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Original Article

Study Outcome of Labour Epidural Analgesia Programme in A Tertiary Care Hospital

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ABSTRACT

Background and objectives: Child birth is a painful process and pain relief during labour has always been associated with myths and controversies. Labour pains are one of the most distressing pains known. With advancements in pain management and avaialability and availability of safe and well proven interventions it cannot be considered acceptable for a person to experience such severe pain. Hence the option of labour analgesia should be given to all pregnant women with the aim of safe foetal outcome without any maternal complications. The ACOG has expressed the firm opinion that maternal request is sufficient for pain relief during labour and they have also pointed out that there is no other circumstance where it is considered acceptable for a person to experience severe pain , amenable to safe intervention,while under physicians care. This study was conducted to know the outcome of labour epidural analgesia in a tertiary care hospital and to assess the effect of labour analgesia and duration of labour and fetal and maternal complications.

Methods: This study was carried out for a period of 24 months (from October 2019 to September 2021) at Army hospital, in Dept. of Anesthesia and Obstetrics & Gynecology. Singleton pregnant patient who are ASA grade 1 or 2 with adequate pelvis between 37- 42wks POG with favourable bishop score and cervical dilatation $\geq$ 4cm were selected for the study. Patients with medical and obstetrics complications and who are allergic to bupivacaine and fentanyl were excluded. The patient was assessed till delivery and data was tabulated in microsoft excel sheet and analysed using SPSS software.

Results: A total of 255 parturients were studied to determine the outcome of epidural labour analgesia. Out of the 255 parturients , 205 (80.37%) parturients underwent normal delivery, 29(11.37%) parturients required instrumental assistance and 21(8.23%) parturients underwent caesarean section. The mean duration of the first and second stage of labour after institution of labour analgesia was 100.32$\pm$20.61 minutes and 88.53$\pm$15.67 min respectively.In the current study 84.3% parturients graded labour analgesia as excellent, 5.5% as fair, 7.8% as good and 2.3% poor. The incidence of maternal hypotension in the current study was 2% and postdural puncture headache was 2.7%. In this study 15 (5.9%) neonates had bradycardia and the Apgar at 1 min and 5 min were 8.23$\pm$0.82 and 9.73$\pm$0.84 min respectively.

Conclusion: Our study concluded that epidural analgesia is very safe and effective form of analgesia with no increase in LSCS and instrumental deliveries with no major maternal and fetal complications.

Keywords*: Epidural analgesia, labour ,parturients, pain relief*

INTRODUCTION

Child birth is a painful process and pain relief during labour has always been associated with myths and controversies. Labour pains are one of the most distressing pains known. It cannot be considered acceptable for

a person to experience such severe pain, amenable to safe intervention, while under a physician's care. Hence option of labour analgesia should be given to all pregnant patients with the aim of safe fetal outcome without any maternal complications.

Pain relief alone is an adequate medical indication for administration of epidural analgesia during labour. The American College of Obstetricians and Gynecologists published the opinion that "maternal request is sufficient justification for pain relief during labour." Also, they pointed out that "there is no other circumstance where it is considered acceptable for a person to experience severe pain, amenable to safe intervention, while under a physician's care."[1]Use of labour analgesia has gained wide spread popularity ever since the three famous women, Fanny Longfellow wife of famous American poet Henry Wadsworth Longfellow (1847), Emma Darwin wife of Charles Darwin the eminent Naturalist, and Queen Victoria wife of Prince Albert (1853) not only accepted but strongly endorsed the use of analgesia during birth process [2].

Unlike post-operative pain which tends to diminish with the passage of time, labour pains increase as the labour progresses and are often most severe at the end of the first stage of labour. Many pharmacological and non-pharmacological methods of labor analgesia have been adopted over the years. Neuraxial or regional analgesia is the most commonly used method of analgesia during child birth in western countries, and the trend for same is rising in India too. Different regional anesthesia techniques include epidural analgesia, spinal analgesia (sometimes referred to as the intrathecal or subarachnoid space), or a combination of epidural and spinal analgesia .

