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RESEARCH ARTICLE

PROSPECTIVE STUDY OF EFFECT OF EPIDURAL ANALGESIA DURING LABOUR AND MATERNAL AND NEONATAL OUTCOME IN TERTIARY CARE CENTRE

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ABSTRACT

Background and objectives: The pain of childbirth is the most severe pain, most women will endure in their lifetimes. Women in pain don't need an "indication" for pain relief in labour. According to the American Society of Anesthesiology (ASA) "in the absence of a medical contraindication, maternal request is a sufficient medical indication for pain relief during labour" A prospective study was conducted with the approval of the hospital Ethics Committee. 60 parturient in labor were enrolled in the study after signing written informed consent. This study is descriptive case series study which was conducted in department of obstetrics and gynecology, from January 2017 to July 2017.

Methodology:

The inclusion criteria were

- Nulliparity
- Age 18-35 years
- Gestational age >37 weeks
- Single foetus with vertex presentation.

Exclusion criteria included

- Multigravida
- Abnormal presentations :Breech,Transverse
- Infection at the site of epidural
- Coagulopathies
- Any spinal deformities
- History of allergy to local anesthetics, fentanyl or tramadol.

All parturients were counseled on admission to the labor ward and those who were desirous of epidural analgesia were allocated to the epidural group (study group). Visual Analogue Pain Scale (VAPS) was used for quantification of pain at the peak of uterine contractions (0mm = no pain and 100mm = worst pain).

Results: Parturient recruitment and data collection occurred over a period of two consecutive years. Out of the 60 parturients who participated, 50 completed the study. 10 patients from the epidural group were excluded as epidural analgesia was ineffective in 3 cases, data was incomplete in 4cases and in 3 cases caesarean was done before full cervical dilatation.

Conclusion: Epidural analgesia, prolongs the first stage of labor, but is not associated with adverse maternal or neonatal outcome.

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INTRODUCTION

The pain of childbirth is the most severe pain, most women will endure in their lifetimes. Women in pain don't need an "indication" for pain relief in labour. According to the American Society of Anesthesiology (ASA) "in the absence of a medical contraindication, maternal request is a sufficient medical indication for pain relief during labour Several strategies and alternative therapies have been used to provide analgesia for labour pain.

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Over the last few years, a number of improvements have enhanced the efficacy and safety ofneuraxial analgesia and ultimately have improved mothers' satisfaction with their birth experience. As labour analgesia is a field of obstetric an aesthesia that is rapidly evolving, this review is an update, from a clinical point of view, of developments over the last 5–7 years. We here focus advantages and controversies related to combined spinal-epidural analgesia, patient controlled epidural analgesia and the integration of computer systems into analgesic modalities..It is believed that epidural analgesia prolongs the duration of first stage of labor. Studies that assessed duration of first stage as a secondary outcome reported that it was unaltered in some (Halpern *et al*., 2005; Simmons *et al*., 2007) while it was prolonged in some (Sharma

et al., 2004) and shortened in some others (Wong *et al*., 2005; Wong *et al*., 2009; Ohel *et al*., 2006). This was a observational prospective study assessing the duration of first stage of labor in epidural analgesia as a primary outcome. Quality of analgesia and maternal and neonatal safety were considered.

METHODS

A prospective study was conducted with the approval of the hospital Ethics Committee. 60 parturient in labor were enrolled in the study after signing written informed consent. Power of study was calculated using NESS and PASS. Considering duration of first stage of labor as primary outcome, based on a pilot study with matched controls, with an alpha error of 5% and power of study 90%, the number of cases required was 50. To allow for a drop out of 20%, we increased the sample size to 60. The inclusion criteria were, nulliparity, age 18-35 years, gestational age >37 weeks, single fetus with vertex presentation. Exclusion criteria included infection at the site of epidural, coagulopathies, any spinal deformities, history of allergy to local anesthetics, fentanyl or tramadol. All parturients were counseled on admission to the labor ward and those who were desirous of epidural analgesia were allocated to the epidural group (study group). Visual Analogue Pain Scale (VAPS) was used for quantification of pain at the peak of uterine contractions (0mm = no pain and 100mm = worst pain).

