ORIGINAL RESEARCH PAPER

Anesthesiology

KEY WORDS: Pain free postoperative period, early ambulation, adjuvants, spinal anesthesia,

COMPARATIVE EVALUATION OF ADJUNCT FENTANYL VERSUS CLONIDINE ADDED TO 0.5% BUPIVACAINE HEAVY IN LOWER SEGMENT CESAREAN SECTION

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ABSTRACT

Pain free postoperative period and early ambulation are the need of the day for mothers and their neonates for early initiation of breast feeding. Co-administration of adjuvants with bupivacaine for spinal anesthesia is advocated to reduce its dose and improve the quality of intraoperative and postoperative analgesia with least number of side effects. The present study is aimed to compare the analgesic efficacy and mean duration of effective analgesia of intrathecal Bupivacaine with Fentanyl and Bupivacaine with Clonidine in cesarean section of parturients.

METHODS: 80 full term parturients scheduled for cesarean section were randomized into 2 groups of 40 each. GROUP BC (Bupivacaine with clonidine) received 10 mg of 0.5% hyperbaric Bupivacaine and 30µg clonidine intrathecally whereas GROUP BF (Bupivacaine with Fentanyl) received 10mg of 0.5% hyperbaric Bupivacaine and 25 µg fentanyl intrathecally.

RESULTS: Patients in group BC showed long duration of analgesia compared to group BF (p value <0.05). Both the groups had satisfactory analgesia with hemodynamic stability and there were no significant differences regarding mean arterial pressures, heart rate, Respiratory rate and SpO2.

CONCLUSION: We conclude that both the adjuvants provide excellent sensory and motor blockage with lower dose of bupivacaine. Both drugs improved intraoperative analgesia and prolonged the duration of effective analgesia without any significant adverse effects.

INTRODUCTION

Spinal anaesthesia is a form of regional anaesthesia which involves injection of an anaesthetic drug into the subarachanoid space to provide simple effective and safe analgesia in perioperative period.[1] It is one of the easiest and most reliable techniques of regional anaesthesia used for cesarean section deliveries because of its greater maternal safety, foetal benefits, higher paternal satisfaction, and consumer demand. Various adjuvants are added intrathecally with local anaesthetic for better post-operative pain management, to reduce the amount of local anaesthetics and to decrease the incidence of side-effects. In our daily practice clonidine and fentanyl has widespread use.

Adrenergic alpha2 agonist clonidine has been considered as an adjuvant for its antihypertensive, sedation, analgesia, sympatholytic effects and reduce the amount of anaesthetic agents requirement [3]. Clonidine can achieve analgesia when administered intravenous, epidural or intrathecally.[1] It provides prolonged, and dose dependent analgesia with a consequently decreased requirement for supplemental analgesics.

Fentanyl is one of the most extensively used synthetic opioid as adjuvant in parturients and has been found to be safe and effective both in terms of neonatal and maternal outcome. It acts by decreasing the sensory input to the central nervous system. The site of action of adjuvant drugs is different from that of the local anaesthetic.[2] Adjuvant drug also lowers the incidence of local anaesthetic systemic toxicity by decreasing the dose requirement of the local anaesthetic agent.[3]

Hence this study is being undertaken to evaluate the effects of Clonidine(30 µg) and Fentanyl (25 µg) added to (0.5)% Bupivacine Heavy in lower segment cesarean section (LSCS).

AIMS AND OBJECTIVES

The Primary Objective was to compare the efficacy and mean duration of analgesia of intrathecal hyperbaric 0.5% bupivacaine-clonidine mixture and hyperbaric 0.5% bupivacaine-fentanyl mixture in lower segment cesarean section (LSCS). And the secondary objectives were to compare onset of blockade, sedative effects and other side effects.

Technique Of Anaesthesia:

A prospective randomized single-blind study was conducted in 80 number of patients in Assam Medical College & Hospital, Dibrugarh over a duration of one year after getting approval of Institutional Ethics Committee (H).

Patients were randomly allocated into two groups at 40 patient each group

(1) Group **BC** received 0.5% hyperbaric bupivacaine 10mg (2ml) and clonidine 30µg as a mixture.
(2) Group **BF** received 0.5% hyperbaric bupivacaine 10mg (2ml) and fentanyl 25µg as a mixture.

