ORIGINAL ARTICLE

EFFECT OF EPIDURAL ANALGESIA ON LABOR AND ITS OUTCOMES

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Background: Epidural analgesia is an effective and popular way to relieve labour pain but it may interfere with normal mechanism of labour. The objective of this study was to evaluate the outcome of labour in women with effective epidural analgesia in terms of duration of labour, mode of delivery and neonatal outcome. **Methods**: This was a quasi-experimental study conducted in the Department of Obstetrics and Gynaecology, Shaikh Zayed Federal Postgraduate Medical Institute and Hospital, Lahore. One hundred pregnant women were selected by non-probability convenient sampling method. Subjects were divided into two groups of 50 each as per convenience. Patients of any gravidity at term from 37–41 weeks were included in the sample. Epidural analgesia was applied to group B and distilled water to group A at the lumber region and the progress of labour, mode of delivery and effects on Apgar scores of neonates were evaluated. Out of hundred patients, 77 had normal duration of second stage while 23 had prolonged second stage. Among them, 18 patients (36%) were in epidural group and 5 patients (10%) in non-epidural group, while 4 patients (8%) in epidural group developed intra-partum complications; whereas among non-epidural group had such complications. 65 patients had spontaneous vaginal delivery while 35 patients had instrumental delivery. Among them 29 patients (58%) were in epidural group while only 6 patients (12%) were in non-epidural group. Babies born had Apgar score 5/10 (21.8%), 6/10 (59.4%) and 7/10 (17.8%) at 1 minute and 8/10 (74.3%) and 9/10 (24.8%) at 5 minutes in both groups and none of them needed bag and mask resuscitation. **Conclusion:** Epidural analgesia does prolong the duration of second stage of labour and increases the instrumental delivery rate. Neonatal outcome is satisfactory while only a few intra-partum complications are found with epidural analgesia.

Keywords: Epidural analgesia, forceps, labour, parturition, Apgar score, Neonatal outcome

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INTRODUCTION

Labor is an intense and often painful experience, with as many as 30% of mothers finding it much more painful than expected.[1] Although various non-pharmacological methods of pain relief have been described including transcutaneous electrical nerve stimulation (TENS), hypnosis, acupuncture and training in a variety of relaxation techniques, many request pharmacological method of pain relief. Mothers, throughout history, have been given extracts of opium and hyoscine in an attempt to reduce suffering during prolonged, difficult labours but epidural analgesia which has gained popularity since early 1970's remains the most reliable technique for the relief of labour pain. The term epidural is used in reference to both analgesia(diminishment or total relief of pain) and anaesthesia (total absence of sensations) produced by injecting local anaesthetics and/or opioids (natural or synthetic narcotics) into epidural space surrounding the spinal column.[2]

The pain of labour is derived from visceral and somatic components. The visceral component which involves primarily the cervix and lower uterine segment, becomes active during the first stage of labour due to contractions causing cervical dilatation and effacement, transmitting pain impulses when stretched and distended. Pain of first stage of labour is referred to T10-L1 dermatomes. Somatic pain is derived from vagina, vulva and perineum, beginning late in first stage of labour, prior to complete cervical dilatation and is transmitted by pudendal nerve which communicates with sacral nerves S2, S3 and S4. These pathways can be blocked by epidural blockade.[3]

Pain contributes to exhaustion, and may produce long term emotional disturbances which may negatively influence the mother's relationship with her baby during first few crucial days[4]. Moreover it has detrimental cardiovascular, metabolic and endocrine effects predisposing to foetal hypoxia.[5] Lumbar epidural analgesia offers a safe and effective method of pain relief during labour. It is a versatile technique that may be extended to provide anaesthesia for operative delivery. The benefits of epidural analgesia include effective pain relief without appreciable motor block, reduction in maternal catecholamines and a mean to achieve rapid surgical anesthesia.[6] Epidural analgesia is now-a-days a popular method of pain relief but it may interfere

with normal mechanism of labour. Trials of delayed pushing have occurred about the association between epidural analgesia , instrumental deliveries and prolongation of second stage of labour, which is because of weak desire to push due to diminution of bearing down reflex and reduced uterine activity. Other maternal outcomes include second stage caesarean section, episiotomy, perineal injuries, maternal fever, partial block, post-dural puncture headache, urinary retention and hypotension. Neonatal outcomes include low Apgar score, need for positive pressure ventilation, birth trauma and admission to neonatal intensive care unit.[7–9]

