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Original Research Article

Influence of Epidural Analgesia on Pain Relief, Progression of Labour and Neonatal Outcome: A Comparative Study

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Abstract

Introduction- Developed nations have shown an increase in the use of painless labour techniques with the most commonly use of epidural Ropivacaine with Fentanyl as an adjuvant. Several researches have showed minimal side effects & no increase in the incidence of cesarean sections .However, in developing nations the use of labour analgesia is minimal, claiming doubts on its efficacy and risks associated. Thus, this comparative study was undertaken to evaluate the influence of epidural analgesia on pain relief , progression of labour , neonatal outcome & overall patient satisfaction.

Material & Methods- 90 nulliparous parturients with established labour ,age 20-35 y, body weight < 80 kg, at least 36 completed wk. of gestation (confirmed by ultrasound), single fetus in vertex presentation, cervical dilatation > 4 cm were included in the study. Epidural group – Participants were administered 0.25% Ropivacaine and 50µg fentanyl (n=45), Control Group - Did not receive any anaesthesia(n=45). Both the groups were assessed for Duration of labour, Number of vaginal, instrumental vaginal delivery & caesarean sections , neonatal outcome, VAS Pain scores & overall patient satisfaction.

Result- Both the groups were comparable with respect to demographic variables. In epidural group, mean duration of first stage of labour was statistically significantly shorter as compared to control group ($p<0.05$). The Epidural group showed statistically significantly prolongation of second stage of labour ($p<0.05$). There was no statistically significantly difference in the number of vaginal deliveries, instrumental deliveries or C section in both the groups ($p >0.05$). No difference in APGAR scores were observed between groups.

Conclusion- Increased pain relief & patient satisfaction observed with no increase in incidences of instrumental vaginal delivery or cesarean section and similar neonatal outcomes observed with epidural analgesia. With advancements in technology, patient awareness & continued medical education the labour analgesia would prove to be a boon to alleviate the pain of delivery in developing nations.

Keywords: Epidural analgesia, Labour, Ropivacaine, Fentanyl

Introduction

One of the most severe pain is labour pain, an adequate pain control management should be established to alleviate this pain as much as possible. Clinicians have used varied anesthetic techniques from time to time, out of which epidural anaesthesia

have emerged out to be most preferred, frequently used and reliable one. Over 50% of hospital admitted pregnant females in developed countries have been administered epidural analgesia with efficacy. [1]

In India , the incidence of usage of analgesics in labour is 11% only. [2] This may be due to lack of awareness, patient education & financial constraints. On the part of medical professionals doubts on safety & efficacy, lack of proper training & medical education, heavy patient inflow may be reasons for not practicing labour analgesia in daily routine practices. [3]

Epidural analgesia is a relatively safe & effective technique. However, concerns have arised on its effect on the progression of labour, maternal & neonatal effects & patient satisfaction.The advantages of epidural analgesia include painless delivery, reduced stress, patient satisfaction , improved mental well being reduced risk of morbidity with improved neonatal [4]. Also there is balanced rate & amplitude of respiration, balanced acid base balance in both fetus & mother & decrease in blood pressure in preeclamptic patients. Several studies have shown Epidural analgesia to be associated with lower visual analog pain scores during both the first & labor stages. Maximized pain relief was noted with epidural analgesia. [5]

Contrast studies have claimed epidural anesthesia to result in maternal exhaustion , damage to pelvic floor & increased incidence of C sections [6] while others have claimed side effects of hypotension, bradycardia, pruritis, fever with shivers, backache, itching, urinary incontinence, dural puncture, post dural puncture headache. [7]

Thus this study was aimed to compare the influence of epidural anaesthesia on pain relief, progression of labour and neonatal outcome in nulliparous parturients with parturients not receiving any analgesia.

Methods

The study included 90 nulliparous parturients who were undergoing labour came to the maternity ward. The participants who agreed for epidural anaesthesia were enrolled in Group I. Group II included nulliparous parturients not receiving any analgesia. The study protocol explained to participants & attendants & written informed consent undertaken.

Nulliparous women , with age 21-35 y, body weight < 80 kg, at least 36 completed of gestation , established labour, single fetus in vertex presentation, cervical dilatation of equal / > 4 cm were included in the study. Exclusion criteria included the existence of medical complications like preeclampsia, eclampsia, diabetes, etc), any allergies to local anaesthetics / contraindications for epidural analgesia were excluded from study .

