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Research Article

The Effects of Early and Late Epidural Analgesia on Delivery Period and Labour Practice

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Abstract

Background: The purpose of this study was to search the effects of epidural analgesia applied on primiparous pregnant women in case of early and late cervical dilatation, on the phases of labour, interventional labour and the necessity for cesarean delivery, in comparison to the control group with no demand of labour analgesia.

Methods: Group I (n=25) was the early epidural analgesia (EEA) group, which the epidural analgesia began to be applied when cervical dilatation was 2-3 cm; Grup II (n=25) was regarded as the late epidural analgesia (LEA) group, which the epidural analgesia began to be applied when cervical dilatation was 4-5 cm. Grup III (n=25) was, on the other hand, the control group (C), that involved pregnant women who did not demand painless childbirth.

Results: In the evaluation of obstetrical data, it was stated that the first phase of labour is significantly shorter and the second phase is significantly longer in the groups we applied analgesia in comparison with the control group. However, this statistically significant extension of time in the second phase is within acceptable limits for second phase. We also stated that the epidural analgesia never increased interventional labour incidence, and the rate of necessity for cesarean delivery was not so much different from the control group.

Conclusion: We have concluded that it is unnecessary to delay the epidural analgesia application waiting for the cervical dilatation to proceed, in case that the labour pain comes up the VAS values (≥3).

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- Painless labour
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INTRODUCTION

Epidural analgesia is today the most preferred method in labour analgesia and the complication rate is very low as long as it is performed correctly [1-4].

The epidural analgesia applied in labour has positive impacts such as reducing the mother's stress by relieving labour pain, balancing breath rate and depth, keeping the maternal and fetal acid base equilibrium and the uteroplacental circulation, and enabling the blood pressure decrease in preeclampsia. Besides these physiological benefits, the patient's comfort and psychological convenience for not having excessive pain make the patient leave more contently [5,6].

Our study aimed at searching the phases of labour with epidural analgesia applied in case of early and late cervical dilatation in primipara mothers compared to the control group that does not demand labour analgesia; and the impacts on necessity for interventional labour and cesarean delivery.

MATERIAL AND METHODS

Our study was carried out on primipara cases demanding vaginal labour in Akdeniz University Medical Faculty Anesthesiology and Reanimation Department. Following the Faculty Ethics Committee approval, the patients were given information and consent forms, necessary explanations were made, and then verbal and written consents were taken from the patients.

75 primiparous pragnant women between ages 20 and 40, who were in their 36 to 42 gestational weeks and in vertex presentation, who had actively begun the labour practice, were in ASA I classification according to American Society of Anesthesiology criteria, whose estimated fetal weight was under 4000 grams and Visuel Analoque Scale (VAS) (0=No pain, 10=Excruciating pain) ≥ 3 were involved in the study. Cases with systemic diseases such as diabetes mellitus and hypertension, and who had contraindication for regional technic were not involved.

Cases involved in the study were separated into 3 equall groups. While Group I (n=25) was the early epidural analgesia (EEA) group, which the epidural analgesia began to be applied when cervical dilatation was 2-3 cm; Group II (n=25) was regarded as the late epidural analgesia (LEA) group, which the epidural analgesia began to be applied when cervical dilatation was 4-5 cm. Group III (n=25) was on the other hand, the control group (C), that involved pregnant women who did not demand painless childbirth.

All of the cases were applied for maternal monitorization noninvasive Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Maternal Heart Rate (MHR), Peripheric Oxygen Saturation (SpO_2) (Kontron Instruments minimon 7137 plus), Fetal Heart Rate (FHR) and monitorization for contraction frequency (Hewlett Packard series 50 XM). 500 cc % 0.9 isotonic solution iv was infused to the ones who were to be applied epidural analgesia, before the application of analgesia. The patients were positioned on their left sides, the 18 Gauge Touhy injection (Portex) was given through the intervals L_{3-4} or L_{4-5} and the epidural space was detected by loss of resistance method. Afterwards, the 20 Gauge epidural catheter was given into the epidural space and fixed to remain in 3 cm epidural space. Two-steps test dosage was applied in order to test the placement of epidural catheter: On the first step the aim was to test the spinal location by applying 2 mL (40 mg) of lidocaine through epidural catheter. On the second step 5 mL (100 mg) of lidocaine was infused through the catheter in order to eliminate the iv location of catheter, and the patients were evaluated in terms of neurotoxicity symptoms.

The drug solution to be used in the study was prepared with 0.1 % levobupivacaine + 2mcg/ml fentanyl. The pregnant women were informed about PCEA device. PCEA device was programmed so as to make the basale infusion speed 6 ml/h, bolus dose 6 ml, and the lock-out time 10 minutes, and then drug was given through epidural catheter. The VAS scale of the cases was aimed to be under 3 in 30 minutes. In case of inadequate analgesia, an additional 5ml 0.25 % levobupivacaine injection through the epidural catheter was planned. All the cases were infused 5 U oxytocin in 250 ml 5% of Dextrose during the labour process.

