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Original Research Article

Effect of epidural analgesia on the duration of labour and pains: a comparative study

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ABSTRACT

Background: Epidural analgesia is regional anaesthesia that blocks pain in a particular region of the body. The use of Epidural Analgesia (EA) in labor is widespread in modern labor ward practice, and its benefits in terms of pain relief are well-recognized. Objective of this study was to study the effect of epidural analgesia on the duration of labour and pains.

Methods: The present study was conducted on 60 women in the department of obstetrics and gynecology at Topiwala National Medical College, Mumbai during a period from October 2014 to January 2017. The women requesting EA were assigned as the study group (Group A - 30 cases) and women not receiving EA were included in the control group (Group B - 30 cases).

Results: The duration of active phase of first and second stage of labour was found to be prolonged in patients who received EA as compared to control group. An increase in number of caesarean sections and requirement of oxytocin augmentation was found to be more in Group A as compared to Group B. There was no statistically significant difference in Apgar score of newborns at 1 min and 5 min in both the groups. The patients demanding epidural drug had better pain relief during labour. In Group A, 17% of patients and in Group B, 7% of patients had nausea and vomiting. Other side effects were minimal.

Conclusions: Epidural analgesia is not a totally free of disadvantages, it is the most effective mode of pain relief available compared with other techniques. The addition of patient-controlled epidural analgesia and innovations using new technologies enhance patient satisfaction.

Keywords: Apgar score, Epidural analgesia, Labour, Oxytocin, Pain, Regional anesthesia

INTRODUCTION

Labour and delivery cause severe pain in many women. Experiencing labour pains and giving birth to infant is normal physiological process. Becoming a common problem of visceral pain, the pain of the first stage of labour is often referred to the dermatomes given by the same spinal cord segments that receive input from the uterus and cervix (T10 to L1). Additionally, during the late first stage and second stage of labour, stimulation of

pain-sensitive structures within the pelvic cavity, and pressure on a single or more root base of the lumbo sacral plexus may bring about hurting, burning, or cramping distress in the thigh, lower limbs and back. Stimulation of these structures plays a role in pain referred to the lower lumbar and sacral portions.¹

Epidural and intrathecal blockade (neuraxial blockade) provides complete analgesia for both the first and second stages of labour.¹ EA is regional anaesthesia that blocks

the nerve impulses from the lower spinal segments of the body. It was first used in obstetric practice in 1946 and its use in labour has steadily increased until the last decade.² However, the safe fetal outcome without any adverse maternal outcome is the chief goal of pain relief during labor and hence epidural analgesia is the most widely used modality for this purpose.³

In developing countries like India national average acceptance of epidural analgesia for labour pains relief is almost negligible though sporadically few centre have a comprehensive labour analgesia program.⁴ The present study was conducted to analyse the effect of epidural analgesia on the cervicographic progress of labour in active phase, obstetric outcome, maternal satisfaction with analgesic efficacy and foetal outcome.

METHODS

After obtaining approval from Institutional Ethical Committee and written informed consent from parturient, this hospital based retrospective and prospective observational study was conducted on 60 women in the department of obstetrics and gynecology at BYL and Topiwala National Medical College, Mumbai during a period from October 2014 to January 2017. Patient with live intrauterine pregnancy with cephalic presentation with adequate pelvis and who taking epidural and going through vaginal delivery were included in the study. Selection criteria of cases were all ANC patients either registered or referred was informed about epidural analgesia with risks and were free to choose any of the method. All registered patients were counseled in the 3rd trimester and referred patients were counseled at the earliest. Each participant in active labour who met inclusion criterion with cervical dilation more than 4 cm was divided in two groups, Group A - the women requesting epidural analgesia were assigned as the study group (30 cases), and Group B - women not receiving epidural analgesia were included in the control group (30 cases). Controls were selected randomly after matching the necessary inclusion criteria with the study group. Parturient with bleeding disorders, spine deformities, infection at the site of epidural placement, refusal of patient, allergic to anesthetic drugs, neurological or neuromuscular diseases were excluded from the study.