Groups

Epidural Group - Participants received 10 ml of ropivacaine 0.25% and 50µg fentanyl and maintained by using a continuous infusion of ropivacaine 0.1% with fentanyl 2µl/ml at a 10ml/hour rate (n=45)

Control Group – Participants did not receive any anesthesia (n=45)

Epidural group

A day prior complete pre anaesthetic evaluation was done .Ringer lactate was administered i.v. after 4 cm cervical dilatation was achieved. Patient was made to sit in upright position under complete aseptic precautions 18 G Tuohy needle using loss of resistance technique L3-L4 epidural space was identified .A test dose of 2ml 2% lignocaine administered into epidural space . This was followed by a bolus dose of 10 ml of ropivacaine 0.25% and 50µg fentanyl. Analgesia was maintained using a continuous infusion of ropivacaine 0.1% with fentanyl 2µl/ml at a 10ml/hr rate. Maternal vitals & sensory block levels were monitored throughout the

labour & postoperative period by trained anaesthetist.

Control group

No anaesthesia was given

Obstetric management

The obstetric management of all the patients was managed by experienced gynaecologist & trained hospital healthcare workers. Routine IV fluid administration & external electronic fetal heart rate monitoring was done continuously. To assess the progress of labour , pelvic examination was performed at regular intervals. According to maternal & fetal conditions, the decision of vaginal ,instrumental vaginal / C section delivery was performed.

Parameters Assessment

1.Duration of labour – Time duration of First & second stages of labour was undertaken

2. Number of caesarean sections and instrumental vaginal & vaginal delivery were recorded

3. Neonatal outcome – Assessed by using APGAR score at 5 min.

4. Pain scores- Visual analogue score were recorded

Results

Both the groups were comparable with respect to demographic variables. (Table 1)

Table I Demographic Variables

	Epidural Group	Control Group	P value
AGE (yr)	26.76±4.09	25.65±3.86	>0.05
WEIGHT (kg)	77.8±2.07	76.09±3.05	>0.05
HEIGHT (cm)	157±3.92	159±4.02	>0.05
GESTATIONAL WEEK	38±0.79	37.32±0.88	>0.05

In epidural group, mean duration of first stage of labour was statistically significantly shorter as compared to control group($p<0.05$). The Epidural group showed statistically significantly prolongation of second stage of labour ($p<0.05$). There was no statistically significantly difference in the no. of vaginal deliveries, instrumental deliveries or C section in both the groups($p >0.05$).No statistically significant differences were observed in APGAR scores of both the groups(Table II). The overall VAS scores were statistically significantly lower in epidural group ($p<0.05$). The pain relief & patient satisfaction were observed to be higher in Epidural group.

Table II: Labour Variables

	Epidural Group (mean ±SD)	Control Group(mean ±SD)	P value
Duration of 1st stage (hr)	4.05 ± 1.98	5.32 ± 1.32	<0.05
Duration of 2nd stage (min)	38.21±7.72	29.45±6.75	<0.05
Normal vaginal delivery (n, %)	35 (77.7%)	39 (86.6%)	>0.05
Instrumental delivery(n, %)	6 (13.33%)	4 (8.88%)	>0.05
Caesarean delivery (n, %)	4 (8.88%)	2 (4.44%)	>0.05
VAS Scores for pain	4.2±0.75	8.6±1.03	<0.05
Apgar score at 5 min (n, %)			
>7	41(91.11%)	42(93%)	>0.05
<7	4(8.8%)	3 (6.66%)	>0.05

