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LOW DOSE BUPIVACAINE WITH FENTANYL PROVIDES EXCELLENT PERIOPERATIVE ANALGESIA WHILE MAINTAINING HAEMODYNAMIC STABILITY IN PREECLAMPTIC PARTURIENTS

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ABSTRACT

Preeclampsia is characterized by blood pressure of more than 140/90mmhg after 20 weeks of pregnancy in previously normotensive patients ,associated with protinuria. To conduct these cases in general anaesthesia is not very easy task and poses great risk of life for patients as well as fetus. Ability to run these cases in central neuraxial blockade with added adjuvant is of prime importance as it provides a conscious mother who is able to enjoy her birthing experience and initiation of breast feeding can be set early in comparision to patients who had undergone general anaesthesia.

Fentanyl is very potent opioid agonist which is very commonly used as an adjuvant in spinal anaesthesia. In our study we have compared a low dose of bupivacaine (7.5mg) along with fentanyl(25µg) with bupivacaine alone(10mg). We studied the effect of these drugs on hemodynamic profile, perioperative analgesia and sedation and found that fentanyl showed a favourable hemodynamic profile and good duration of analgesia when compared with bupivacaine alone group.

KEYWORDS : Subarachnoid block, bupivacaine,fentanyl, hemodynamics, perioperative analgesia.

INTRODUCTION

The provision of anaesthesia and analgesia for operative and non operative delivery in PIH patients is challenging on part of the anaesthesiologist. Although sudden hypotension remains a problem particularly in view of conservative attitude to preloading with fluid, it has been shown that neuraxial anaesthesia reduces the circulating catecholamine level and augments uteroplacental blood flow presumably through arteriolar vasodilation.The better the preoperative medical management (fluids + vasodilators), lesser the incidence of hypotension.

On the other hand general anaesthesia poses a different set of risks when introduced in preeclamptic patients.[1] Bleeding tendencies of airway on trivial trauma during laryngoscopy and pressor response of laryngoscopy increases further risk in pregnant patients due to increased vascularity of mucosa, there is deterioration of mallampatti grading and there are increased chances of pulmonary edema in these patients.[2] Cumulative effect of these events can lead to mobilization of patient to ICU and postoperative ventilation.

The choice of anaesthetic technique should be individualised after weighing risks and benefits and the degree of urgency. Low dose bupivacaine for spinal anaesthesia has been found to be appropriate in preeclampsia patients, to further reduce associated adverse hemodynamic effects and provide the satisfactory spinal block without compromising safety suitable adjuvant to low dose local anaesthetics can help.

Fentanyl being highly lipid soluble diffuses into spinal cord and binds to dorsal horn receptors rapidly when administered intrathecally.[3] This produces a rapid onset of analgesia with minimal cephalic spread.

AIMS AND OBJECTIVE

This study aimed to compare haemodynamic and sensory-motor effects of low dose bupivacaine and fentanyl with bupivacaine alone for spinal anaesthesia in preeclamptic paruturients undergoing caesarean section.

MATERIAL AND METHODS

The study is a randomized controlled study, which was carried out in Sultaniya Zanana Hospital, Bhopal. Duration of study was September 2016 to October 2017.

After proper approval from ethics committee. 60 patients were selected on random basis, 30 in each group. Group F includes patients who were given intrathecal fentanyl along with bupivacaine and group B includes patients who were given intrathecal bupivacaine alone.

Inclusion criteria were patients preeclamptic patients posted for caesarean section and have otherwise normal pregnancy except for preeclampsia.

Infection at the site of puncture, history of bleeding diathesis, patients with HELLP syndrome and neuropathies were excluded from study.

All patients were given aspiration prophylaxis. After explaining the procedure, written informed consent were taken. Baseline recordings of hemodynamic parameters were done. All patients were preloaded with 10ml/kg of Ringer's lactate thereafter under all aseptic precautions sub arachnoid block was performed using 25G spinal needle in L3-L4 space by midline approach in left lateral position. After successful dural puncture anaesthetic solution was injected.