Motor block in the lower extremities were assessed using modified Bromage score (0=no block, 1=unable to raise extended leg, able to move knees and foot, 2=unable to raise extended leg or knees, able to move foot, 3=complete motor block of the lower limbs), ECG, SpO_2 and NIBP were monitored using multichannel monitors (Philips Intellivue MP20) with trend facilities. Hypotension was defined as a systolic and diastolic blood pressure less than 100/60 mm Hg or 80% of the baseline values and bradycardia as heart rate less than 60/min. Oxygen saturation below 94% in room air was considered abnormal and oxygen was supplemented. Hypotension was managed by rapid infusion of lactated Ringer's solution and, or intravenous boluses of ephedrine 6mg and bradycardia by intravenous glycopyrollate. Ondansetron 4mg was given intravenously at 8 hourly intervals. Cervical dilatation and VAPS score at the time of initiation of analgesia was noted. Duration of first stage of labor was taken as the interval between the beginnings of active phase of labor (regular contractions with 3-4 cm dilatation) to full cervical dilatation (10cm). Subjective score of parturient satisfaction for analgesia was obtained on a five point scale (4=excellent, 3=good, 2=fair, and 1=poor, 0=unequivocal). Any maternal complications such as fever, dizziness, headache, back pain, nausea, vomiting, itching, post-partum hemorrhage and urinary retention were recorded. Management of labor was as follows. Oxytocin was administered in titrated doses to augment labor till regular contractions occurred at every 2-3 minutes interval. Vaginal examinations were conducted every two hours, at the time of parturient experiencing the urge to strain and whenever it was indicated as decided by the obstetrician. Continuous tococardiography monitoring evaluated uterine contractions and fetal heart rate. Systemic or epidural analgesia was initiated when there were regular contractions at 5 minute intervals associated with progressive cervical effacement and dilatation of 3–4cm. Parturients were preloaded with 500ml of lactated Ringer's solution over a period of 30 minutes and thereafter fluid infusion was maintained at the rate of 2-3ml/kg per hour. As per the usual labor room protocol, the systemic analgesia group received tramadol 2mg/kg and phenergan 0.5mg/kg intramuscularly at 6 hourly intervals, the last dose being at 6cm dilatation. In the epidural group, in lateral position, an epidural catheter was inserted at L2-3 or L3-4 intervertebral space using loss of resistance to air technique and fixed at 2 to 3cm in the epidural space. Epidural test dose was omitted for the purpose of study. After confirming negative aspiration for blood and CSF, analgesia was initiated with 10ml bolus of 0.1% ropivacaine with 50mcg fentanyl. We used continuous epidural infusions because that was the standard technique practiced in our institution. 0.1% ropivacaine with fentanyl 0.0001% was instituted as an infusion at 5ml per hour using a syringe pump (B Braun) after half hour of initial bolus dose. Boluses of 5ml of the drug were given for break through pain and for perineal analgesia in the second stage of labor. Parturients were nursed in supine position maintaining a 15° lateral tilt alternating between right and left side. ECG, NIBP, pulse rate and oxygen saturation were monitored continuously. Motor block and VAPS score at the peak of uterine contractions were recorded every 30 minutes.

Statistical Analysis

Data analysis was done using IBM Statistical Package for Social Sciences (SPSS) version 22. Summary of the continuous variables were presented as mean+standard deviation. A p-value of <0.05 was considered as statistically significant. Analysis of variables of interest was compared among the groups using independent sample t-test.

RESULTS

Parturient recruitment and data collection occurred over a period of two consecutive years. Out of the 60 parturients who participated, 50 completed the study. 10 patients from the epidural group were excluded as epidural analgesia was ineffective in 3 cases, data was incomplete in 4cases and in 3 cases caesarean was done before full cervical dilatation.

Table 1. Demographic details at the time of initiation of analgesia

	Study Group (n = 50)
Age (yrs)	26.14±2.12
Weight (kgs)	65.21±7.21
Height (cm)	155.12±5.10
Gestation (wks)	38.28±1.01
Cervical dilatation at epidural (cm)	3.52±0.77
Baseline VAPS	47.80±12.18

Neonatal Outcome

All neonates had an APGAR score of 9 or 10 at 5 minutes. Umbilical venous blood gas values were within normal limits Table 2. Three in the study group needed observation in the ICU for 24 hours.