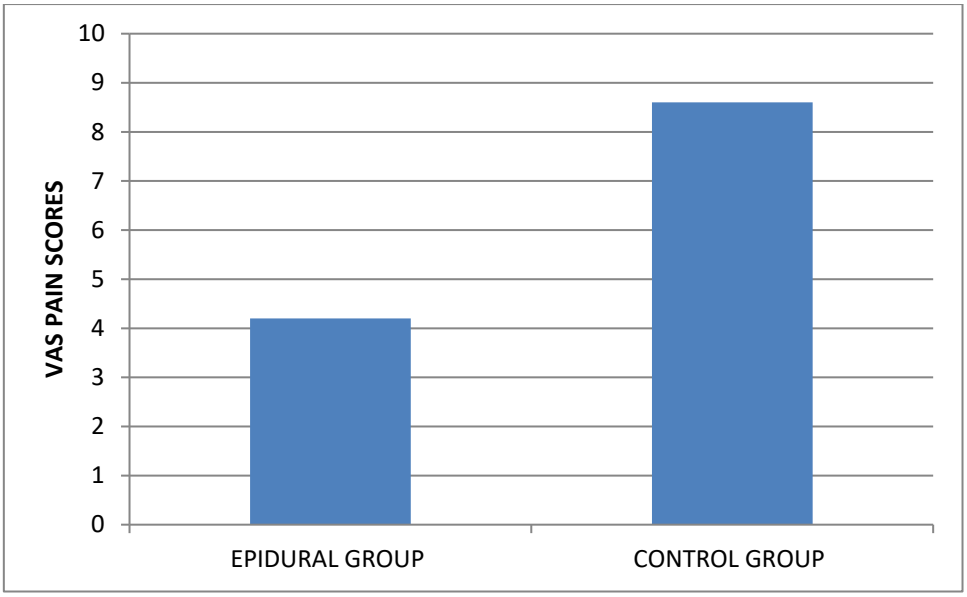

Figure1 Overall Pain Scores

Statistical analysis

The study data was tabulated & statistically analysed using SPSS version 22.0 for Windows (IBM Corp, India). Quantitative data are presented as mean ± SD . Intergroup comparisons were made using Student's paired *t*-test used to analyse inter f=group comparisons. P-value 0.05 at 90% confidence interval was considered to be statistically significant. Data was expressed as number n and %.

Discussion

Pain has been defined as An unpleasant sensory & emotional experience associated with or resembling that associated with,actual or potential tissue damage. [8] Greater sensory pain is experienced by nulliparous women in the first stage of labour, while second stage is more enhanced in multiparous women. Two components of labour pain are somatic & visceral. In the first stage of labour, uterine contraction & dilatation of cervix occurs. Small unmyelinated C fibres carry the pain impulses to the dorsal horn of spinal cord (T10-L1 segment). In the later stages of pain is carried away by myelinated thick Aδ fibres of the posterior cutaneous nerve to the nerve roots of S2 – S4 due to which a sharp somatic pain is felt in the perineum. [9]

The labour pain leads to the release of catecholamines which causes constriction of uterine blood vessels, compromising the fetal blood supply, oxygen & metabolic acidosis. Also prolongation of labour can cause injury to mother & child. Epidural analgesia is a proven safe & effective method to reduce labour pain & its side effects on sympathetic nervous system & respiration, due to reduction in catecholamines release. Therefore, suppression of labour pain should be advised to minimize the suffering of mother with minimal obstetrics & neonatal outcomes. [10]

In the present study, 0.25% Ropivacaine with 50 mcg fentanyl were administered to provide labour analgesia in labour group. 0.25% Ropivacaine is the second most common choice of local anesthetic used by Anaesthetics due to its lesser cardiac & neuro side effects. Fentanyl is the most common adjuvant used.

The present study observed lower VAS scores in epidural group as compared to control group ($p < 0.05$). Also higher patient satisfaction was noted. Also, Halpern et al concluded a much better pain relief and

patient satisfaction with epidural labor analgesia. [5]

The present study observed no statistically significant difference in the mean duration of first stage of labour between both the groups ($p>0.05$). The duration of second stage labour was found to be prolonged in epidural group ($p<0.05$).

Thoubourn et al explained the role of epidural analgesics in prolonging labour to its motor blocking ability with associated weakening of pelvic floor muscles due to which effective maternal pushing & involuntary bearing down reflex is affected. [11] Perhaps Nafisi et al 2006 demonstrated reduced motor blockage when diluted anesthetics are used. [12] Schnider SM et al in contrast demonstrated accelerated labour progression resulting from reduced maternal catecholamines due to effective lumbar epidural analgesia. Thus the inhibitory effect of maternal catecholamines on uterine contractility is counteracted. [13]

Halpern et al concluded a longer second stage labor i.e. 14 minutes longer during epidural analgesia . Widely varying effects are reported for first stage labor length. Epidural labour group experiences frequent oxytocin augmentation . There is a possibility of lengthening of labour by altering the uterine sympathetic parasympathetic balance. [5] Kiselev M, 2001 stated slower cervical dilatation 0.4 cm /hr with epidural labor analgesia. [14]

Some direct & indirect problems can occur with labor prolongation as slow labour progression can become arrested & lead to operational delivery.