A detailed medical, obstetric history was taken and later followed by a detailed general and obstetric examination. Basic investigations like hemoglobin percentage, blood group and type, were done. The selected patients were provided epidural analgesia on demand. Epidural analgesia was given by an expert anesthesiologist and monitored in labour room where all resuscitative measures were readily available. Epidural space was identified at the level of L3-L4 interspaces in sitting position under all aseptic conditions using 16 G Tuohy's epidural needle and by loss of resistance to saline technique. Epidural catheter was inserted and catheter was then secured and the parturient was placed in supine

position. Loading dose of drug was given by anesthesiologist. Pain intensity was evaluated during contraction using visual analogue pain scale (0-10) every hourly. VAS score for pain consisted of a 10 cm line, zero representing 'no pain' and 10 representing 'worst pain'. A reduction in pain score to less than 5 was considered to represent onset of analgesia. Top up of 5 ml or above given when VAS is >5. Maternal hemodynamics were measured hourly. Sensory and motor blockade was assessed by bilaterally after giving epidural analgesia. The progress of labour was plotted on a partogram. CTG recordings were taken at regular intervals. Per vaginal examination was done every 4 hourly. The epidural catheter was removed after delivery or caesarean section with tip intact. Neonatal welfare was assessed at 1st min, 5th min by Apgar score. Maternal satisfaction was assessed by interrogating the parturient post-delivery day after 24 hours which was graded as Excellent - I, Good - II, Fair - III, Poor - IV.

Statistical analysis

Data analysis was done with the help of appropriate statistical software. Quantitative data was presented with the help of mean, standard deviation, median and inter quartile range. Comparison of variables like duration of labour, visual analogue scale etc. among the study group was done with the help of unpaired t-test or Mann Whitney test. Quantitative variable was presented with the help of frequency and percentage. Comparison among the study group was done by Chi square test.

RESULTS

In current study 30 patients who requested epidural analgesia in labour were studied and compared with another 30 patients who did not require epidural analgesia for pain relief in labour. The most common age group in both epidural and control group was between 21-25 years as shown in Table 1. The mean age in epidural and control group was 25.07±4.291 and 25.13±4.10 years respectively.

Table 1: Age-wise distribution of patients under epidural and control group.

Age group	Group		Total
	Case	Control	
Till 20 years	3 (50.0%)	3 (50.0%)	6 (100%)
21-25 years	14 (48.3%)	15 (51.7%)	29 (100%)
26-30 years	11 (52.4%)	10 (47.6%)	21 (100%)
> 30 years	2 (50.0%)	2 (50.0%)	4 (100%)

The maximum number of patients was in the gestational age 39-39.6 weeks in both the groups when compared by dates, whereas maximum number of patients was 38-38.6 weeks by scan in epidural group and 37-37.6 weeks in control group, (Table 2). The inclusion of multigravidas was more in both the epidural [19 (47.5%)] and control group [21 (52.5%)].

The majority [20 (64.5%)] of epidural patients had 6-10 hours of latent phase of first stage of labour with mean time 5.67 ± 1.398 hours on the other side majority [19 (65.5%)] of

control patients had shorter latent phase i.e. 1-5 hours with mean duration 4.93 ± 1.780 hours, but the difference was not statistically significant ($p = 0.081$), (Table 3).

Table 2: Distribution of patients according to the gestation age in both epidural and control group.