Table 2. Neonatal Outcome

Neonatal outcome		Study Group (n = 50)
Apgar scores	1 min	8.57±0.67
	5 min	9.78±0.22
	pH	7.34±0.02
Umbilical venous blood gas	pO2(mmHg)	26.07±2.29
	pCO2(mmHg)	39.45±3.13
	HCO3(mmol/L)	19.66±0.86
	BE	-5.76±0.92

Table 3. Maternal Adverse Effect

Maternal effects	Study Group (n = 50)
PPH	1
Nausea/Vomiting	2
Pruritus	1
Numbness	0
Shivering	1
Headache	2
Back pain	4
Fever ≥100º	1

There was no hypotension, bradycardia, hypoxia or urinary retention in any of the parturients in either group. Post-partum hemorrhage (PPH), nausea, vomiting, numbness, shivering, headache and back pain which occurred in small numbers.

QUALITY OF ANALGESIA: Quality of analgesia was excellent or good in 70% of parturients observed in this study.

DISCUSSION

Labor induces considerable pain and hence warrants analgesia. The age old practice of pain relief in labor is by systemic medication. Systemic medication is easier to administer and is less invasive. However, the rising concerns of inadequate analgesia, maternal and neonatal side effects has led to the quest for a better techniques of analgesia like neuraxial (epidural) analgesia which is now regarded as the gold standard for pain relief during labor. It is commonly assumed that parturients who are given neuraxial labor analgesia have longer duration and poor progression of labor and those they may end up having more instrumental vaginal deliveries. Prolonged labor can be undesirable for the mother and the fetus. The possible concerns of prolonged labor include the need for prolonged analgesia, increased incidence of chorioamnionitis, neonatal and puerperal sepsis. These fears are a stumbling block in recommending epidural labor analgesia by the obstetricians. The parturients are also very often reluctant to request for it because of these reasons.

In the present study, the duration of first stage of labor was significantly prolonged in the study by 59 minutes. (367.39±76.72min v/s 308.22±89.31min, p value = 0.000, 95% CI = (-75.33, -43.00)). Maximum number (near 15%), reached full cervical dilatation at 300-314 minutes in systemic group and 360-374 minutes. The available evidence suggests that neuraxial labor analgesia has a variable effect on the duration of the first stage of labor. Our results are in consensus with that of Behrens &colleagues (Behrens *et al*., 1993), and Rahm & colleagues who demonstrated decreased uterine activity with epidural analgesia due to reduction in prostaglandin F2 alpha and oxytocin release resulting in prolonged labor. These conflicting reports may be a result of varied factors which affect the contraction of uterus and thus the first stage of labor. An attempt was made to standardize the factors which influence uterine contraction and hence affect the first stage of labor. Oxytocin infusion was used in 68% patients in the study in titrated doses to augment labor so that regular contractions occurred at 2-3 minutes interval. In this study, parturients were preloaded with 500ml of lactated Ringer's solution over a period of 30 minutes and thereafter fluid infusion was maintained at the rate of 2-3ml/kg per hour. One liter of crystalloid solution, but not 0.5 liter is demonstrated to decrease uterine activity due to the release of antidiuretic hormone which temporarily decreases the production of oxytocin as both hormones are released by the posterior pituitary gland (Cheek *et al*., 1996; Zamora *et al*., 1996). In contrast, there are studies which demonstrate augmentation of uterine activity and reduction in the duration of labor due to decreased plasma epinephrine and sympatholysis with epidural analgesia (Abrao *et al*., 2009; Clarke *et al*., 1994; Cohen *et al*., 1993).

Neonatal status at birth was similar and acceptable in both the groups. The prolongation of first stage of labor in the epidural group did not affect the neonatal outcome. Prolongation of labor demands prolonged analgesia. Prolonged epidural analgesia per se is unlikely to cause respiratory depression in the same proportion as systemic analgesia with opioids. Analgesia offered by neuraxial blockade is of a much superior quality. In the doses commonly used for labor, systemic medication is much less effective than epidural for pain relief. Because of the possibility of respiratory depression, administration of systemic analgesia is restricted in late labor. This can result in inadequate analgesia, and also there can be respiratory distress in the newborn if multiple and relatively large doses are given within few hours before delivery or if the labor progresses much more quickly than expected. Maternal adverse effects were minimal. Incidence of pruritus, though mild in nature was higher in the study most likely due to fentanyl added to the local anesthetic. Epidural analgesia prolonged the first stage of labor without any adverse effects in the parturient and neonate while providing superior analgesia.

Conclusion

Epidural analgesia, prolongs the first stage of labor, but is not associated with adverse maternal or neonatal outcome.

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