

## EFFECTS OF EPIDURAL ANALGESIA ON THE MOTHER AND FETUS IN LABOUR

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### Abstract

**Background:** The present study is to evaluate the effect of epidural analgesia on maternal and fetal outcome. That is the duration and progress of labor, mode of delivery (spontaneous vaginal/instrumental/operative), requirement of oxytocin augmentation, Apgar score of newborn, complications following epidural analgesia and effectiveness of analgesia on labor. **Methods:** This prospective study was conducted at J.L.N.M.C.H Bhagalpur, a total number of 60 patients who were primigravida with full term singleton pregnancy with vertex presentation in established early labor who come under the inclusion criteria were divided randomly into two groups, group-A received epidural analgesia and group-B did not receive epidural analgesia. A detail history, P/A, P/V examination, investigations were done and epidural catheter inserted once the patient enters active phase of labor. **RESULTS:** Age group of patients varied from 20 – 25 years (70%) in group A and (66.7%) in group B. There was significantly increased use of oxytocin in Group A. Epidural analgesia has shortened the duration of I stage of labor by 13.10 min and prolonged II stage of labor, when compare to control group. Maximum patients [25 (96.5%)] did not have motor blockade. Epidural analgesia has not increased the rate of instrumental vaginal delivery (6.7% vs. 0) and cesarean section rate (16.7% vs. 10%) when compare to control group. In group A-There were 11 (36%) neonates who had Apgar score  $\leq 7$  at 1 min and no neonates with Apgar score  $\leq 7$  at 5 min. In group B -There were 6 (20%) neonates who had Apgar score  $\leq 7$  at 1 min and no neonates with Apgar score  $\leq 7$  at 5 min. There were 23 (92%) patients in group A who had no pain. **CONCLUSION:** We concluded that epidural analgesia did not affect duration of labor or cesarean section rate and has no effect on perinatal outcome and can therefore be recommended to mothers as a satisfying and effective method of pain relief of labor.

**Keywords:** Apgar score; Epidural Analgesia; Instrumental delivery.

### Introduction:

Labor pain is a highly individual reflection of variable stimuli that are uniquely received and interpreted by each woman. These stimuli are modified by emotional, motivational, cognitive, social, and cultural circumstances. The complexity and individuality of the experience suggest that a woman and her caregivers may have a limited ability to anticipate her pain experience prior to labor<sup>[1]</sup>. Labor epidural analgesia still remains the gold standard of obstetric pain management, until now there has been no single new drug to overcome the superiority of neuraxial analgesia in obstetrics.

**Epidural analgesia:** Epidural analgesia in labor was first described by Von Stoeckel in 1909. He used procaine to produce what he termed as ‘sacral anesthesia’. The use of lumbar epidural analgesia was made possible by the description of pain pathways by Aburel in 1930. As early as 1901, Tuffier had attempted lumbar epidural analgesia.

The lumbar approach to the epidural space for analgesia in labor was first used by Graffagnino and Seyler in 1938. In the next decade, Flowers and colleagues recommended using continuous lumbar epidural with a catheter<sup>[2]</sup>. First major step toward current techniques of pain relief was

made in 1942; when Hingson and Edwards proposed the use of continuous caudal epidural local anesthetic infusion as a technique for maternal pain relief. Since then, revolution of analgesic techniques has been dependent on a number of personalities, technical and pharmacological factors. Evolution of obstetrical epidural analgesia has occurred over half a century<sup>[3]</sup>. presently, epidural analgesia has been considered as a safe and effective mode of pain relief in labor. In 1952, Cleland suggested a 2-catheter technique to provide a segmental peridural block. The introduction of lignocaine in 1949 and bupivacaine in 1963, with their better safety profiles promoted the use of continuous epidural techniques<sup>[2]</sup>.

### Objective:

To evaluate the effect of epidural analgesia on maternal and fetal outcome. Effectiveness of analgesia on labor, Mode of delivery (Spontaneous/Instrumental/Operative), Apgar score of the newborn at 1min and 5min.

### Methods and Materials:

**Source of data:** This was a prospective study conducted at J.L.N.M.C.H Bhagalpur.60 primigravide who met the inclusion and exclusion criteria were divided into equal

groups. Group A (who received epidural analgesia) & Group B (without epidural analgesia).