INCLUSION CRITERIA:

Patients with ASA II aged 18-45 years who gave consent for the procedure, Elective cesarean section

EXCLUSION CRITERIA:

- Patient less than 18 years or who don't give consent, and age more than 45 years.
- Any hypersensitivity or contraindication to Clonidine or Fentanyl
- Bronchial Asthma Patients.
- Hypertensive patients ,Diabetes mellitus, morbid obesity
- Congenital cardiac abnormality
- Congestive heart failure patients
- Emergency caesarean section patients

After a detailed history and thorough clinical examination the patients were enquired about any history of drug allergy, previous surgeries, or prolonged drug treatment. General examination, systemic examinations and assessment of the airway were done. Preoperative fasting of minimum 6 hour was ensured before operation in all cases and informed consent was taken . On the day of surgery Standard monitors

were connected and baseline parameters of Spo_2 ECG_2 Pulse rate and mean arterial blood pressure were recorded and monitored. An intravenous line was secured with 18G cannula and patients were preloaded with 10mL/Kg of Ringer Lactate. Under all aseptic and antiseptic precaution lumber puncture was done using 25G Quincke spinal needle through midline approach in lateral position. Intrathecal Bupivacaine heavy (study drug) was injected in L3-L4 space over 30 sec. After that, the patients were made supine with 15-20° left displacement of uterus until birth of baby by keeping a wedge under the right buttock. Fluid therapy was maintained with (NS/DNS) @10ml/kg/hr.

Before the surgical incision, the sensory level was assessed by response to pin-prick while weakness was evaluated using a modified bromage scale. The onset of sensory block was assessed along the mid clavicular line bilaterally. Dermatomal level was tested every 2 min after subarachanoid block until T6 level was stabilised for four consecutive readings.

The sensory level was assessed by response to pin prick method.This was assessed every 2 minutes until sensory block upto T6 was achieved.

PARAMETERS TO BE NOTED:

- Sensory blockage
- Motor blockage
- Hemodynamic stability
- Sedation scores
- Post operative block characteristics

The following variables were observed and recorded for sensory block:

- The time taken for onset of sensory block

The following variable was observed and recorded of motor block:

- The time taken for complete establishment of motor block (Bromage-3)

Postoperative block characteristics were assessed by the following parameters:

- Mean time for first rescue analgesia (Duration of effective analgesia)

Patients were assessed for degree of sedation and scoring done with Campbell sedation scale at every 15 minutes till the delivery of baby and thereafter upto 2 hours at 30 minutes intervals. Hemodynamic parameters were monitored and recorded throughout the surgery at every 5 min till the delivery of baby and every 15 min there after until the end of procedure. All the hemodynamic parameters were recorded in the recovery room at 30 min interval upto 2 hours. Postoperative block characteristics were assessed at 1 hour interval till 6 hours or with use of first dose of rescue analgesia[4]. Sensory regression was assessed by pin prick method and motor block was assessed using modified Bromage scale. Postoperative pain was assessed by 10 – point verbal rating scale (VRS). VRS was measured every 60 minutes postoperatively till patient complained of pain (VRS>4). If patient complained of pain (VRS>4), then rescue analgesia with inj tramadol (1-1.5mg/kg) mg via iv route was administered[1]. Hypotension (20% fall in MAP from preinduction levels or a systolic BP lower than 100mmHg) were treated with IV fluid bolus and intermittent bolus 6 mg intravenous Mephentramine. Total Mephentramine requirement, number and duration of hypotension episodes were recorded.

During the surgical procedure and postoperative period, adverse effect like anxiety, nausea, vomiting, shivering, dry mouth, respiratory depression, etc were observed for (if any) and treated accordingly. Nausea and vomiting were treated with 4 mg of IV bolus ondansetron. Shivering was treated with oxygen inhalation @ 5-9L/min, sponging the skin with warm water and injection tramadol (0.5mg/kg) was also used[3].