The contemporary goal of providing maternal labour analgesia is the relief of the suffering and the pain of labour and delivery, while minimizing effects on maternal safety, awareness, motor functions, progress of labour and foetal well being. Regional anaesthetic techniques are especially well suited for achieving this goal. Over the past ten years there have been remarkable changes in the field of obstetric analgesia. Not only newer techniques such as combined spinal-epidural, continuous epidural infusions, walking epidurals and patient controlled epidural analgesia(PCEA) are now available, but also better drugs that provide selective sensory block like Ropivacaine is available[3].

The aim of an epidural bock is to provide maximum analgesia with minimum motor block since ambulation of parturient is associated with better establishment and progression of active labour. Advantages include analgesia with reduction of maternal fatigue without blurring of consciousness. The mother gains satisfaction from being able to participate in her labour and to maintain bonding with her child. However, the procedure, local anaesthetic agents and opioids all are not without side-effects. Motor and sympathetic blockade, toxic reactions and non-specific sensory blockade with local anaesthetics as well as sedation, pruritis, lower Apgar scores and shivering with opiates can occur. Additionally, labour epidurals have a reported increase in duration of labour and increase in instrumental deliveries or caesarean sections. This study is being undertaken to know the outcome of this epidural labour analgesia programme in a tertiary care hospital.

MATERIALS AND METHOD-

This prospective clinical study was carried out for a period of 2 years (from October 2019 to August 2021 at Army Hospital in Department of Obstetrics & Gynaecology. A total of 255 Singleton pregnant patient who were ASA grade 1 or 2 with adequate pelvis between 37- 42wks POG with cervical dilatation $\geq$ 4cm with no pregnancy induced complication like APH were selected for the study. Patients with medical like Heart disease, DM, HTN, Jaundice, RHD, Renal diseases , Haemorrhagic disorders, previous neurological diseases, spinal deformity, local sepsis, skin lesions and obstetrics risk factors – pre-eclampsia, Gestational Diabetes, Placenta Praevia and premature rupture of amniotic membranes and who were allergic to bupivacaine and fentanyl were excluded.

In Primigravidas with < 5 cm dilatation in active labour ,starting dose of 8-12 mL of 0.125% bupivacaine with fentanyl 2 mcg/ml is given and subsequent dosages of 0.0625% bupivacaine with fentanyl 2 mcg/ml @ 8-12 mL/h was given to achieve and maintain a height of $T_{10.}$

In Primigravidas > 5cm dilatation in active labour, CSE intrathecal Fentanyl 25 mcg + insertion of epidural catheter to start 0.0625% bupivacaine with fentanyl 2 mcg/ml @ 8-12 mL/h continuous infusion (via pump) was given to achieve and maintain a height of $T_{10.}$

In Multigravidas < 5 cm dilatation in active labour CSE: Intrathecal Fentanyl 25 mcg + Insertion of epidural catheter to start 0.0625% bupivacaine with fentanyl 2 mcg/ml ONLY AFTER pain returns @ 8-12 mL/h continuous infusion (via pump) to achieve and maintain a height of $T_{10.}$

Multigravidas > 5-8 cm dilatation in active labour, single shot epidural with 12-15 mL of 0.125% bupivacaine.

Automated maternal non invasive blood pressure and heart rate was monitored. Cardiotocography and fetal heart rate monitoring was carried out.All necessary resuscitative equipment and drugs were kept ready at all times. A multi-orifice epidural catheter was inserted 4 cm into the epidural space at the L2-3 or L3-4 inter-vertebral space. Parturients were given epidural analgesia as per the Programmed Labour Protocol. Patients not experiencing analgesia within 15 min of drug administration were excluded from study.