The use of epidural analgesia has steadily increased in our country over the past few years. With more expertise our anaesthetists now judge the different technique of anaesthesia available to them for a particular patient. A number of factors may be involved in lower acceptance of this useful modality by our population, including social customs, lack of public awareness and lack of organized maternity services. This trend is likely to change positively in the days to come. There is a need of research in this part of the world to evaluate the outcome of labour with epidural analgesia to increase its acceptance in our population in terms of better pain relief and maternal satisfaction.[10,11]

MATERIAL AND METHODS

It was a quasi-experimental study carried out in the Department of Obstetrics and Gynaecology, Shaikh Zayed Federal Postgraduate Medical Institute and Hospital, Lahore. One hundred pregnant women were selected by non-probability convenient sampling method. Subjects were divided into two groups of 50 each as per convenience. This was a single blind placebo based study by giving subcutaneous injection of distilled water at the lumber region in group A and epidural analgesia to group B. Women of any gravidity at term (37-41weeks gestation), in spontaneous or induced labour, with singleton cephalic presentation with adequate pelvic dimensions as assessed by clinical pelvimetry and reactive cardiotocography (CTG) were included in study. Gestational age was confirmed by LMP and ultrasonography. Women with obstetrical complications like twin pregnancy, previous caesarean section and those where shortening of second stage was indicated because of relative cephalopelvic disproportion like short maternal stature and good size baby or maternal medical problems were excluded from study.

After informed consent the initial assessment of both groups including history and physical examination were done at the time of admission. Diagnosis of active stage of labour was made by observing good uterine contractions and cervical assessment. Maternal status in terms of stable vital signs (blood pressure, pulse, temperature) and foetal status in terms of satisfactory CTG were assessed.

Emergency tray containing airways, laryngoscope, endotrocheal tube, thiopenton sodium, diazepam and ephedrine was checked. For group B parturient, anaesthetist was called after an intravenous preload of 500cc of ringer's lactate in 20–30 minutes, each mother was turned to left lateral position and was asked to curl up to open up the intervertebral spaces.

Anaesthetist after a full scrub up, cleaned area from infra scapular region to natal cleft and laterally up till flanks with povidine iodine and area draped in sterile sheet with central hole at lumber region. The interspaces L4-L5 were chosen and underlying skin was infiltrated with 1% lidocaine. With 16 gauge Touhy needle, skin was pierced and needle was advanced through supraspinous, interspinous ligament till ligamentum flavum was reached, which had much firmer feel, stylet was removed. To identify epidural space, loss of resistance technique to inject air was used. With gentle bounces Touhy needle was inserted till epidural space was reached. Syringe was removed to see for efflux of blood and cerebrospinal fluid (CSF). Catheter was threaded down the needle into epidural space. Touhy needle was removed after measuring the depth of epidural space. Now filter was attached to the hub of catheter and sterile dressing applied at the site of puncture. Then 2cc of 0.25% bupivacaine, i.e., 10mg administered as test dose to confirm that duramater had not been punctured and to avoid extensive spinal anaesthesia. Maternal blood pressure (BP) was monitored 5 minutes later. In the absence of any untoward sensory or motor effect, a bolus injection of bupivacane 4cc in left lateral and right lateral position at 5 minutes interval administered as to initiate the block.

Parturients were kept in left lateral position with pillows at their back as to prevent aortocaval compression and were continuously attended.

Analgesia was maintained with conventional intermittent top ups which were administered on appraisal of pain at least at 1–2 hour interval. After initiation of block and following each top up maternal pulse and BP was monitored at 5 minutes interval for 30 minutes and then half hourly thereafter.

Complications were defined as hypotension (systolic BP less than 100mm Hg and diastolic BP less than 60mm Hg), unilateral block, unblocked segments, post-dural puncture headache, cardiac arrest etc. If analgesia was considered inadequate, anaesthetist was called to assess the block. Anaesthetist intervention was defined supplementary as dose of bupivicaine, resetting the catheter or withdrawal of catheter by anaesthetist.

In group A parturients, no epidural analgesia was given. In both groups, foetal heart rate was continuously monitored with external CTG. Progress of

labour was plotted on partogram. Duration, intensity and interval of uterine contractions were monitored with manual palpation as well as tocodyno-meter in CTG machine and if found to be ineffective with failure of cervical dilatation at the rate of at least 1cm/hr on 2 hourly vaginal examination, then according to the practice of our unit to manage labour actively, oxytocin infusion was started.

With continuous electronic foetal monitoring second stage was allowed up till one to two hours. In the case of persistent bradycardia or decelerations, intervention was done accordingly. In our unit facilities for foetal scalp pH assessments were not available at that time so we depended upon meconium stained liquor with abnormal foetal heart rate patterns to make the diagnosis of foetal distress. At the time of delivery neonatologist was called, and baby was evaluated in terms of Apgar scores and the need for bag and mask resuscitation.

