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A Comparative Study Of Bupivacaine And Bupivacaine With Fentanyl For Labour Analgesia

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Abstract
A comparative study was done on 60 nulliparous women at >37 weeks of gestation and 18-35 years age group, requested for epidural labour analgesia, In Group B 2.5 ml Bupivacaine (0.5%) + 7.25 ml normal saline was given and in Group BF Fentanyl 50mcg + 2.5 ml Bupivacaine (0.5%) + 6.5 ml normal saline given.It was observed that epidural Fentanyl with low dosage of Bupivacaine improved the quality of analgesia in early labour.. There were no significant adverse effects like maternal hypotension, sedation, respiratory depression, nausea/ vomiting, pruritus, shivering in both the groups. Instrumental delivery did not increase and maternal satisfaction was excellent. Neonatal Apgar score in one and five minutes in both the groups was also 9-10. Bupivacaine+fentanyl may be the better choice in epidural labour analgesia.

Keywords: *Epidural analgesia,Fentanyl, Bupivacaine*

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I. Introduction

Exclusion criteria:

The meninges covering of spinal cord are of three layers; the pia, arachnoid, and the dura matter. The epidural space is defined potential space within the spinal canal that surrounds the dural sac and is bounded by the posterior longitudinal ligament anteriorly, the ligamentam flavam and the periosteum of the laminae posteriorly, and the pedicles of the spinal column and the intervertebral foramina containing their neural elements laterally Epidural anesthesia is one of the most commonly employed technique of analgesia during labour. The goal of maternal labour analgesia is relief of pain without compromising progress of labour and fetal wellbeing. Epidural analgesia is the most effective and least depressant method of intrapartum pain relief in current practice[1].Patient compliance is more and cost is also not high.Low concentration of bupivacaine combined with fentanyl result superior analgesia with minimum side effect[2]. Bupivacaine,a long acting local anesthetic agent, is an amino amide derivative with molecular formula C19H28N2O. HCL.H2O. It prevents the transmission of nerve impulses by inhibiting passage of sodium ions through ion-selective sodium channels in nerve membrane.

Fentanyl is a phenylpiperidine-derivative synthetic opioid agonist that structurally related to meperidine., it is 75 to 125 times more potent than morphine and available as fentanyl citrate solution in 2 ml, 10ml ampoules. The formula is C22H28N20.C6H8O7.It acts primarily as mu (μ) receptor agonist.and also as kappa (K) and delta (δ) receptors producing spinal analgesia. It also antagonizes 5HT in the brain, thereby potentiating the analgesic activity of the opioids. Sufentanil is a thienyl analogue ,5 to 10 times potent than fentanyl, and has a greater affinity for opioids receptors.The contraindications of epidural analgesia are severe maternal hemorrhage, coagulopathy and local or generalized sepsis. Many physicians induce as soon as the diagnosis of true labour pain established and patient request pain relief while others follow the practice of inducing labour when cervical dilation reached 2-3cms. In a developing country like India cost of epidural anaesthesia is also important.

II. Materials And Methods:

The comparative study was done,after approval of institutional ethical committee and informed consent from the mother and her spouse. It was conducted on 60 nulliparous women at >37 weeks of gestation who requested for labour analgesia, at any time during labor. Pregnant woman between the age group 18-35 years were chosen.

1. Refusal to give consent for regional anesthesia.
2. Allergy to local anaesthetic agent

3. Contraindication to fentanyland Bupivacaine
4. Active maternal hemorrhage/hypovolemia
5. Presence ofany coagulopathy
6. Maternal septicemia or untreated febrile illness
7. Infection at or near the proposed needle insertion site
8. Cervical dilation more than 7 cm
9. Patient receiving any other analgesics concurrently or within last four hours
10. Severe medical disorders of mother and or foetus
11. Foetal distress
12. Bad obstetric history/ valuable baby
13. Neurological / psychiatric problem of mother.
14. Non-vertex presentation
15. Multiple foetus

Before the procedure was begin, the patients' base line vital signs (blood pressure, heart rate, and respiratory rate, SPO2) and fetal heart rate was documented. The patients were asked to relate any symptoms of pruritus, nausea, or vomiting. After proper assessment from history,and physical examination women in spontaneous or induced labour consenting for labour analgesia was allocated into two groups with 30 women in each group, Group B and Group BF respectively.