Alexander et al observed decreased uterine performance due to oxytocin augmentation in epidural group resulting in prolongation of both stages of labour. Also when epidural analgesia is used, modifications should be done in the management of first stage of labor. These influence to minimize the C sections rates in epidural labour analgesia. [15]

Anwar S et al 2015 observed prolongation of second stage of labour, increased rate of instrumental delivery, relatively better neonatal outcome with a few intra-partum complications in epidural labour analgesia group. [16]

The present study observed no statistically significant difference with respect to differences in incidence of vaginal delivery, instrumental delivery & C section($p>0.05$).

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Several randomized clinical trials (RCT) and impact studies concluded that the technique of analgesic does not influence the C section rate or instrumental vaginal delivery. Various RCT & meta analysis by Halpern et al [5], Zhang et al [17], Segal et al [18] noted no overall statistically significant increased C section delivery rates.

Accordingly, study by Agrawal D [19] also observed no statistically significant difference in the incidences of caesarean sections, instrumental and normal vaginal deliveries.

In Retrospective studies, such as by Lieberman et al involving data of 1,733 women, 57% women undergoing labour opted for epidural analgesia .Epidural analgesia group presented with more C section rates since the patients were short, heavy, with larger fetus presenting at greater gestational age, featl malpositioning, with lower cervical dilation, required more oxytocin augmentation & varied demographic differences . [7]

In contrast , Thorp etal 1993 [20], Zimmer et al 2000 [21], Liang et al [22] observed higher C section rates in partirutents receiving epidural analgesia. Studies by Liang et al [22], Bakhamees et al [23], Raja et al [24], Anim Somouh et al [25] have observed statistically significantly increased incidences of instrumental vaginal delivery with epidural analgesia as compared with systemic opioids. Instrumental vaginal deliveries have

declined with time reflecting improved epidural techniques & management of epidural labour.. [26]

In the present study, no statistically significant difference in APGAR scores were observed at 5 min in both the groups ($p>0.05$).The APGAR scores in epidural & control groups were >7 in 91.11% & 93% neonates respectively . Thus the neonatal outcomes scored well & were not influenced by epidural analgesia.

Halpern et al compared epidural analgesia with iv opiods in labour pain & observed no increased incidence of fetal heart rate abnormalities, severe asphyxia ,intrapartum meconium or early or 24 hour Neuroadaptive and Adaptive Capacity scores were observed. Also the neonates of the study participants (epidural group) had a less need for neonatal naloxone & lower rates of Apgar score < 7 at 1 minute and at 5 min . [5]

Leighton and Halpern 2002 noted better neonatal outcomes in epidural analgesia group & may be more dose dependent. [27]

Anwar S et al 2015 concluded that both epidural & control group did not observed any difference in Apgar scores at 1 min and 5 min. Neonates did not require bag /mask resuscitation. [16] Accordingly no adverse effects observed by Naz & Saeed. [28] In a systematic review & meta-analysis involving 2000 neonates by Menez-Orieux C comparing delayed & early pushing in patients with epidural analgesia no adverse neonatal outcome were noted . The parameters analysed were Apgar scores, umbilical artery pH resuscitation, perinatal death. [29,30]

Conclusion

Epidural analgesia with 0.25% Ropivacaine & 50mcg Fentanyl in nulliparous females undergoing labour resulted in increased patient satisfaction and lower pain scores. No differences in number of vaginal, instrumental vaginal delivery or C section were noted. There was prolongation of second stage labour & better neonatal outcomes were observed. With advancements in the technology Epidural analgesia is safer & most efficacious form of labour analgesia, its use does not hamper the progress of labour or neonatal outcome.

References

1. Camann, W.Pain relief during labor. Obstetric Anesthesia Digest 2005; 3: 115.
2. Pandya ST. labour analgesia : Recent advances. Indian J Anaesth. 2010;54:400-8
3. James JN, Prakash KS and Ponniah M. Awareness and attitudes towards labour pain and labour pain relief of urban women attending a private antenatal clinic in Chennai, India. Indian J Anaesth. 2012 Mar-Apr; 56(2): 195–198.
4. Robert, R. & Gaiser, R. R. Labor epidurals and outcome. Best Practice and Research. Clinical Anaesthesiology 2005;1:1.
5. Halpern SH, Abdallah FW. Effect of labor analgesia on labor outcome. Curr Opin Anaesthesiol 2010;23:317–322.
6. Mayberry, L. J., Clemmens, D., & De, A.Epidural analgesia side effects, co-interventions and care of women during childbirth: a systematic review. American Journal of Obstetrics and Gynecology 2002; 5: S81-S93.
7. Lieberman, E. Epidemiology of epidural analgesia and cesarean delivery. Clinical Obstetrics and Gynecology 2002;2:317-331.
8. Srinivasa N Raja et al. Pain. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises 2020 ;161(9):1976-1982.
9. Reena, Bandyopadhyay KH, Afzal M, Mishra AK, Paul A. Labor epidural analgesia: Past, present and future 2014;28(2):71-81
10. Anim-Somuah M, Smyth R, Howell C. Epidural versus non-epidural or no