**Inclusion criteria:** Women who gave written informed consent. Primigravidae with Term Singleton pregnancy, Vertex presentation with spontaneous onset of labor pains.

**Exclusion criteria:** Patient refusal, Antepartum hemorrhage, Multiple gestation, Malpresentation, Cephalopelvic disproportion, Preterm labor, Intrauterine death, Diabetes mellitus Cardiac and Respiratory diseases, Infection at the injection site, On Anticoagulant therapy, Previous back surgeries, Spinal deformities, Bleeding disorders.

**Procedure:** On admission a detailed history was taken, maternal pulse rate and blood pressure checked, respiratory and cardiovascular system examined followed by per abdominal examination and fetal heart sound was checked. Per vaginal examination was done. If the patient satisfied the inclusion and exclusion criteria, patient's informed consent was taken for epidural analgesia. After all investigations and preparation of the patient, patient was positioned in either sitting or lying on her side with her knees and hips flexed. Under aseptic precautions, epidural catheter was inserted via a specially designed 16-18 Gauge Tuohy needle into epidural space. The space was located by using loss of resistance to a syringe filled with air. About 2-4 cm of catheter was left in the identified space and the local anesthetic (10 ml 0.0625% bupivacaine with fentanyl 2µg/ml) was administered via a filter through this catheter, as often as required for the duration of labor. The dose was given once patient enters active stage of labor (3-4cm). After the dose was given, the level of blockade was assessed by pin-prick technique and the upper level of sensory blockade was maintained at T10 level. The top up doses were repeated whenever patient complains of pain and when the level became lower than T10. The patient was asked to remain in lateral decubitus position, the top ups was continued in the similar manner till patient was fully dilated. After full dilatation top up dose was given in sitting posture. The pain experienced by the parturient was assessed by a visual analog scale of 10. The patient was asked to mark the degree of pain before and after the top up dose. The statistical analysis was performed using mean and SD deviation, calculation of Percentage, t- test and chi-square test were applied, to calculate P value for mode of delivery.

## Results:

### Age wise distribution:

**Table 1: Age wise distribution of samples**

| Age in years | Group A |     | Group B |       |
|--------------|---------|-----|---------|-------|
|              | No      | %   | No      | %     |
| <20          | 0       | 0   | 1       | 3.33  |
| 20-25        | 21      | 70  | 20      | 66.67 |
| 25-30        | 6       | 20  | 5       | 16.67 |
| 30-35        | 3       | 10  | 4       | 13.33 |
| ≥35          | 0       | 0   | 0       | 0     |
| Total        | 30      | 100 | 30      | 100   |

In the Group A, out of 30 cases, 21 (70%) cases were in the age group 20-25 years. In the same age group Group B cases are 20 (66.7%). There is no statistically significant difference in age among Group A and Group B ( $p>0.05$ ).

### Cervical dilatation:

Mean cervical dilatation in the Group A was 3.60cm & Group B 3.54 cm.

### Oxytocin augmentation:

**Table 2:** Oxytocin Augmentation in Study and control groups.

| Oxytocin | Group A |     | Group B |     |
|----------|---------|-----|---------|-----|
|          | No      | %   | No      | %   |
| Not use  | 21      | 70  | 24      | 80  |
| Used     | 9       | 30  | 6       | 20  |
| Total    | 30      | 100 | 30      | 100 |

In the group A out of 30 cases, in 21 (70%) cases oxytocin was not used for augmentation of labor and in 9 cases (30%) oxytocin was used.

In group B, out of 30 cases in 24 (80%) of cases oxytocin was not used for augmentation of labor and in 6 (20%) cases oxytocin was used. Statistically there is significant difference in the use of oxytocin among Group A and Group B ( $P<0.05$ ). There was significantly increased use of oxytocin in Group A.

### Duration of labor:

**Table 3:** Duration of Labor in Study and control groups.

| Duration (min)        | Group A Mean ± S.D (N = 25) | Group B Mean ± S.D (N = 27) | p-value |
|-----------------------|-----------------------------|-----------------------------|---------|
| Mean active I stage   | 243.54±43.46                | 256.64±34.64                | > 0.05  |
| Mean active II stage  | 44.56±5.56                  | 36.67±7.76                  | < 0.05  |
| Mean active III stage | 9.54±4.56                   | 9.48±4.64                   | > 0.05  |

The epidural analgesia does not prolong the I stage of labor, in fact it shorten the I stage of labor by reducing maternal anxiety which is not statistically significant ( $p>0.05$ ). In the II stage mean duration of labor is higher in the Group A as compared to Group B it is statistically significant ( $p<0.05$ ). In the III stage, there is no statistically significant difference in duration of labor among both Groups ( $p>0.05$ ).