Patients who experienced inadequate analgesia during labor, defined as a patient requesting additional analgesia and was given an additional 10-mL bolus of study solution. Patients with persistent inadequate analgesia requiring manipulation of the epidural catheter or who delivered within 2 h of epidural catheter placement were excluded from data analysis.

Fetal heart sound, maternal blood pressure and heart rate before & after injection of drugs for 30 minutes after initial dose / every top-up of the epidural block was recorded. Where an epidural infusion was used in labour OR the block was stable, observations were performed half-hourly with continuous CTG monitoring.

Hypotension, defined as symptomatic systolic blood pressure <100 mm Hg or a 20% reduction from baseline, was treated with additional left uterine displacement, maternal oxygen administration, IV fluid bolus, or ephedrine as indicated.

Patients were asked to rate pain intensity during uterine contractions. Pain intensity was monitored using a numeric Visual Analogue Score (VAS) where 0 = no pain, 10 = worst pain imaginable. Sensory levels to cold was assessed in the midline every ten minutes. Motor block was assessed every ten minutes using the modified Bromage scale (0=no block; 1=unable to flex either hip joint but able to move knee and ankle joints; 2=unable to move hip and knee of either limb but able to move either ankle; 4=unable to move hip, knee or ankle joint of either lower limb). Pain relief and motor blockade was assessed at 15 minutes after epidural and every 30 minutes thereafter till vaginal delivery

Cumulative study solution volumes and delivered demand doses were recorded at complete cervical dilation and at delivery. Patients requiring supplemental perineal analgesia for vaginal delivery were given local anaesthetic. Patient satisfaction was assessed immediately after delivery as excellent, good, fair, or poor. Following delivery, the Apgar score of the neonate was recorded at 1 and 5 min.Any neonatal or maternal side effects of drugs were recorded . The data was tabulated in Microsoft Excel data sheet with relevant numerical grading and analysed by using SPSS software.

OBSERVATIONS AND RESULTS

Table 1: Type of Delivery

Type of delivery	No	Percentage (%)
Normal delivery	205	80.39
Instrumental delivery	29	11.37
Caesarean delivery	21	8.23
Total	255	100

Table no 1 shows that 205 (80.39%) parturients underwent normal delivery, 29 (11.37 %) parturients required instrumental assistance and 21 parturients i.e., 8.23% underwent caesarean section.

Table 2: Duration of labour

Stage of labour	Duration (Mean $\pm$ SD in minutes)
I Stage	100.32$\pm$20.61
II Stage	88.53$\pm$15.67

Table 2 shows the duration of the first stage of labour after institution of labour analgesia was 100.32$\pm$20.619 (mean$\pm$SD).

Table 3: Grading of Anaesthesia

Grade	No	Percentage (%)
Excellent	215	84.3

Fair	**14**	**5.5**
Good	**20**	**7.8**
Poor	**06**	**2.3**
Total	**255**	**100**

Table no 3 shows that 84.3% parturients graded labour analgesia as excellent, 5.5% fair, 7.8% good and 2.3% poor.

Table 4: Complications in Labour

Complications	**No**	**Percentage (%)**
Maternal Hypotension	**05**	**2**
Neonatal Bradycardia	**15**	**5.9**
Postdural Puncture Headache	**06**	**2.7**

Table no 4 shows that the incidence of maternal hypotension in the current study was 2% and postdural puncture headache was 2.7 and neonatal bradycardia was 15 (5.9%). the Apgar at 1 min and 5 min were 8.23±0.82 and 9.73±0.84 min respectively.

Table 5: APGAR Score

APGAR Score	**Duration (Mean ± SD in minutes)**
1 min	8.23 ± 0.82
5 min	9.73 ±0.84

Table no 5 shows that the Apgar at 1 min and 5 min were 8.23±0.82 and 9.73±0.84 min respectively.

DISCUSSION-

This prospective observational study was conducted in department of Obstetrics and Gynecology of service hospital during the course of one year. A total of 261 parturients received labour analgesia. Out of these, six parturients were excluded from study as per protocol because two had no relief in labour pains within 15 min of administering labour analgesia and four patients delivered within 1hour of administering labour analgesia. A total of 255 parturients were studied to determine the outcome of epidural labour analgesia programme .