Table–1: Campbell Sedation Score[1]

SCORE	RESPONSE
1	Wide awake
2	Awake and comfortable
3	Drowsy and difficult to arouse
4	Not Arousable

Table–.2: Modified Bromage Scale

SCORE	RESPONSE
0	No motor block
1	Inability to raise extened legs,just able to flex knees,full ankle flexion
2	Inability to flex knees,some flexion of ankles possible
3	Complete block of motor limb

RESULTS AND OBSERVATIONS:

The demographic profile of the patient in both the groups were comparable

Table -3 Efficacy Endpoints:

Parameter	GROUP BC	GROUP BF	P value
Mean time of onset of sensory block (minutes)	2.69 ± .11	2.64 ±.14	0.14
Mean time of onset of motor block (minutes)	2.69 ± .14	2.64 ±.16	0.12
Mean duration of analgesia (minutes)	271.37 ± 5.94	177.09 ± 5.38	<0.05

In our study we found the mean time of onset of sensory block was 2.69 ± .11 minutes in group BC and 2.64 ±.14minutes in group BF and both the groups were comparable with no significant difference (p=0.14) .Also the mean time of onset of motor block was 2.69 ± .14 minutes in group BC and 2.64 ±.16 minutes in group BF and both the groups were comparable with no significant difference (p value =0.12) between the study groups. The mean duration of analgesia was 271.37 ± 5.94 minutes in group BC and 177.09 ±- 5.38 minutes in group BF, thus BC group has longer duration of action, a highly significant difference (p<0.01) between the study groups. It was seen that there was no significant statistical difference between group BC and BF as per pulse rate was concerned (p value >0.05), no significant statistical difference as per Respiratory rate was concerned (p value >0.05). Mean sedation score at 0, 30, 60, 90 and 120 min for Group BC were 1.49 ±.51, 3.03 ±.49, 3.05 ±.32, 2.38 ±.49, 2.46 ±.51 and Group BF were 1.58 ±.55, 2.50 ±.51, 2.53 ±.55, 2.45 ±.50, 2.50 ±.51 respectively. In our study, the sedation score was statistically significant at 30 and 60 minutes between two groups(p<0.01). The baseline sedation score and sedation score at 90 and 120 minutes had no significant statistical difference between Group BC and Group BF as difference was insignificant(p value>0.05).

In this study it was seen that there was no significant statistical difference between group BC and BF as per Oxygen saturation (SPO2) and mean arterial blood pressure was concerned and difference was insignificant (p>0.05).

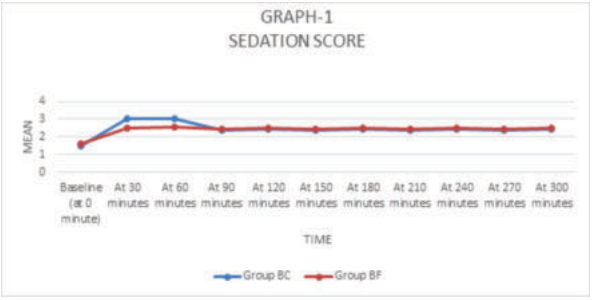
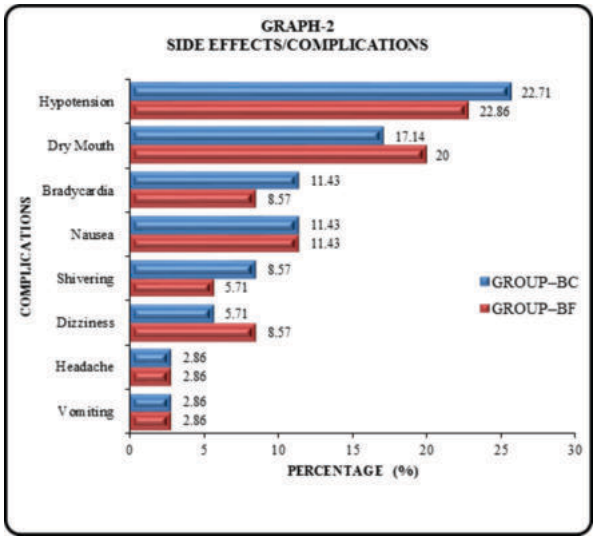