### Mode of delivery:

**Table 4: Mode of delivery in Group A and Group B .**

| Mode of delivery             | Group A |      | Group B |     |
|------------------------------|---------|------|---------|-----|
|                              | No      | %    | No      | %   |
| Spontaneous vaginal delivery | 25      | 83.3 | 27      | 90  |
| LSCS                         | 5       | 16.7 | 3       | 10  |
| Total                        | 30      | 100  | 30      | 100 |

In group A (study group) out of 30 cases, 25 (83.3%) had spontaneous vaginal delivery, and 5(16.7%) cases

underwent LSCS. In the group B (control group) out 30 cases 27 (90%) had spontaneous vaginal delivery and 3 (10%) cases underwent LSCS. Spontaneous vaginal delivery cases were more in control group A 27 (90%) as compared to study group B 25 (83.3%) but it is not statistically significant ( $p > 0.05$ ). So there is no significant increase in the rate of instrumental deliveries and LSCS in epidural group.

#### Neonatal apgar score:

**Table 5:** Neonatal APGAR score at 1 min in Group A and Group B.

| APGAR score at 1 min | Group A   |      | Group B   |      |
|----------------------|-----------|------|-----------|------|
|                      | No        | %    | No        | %    |
| <5                   | 9         | 30   | 4         | 13.3 |
| 6-7                  | 20        | 66.7 | 26        | 86.7 |
| 8-9                  | 1         | 3.3  | 0         | 0    |
| Total                | 30        | 100  | 30        | 100  |
| Mean                 | 5.93±1.38 |      | 6.36±0.79 |      |

**t – test and p-value t = 1.49, p>0.05, Not significant**

The APGAR scores at 1 min in the Group A; 9 cases (30%) with less than 5, 20 cases between 6-7 and 1 case between 8-9. The APGAR score at 1 min in the Group B; 4 cases (13.3%) with less than 5, 26 cases between 6-7 and no cases between 8-9. There was no statistical significant difference of APGAR score at 1min between Group A and Group B ( $p > 0.05$ ).

**Table 6:** Neonatal APGAR score at 5 min in Group A and Group B

| APGAR score at 5 min | Group A   |      | Group B   |      |
|----------------------|-----------|------|-----------|------|
|                      | No        | %    | No        | %    |
| <5                   | 0         | 0    | 0         | 0    |
| 6-7                  | 4         | 13.3 | 5         | 16.6 |
| 8-9                  | 26        | 86.7 | 25        | 83.3 |
| Total                | 30        | 100  | 30        | 100  |
| Mean                 | 8.03±1.11 |      | 8.03±1.11 |      |

**t = 0.702, p > 0.05, not significant**

There was no statistical significant difference of APGAR score at 5 min between Group A and Group B ( $p > 0.05$ ).

**Table 7:** Assessment of pain by Visual analogue scale (VAS).

| VAS      | Group A Mean ± S.D (N = 25) | Percentage |
|----------|-----------------------------|------------|
| No pain  | 23                          | 92         |
| Mild     | 2                           | 8          |
| Moderate | 0                           | 0          |
| Severe   | 0                           | 0          |
| Total    | 25                          | 100        |

23 (92%) patients had no pain, 2 (8%) patients had mild pain, there were no rating for moderate and severe.

#### Discussion:

In the present study (Group A) majority of patients were in the age group of 20–25 yrs ;21 (70%) since only primigravida were included, 4 patients were in age group of 25– 30 (20%) and 3 patients were > 30years (10%). The mean age in group was 23.7 ± 2.34years. In Group B

majority of patients were in the age group 20-22 years; 20 (66.7%). the mean age in group was 23.6 ± 2.45 years. In a study conducted by C.J. Howell et al <sup>[4]</sup>, Maternal age was 24.3 ± 5.3 years and in the study of David. H. Chestnut et al <sup>[5]</sup> the mean age in years was 21 ± 4 years.