analgesia in labour. Cochrane Database Syst Rev 2005;4:CD000331.
11. Thorburn J, Moir DD. Extradural analgesia: The influence of volume and concentration of bupivacaine on the mode of delivery, analgesic efficacy, and motor block. Br J naesth 1981;53:933-9.
12. Nafisi S. Effects of epidural lidocaine analgesia on labor and delivery: A randomized, prospective, controlled trial. BMC Anesthesiol 2006;6:15.
13. Schnider SM, Abboud TK, Artal R, Henriksen EH, Stefani SJ, Levinson G. Maternal catecholamines decrease during laborafter lumbar epidural anesthesia. A m J Obstet Gynecol 1983;147:13-5.
14. Kiselev M, Tornatore JM, Leighton BL, Halpern SH, Kjaer K,Fong J, et al. Latent phase cervical dilation is faster during epidural meperidine than during epidural bupivacaine labor analgesia in nulliparous, induced-labor patients [abstract].Anesthesiology 2001;(SOAP Suppl):3.
15. Alexander, J. M., Sharma, S. K., McIntire, D. D., & Leveno,K. J. Epidural analgesia lengthens the Friedman active phase of labor. Obstetrics and Gynecology 2002 1,46-50.
16. Anwar S, Anwar MW,Ayaz A, Danish N, Ahmad S. Effect of epidural analgesia on labor and its outcomes. J Ayub Med Coll Abbottabad 2015;27(1):146-150
17. Zhang M, Yang HX, Li HY, Shi HX, Qu Y. Influence of combined spinal-epidural analgesia and epidural analgesia on the progress of labour. Zhonghua Fu Chan Ke Za Zhi. 2005;40:365-68.
18. Segal, S., Blatman, R., Doble, M., & Datta, S. The influence of the obstetrician in the relationship between epidural analgesia and cesarean section for dystocia. Anesthesiology 1999;91: 90-96.
19. Agrawal D, Makhija B, Arora M, Haritwal A and Gurha P. J Clin Diagn Res. 2014; 8(10): OC03–OC06.
20. Thorp JA, Hu DH, Albin RM, et al. The effect of intrapartum epidural analgesia on nulliparous labour: a randomized, controlled, prospective trial. Am J Obstet Gynecol. 1993;169:851-58.
21. Zimmer EZ, Jakobi P, Itskovitz-Eldor J, et al. Adverse effects of epidural analgesia in labour. Eur J Obstet Gynecol Reprod Biol. 2000;89:153-57.
22. Liang CC. Does intrapartum epidural analgesia affect nulliparous labour and postpartum urinary incontinence? Chang GUNG Medical J. 2007;30:161-67.
23. Bakhamees H, Hegazy E. Does epidural increase the incidence of cesarean delivery or instrumental labour in Saudi populations? Middle East J Anesthesiol. 2007;19:693-704.
24. Raja KS, Tasleem H. Influence of epidural analgesia on frequency of instrumental delivery and duration of labour. Rewal Medical J. 2009;34:86-88.
25. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. Cochrane Database Syst Rev. 2011;CD000331.
26. Roberts CL, Algert CS, Douglas I, Tracy SK, Peat B. Trends in labour and birth inter-ventions among low-risk women in New South Wales. Aust NZ J Obstet Gynaecol. 2002;42:176-81.
27. I Gde Made Satya Wangsa, Wiradiputra, A. E. ., Putra , G. N. P. W. ., & Deker, M. . (2022). Talus Fracture in a 24-Year-Old Patient: A Case Report. Journal of Medical Research and Health Sciences,
28. 5(4), 1973–1979. https://doi.org/10.52845/JMRHS/2022-5-4-18
29. Leighton BL, Halpern SH. The effects of epidural analgesia on labor, maternal, and neonatal outcomes: a systematic review.Am J Obstet Gynecol 2002;186:S69 –77.

30. Naz F, Saeed M. Epidural analgesia and labour mechanism.Mother & Child 1998; 13(4):132–5.
31. 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 metaanalysis of randomized trial. J Gynecol Obstet Biol Reprod 2005;34:440–7.