The outcome in both groups like duration of second stage of labour, mode of delivery, intra-partum complications, neonatal Apgar scores at 1 minutes and 5 minutes and any need for bag and mask resuscitation were recorded. All above data was entered on a *pro forma* and was analysed using SPSS version 11. The variables analysed included demographics, prolonged second stage, mode of delivery etc.

For the comparisons of two groups regarding the outcome variables, Chi-square test was used. P value of equal to or less than 0.05 was taken as significant.

RESULTS

A total of 100 pregnant women fulfilling the inclusion criteria were included in this study. Most of the women were in age group 20–30 years (84%). The mean age of the patients was 26.21 years. All patients included were at term, i.e., 37–41 weeks of gestation with the mean gestational age 38.49 weeks. There were 51% primigravida and 49% multigravida in study groups.

Out of hundred, 77 patients had normal second stage which was less than 1 hour while 23 patients had prolonged second stage. Among them 16 (69.56%) were primigravida with duration of second stage of labour more than 2 hours while 7 (30.43%) were multigravida with second stage duration of more than 1 hour.

On comparison, 18 patients (36%) with prolonged second stage received epidural analgesia while 5 patients (10%) with prolonged second stage were in non-epidural group (Table-1).

Four patients out of 100 had intra-partum complications and all of them were in epidural group (8%) while no intra-partum complications were observed in non-epidural group.

Regarding mode of delivery, sixty-five patients out of hundred had spontaneous vaginal delivery with or without episiotomy and the rest delivered by instruments.

On comparison, only 21 patients in epidural group had spontaneous vaginal delivery with or without episiotomy (42%) while 44 patients in non-epidural group delivered by spontaneous vaginal route (88%). In epidural group 27 patients had forceps applied (either mid-cavity or outlet forceps) and 2 patients had ventouse applied due to malrotation while in non-epidural group only 4 patients had forceps and 2 had ventouse delivery (Table-2). On comparison 16% babies in epidural group and 28% babies in non-epidural group had Apgar score 5/10, 66% babies in epidural group and 54% babies in non-epidural group had Apgar score 6/10, 18% babies in epidural group and 18% babies in non-epidural group had Apgar score 7/10 at 1 minute (Table-3). Table-4 shows Apgar score after 5 minutes.

Table-1: Duration of second stage of labour between non-epidural and epidural groups

Duration of second stage of labour	Groups		Total
	Non-epidural	Epidural	
<1 hour	45 (90%)	32 (64%)	77
1 hour or >1 hour	2 (4%)	5 (10%)	7
2 hours or >2 hours	3 (6%)	13 (26%)	16
Total	50	50	100
p=0.008			

Table-2: Mode of delivery between non-epidural and epidural groups

Mode of delivery	**Groups**		**Total**
	Non-epidural	Epidural	
SVD with episiotomy	44 (88%)	21 (42%)	65
Forceps delivery	4 (8%)	27 (54%)	31
Ventouse delivery	2 (4%)	2 (4%)	4
Total	50	50	100
p<0.00			

Table-3: Apgar scores at 1 minute in non-epidural and epidural groups

Apgar scores at 1 minute	**Groups**		**Total**
	Non-epidural	Epidural	
5/10	14 (28%)	8 (16%)	22
6/10	27 (54%)	33 (66%)	60
7/10	9 (18%)	9 (18%)	18
Total	50	50	100
p=0.327			

Table-4: Apgar scores at 5 minutes in non-epidural and epidural groups

Apgar scores at 5 minutes	Groups		Total
	Non-epidural	Epidural	
8/10	36 (72%)	39 (78%)	75
9/10	14 (28%)	11 (22%)	25
Total	50	50	100
p=0.645			

DISCUSSION

Epidural analgesia has gained wide spread popularity in the last few decades. Not only there is accumulating evidence of greater efficacy and safety but the role of acceptance has expanded with

developments and improvements in the pharmacological armamentarium, equipment, monitoring and clinical management. In obstetrics, great concern prevail regarding the influence of epidural analgesia on obstetric mechanism, progress and outcome of labor.[12]