Duration of I stage of labor in Group A of our study is 243.54± 43.46 min and 256.64 ± 34.64 min in Group B. Duration of I stage is shortened by 13.10 min when compared to group B but not statistically significant in our study. In Impey L. et al <sup>[6]</sup> study, the duration of I stage is 294 ± 156 min which is prolonged compare to our study. Duration of II stage of labor is prolonged in the group A of present study compared to group B present study, which is statistically significant  $p < 0.05$ . Duration of II stage of labor in Group A of present was 44.56 ± 5.56 min which was prolonged when compared to study conducted by Impey L. et al <sup>[6]</sup> which was 35 ± 16.2 min. Epidural analgesia can affect the dynamics of second stage of labor, as diagnosis of the commencement of the second stage is often delayed because sensory blockade obtunds the desire to bear down. The relaxation of the pelvic floor muscles may delay rotation of the descending presenting part and weakness of abdominal muscles may impede the muscles expulsive efforts. Finally, the abolition of the reflex desire to bear down may further complicate the matters, especially for the primigravida who may find difficulty in co-ordinating the forces necessary to expel the fetus by her own efforts <sup>[7]</sup>.

Pain was assessed by VAS before and after top up dose of epidural analgesia. In our study 23 (92%) patients had no pain, 2 (8%) patients had mild pain, and there were no rating for moderate and severe. This is similar to a study conducted by David. H. Chestnut et al <sup>[5]</sup>, maximum patients had no pain 35 (76%) and 9 (20%) patients had mild pain. Motor blockade was assessed by a Bromage scale and in our study maximum 24 (96%) patients had no motor blockade and 1 (4%) patient experienced partial motor blockade which is similar to the study conducted by David H. Chestnut et al<sup>[5]</sup>. 23 (50%) patients had no motor blockade and 19 (41%) had partial motor blockade. Hence motor blockade is not common in patients receiving epidural analgesia.

In the present study in group A maximum number of patients had spontaneous vaginal delivery 25 (83.3%), and 5 (16.7%) patients underwent for cesarean delivery due to fetal heart rate variability. This is similar to a study conducted by Behnamfar F et al<sup>[8]</sup>, where the number of patients who had spontaneous vaginal delivery were 43(86%), Instrumental delivery were 1 (2%) and cesarean delivery were 6 (12%).

In our study, in group B; out of 30 cases ;27 (90%) had spontaneous vaginal delivery and 3 (10%) cases underwent LSCS. Spontaneous vaginal delivery cases were more in control group B; 27 (90%) as compare to study group 25 (83.30%) but it not statistically significant ( $p > 0.05$ ). So there is no significant increase in the rate of instrumental deliveries and LSCS in epidural group.

In the present study in group A, Apgar at one min was  $\leq 7$  in 11 (36%) and no neonates with Apgar  $\leq 7$  at 5 min which is similar to those in other studies. In the present study, in group B; Apgar at one min was  $\leq 7$  in 6 (20%) and no neonates with Apgar  $\leq 7$  at 5min. There was no statistical significance between group A and group B. In the study by C J Howell *et al*<sup>[4]</sup> only one baby had  $\leq 7$  Apgar at 5 min .

In the study of Chestnut *et al*<sup>[5]</sup> 1 min Apgar  $\geq 7$  was 40 (87%) and 5min Apgar  $\geq 7$  was 46 (100%) . In our study group A -urinary retention was seen in 1 (3.3%) patient, nausea in 2(6.6%) patients and partial motor block in 1 (3.3%) patient. In group B has no side effects. The most common side effects were sedation and nausea as in the study of **Leighton *et al* and Chestnut *et al***.

#### Conclusion:

Epidural analgesia during labor is a simple and effective method for painless and safe delivery. Epidural analgesia has favourable effects on progress of labour. Ist stage of labor is not prolonged when epidural dose is given once patients enter active phase of labor. Most women who do not bear down adequately during stage II of labor can go for to instrumental delivery. But there are no intrapartum complications and the Apgar score was good. But there was no increase in rate of cesarean section and the II stage of labor was prolonged but maximum number of deliveries were spontaneous, significant difference in the rate of instrumental vaginal delivery and the length of II stage of labor need to be considered when counseling women.

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