In our study ,out of the 255 parturients , 205 (80.39%) parturients underwent normal delivery, 29 (11.37 %) parturients required instrumental assistance and 21 parturients i.e., 8.23% underwent caesarean section.. This study is in concordance with the study conducted by Papalkar J et al [4] , in which they evaluated the effect of epidural analgesia on maternal and foetal outcome in 120 parturients and compared it with parturients devoid of analgesia in a rural set up where availability of resources was not the only constraint but lack of awareness and difficulty in acceptance of such intervention by the patients and the obstetricians was also a major limitation. However A Cochrane review of 20 trials involving a total of 6534 women estimated that the relative risk of caesarean delivery with epidural analgesia was 1.07 (95% Confidence Interval 0.93 to 1.23) as compared with other methods or with no analgesia. This implies that there was no evidence of a significant difference in the risk of caesarean section with epidural analgesia. Another Cochrane analysis concluded that the risk ratio for caesarean section was 1.10, 95% CI 0.97 to 1.25. Although this finding remains statistically non-significant, a small increase in the risk of caesarean section cannot be excluded .[5]

In this current study, the rate of instrumental delivery was 11.37%. The incidence of instrumental intervention has been variously described in literature as ranging from 1.5% to 26 % of cases. Shahram et al have concluded that epidural analgesia is associated with an increased risk of instrumental vaginal delivery and prolonged second stage of labour. They attributed this high rate of instrumental intervention to several reasons. Reduction of serum oxytocin levels resulting in a weakening of uterine activity due in part to intravenous fluid infusions being given before epidural analgesia, thereby reducing oxytocin secretion. The increased use of oxytocin after starting epidural analgesia may indicate attempts at speeding up labour. Additionally, a bias may be present as there is a lower threshold for performing instrumental vaginal delivery in the presence of epidural analgesia since patients did not appreciate a longer second stage.[6]

In the current study, the duration of the first stage of labour after institution of labour analgesia was 100.32±20.619 (mean±SD). The total duration of first stage was not noted. 120 parturients were included in a study by Papalkar J et al in which 60 women received epidural analgesia for relief of labor pain and 60 women served as control. No effect of epidural analgesia was noted on progress of first stage of labour. The authors attributed this to careful attention being paid to correct inefficient uterine action early in labour with oxytocin infusion as part of their hospital protocol. Following this policy, after augmentation further 53.33% had duration of labour less than 8 hours which was again comparable to control group (56.67%) [4]. In the current study also, oxytocin is given in the first stage of labour at the rate of 5 IU/h as part of the hospital protocol.

In contrast to our study N Sindik et al allotted 551 pregnant women to a study group receiving 0.125% bupivacaine combined with 2-4 microg of fentanyl or 0.5 microg of sufentanyl and 733 patients in the control group. The authors reported statistically significant differences in the duration of both stages of labor, which were significantly protracted, and the incidence of operative deliveries was higher in the study group of patients compared with controls.[7]

The mean duration of 2nd stage was 88.53±15.67 min which is in concurrence with studies done by Shahram N et al [6] and Fyneface-Ogan et al[7] . In contrast, Wang et al observed that the duration of stage I , stage II labor and the total duration of labor was 497.9±168.4 min, 54.3±43.8 min, and 522.1±178.9 min, respectively, which were significantly longer than those in the control group (404.2±156.0 min, 31.5±19.8 min, and 435.8±159.2 min, respectively, P≤0.05). No significant difference was found between the two groups in the rates of oxytocin use, emergency cesarean section, instrumental delivery, meconium-stained amniotic fluid, and low Apgar scores (P≥0.05).[8]