Patients were requested to evacuate the bladder before the procedure. Pulse oximetry for SPO $_2$, NIBP, ECG and were attached before giving the epidural. Each patient was preloaded with 15 - 20 mL/ kg of normal saline solution IV over a period of 15 minutes.

Anesthetic drugs and difficult airway equipments for resuscitation and general anesthesia were kept ready at hand before starting the procedure.

Epidural technique was performed in sitting position by using a Tuohy needle (18G) under full asepsis at L3-4 or L4-5 interspace and advanced 3 to 5 cm for achieving a T6-S5 neural blockade. The patients received a test dose of 3mL of 2% lidocaine with 1: 200,000 epinephrine. If the test dose became negative for intravascular injection (20% increased in maternal heart rate within 20 seconds of test dose) and intrathecal injection (no signs of motor block after 3 minutes of monitoring), isobaric bupivacaine 0.125 % was used for labour analgesia with and without fentanyl as follows by random allocation into two groups.

Group B (n = 30): 2.5 ml bupivacaine (0.5%) + 7.5 ml normal saline to a total volume of 10 ml.Group BF (n=30): fentanyl 50mcg (0.5 ml) + 2.5 ml bupivacaine (0.5%) + 6.5 ml normal saline to a total volume10 ml After performing the block Episodes of side effects such as hypotension (SBP <20%) of base line or SBP <90 mmhg, bradycardia (<50/min, respiratory depression RR < 10/min and hypoxia spo2 <90%) were recorded.

The fetal heart rate pattern was evaluated by using continuous cardio. After the first 30 minutes, patients were allowed to ambulate, provided there was no detectable motor block and the foetal heart rate pattern was normal. Women were asked to report immediately when pain relief started.

The study concludes whenever the patient asked for rescue analgesic or baby was delivered.

Apgar scores at one and five minutes were recorded. After removal of catheter, the tip of catheter was also checked and the needle puncture site was sealed with antiseptic solution, dressing.

III. Result Analysis:

Table 1: comparing Maternal Satisfaction Score between the groups under study. Applying chi-square test p-value >0.05, there was no significance difference between the groups.

Maternal Satisfaction Score	BF	B	Total
Excellent	27 (90%)	25 (90%)	52
Good	3 (10%)	5 (10%)	8
Total	**30**	**30**	**60**

Table 2: comparing Apgar Score between the groups under study. Applying chi-square test p-value >0.05, there was no significance difference between the groups.

Apgar score in 1 minute	BF	B	Total
8	0	1	1
9	6	3	9
10	24	26	50
Total	**30**	**30**	**60**

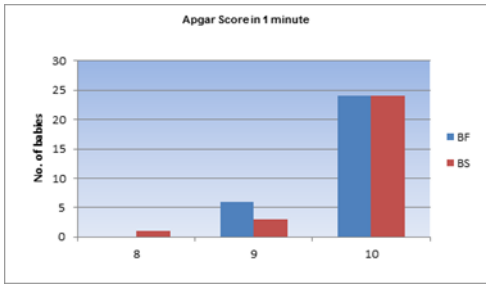

Chart 1: Chart comparing Apgar Score between the groups under study.

patients were placed in the recumbent position, with left uterine displacement. VAS scores, were recorded in every minutes for 10 minutes, motor block for every 5 minutes for 30 minutes .And haemodynamic status , any adverse effects were recorded at 5, 10, 15, 20, and 30 minutes after the administration of the study drugs and every 30 minutes, thereafter, upto 3 hours. Observations continued at 1 hour interval after 3 hours. Observations were performed by anaesthesiologist.After performing the procedure the onset of sensory and motor block were assessed by using alcohols swab test and modified Bromage score (Bromage PR) respectively.

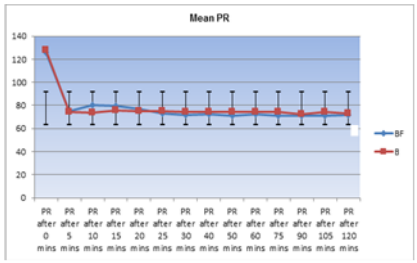

Chart 2: Chart comparing Mean Pulse Rate (PR) between the groups under study, at given time intervals. Applying two – tailed unpaid t- test, p – values>0.05 indicated that there were no difference in mean values of PR between two groups in different time interval. There was no significant difference mean PR between the two groups.

