Oxygen was administrated via oxygen mask at 4lt/min. All patients received premedication with inj. Ondansetron 0.8mg/kg . Patients were given sitting position. Lumbar puncture was done under all aseptic precautions at L3-L4 space with 23G spinal needle. After ensuring free flow of cerebrospinal fluid the desired drug was injected in subarachnoid space. Time of onset of Sensory Block and time of onset of motor Block was noted. Duration of Sensory Block and Motor Block was measured. Duration of Surgery was noted. The Noninvasive Blood Pressure, Pulse rate, Oxygen Saturation and respiratory rate was charted every five minutes for first twenty minutes and then every 10 minutes throughout Surgery. Post Operatively – Patients were assessed at every hour till patient complains of pain. Inj Diclofenac Sodium 50mg IV was given as rescue analgesic. Total no. of analgesic doses were counted in first 24 hrs. Adverse events such as Hypotension, Bradycardia, Nausea, Vomiting, Retention of urine, Headache, Sedation were recorded.

STATISTICAL ANALYSIS DETAILS

Data was analysed by using SPSS 24.0 version. Qualitative data was expressed in terms of percentages and proportions. Quantitative data was expressed by unpaired t test. A p value of <0.05 was considered as statistically significant.

RESULTS

Comparative evaluation was done for age, sex, weight and height. P value was calculated using t test and was statistically insignificant.(p>0.05) .

Table 1: Comparison of Mean Time Onset of action (min) of patients in Groups:

	Bupivacaine + Fentanyl (Group F) Mean ± SD	Bupivacaine (Group B) Mean ± SD	P-value	
Onset of Sensory block (min)	3.4 ± 0.62	2.43 ± 0.49	P<0.01	Significant
Onset of Motor block (min)	2.5 ± 0.50	2.5 ± 0.50	P = 1	Not Significant

We found that the time of onset of sensory block was significantly longer in Group F (3.4 ± 0.62 min) as compared to Group B (2.43 ± 0.49 min). This difference was statistically significant (p<0.01)

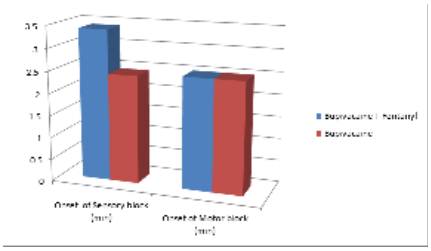

Table-2: Difference in pulse rate in Bupivacaine with Fentanyl and Bupivacaine study group

Pulse rate	Bupivacaine + Fentanyl		Bupivacaine		P value	
	Mean	SD	Mean	SD		
Baseline	85.8	7.08	85.9	7.26	0.92	Not Significant
0 min	85.72	7.47	85.65	7.59	0.94	Not Significant
5 min	84.45	7.77	86.00	10.07	0.20	Not Significant
10 min	83.02	11.98	85.98	9.89	0.11	Not Significant
15 min	84.25	7.57	87.17	8.10	0.01	Significant
20 min	83.92	8.41	86.87	8.59	0.02	Significant

There was statistically significant difference between two groups of patients in terms of pulse rate all the time(p value >0.05). Variation in trendline between two groups in all time duration was probably due to better pain relief in Bupivacaine with Fentanyl study group when compared to Bupivacaine.

Table-3: Duration of Analgesia in Bupivacaine with Fentanyl and Bupivacaine study group

Duration of Analgesia	Mean	SD	P value	
Bupivacaine + Fentanyl	360	53.15	0.01	Significant
Bupivacaine	219.75	39.29		

Duration of postoperative analgesia was significantly longer in Group F as compared with Group B. This difference was statistically highly significant (P<0.01).

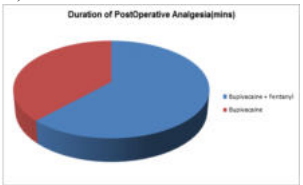

Table- 4: Rescue Analgesia in Bupivacaine with Fentanyl and Bupivacaine study group

No of Rescue Analgesia	Mean	SD	P value	
Bupivacaine + Fentanyl	1.06	0.24	0.01	Significant
Bupivacaine	3.33	0.63		

This showed that no. of rescue analgesics required were significantly less in Group F.

DISCUSSION:

The prevalence of caesarean sections has increased during the past 20 years. The most popular technique for caesarean sections is spinal anaesthesia. Because of its high efficacy and minimal neurological side effects, bupivacaine is the local anaesthetic that is commonly used for caesarean sections. In order to eliminate the visceral discomfort brought by traction on the peritoneum and intraperitoneal organs during caesarean birth, a higher dose of local anaesthetic is necessary. However, high doses are linked to high levels of block and unfavourable side effects. Many studies have been conducted to compare the effects of different opioids used as adjuvant in caesarean section.

