

Original Research Article

Labour outcomes of epidural analgesia using ropivacaine and fentanyl – A retrospective study in a tertiary care hospital of South India


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Abstract

Though there are multitudes of analgesic techniques available to relieve labor pain, epidural analgesia is considered as most effective against labor pain. Many studies have investigated whether and how the epidural analgesia may have an impact on the first and second stage of labor, maternal and neonatal outcomes and birth experience but the results are still controversial. There was an interest to analyze on delivery outcomes of Bloom Life Hospital at Chennai, on the delivery outcomes (maternal and fetal) on using Epidural analgesia (0.2% ropivacaine + 50 mic Fentanyl). Data was accessed from bloom Life Hospital (N= 223 parturients) administered with Epidural analgesia between April 2015 to October 2021. The obtained data was coded and the preliminary analysis was performed descriptively analyzed. The descriptive analysis revealed that among 223 parturients who received EA 89% (N=174) had Normal Vaginal delivery. Only 28 among the study participants (12.5%) had ins/outlet forceps delivery. Neonatal outcomes revealed that 138 among 224 babies did not require NICU admission. The study data has clearly revealed that Epidural Analgesia did not increase the rates of C-Section. In Future, prospective study has been planned to know the impact of EA on labor, delivery, maternal and fetal outcomes.

Key words

Vaginal delivery, C-Section, Maternal outcomes, Fetal outcomes, Epidural analgesia.

Introduction

Labour and childbirth are known to be extremely painful life experiences in a women's life causing psychophysiological stress [1]. Unrelieved stress in labor produces increased plasma cortisol and catecholamine concentration and the cause reduction in uteroplacental blood flow [2]. Though multiple methods have been developed over the years to provide pain relief, epidural analgesia has become the most effective and standard obstetric care since 1970 [3, 4]. Childbirth is a holistic experience where a balance is needed between pain relief and physical, emotional, psychological, sociologic and sometimes religious dimensions [3]. Therefore the goals of therapy for labor pain should be multidimensional especially in traditional country like India. Recent trend among obstetric anesthesiologist is to use the lowest possible concentration of drugs that offers adequate pain relief along with minimum one or two motor block, and decrease the incidence of instrumental deliveries or LSCS [3].

Although Bupivacaine is a well-proven drug for labour analgesia, it has been shown to increase the assisted deliveries because it appears to induce lower extremity motor blockade. Ropivacaine, an amino acid local anesthetic structurally related to bupivacaine has been shown to be less lipophilic and hence motor block is less as compared to bupivacaine and less likely to cause CNS and cardiotoxicity [5, 6].

Previous studies have reported that epidural analgesia with 0.1% ropivacaine alone at rate of 10 ml/h provided analgesia in 1st stage of labor and that the addition of 2 mcg/ml fentanyl to that concentration improved analgesia to a quality similar to 0.2% ropivacaine [7]. A previous study report on a pilot study with epidural analgesia of 0.2% ropivacaine (8 ml) with fentanyl 25 mcg evaluate the analgesic efficacy, degree of motor blockade, obstetric outcome in the form of

incidence of normal vaginal, assisted vaginal and lower segment cesarean section has suggested the combination as good for initiation of ambulatory labor analgesia [2]. The addition of increasing doses of fentanyl to 0.17% ropivacaine contributed to shortened onset as well as prolonged duration of labor epidural analgesia and improved patient satisfaction [7]. Another study reported that 0.2% ropivacaine shorten the duration of labor compared to 0.125% ropivacaine. While several studies report that epidural analgesia does not increase C-Section, there are also a few studies contradict the fact. With this background, combination of 0.2% ropivacaine + 50 mcg/ml Fentanyl was used for epidural analgesia in a private birthing centre at chennai since 2015. A preliminary effort has been taken to evaluate the maternal and fetal outcomes retrospectively from the available hospital records from April 2015 to October 2021. The mode of delivery was taken as the primary outcome of our research (spontaneous, assisted vaginal or cesarean). We also obtained data on neonatal outcomes which included Apgar scores at 1 min and at 5 min and the requirement for immediate interventions. Maternal variables such as gestational weeks, parity, age at the onset of labor were also recorded and analyzed.

Materials and methods

Ethical issues

The study participants were informed about the procedure in detail and the informed consent was obtained for the procedure before EA. The parturients were educated about epidural and its effect on pain management and its advantage. The data on maternal and neonatal outcomes were analyzed retrospectively from medical records of the Bloom Life Hospital, velachery, Chennai.