Table 3: Comparing Mean Arterial Pressure (MAP) between the groups under study, at given time intervals

MAP	BF	B	Mean Difference	Two – tailed p - value
MAP after 0 mins	85.7667	87.1429	-1.3762	0.194
MAP after 5 mins	79.0667	77.9286	1.1381	0.489
MAP after 10 mins	85.6	85.5357	0.0643	0.949
MAP after 15 mins	85.5667	86.6786	-1.1119	0.283
MAP after 20 mins	87.7667	89.1429	-1.3762	0.31
MAP after 25 mins	88.4333	89.1071	-0.6738	0.641
MAP after 30 mins	91.3333	91.8571	-0.5238	0.678
MAP after 40 mins	90.5	89.3571	1.1429	0.262
MAP after 50 mins	88.7	89.9286	-1.2286	0.349
MAP after 60 mins	87.6	90.5714	-2.9714	0.11
MAP after 75 mins	90.2667	86.9643	3.3024	0.112
MAP after 90 mins	91.9667	86.9286	5.0381	0.239
MAP after 105 mins	87.7667	86.8929	0.8738	0.457
MAP after 120 mins	86.3667	83.5	2.8667	0.087

Applying two – tailed unpaid t- test, p – values>0.05 indicated that there were no difference in mean values of MAP between two groups in different time interval. There was no significant difference mean MAP between the two groups.

It was found that there was no significant difference mean Respiratory rate between the two groups.

IV. Discussion:

Sixty patients were requested for labour analgesia and randomly allocated in to two group(BF and B). The groups were similar in respect to demographic parameters. Epidural fentanyl (50mcg) with low dosage of bupivacaine (0.125%) improved the quality of analgesia in regarding their onset and duration, in early labour in groupBF. Haemodynamic stability of parturients was maintained throughout the study period Neonatal Apgar score in one and five minutes in both the groups was also 9-10.Fentanyl+ bupivacaine may be the better choice in epidural labour analgesia.

There was no significant difference in the heart rate (table), blood pressure, systolic and mean arterial pressure (table), respiratory rate (table), SpO2 between the groups (table). None of the parturients in any of the groups had bradycardia (heart rate < 50 /min), respiratory depression (respiratory rate < 10 / min), or hypoxia (SpO2 < 90%). These observations were similar to that observed in previous studies by Vertommen J .et al, Steinberg RB et al, Cohen S et al, Vertommen J D et al, Olofson et al, Herman N L et al, Bernard J M et al.

In the present study, there was no significant difference in the incidence of hypotension (fall of systolic

blood pressure > 20% from base line) between the groups. Thus, the addition of fentanyl to isobaric bupivacaine did not cause significant fall of blood pressure. This observation was similar to that observed in previous studies by Vertommen J et al, Steinberg RB et al, Cohen S et al, Vertommen J D et al, Olofson et al, Herman N L et al, Bernard J M et al, Sharma RM et al, and Joris JL et al.[3].).In a study it was observed that much lower pain score with least adverse effects on maternal cardiovascular or pulmonary functions and fetal physiology with higher maternal satisfaction are reported with the use of neuraxial analgesic techniques during labour and delivery [4]

Regarding the side effects like sedation, nausea/ vomiting, pruritus and shivering were also comparable in both the groups. This observation was similar to that observed in previous studies by Vertommen J et al, Steinberg RB et al, Vertommen J D et al, Olofson et al, Herman N L et al, Bernard J M et al, and Sharma RM et al. None of patients any groups had bradycardia of <50/ minute, or respiratory depression (respiratory rate <10/ minute) or hypoxia (SPO2<90%). No patients in any groups had sedation or developed shivering and vomiting in any point of time. Only 2 patients in group BF had nausea, 2 patients in group B had pruritus. These were statistically not significant (p=>0.05).The incidence of pruritus was observed as 36% in Bupivacaine-Fentanyl in a meta-analytical review which attempted to study the efficacy and safety of this combination.[5]

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