ORIGINAL ARTICLE

Comparison of intrathecal sufentanil and morphine in addition to bupivacaine for caesarean section under spinal anesthesia

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ABSTRACT

Background: Co-administration of small dose of opioids with bupivacaine for spinal analgesia is advocated because of synergistic action between local anaesthetics and opioids, leading to reduction in doses, intraoperative discomfort and postoperative analgesic requirement.

Aim: We compared the effects of intrathecal sufentanil with intrathecal morphine, when added to bupivacaine for caesarean sections.

Method: Sixty ASA I and II parturients, undergoing caesarean section under spinal anaesthesia, were randomly allocated into three groups of 20 each to receive either injection (inj.) bupivacaine 12 mg (Group I), which was labelled as the control group; inj. bupavacaine 12mg + inj sufentanil 10mcg (Group II) or inj. bupavacaine 12 mg + morphine 0.2mg (Group III) in a double blind clinical trial. The parameters studied were the time of onset, sensory level of the block achieved, total duration of analgesia, any need of rescue analgesics, maternal side effects and foetal outcome..

Result: Mean duration of analgesia (hrs) was higher in group III as compared to group I and group II (15.9±0.96 VS. 1.95±0.55 and 5.83±0.39 respectively); total duration of analgesia was significantly longer with the use of sufentanil and morphine as compared to control (5.83±0.39 and 15.91±0.96* vs. 1.95±0.55). Onset of block was significantly faster with use of sufentanil in Group II (1.92±0.27) vs. Group I and II (4.64±0.28 and 4.50±0.22 respectively). Analgesia was significantly better with the use of opioids compared to control as no additional analgesic were required in both groups. Side effects with insignificant difference noted were hypotension, nausea, and shivering. However, vomiting had a higher incidence in Group I [8(40%) vs. 1(5%) and 6(30%)]; and the incidence of pruritis and somnolence was higher [6(30%)] in Group II as compared to Group III [2(10%) and 1(5%) respectively]. No adverse effects on foetus were seen with use of opioids and comparable Apgar scores were noted.

Conclusion: Addition of small doses of sufentanil or morphine to intrathecal bupivacaine is suitable for use in caesarean section, providing rapid onset and prolonged analgesia but with some side effects like pruritis and somnolence.

Keywords: Anaesthesia; Spinal; Intrathecal; Morphine; Sufentanil; Bupivacaine; Caesarean section

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INTRODUCTION

Co-administration of small doses of opioids with bupivacaine for spinal analgesia is advocated because of synergistic action between local anaesthetics and opioids leading to a reduction in dose of either of the agent used alone, intraoperative discomfort and postoperative analgesic requirement. We planned to compare the perioperative and postoperative effects of addition of sufentanil and morphine to bupivacaine for spinal analgesia in parturients undergoing caesarean section.

METHODOLOGY

We planned a randomized clinical trial of three treatment

modes, and recruited 60 parturients scheduled to undergo caeserian section with spinal anaesthesia. The trial was conducted in Department of Anesthesiology, Himalayan Institute of Medical Sciences, Dehradun (India). The parturients were allocated randomly to three groups of 20 each using sealed envelopes. Group I was designated to be the control group. The spinal agents to be used were as under;

Group I: Spinal analgesia with bupivacaine 12mg.

Group II: Spinal analgesia with bupivacaine 12mg + sufentanil 10μg.

Group III: Spinal analgesia with bupivacaine 12mg + morphine 0.2mg.

After approval of the hospital ethics committee and written informed consent, 60 ASA I and II parturients, undergoing elective caesarean section, were included in our study. Females with multiple pregnancies, PIH, placenta previa, morbid obesity, foetal distress and any contraindication to spinal analgesia were excluded from the study.

All the subjects were advised tablet ranitidine 150mg and tablet metaclopramide 5mg a night before as well as 2 hours prior to surgery. In the operating room, intravenous (IV) access was established with 18 G cannula and baseline vital signs e.g. pulse rate and non-invasive blood pressure were recorded. The parturients were then preloaded with 1000ml of Ringer's lactated solution. With the parturients in sitting position, spinal analgesia was administered at L3-4 space, using 25G Quincke Babcock spinal needle by an anaesthetist blind to the type of drug being used. On completion of the spinal injection, the parturients were placed supine on the table and a wedge was put under right hip to provide 15º lateral tilt. NIBP was monitored every 5 min till the end of surgery. Level of spinal analgesia was checked by pin prick method in midclavicular line. Level of block of T6 was considered adequate for caesarean section. Time was noted to achieve the block.

In the event of patient experiencing discomfort during surgery a bolus of injection sufentanil 10μg IV was given as a rescue analgesic. If fall in NIBP was greater than 30 % of the base line, inj. ephedrine was administered in repeated boluses. Inj. Oxytocin (syntocinon) 10 units in an infusion was administered after delivery of the baby. A paediatrician assessed the neonatal Apgar score at 1, 5 and 10 min after delivery.