Participants

About 223 parturients in Bloom Life Hospital from April 2015 to October 2021 who willingly

consented for EA were taken for the study. Inclusion criteria consisted of parturients with singleton live births with gestational age at delivery of 34 weeks to 41 weeks of gestation and cephalic presentation. Exclusion criteria consisted of cases with fetal presentation at the onset of labor was noncephalic, cases with indications for elective cesarean delivery, gestational age of less than 36 weeks and multiple pregnancies.

Methods

Women in the active phase of labor i.e. having cervical dilation > 3cm and well effaced, 03 sustained contraction per 10 minutes, well engaged fetal head in primi gravidae were the study participants.

The procedure consists of the following steps:

- Patient position - Sitting
- Back painted and draped
- LA infiltrated at L1-L2 space
- 184 epidural catheter to be used
- Epidural space identified by LOR technique
- Catheter threaded, cauded and fixed with 5 cm in the space

Drugs

- 2 ml Lignocaine 2% with adrenalin – Test dose
- Bolus of 10 ml of 0.2% ropivacaine + 50 mcg/ml Fentanyl was injected in epidural space at L1-L2 level
- Infusion of 0.2% ropivacaine + 1 mcg/ml Fentanyl was given at 5 ml/hour.
- The same above dose was given as bolus if parturient complains of pain

Maternal variables, such as gestational weeks, gravidity, parity, One minute Apgar scores, baby weight and requirement for NICU admission was documented to assess the maternal and neonatal outcomes.

Expected outcomes

Through this intervention, the mother is expected to have good labor experience with possibility of

no adverse effects. The mother is expected to cooperate well to favor normal delivery and to reduce the rates of C-Section.

Results and Discussion

The current study has recorded all the available outcomes of EA to have a clear understanding of its safety and efficacy during labor. Several studies have shown the relationship of epidural analgesia and factors like labor duration, rate of instrumental studies, oxytocin use, temperature and APGAR score [8-11]. But there are a few studies with the present combination of EA 0.2% ropivacaine + 50 mcg/ml Fentanyl.

The recorded and analyzed hospital data showed that 58% (n=130) parturients who received EA were Primy mothers (**Table - 1**). Most of the parturients (n=130) were between 38-40 weeks of gestation. The observations made in our study has been compared with and argued with many other studies conducted individually on the outcomes such as the effect of epidural anesthesia in increasing C-section delivery.

Table – 1: Distribution of Age, Parity and gestational age among the parturients who received EA.

Particulars	Distribution of subjects
Age	
<25 years	21
25-30 years	120
30-35 years	69
>35 years	13
Parity	
Primy	130
Gravida 2 or more	93
Gestational weeks	
<36 weeks	6
36-38 weeks	39
38-40 weeks	130
>40 weeks	48

While the mode of delivery has been our primary outcome, the present study results show that out of 223 parturients, 174 had a vaginal delivery

and 21 have undergone C- section delivery and 28 underwent vaccum/forceps delivery (**Figure - 1**). The highest maternity age among the samples was found to 25 – 35 years (n=120) (**Table - 2**). Most of the parturients who delivered through Vaccum /outlet forceps delivery were between 38-40 weeks of gestational age, whose maternal age ranged from 30- 35 years (**Table - 3**). Few studies previously reported increased risk of an instrumental or assisted delivery through epidural anesthesia, but the observation of our study depicts that higher maternal age could be a cause for vaccum /outlet forceps delivery which is also evidenced by previous studies [12, 13].

Figure – 1: Delivery outcome among subjects who received EA.

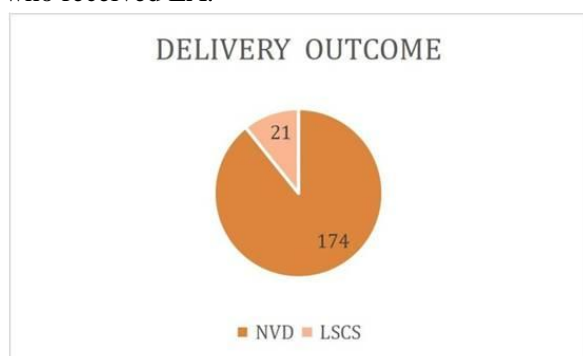


Table – 2: Neonatal outcomes among the parturient who received EA.