Table- 4 Side Effects

COMPLICATIONS	GROUP–BC		GROUP–BF		*p value*
	n	%	*n*	%	
Hypotension	9	22.71	8	22.86	0.780
Dry Mouth	6	17.14	7	20.00	0.095
Bradycardia	4	11.43	3	8.57	0.690
Nausea	4	11.43	4	11.43	1 .000
Shivering	3	8.57	2	5.71	0.322
Dizziness	2	5.71	3	8.57	0.322
Headache	1	2.86	1	2.86	1 .000
Vomiting	1	2.86	1	2.86	1.000
Pruritis	0	0	0	0	–
Respiratory Depression	0	0	0	0	–



A few no. of patients developed side effects like hypotension, dry mouth, bradycardia nausea shivering etc in both the groups with no significant difference (p>0.05).

DISCUSSION:

Spinal anesthesia is a potent and safe technique that provides surgical anesthesia and post operative pain control[5]. Addition of an adjuvant to bupivacaine heavy in spinal anesthesia helps in providing better surgical anesthesia and post-operative analgesia with very less side effects[3].

Clonidine, a selective partial agonist for alpha adrenoreceptors increase both sensory and motor block of local anesthetics after administration through intrathecal route. It exerts analgesic effect through the activation of post synaptic alpha-2 receptors in substantia gelatinosa of spinal cord[2]. Fentanyl and bupivacaine co-administration has a synergistic inhibitory action on the A delta and C- fibers conduction causing improved perioperative analgesia.[1]

In our study, we found that the mean time for onset of sensory block at T6 level in group BC (Bupivacaine + clonidine) to be 2.69 ±.11 minutes and that of group BF (Bupivacaine + fentanyl) to be 2.64 ±.14 minutes. It was almost similar and found to be statistically insignificant. This finding was almost consistent with the studies of Vatsalya et al[1] and Bhattacharjee A et al[2].

The mean time for motor block in group BC (bupivacaine + clonidine) to be 2.69 ±.14 min and that of group BF (bupivacaine + fentanyl) to be 2.64±.16. It was almost similar and found to be statistically not significant. This finding was almost consistent with the studies of Vatsalya et al[1] and Bhattacharjee A et al[2].

The time to first rescue analgesia (duration of effective analgesia) in our study was 271.37 ± 5.38 minutes and 177.09 ± 2.83 minutes for group BC and group BF respectively. The time to first rescue analgesia for the patients receiving clonidine was longer and statistically highly significant. This finding was almost consistent with the studies of Vatsalya et al[1] and Shidaye RV[4] We observed more sedation score in BC group than in BF group. In our group 72 % patient in BC group were sedated in contrast to 12% in BF group but none of these patient had respiratory depression. Vatsalya *et al*[1] (2014) also found similar results in their study. Their mean sedation score was higher in the clonidine group. They observed that sedation score of 3 of five point scale which meant arousable by gentle tactile stimulation, was more in the clonidine group (72%) than in the fentanyl group (12%). Shidiya RV[4] et al observed that sedation score of 3 of five point scale which meant arousable by gentle tactile stimulation, was more in the clonidine group than in the fentanyl group.

LIMITATIONS OF THE STUDY:

- Present study was done in a small group of 40 patients each in both the groups.
- Patients with ASA 3 and more were excluded from the study. Hence, the advantages of using bupivacaine with adjuvants like clonidine and fentanyl in patients having serious comorbid diseases could not be evaluated.
- Younger age group (<18 years) and elderly people (>45 years) were excluded from the study.

CONCLUSION

We conclude that the use of intrathecal clonidine 30µg and Fentanyl 25µg both provide excellent sensory and motor blockage with low dose of Bupivacaine Heavy. Both the drugs improved intraoperative analgesia and prolonged the duration of effective analgesia without significant effect on neonate neurobehaviour. Fairly good analgesia with less sedation and better haemodynamic stability was observed with 25 µg fentanyl. Addition of clonidine30 µg which gave excellent analgesia of significantly prolonged duration than fentanyl; along with sedation was also a better alternative for parturients undergoing cesarean section.

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