In the current study 84.3% parturients graded labour analgesia as excellent, 5.5% fair, 7.8% good and 2.3% poor. These subjective findings are in concurrence with Papalkar et al [4]. A number of studies have proved that epidural analgesia offers superior pain relief as compared to other forms of pharmacological or non-pharmacological methods.[9,10] Morgan B M et al studied the amount of pain that had been experienced by 1000 women during vaginal delivery of a live child by interview within 48 hours of delivery. Patients had been offered a choice of analgesia, and 536 had received epidural analgesia: pain relief was greatest in this group, just over half having had a painless labour .[9] The current study used the numeric rating scale (VAS) for grading of pain. Guglielminotti J et al used the pupillary diameter (PD) and pupillary light reflex amplitude (PLRA) i.e., the difference between PD before and after light stimulation to describe the effects of labor pain and pain relief with epidural analgesia on PD and PLRA, determine their association with pain intensity and determine the ability of a single measurement of PD or PLRA to assess pain. It is reported that changes in PD and PLRA brought about by a uterine contraction may be used as a tool to assess analgesia. [11]

The incidence of hypotension in the current study was 2% (5 parturients out of 255). This is in concurrence with the study by Papalkar J et al in which 3.33% patients had hypotension following epidural analgesia Hypotension, a common complication, develops soon after injection of local anesthetics. Because of the speed of the onset of regional block, it is seen more often with spinal block than with epidural block While some studies show more (25-67%) maternal hypotension with CSE analgesia and spinal analgesia than with epidural block[12], others fail to show a significant difference [4]. A meta-analysis defining hypotension as a 20%–30% drop in systolic blood pressure (compared with baseline) or a systolic blood pressure less than 100 mmHg estimated the incidence to be about 10% after the initiation of neuraxial analgesia during labor. Because uterine blood flow and fetal oxygenation is directly related to maternal arterial pressure, hypotension is an important side effect that must be treated rapidly. This incidence is similar between combined spinal–epidurals and low-concentration epidurals.[13]

In this study 15 (5.9%) neonates had bradycardia. After studying available literature. Engel NMAA et al concluded that induction of labour analgesia can result in FHR changes and severe foetal bradycardia. Most likely this is due to uterine hyper tonus secondary to an acute drop in plasma levels of epinephrine. As higher doses of intrathecal opioids seem to be related to more frequent non-reassuring FHR tracings, administration of high doses of intrathecal opioids (≥7.5 mcg sufentanil) is best avoided .[14]

The etiology of fetal bradycardia is not well known. Fetal bradycardia after induction of regional analgesia may result from decreased cardiac output, decreased uterine perfusion, high dose opioid effect or uterine tetany caused by maternal hypotension. It seems to be related to the fast reduction of the pain caused by uterine contractions, which reduces maternal plasma concentration of b-endorphins [15] and epinephrine [4]. A sudden plasma imbalance of epinephrine/norepinephrine may result in uterine hypotonus and/or arterial spasm and the consequent decrease in uterine-placental blood flow [16]

In the current study, Apgar at 1 min and 5 min were 8.23±0.82 and 9.73±0.84 min respectively. Mousa WF assigned 160 nulliparous women in spontaneous labor at full term with a singleton vertex presentation. Parturients who request epidural analgesia were allocated in the epidural group, whereas those not enthusiastic to labor analgesia were allocated in the control group. The number of newborns with 1-min and 5-min Apgar scores less than 7 between both groups and number of parturients receiving oxytocin, however, the maximal oxytocin dose was significantly higher in the epidural group. [16]

Anim-Somuah M et al analyzed 18 trials involving 6898 women. The authors reported that epidural analgesia appears to be effective in reducing pain during labour but did not appear to have an immediate effect on neonatal status as determined by Apgar scores less than seven at five minutes (RR 0.80, 95% CI 0.54 to 1.20).[17]

CONCLUSION

Our study concluded that epidural analgesia is very safe and effective form of analgesia with no increase in LSCS and instrumental deliveries with no major maternal and fetal complications.

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