Gestational age		Group		Total
		Case	Control	
By dates	36-36.6	2 (40.0%)	3 (60.0%)	5 (100%)
	37-37.6	2 (20.0%)	8(80.0%)	10 (100%)
	38-38.6	11 (78.6%)	3 (21.4%)	14(100%)
	39-39.6	13 (59.1%)	9 (40.9%)	22(100%)
	40-40.6	2 (25.0%)	6 (75.0%)	8 (100%)
	41-41.6	0 (0.0%)	1 (100.0%)	1 (100%)
By Scan	35-35.6	0 (0.0%)	1 (100.0%)	1 (100%)
	36-36.6	2 (33.3%)	4 (66.7%)	6 (100%)
	37-37.6	1 (12.5%)	7 (87.5%)	8 (100%)
	38-38.6	15 (71.4%)	6 (28.6%)	21 (100%)
	39-39.6	9 (64.3%)	5 (35.7%)	14 (100%)
	40-40.6	2 (25.0%)	6 (75.0%)	8 (100%)
	41-41.6	1 (50.0%)	1 (50.0%)	2 (100%)

Table 3: Distribution of patients according to the duration of latent and active stage of labour in both the group.

Duration of labour		Group		Total
		Case	Control	
Duration of latent phase	1-5 hours	10 (34.5%)	19 (65.5%)	29 (100%)
	6-10 hours	20 (64.5%)	11 (35.5%)	31 (100%)
Duration of active phase	1-3 hours	7 (29.2%)	17 (70.8%)	24 (100%)
	4-5 hours	14 (58.3%)	10 (41.7%)	24 (100%)
	6-8 hours	4 (66.7%)	2 (33.3%)	6 (100%)

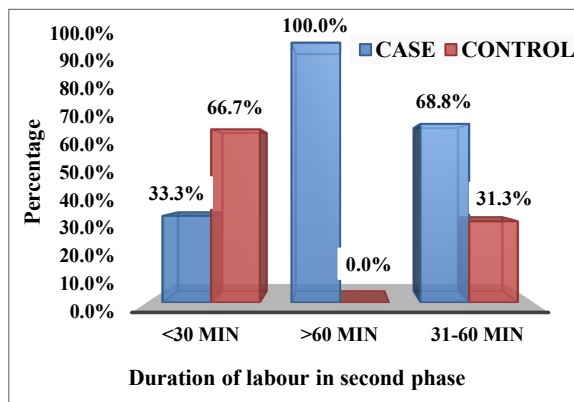


Figure 1: Distribution of patients according to the duration of the second stage of labour in epidural and control group.

Duration of active stage of labour was between 1-3 hours in only 29.2% patients in the epidural group as compared to 70.8% patients in the control group, (Table 3). The mean duration of active stage of labour in the epidural

group (4.20 ± 1.58) was also more as compared to the control group (3.21 ± 1.32) and the difference was statistically significant, ($p=0.15$). Therefore, there was prolongation in the active stage of labour in the patients receiving epidural analgesia. Total duration of first stage of labour in epidural group was 8.03 ± 2.55 hours whereas that of control group was 9.73 ± 2.51 hours, the difference being statistically significant ($p=0.12$).

Table 4: Distribution of neonates on the basis of 1 min and 5 min Apgar score in both the groups.

Apgar 1 min/ 5 min	Group		Total
	Case	Control	
<7/<7	1 (100%)	0 (0.0%)	1 (100%)
<7/>7	1 (100%)	0 (0.0%)	1 (100%)
>7/>7	27 (47.4%)	30 (52.6%)	57 (100%)
FSB	1 (100%)	0 (0.0%)	1 (100%)

Duration of second stage of labour was less than 30 minutes in 12/25 cases and 24/29 controls, the difference being statistically significant, ($p=0.018$), (Figure 1). The mean

duration of second stage in the epidural group was 41.40 min, more than the control group, 26.03 min which was statistically significant, ($p=0.0001$). Therefore, in the present study there was prolongation of duration of 2nd stage of labour in the study group requesting epidural analgesia for pain relief. 25/30 cases and 29/30 control delivered vaginally

and 5/30 cases, 1/30 control delivered by caesarean section, the difference not being statistically significant ($p=0.195$). The requirement of oxytocin augmentation was found to be more in the patients who received epidural analgesia (70%) as compared to those who did not (30%), but failed to show statistical significance.