Group B patients received 2.0 ml 0.5% hyperbaric Bupivaicaine and Group F received 1.5 ml 0.5% hyperbaric Bupivaicaine + 25mcg(0.5 ml) Fentanyl.

The spinal needle was then withdrawn and the patient was immediately turned to wedge supine position. Sensory block was tested using pinprick method till the block reached T6 level and then the surgical incision was allowed. Motor block was evaluated according to the modified Bromage scale.

HR, SBP, DBP, MAP, SPO2 was monitored and recorded throughout the surgery at every 3 min till baby was delivered and every 5 min thereafter until the end of procedure. Urine output was also monitored. Oxygen supplementation at the rate of 4L/min was done using a Hudson's facemask during the procedure.

The time onset of sensory block was noted as attainment of highest sensory level after completion of injection, and motor onset was considered to be the time to reach modified Bromage scale 4 from completion of block.

The time for sensory regression to T12 from highest sensory level and the duration of effective analgesia (time to request for the first dose of rescue analgesic by patients) noted. Duration of motor block was recorded from onset of block to grade I block. Hypotension was defined as 20% decrease in blood pressure from baseline mean arterial pressure and was treated with fluid boluses, and if not controlled then 6mg intravenous Ephedrine was given. Total Ephedrine requirements, number and duration of hypotensive

episodes were recorded. The Apgar score of the newborn was recorded at 1 min and at 5 min post delivery. Side effects such as hypotension, bradycardia (heart rate <50 beats per minute), nausea, vomiting, pruritus, shivering and oxygen desaturation (spo2<90%) were recorded. Patients were assessed for degree of sedation and scoring was done with modified Ramsey Sedation Score.

STATISTICAL ANALYSIS

The data was collected, assessed and statistically analyzed; Comparison of mean was done using unpaired t test. For categorical data chi-square test was applied. P-value of < 0.05 was considered statistically significant.

RESULTS

Both groups comprised of 30 patients each. There were no differences between the demographic characteristics of two groups.

The time to achieve T6 sensory level and onset of motor block was earlier in plain bupivacaine group as compared to fentanyl group but the difference was not statistically significant. The time to regress up to T12 and the duration of effective analgesia (208.3+36.39 min in group F; 136.76+23.90 min in group B) was significantly prolonged in fentanyl group. The recovery of motor block was also significantly prolonged in Fentanyl group as compared to Bupivacaine group.

TABLE 1

Parameter(min)	Group B(n= 30)	Group F(n=30)
Onset of sensory block	3.74±0.15	4.10±0.45
Onset of motor block	2.44±0.46	2.56±0.32
Time of regression toT12	102.72±12.51	135.0±10.89
Total duration of analgesia	136.76±23.90	208.3±36.39
Total duration of motor block	104.4±11.37	146.2±15.20

Parturient in both the group showed a fall in blood pressures after 5-10min of spinal block but MAP remained in the acceptable limits that is <20% of baseline. Incidence of hypotension and requirement of ephedrine was observed more with plain Bupivacaine as compared to Bupivacaine with Fentanyl.

Patients in Fentanyl group showed a slight decrease in heart rate at different time interval from baseline. Bradycardia was observed in one patient in Bupivacaine who responded well to IV Atropine. Statistically significant difference exists in sedation scores between the groups which were exclusively noted in group receiving Fentanyl. Sedation was observed in 72% parturients who received Fentanyl in addition to Bupivacaine.