An approximate power of 80% was for a sample size of 20 in each group for the investigation to detect the differences in the outcome variables.

Statistical analysis was performed for comparing groups using ANOVA F-test and pairwise comparison by Scheffe test between the groups. The quantitative data on side effects of drugs under study were compared using Fischer exact test. EPI Info 2000 statistical software was used. P <0.05 was considered as significant.

Table 1: Demographic Profile of Patients (Mean±SD)

Variables	Group I N=20	Group II N=20	Group III N=20	P Value+
Age(yrs)	27.4±4.49	25.65±2.5	25.75±3.19	0.2134
Weight(kg)	57.45±3.03	56.15±4.55	56.9±3.02	0.5229
Height(cm)	157.5±3.30	156.15±4.61	156.9±2.77	0.5056

+ P value obtained from ANOVA F-test.
*P <.05 were considered as significant.
SD= Standard Deviation

RESULTS

Demographic data was similar among all the groups (Table 1). Time to maximal cephalad spread and resolution to T10 segment was significantly reduced in Group II (Table 2). The time to which analgesia lasted was significantly reduced in Group III (Table 2). A statistically significant difference was noted in the requirement of rescue analgesics in Group I (Table 2).

There were no significant differences with respect to shivering, hypotension, bradycardia and respiratory depression among the groups. Incidence of nausea was

Table 2: Characteristics of sensory block: Data presented as numbers or (Mean+SD)

Variables	Group I N=20	Group II N=20	Group III N=20	P-Value*
Maximum Height	T6	T5	T6	
Time to Max Cephalad spread (min)	4.64±0.28	1.92±0.27*	4.50±0.22	<0.001
Resolution to T10 (min)	114.25±6.54	137±10.69*	119.25±7.66	<0.001
Duration of analgesia (hrs)	1.95±0.55	5.83±0.39	15.91±0.96*	<0.001
Additional analgesics	3(15%)*	0	0	

* P value obtained from ANOVA F-test.
*P <05 were considered as significant

Table 3: Frequency of intraoperative side effects

Variables	Group I N=20	Group II N=20	Group III N=20
Hypotension	4(20%)	6(30%)	4(20%)
Bradycardia	0	0	0
Respiratory depression	0	0	0
Nausea	6(30%)	2(10%)	4(20%)
Vomiting	8(40%)*	1(5%)	6(30%)
Pruritus	0	6(30%)*	2(10%)
Shivering	6(30%)	2(10%)	4(20%)
Sedation	0	6(30%) *	1(5%)

*P <05 was considered as significant as assessed by chi-square and Fisher test

Table 4. Neonatal outcome:
Data presented as mean Apgar score (range)

Time (min)	Group I N=20	Group II N=20	Group III N=20
1	7(6-8)	8(6-9)	8(6-9)
5	9(8-9)	9(8-9)	9(8-10)
10	9(9-10)	9(9-10)	9(9-10)

not statistically significant. Vomiting and pruritus were significantly less in Group II. Statistically significant difference was noted with respect to sedation in Group II (Table 3). Neonatal outcome in terms of Apgar score was similar among the groups (Table 4).

DISCUSSION

Our study demonstrated that addition of sufentanil or morphine to intrathecal local anaesthetic solution in patients undergoing caesarean section improved patient comfort and prolonged the analgesic effects when compared to local anaesthetic only. Various studies (1-3) have shown that addition of opioids have synergistic effect when added to bupivacaine. Theories postulated for this action range from prolong inhibition of C fibres, inhibition of different ionic channels such as Na^{+} channel by local anaesthetics and voltage gated Ca^{++} channel by opioids; all potentiate binding of opioids to spinal opioid receptors (4-6).

The time of cephalad spread to reach the T6 segment was faster with the use of intrathecal sufentanil. This may be attributed to increased lipid solubility of the drug as shown in a study by Braga et al (7). In our study addition of intrathecal sufentanyl and morphine significantly prolonged the mean duration of effective analgesia. This action is even prolonged many fold as compared to the duration of analgesia by any of the drug when used IV. However, addition of an intrathecal opioid was associated with significant side effects such as hypotension, vomiting and Pruritus, although none of these effects were significant to warrant urgent interventional measures. Respiratory depression as judged by a respiratory rate< 10/min and SpO2<93% was not associated with the use of intrathecal opioids in our study. This correlates well with other reports e.g. studies by Belzarena and Abouleish (8, 9) who demonstrated that respiratory rate < 10/min may not be present.

Neonatal outcome as judged by Apgar scores at 1, 5 & 10 mins were similar in all the groups. Addition of opioid intrathecally was not found to be associated with any significant fetal depression.

CONCLUSION

Addition of opioids to bupivacaine is an effective measure to prolong the duration of post operative analgesia as well as to improve the quality of sub-arachnoid block with acceptable level of increased side effects, but without increasing neonatal morbidity.

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