Table 5: Distribution of patients by VAS in epidural and control group at 4 cm dilated cervix and at fully dilated cervix after the administration of epidural drug.

VAS		Group		Total
		Case	Control	
4 cm dilated	0-3	1 (100%)	0 (0.0%)	1 (100%)
	4-6	5 (45.5%)	6 (54.5%)	11 (100%)
	7-10	24 (50.0%)	24 (50.0%)	48 (100%)
Fully dilated	0-3	6 (100%)	0 (0.0%)	6 (100%)
	4-6	19 (100%)	0 (0.0%)	19 (100%)
	7-10	0 (0.0%)	29 (100%)	29 (100%)

As shown in the Table 4, all babies had Apgar >7 in 1 min and 5 min in all the control whereas the 1 min Apgar scores were <7 in 2 babies in the epidural group, reason in both were respiratory distress and 1 was fresh still birth. There was no statistically significant difference in the Apgar score of the new-borns at 1 min and 5 min in both the groups.

Pain assessment was done by using visual analog scale (VAS) as shown in Table 5. VAS scoring does not show any difference in the epidural and control group before the administration of epidural analgesia. It was found that patients demanding epidural drug had better pain relief during labour and provided better maternal satisfaction.

Total 19/60 patients were high risk, out of which 10 (52.6%) were from epidural group and 9 (47.4%) from control group but the difference was not statistically significant ($p=0.781$). 15 out of 60 patients had postpartum complaints, majority (66.7%) of which from the epidural group and rest 33.3% from the control group ($p=0.136$). Patients had some of the undesirable effects also after receiving epidural analgesia like hypotension (in 3 cases) which was mild and was treated with IV fluids. Nausea and vomiting were observed in 17% cases but it was also seen in 7% controls which may be due to many factors. Postpartum hemorrhage (PPH) was observed in 2 cases and 2 controls. Fever was seen in only one control.

DISCUSSION

In present study, the duration of first stage of labour (latent and active phase), duration of active phase independently and the duration of second stage of labour in both the study and control group was analyzed. The mean duration of latent and active phase of 1st stage of labour in the epidural group was more as compared to

control group. The difference between two groups was not statistically significant in regards to mean duration of latent phase while difference was statistically significant in regards to mean duration of active phase of 1st stage of labour. So it can be interpreted from the above results that the latent phase of labour did not get affected by epidural analgesia on the other side, active phase of first stage gets prolonged after epidural analgesia as compared to the group not receiving epidural analgesia, this finding was compared with the other studies.⁵⁻⁷ The mean duration of second stage in the epidural group was 41.40 min, more than the control group, 26.03 min, which was statistically significant. There was prolongation of duration of 2nd stage of labour in the study group requesting epidural analgesia for pain relief. The result of present study correlated with the study done by Sahu et al, Agarwal et al, Rimaitis et al and Mousa et al.⁸⁻¹¹

There was no statistically significant difference observed between two groups when comparing the rate of caesarean sections and normal vaginal deliveries. The indication for the caesarean deliveries in control group was previous section with scar tenderness and that of epidural group were foetal distress and failure of induction. Few early studies have reported significantly higher incidences of caesarean deliveries with epidural analgesia as compared with systemic opiate drugs.^{6,12,13} In the late 1980s and early 1990s, several retrospective trials demonstrated an association between the use of epidural and increased caesarean rate.¹⁴

Many studies prove that epidural analgesia leads to the prolongation of first and second stage of labour as it results in suppression of prostaglandin F2 α release, leading to diminished uterine contractility and thus requiring oxytocin augmentation to keep the average labour duration.^{11,15} In the current study requirement of oxytocin augmentation was more in epidural group as compared to control group, but we failed to show

significant association between epidural analgesia and the number of patients who required oxytocin augmentation during labor. This can be explained by a careful use of oxytocin infusion to negate the possible effect of epidural analgesia on the course of labor. This result is supported by the findings of previous studies.¹⁶⁻¹⁸