In our study, the criteria for prolonged second stage of labour (from full cervical dilatation till the delivery of baby) was 2 hours or more than 2 hours for primigravidas and 1 hour or more than 1 hour for multigravidas. Taking this into account 77% patients had normal duration of second stage of labour, i.e., <1 hour while 23% of patients had prolonged second stage. These results were very close to the study conducted in Shaikh Zayed Hospital in 1998 by Naz and Saeed[13] that reported the impact of epidural analgesia in eighty primigravidas. In their study, 86.25% patients had normal duration of labour while prolonged labour was encountered mainly in induction group in spite of oxytocin augmentation. In our study when comparison was made, it was found that 45 patients (90%) with normal second stage (<1 hour) were in non-epidural group while 32 patients (64%) with normal second stage were in epidural group and 36% of patients with prolonged second stage were in epidural group while only 10% patients with prolonged second stage were in non-epidural group (36% vs 10%, p=0.008). Another study conducted by Javed *et al*[8] reported normal duration of second stage (<1 hour) in 84% of control group and 30% of epidural group while prolonged second stage was observed in 16% of control group and 70% of epidural group (70% vs 16% p<0.05)

It is recommended to wait for 3 hours after full cervical dilatation for descent and spontaneous rotation of fetal head with satisfactory CTG, according to American College of Obstetrics and Gynaecology. But this needs more top ups which can enhance motor blockade with bupivacain, so intervention was decided after 1 hour for multigravidas and 2 hours for primigravidas and results had good neonatal outcome with this consideration. Similarly Thorp *et al*[14] in their retrospective observational study showed that women with epidural analgesia had a second stage of labor twice as long as that of women without epidural analgesia, but they used continuous 0.125% bupivacain infusion. Jan Zhang[15] described a quantitative review of four studies in which the duration of second stage of labour was increased to 63% with respect to women who did not receive epidural analgesia. Lyon *et al*[16] presented data from US Air Force Medical Corps describing fraction of labours with second stage lasting for >2 hours, which increased from 15% to 23% (p<0.05) due to epidural analgesia.

Epidural analgesia increases the incidence of instrumental delivery. Reported incidence of instrumental delivery varies between 10–56% in literature. This wide variation is due to the use of different local anaesthetic concentrations, combined regimens with opioids, ineffective maternal efforts and motor blockade of pelvic muscles. In our study, 64.4% patients delivered spontaneously while 34.6% had instrumental delivery (forceps or ventouse). This was consistent with the same analysis of Naz and Saeed[10] who reported spontaneous vaginal delivery rate of 57.50% and instrumental delivery rate of 32.50%. On comparison, 21 patients (42%) in epidural group and 44 patients (88%) in non-epidural group had spontaneous vaginal deliveries (42% vs 88%) while 29 patients (58%) in epidural group and 6 patients (12%) in non-epidural group had instrumental deliveries (58% vs 12% p=0.000). This is slightly higher to observation of Javed *et al*[8] who reported 40% instrumental delivery rate in epidural group and 10% in control group (40% vs 10% p<0.05). Although P value is statistically significant in both studies but in our study ten patients had forceps delivery due to foetal distress depicted by decelerations as monitored by CTG. Currently there is enough data to suggest that intra-partum foetal monitoring (CTG) has an effect towards more obstetrical interventions. Another study conducted by Zaidi *et al*[17] reported a very high rate of instrumental delivery (89%) because of prolonged second stage and 11% due to meconium stained liquor and persistent bradycardia. The association between epidural use and instrumental vaginal delivery is complex. It is difficult to distinguish whether epidural analgesia increases forceps use or obstetrician use forceps more liberally in patients who have epidural analgesia in place. All these potential sources of bias are difficult to measure because obstetric practice varies significantly among obstetricians and institutions.

Although epidural analgesia is an invasive technique but is relatively free of life threatening complications in experienced hands. In our study 4 patients (8%) had intra-partum complications in epidural group while the control group had no complication. Two patients had partial blocks. Chen *et al*[18] described 1.5–2.1% incidence of unilateral block/partial block caused by straying from the midline plane during insertion of epidural catheter. In our study, one patient developed hypotension (mean systolic BP of less than 90 mmHg) but did not need ephedrine administration and was corrected vigilantly with intravenous fluids. The reported incidence is 3–5% in literature[19]. Only one patient developed

intrapartum post-dural puncture headache which was later on managed by blood patch. This high percentage of intra-partum complications is probably due to anaesthesia expertise as senior anaesthetists were not available round the clock.

Regarding neonatal outcome, in our study, none of the two groups A and B had 1 minute Apgar scores superior to each other. Similarly at 5 minutes the Apgar scores in both groups had very similar results. None of the baby needed bag and mask resuscitation. Similarly no adverse effects were seen on Apgar score of neonates due to epidural block in study conducted by Naz and Saeed.[10] Another systemic review and meta-analysis showed no evidence of adverse neonatal outcome in terms of Apgar scores, resuscitation, umbilical artery pH, or perinatal death when delayed pushing and early pushing was compared in women with epidural analgesia. Data on almost 2000 infants contributed to this results.[20]

Epidural analgesia is useful in making the labour painless, safer and comfortable for both mothers and neonates. Regarding obstetric outcome, one should always remember that the course of labour is influenced by many factors like adequacy of pelvis, size of baby, and obstetric management apart from provision of analgesia. These variables should be critically evaluated while considering the effects of epidural analgesia on obstetric outcome and trained personnel should be available to provide maximum benefit with minimum complications.