This study was designed to see the efficacy of Fentanyl as an adjuvant to Bupivacaine intrathecally for postoperative analgesia in LSCS. The Demographics Characteristics of the two groups including age, height, weight were not significant in our study.

ONSET OF SENSORY BLOCK - Himabindu Gandam Venkata,et al[15]conducted a randomized controlled prospective study comparing low dose bupivacaine (7.5 mg) and 25 ug fentanyl mixture to conventional dose of hyperbaric bupivacaine for caesarean section and in their study onset of sensory block was found to be 148+/- 38.4 secs in Study group while 168+/- 31.2 secs in Control group. . In our study time of onset of sensory block to T10 was found to be157+/-18.81 secs in Study group while 161.33 +/- 13.76 secs in Control group which was not statistically significant. The time of onset of sensory analgesia to T10 between group I and group II was comparable which is in accordance with above conducted study.

Time for onset of motor block - Harsoor SS, et al,.[16] Conducted a study on Spinal Anaesthesia with Hyperbaric Bupivacaine with 10 ug Fentanyl compared with plain bupivacaine only for caesarean section and time of onset of motor block was found 245.24 +/- 10.57 secs in study group while 248.4+/-22.6secs in control group. In Our study the mean time of onset of motor blockade in group I was 330.7+/-22.81sec, in group II was 333.53+-21.62(P value 0.624).The present study results are comparable with the results of these various studies.

Haemodynamic Parametres - In our study, mean Systolic blood pressure (SBP) changes at all time intervals intraoperatively and postoperatively from 02 min to 24 hours were found to be comparable and statistically not significant (p>0.05) between the two groups. Mean heart rate (HR) changes at all time intervals intraoperatively and postoperatively from 0 min to 24 hours were found to be comparable and statistically not significant (p>0.05) between the two groups. Hunt CO et al.,[13]conducted double blind, randomized study to evaluate effects of intrathecal fentanyl (12.5mcg) in patients undergoing caesarean section on intraoperative parameters. Cardiovascular parameters like SBP, DBP, MAP and respiratory parameters like SpO2, RR were comparable in both the groups.

Duration of Analgesia - Himabindu Gandam Venkata, et al[15]conducted a randomized controlled prospective study comparing a hyperbaric bupivacaine and 25 ug fentanyl mixture to a conventional dose of hyperbaric bupivacaine only for caesarean section and mean duration of analgesia was found to be 200+/-9.1 min in Group 1(study group) while 143+/- 9 min in Group 2(control group). In Our study results in terms of duration of analgesia was comparable with results of above studies. This is likely due to synergy between opioid's & local anaesthetic agents. Fentanyl by acting on mu- receptor in spinal cord, it opens k+ channels & reduced influx of ca2+ so that it inhibits release of neuro transmitters. Opioids act on nociceptive afferent pain pathway, not on sympathetic efferent pathway.

Requirement of Rescue Analgesia - First rescue analgesia was given when patient had pain with VAS > 4, IV Diclofenac was administered and total no. of Diclofenac doses required in 24 hours were calculated. Bimita Acharya,et al,.[14] conducted a study on effect of Bupivacaine(7

mg) and 10 ug Fentanyl compared with plain bupivacaine only during elective Caesarean Section under Spinal Anesthesia. It showed that in post op period reduced doses of rescue analgesics were required in patients of study group compared to study group. Our study results in terms of requirement of rescue analgesic were comparable with results of above studies.

APGAR SCORE - Mean APGAR score at 1 min in group F was 8-9, Group B was 8-10, at 5 min APGAR score in both group I, II was 10. No significant difference was observed between the 2 groups at 1 and 5 min interval. Archana.L, et al,.[12]conducted a prospective double blind comparative study- Hyperbaric bupivacaine with 10 ug fentanyl compared to hyperbaric bupivacaine alone for spinal anesthesia in caesarean section. Mean APGAR score at 1 min and 5 min were 8.867 and 9.433 respectively in control group, it was 8.833 and 9.267 respectively in study group. They observed no significant neonatal side effects on addition of fentanyl.

Our study results in terms of APGAR score were comparable with results of above studies.

Incidence of intraoperative and postoperative other side effects in the form of nausea in two patients, Minimal Hypotension was observed in two patients, vomiting in one patient & Bradycardia in one patient was noticed in group F and vomiting in one patient was noticed in Group B. We did not notice any incidence of Sedation, respiratory depression, perioperative SpO2 was comparable in both the groups. There was no significant difference in side effects between two groups.

CONCLUSIONS:

It can be concluded that 1.5% hyperbaric Bupivacaine 8mg and Fentanyl 10 µg combination group provides longer duration of analgesia 2.ddition of Fentanyl to Bupivacaine did not alter haemodynamic variables in the patients .Number of rescue analgesic doses needed was significantly less in Bupivacaine + Fentanyl group .No significant side effects were observed in either group.

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