No consistent differences have been identified in Apgar scores in babies who are born to mothers with epidurals or without epidurals. Some studies report benefits for the neonate, including a reduction in the incidence of low Apgar scores at 5 min and in the need for naloxone. Other workers have reported transient alterations in the foetal heart rate, particularly bradycardias, after initiation of epidural analgesia. Various explanations have been proposed, including opioid-induced uterine hyper stimulation and placental hypo perfusion (secondary to a fall in maternal blood pressure and unopposed norepinephrine secretion related to rapid onset analgesia and an ensuing rapid fall in maternal epinephrine concentrations). Once again, the clinical importance of these isolated reports is unclear. However, monitoring of the fetus remains important.¹⁹ In present study there was no statistically significant difference in the Apgar score of the newborns at 1 min and 5 min in both the groups. This was indicated by the normal Apgar score, the absence of need for naloxone, or mechanical ventilation for the neonates. This result was similar to the study conducted by Sahu et al and Agarwal et al.^{8,9}

The mean VAS score at 4 cm dilated cervix does not show any difference in the epidural and control group before the administration of epidural analgesia. But the patients who received epidural analgesia had less VAS score at the time of fully dilated cervix than the patient who did not demand epidural analgesia. The mean VAS pain score before epidural analgesia was 7.20 whereas it was 3.96 after epidural analgesia, it was found that the pain was reduced significantly in the women after receiving the epidural analgesia. Also, maternal satisfaction was maximum in the patients who received epidural analgesia. There was significant difference between pre and post epidural VAS score. The similar result found in the study done by Sahu et al, and Sikdar et al.^{8,20}

Patients had some of the undesirable effects also after receiving epidural analgesia. Hypotension (fall in systolic BP >20 mmHg) was observed in 3 patients from study group and in no patient in control group. Hypotension was mild and responded to 500 ml of Ringer's solution given IV and assuring lateral position. No hypotension was seen after top up doses. The incidence of hypotension 7% is less in present study as compared to Halpern et al who give the incidence up to 10%.²¹ Nausea was found in 5 cases and 2 controls. Similarly, vomiting was seen in 5 cases and 2 patients in control group. The nausea and vomiting can occur without any drugs during the active phase of labour which may be because of maternal acidosis. So, the nausea and vomiting found in

both groups may be due to labour, was not clearly understood. Fever was not seen in patients in study group and 1 in control group. This is usually associated with prolonged labour with epidural analgesia, where the exact cause is unknown. Many investigators believe that the association of epidural analgesia with fever is probably attributable to non-infections causes, such as an alteration in production and dissipation of heat resulting from epidural analgesia.¹⁹

Benefits of epidural analgesia

Some of the desirable effects found with epidural analgesia during our study are also cited here.

- The important one was maternal comfort. Patients described the epidural as one of the novel form of pain relief and enjoyed the process of childbirth. Many of them felt they would like to take an epidural analgesia during their next labour.
- Extension of anaesthesia for caesarean was easy because of the epidural catheter being in situ. Additional Lignocaine 10-15 ml given through the catheter for caesarean anaesthesia and positioning for spinal anaesthesia and chances of complications like PDPH were avoided.
- Comfort of the obstetrician was seen during instrumental deliveries or episiotomy suturing. Patient co-operation in both the procedures was good as there was no pain. There was minimal requirement of local anaesthesia for both episiotomies.

CONCLUSION

Epidural analgesia is not totally free of disadvantages, it is the most effective mode of pain relief available compared with other techniques. Recent innovations in drug combinations and delivery systems have resulted in a flexible technique that meets the needs of most parturients in a safe and effective manner. The addition of patient-controlled epidural analgesia and innovations using new technologies enhance patient satisfaction.

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