Particulars	Distribution
Apgar score (10)	
Above 8	153
Below 8	70
NICU Admission	
Yes	85
No	138
Mortality	0
Birth weight (Kg)	
<2	1
2 -2.5	20
2.5-3	79
3-3.5	95
3.5-4	25
>4	3

One of the clinical study has reported the use of 0.0625% bupivacaine with fentanylas EA has

produced 92% satisfactory results with their labor analgesia and only few needed assisted interventions. The same study also reported that, there is no significant increase in C- section to normal delivery between groups with epidural anesthesia and without epidural anesthesia [14]. The largest meta-analysis study also clearly demonstrated that there is no increase in CS in individuals with epidural anesthesia. Yet another Cochrane meta-analysis suggested that there could be an increase in CS when EA given before the active phase of labor and not during the active phase of labor [15].

Table – 3: Distribution of Age, Parity and gestational age among the parturients delivered through Vaccum/ outlet forceps delivery.

Particulars	Distribution
Age (Years)	
<25	4
25 -30	15
30-35	9
Parity	
Primy	17
Gravida 2 or more	11
Gestational weeks	
<36 weeks	-
36-38 weeks	4
38-40 weeks	16
>40 weeks	8

Futhermore, studies demonstrated that the Cesarean delivery by maternal request is very low in women who received EA due to the effective labor pain control [16]. Among the participants in our study, a total of 85 NICU admissions occurred among 223 deliveries with EA and 138 newborns did not require NICU admissions as shown in table-2. Our results, when compared to other reliable sources of research, has shown no association between epidural and non-epidural groups in terms of mode of delivery, neonatal unit admission and neonatal resuscitation. It is also very less likely to cause concerns pertaining to the developmental stage like communication of the child, fine motor functions or any of the abnormalities [17].

Low neonatal APGAR score is associated by many other factors like Gravidity, hemoglobin after the first ante-natal care visit, ante-partum hemorrhage, membrane status, duration of labor and the type of delivery. Among the babies of 223 mothers who received EA, our study reported 153 babies had > 8APGAR score and 70 babies had <8 APGAR score (Table - 2). Taking into consideration the observations made by the previous studies, lower Apgar scores at 1 minute were observed in mothers with EA than mothers without EA. They also state that similar Apgar scores were achieved in both the groups at 5 minutes [18].

Several studies have demonstrated the results of the association of EA with APGAR score of the child that no difference exists between groups in neonatal outcomes and in terms of Apgar score at 5 minutes. The present results suggested that EA improves patient satisfaction and positive birth experience without increasing the Caesarean section and assisted vaginal birth. There exists varying theory on EA and impact on the duration of labor in the first and second phases. Some studies have reported there was no effect on the active phase of the first stage, but the duration of second stage of labor is slightly prolonged. Whereas some studies demonstrated that epidural analgesia was not associated with an increased risk for Caesarean delivery, despite the prolongation of the labor duration and increased risk for operative vaginal delivery and another study suggested longer labor duration in the first and second stages of labor in both the nulliparous and multiparous women [19, 20].

Naito et al, have demonstrated in his study that, the first stage of labor was prolonged in both primiparas and multiparas women also but the main reason stated was advanced maternal age. This is also supported by Hasegawa et al., in which the average age of included women was 32, which also reported extension of the first stage of labor. Theoretically it is well explained that both local anesthesia and excessive pain during labor can reduce the uterine contractions increasing the duration of labor [21].

Another metanalysis conducted comparing the low-concentration ($\leq 0.1\%$ bupivacaine) and high-concentration ($> 0.1\%$ bupivacaine) epidurals demonstrated the reduction in the duration of second stage of labor but did not influence the type of delivery [14].

The average birth weight of the infants in the study is approximately 3 kg. There are no drastic neonatal outcomes or adverse events recorded during the course of the study. Our results are supported by previous studies who have demonstrated no relationship between the usage of epidural analgesia to the birth weight of the infants, neonatal and perinatal outcomes and breastfeeding success [20, 21, 22, 23].

A recent immune histochemical study demonstrated that pain-reducing anesthesia seemed to reduce the oxidative stress in human term placenta and increases the cord pH values [13].

Although severe harmful effects are rarely reported, studies also suggest that there could be possibility of injury by increasing instrumental delivery through EA [24]. The study limitations include the need for larger sample size and the lack of randomization and follow up of babies due to retrospective nature of our study. All the necessary but missed points for observation with a sufficient number of subjects and adequately powered study will be implemented in our future study.

Conclusion

Labor pain is one of the severest forms of pain that occur in women, and greater distress during labor could influence the fetal heart rate, post-partum stress syndrome and a negative birth experience to the mother. The present retrospective analysis demonstrates that ropivacain and fentanyl combination of EA proves to be a good choice to mitigate labor pain and impart favorable maternal and neonatal outcomes. More comparative in-depth studies are

required further on such parameters to confirm the safety of the EA to the mother and the infant.

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