CONCLUSION

Epidural analgesia provides excellent pain relief to patients in labour. It prolongs the duration of second stage of labor and increase instrumental delivery rate which is mostly due to malrotation, prolonged second stage and obstetrician practice style. Neonatal outcome is satisfactory and only few intra-partum complications are found with epidural analgesia.

REFERENCES

1. Waldenstrom U, Irestedt L. Obstetric pain relief and its association with rememberence of labor pain at two months and one year after birth. J Psychosom Obstet Gynaecol 2006;27:147–56.
2. Lawrence C, Tsen. Central neuraxial, analgesia, and anesthesia in obstetrics. In: James DK, Steer PJ, Weiner CP, Gonik B, editors. High-risk pregnancy 3rd ed. India: Elsevier; 2006; p.1473-98.
3. Sadeque N. Critical procedure; technique of providing epidural analgesia. Professional Med J 2005;12(1):105–9.
4. Henderson JJ, Dickinson JE, Evans SF, McDonald SJ, Paech MJ. Impact of intrapartum epidural analgesia on breast feeding duration. Aust NZ J Obstet Gynaecol 2003;43:372–7.
5. Halpern SH, Leighton BL. Misconceptions about neuraxial analgesia. Anesthesiol Clin N Am 2003;21(1):59–70.
6. Gupta S, Kumar AGS, Singhal H. Acute pain- labour analgesia. Indian J Anaesth 2006;50:363–9.
7. Sukhera AS, Ahmed S. Neonatal outcome: a comparison between epidural and general anesthesia for cesarean sections. Professional Med J 2006(1);13:72–8.
8. Javed L, Salick A, Faruqi JN. Epidural analgesia in labor in relation to the rate of instrumental deliveries. Ann King Edward Med Coll 2005;11:307–10.
9. Kuczkowski KM. Labor pain and its management with the combined spinal-epidural analgesia:what does an obstetrician need to know? Arch Gynecol Obstet 2007;275:183–5.
10. Minhas RM, Kamal R, Afshan G, Raheel H. Knowledge, attitude and practice of parturients regarding epidural analgesia for labor in a university hospital in Karachi. J Pak Med Assoc 2005;55:63–6.
11. Volmanen P, Valanne J, Alahuhta S. Breast feeding problems after epidural analgesia for labour: a retrospective cohort study of pain, obstetrical procedures and breast feeding practices. Int J Obstet Anesth 2004;13:25–9.
12. Gee H. Poor progress in labor. In: James DK, Steer PJ, Weiner CP, Gonik B, editors. High-risk pregnancy. 3rd ed. India: Elsevier, 2006; p.1426-42.
13. Naz F, Saeed M. Epidural analgesia and labour mechanism. Mother & Child 1998; 13(4):132–5.
14. Thorp JA, Hu DH, Albin RM, McNitt J, Meyer BA, Cohen GR, *et al*. The effect of intrapartum epidural analgesia on nulliparous labor: a randomized, controlled, prospective trial. Am J Obstet Gynecol 1993;169:851–8.
15. Jun Zhang, Klebanoff AM, Simonian DR. Epidural analgesia in association with duration of labor and mode of delivery: a quantitative review. Am J Obstet Gynecol 1999;180:970–7.
16. Lyon DS, Kunckles G, Whiteaker E, Salgado S. The effect of instituting an elective labor epidural program on the operative delivery rate. Am J Obstet Gynecol 1997;90:135–41.
17. Parveen S, Zaidi H, Khakwani M. Epidural analgesia in labor. Professional Med J 2006;13:396–402.
18. Chen SH, Chiueh HY, Hung CT, Tsai SC, Wong SY. Extensive sensory block caused by accidental subdural catherization during epidural labor analgesia. Chang Gung Med J 2006;29:607–11
19. Moschini V, Marra G, Dabrowska D. Complications of epidural and combined spinal–epidural analgesia in labour. Minerva Anestesiol 2006;72:47–58.
20. Menez-Orieux C, Linet T, Philippe HJ, Boog G. Delayed versus immediate pushing in the second stage of labor for nulliparous parturient with epidural analgesia: a meta-analysis of randomized trial. J Gynecol Obstet Biol Reprod (Paris) 2005;34:440–7.

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