TABLE 2

Side effect	Group B	GroupF
Nausea	5	1
Vomiting	2	0
Pruritus	0	3
Shivering	5	2
Respiratory Depression	0	0

DISCUSSION

Efficacy and safety of spinal anesthesia with bupivacaine in preeclamptic parturients has been studied worldwide and it was always a controversial topic that weather one should prefer general anaesthesia or neuraxial block in these patients. Pregnancy induced physiological changes in maternal body like increased vascularity of mucosa, swollen airways (more so in pregnancy induced hypertension), decreased lung capacities, functional residual volumes makes it very difficult to conduct the cases in genral anaesthesia. Plus there are higher chances of intracranial bleed and pulmonary edema due to stress induced by laryngoscopy, although there are multiple drugs which can be used to attenuate laryngoscopic pressor responses[1,2] but in case of caesarean section where fetal outcome should also be considered, use of these drugs is very limited. On the other hand central neuraxial blockade, subarachnoid block favors the outcome with rapid onset of anaesthesia, improved uteroplacental and intervillous circulation, decreased maternal catecholamine levels. Along with that we have awake and pain free mother who can enjoy birth of her child. But we cannot deny the adverse effect of SAB like sudden hypotension, bradycardia, and very high block, respiratory and cardiac arrest.

With advent of adjuvants in the field of regional anaesthesia we have oppurtinity to significantly reduce the volume of total drug[5,6] and reduce induced complications to multiple times. Injection fentanyl is one which is used very commonly as adjuvant to bupivacaine in SAB. Addition of opioids to intrathecal Bupivacaine prolongs duration of analgesia,[5,6] evidence suggests that fentanyl and bupivacaine have synergistic actions when given intrathecally.[7]

In our study we have found that the time of onset of sensory and motor block was shorter in group B as compared to group F (statistically insignificant) and it can be explained that volume of local anaethetic was more (2ml) in that group than the other, which was 1.5ml+0.5ml in groupF. Nagata E et al explained that onset and duration of action can be modified by increasing the volume of drug.[8]

We have noted that there is significant prolongation of duration of analgesia in group F than group B which was208.3±36.39min and 136.76±23.90min in the groups respectively, Palmer et al and Choi D H et al also found the same. There is increased risk of adverse events when higher doses of opioids are used intrathecally.[9] so we have used the the dose of 25mcg of fentanyl in our study which is supported by study of K Jain et al.[10]

Parturients in both the group showed a significant fall in mean arterial pressure after 5-10min of spinal but MAP remained in the acceptable limit that is <20% of baseline. This stability may be attributed to low dose of bupivacaine used in our study. Also preloading the patient with 10ml/kg of ringer lactate and right side wedge placement may be the contributing factor. Our findings regarding hemodynamic stability with use of Fentanyl are favoured by studies of Jain K et al.[11] and Sheikh F et al.[12]

In our study patients in Fentanyl group showed a slight decrease in heart rate however, fall was not more than 20% of baseline, this can be attributed by pain reliefe and sedation induced by Fentanyl. Bradycardia was observed in only 1 patient in bupivacaine group which responded to i.v.Atropine.Duration of effective analgesia was significantly prolonged in patients receiving fentanyl as compared to patients receiving only Bupivacaine. Trend towards longer analgesia with Fentanyl added to bupivacaine has also been supported by.[5,6]

In our study 72%patients in F group were sedated but none of these patients had respiratory depression. Pruritus was found exclusively in fentanyl group with incidence of 10%. Episodes of nausea and vomiting were more in group B which can be explained due to hypotensive action of Bupivacaine also mentioned earlier. (Table 2)

None of the neonates in the study group had a 1min or 5min Apgar score less than 7.Fentanyl did not have any deleterious effect on neonates in present study. Though it would have been better if umbilical pH and blood gases could be assesed for better fetal monitoring, but could not be done for certain reasons.

CONCLUSION

Thus fentanyl as adjuvant appears to provide better anesthetic effects in terms of analgesia, haemodynamic stability and reduced incidence of side effects. Relatively prolonged analgesia in early postoperative period helped to avoid exaggerated rise in blood pressure and heart rate which is desirable in preeclamptics.

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