SBP, DBP, MHR, FHR and VAS values of all cases were recorded before the analgesia and then every 5 minutes in the first half an hour after the analgesia, every 15 minutes in the second half an hour, and then hourly. The levels of sensorial block (warm-cold test) and motor block (Bromage Scale) were periodically monitored during the process. Periods of the labour phases (1^{st} stage: time between the beginning of contractions with 2-3 minutes frequency and complete cervical dilatation, 2^{nd} stage: time between complete cervical dilatation and delivery), necessity for interventional labour such as vacuum and forceps, and cesarean delivery incidence were evaluated. The bolus dose and total drug amount demanded by the patient during analgesia and also sent by the device were recorded.

The occasion that there was a 20% or more decline in blood pressure compared to the values before analgesia, or a decline in systolic blood pressure below 90 mmHg was assessed as hypotension; the occasions that the heart rate was under 50 beats/min was assessed bradycardia, and that the SpO_2 values decreased below 93 % was assessed respiratory depression. Besides, patients were observed in terms of nausea-vomitting, sedation, shivering, urinary retention and itching.

Statistical Package for Social Sciences (SPSS) for Windows 15.0 program was used for statistical analyses when assessing the findings obtained in the study. Complementary tests were applied for all values at the beginning. Single direction variance analysis or the Kruskal- Wallis analysis was used for comparison between groups. For comparison inside the groups, the difference between pairs test or the Wilcoxon test was used. For cesarean delivery range the Chi-Square test was applied and the Mann-Whitney U test was also applied for both groups. The results were acknowledged $p<0.05$ statistically significant.

RESULTS

No statistically significant differences were detected between groups in evaluation of demographical data concerning the cases such as age, height, weight and gestational age (Table 1) ($p>0.05$).

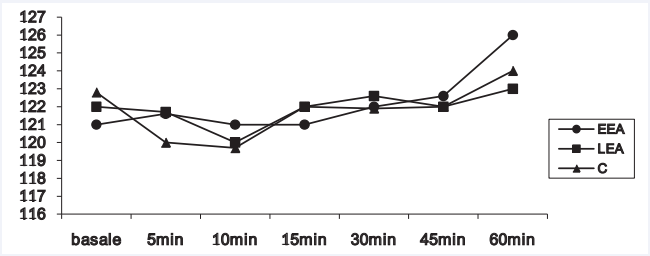
No statistically significant differences were detected between both the analgesia groups and the control group in the evaluation of hemodynamical data regarding the SBP, DBP, MHR, FHR. ($p>0,05$) (Graphs 1,2,3).

None of the cases in the analgesia group were observed to develop motor blockade; the desired sense blockade level (T_8–T_{10}) was attained in the first 30 minutes.

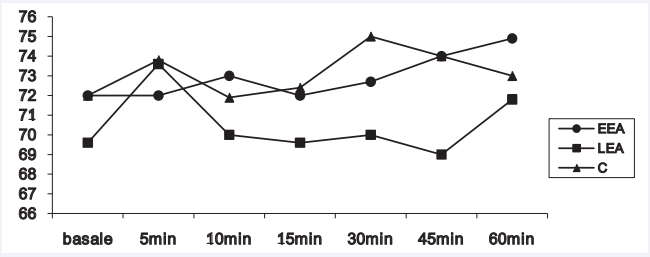
In the evaluation of obstetrical data (Table 2), when comparing the stages of the labour, it was detected that the first stage shortened in Group I (EEA), which was applied analgesia early, compared to Group III (C) which did not demand painless labour. However this difference was not statistically significant ($p>0,05$). It was also detected that in Group II (LEA), which was applied epidural analgesia lately, the first stage of labour was shorter than that of Group III (C), which was statistically significant ($p=0,01$). Group III (C), which was not applied epidural analgesia, was observed to have the longest first stage. When comparing the first stages of labour phases between early and late epidural analgesia groups, Group II(LEA) was detected to have it significantly short ($p=0,04$). In Group III (C) which did not demand painless labour, the second stage of the labour was significantly short comparing to Group I (EAA) and Group II (LEA) ($p<0.05$). No statistically significant differences were

Table 1: Demographical data (mean±SD).

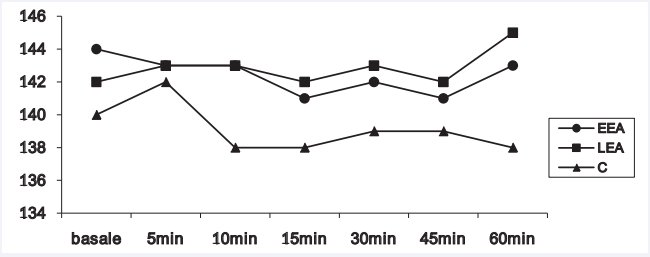
	Group I (EEA) (n=25)	GroupII(LEA) (n=25)	Group III (C) (n=25)
Age (years)	26.5±3.9	26±4.2	28.5±2.9
Height (cm)	163.6±5.3	162.3±5.5	162.9±4.1
Weight (kg)	75.2±9.7	73.3±9.9	78.7±7.5
Gestational age (weeks)	39.0±1.2	37.9±2.1	38.7±0.9
Basal cervical dilatation (cm)	2.6±0.50	4.4±0.57	4.5±1.32
Basal effacement (%)	60±15.27	70±8.10	70±12.40
Rupture of membranes	60 %	68 %	72 %



Graph 1 SBP differences among the groups.



Graph 2 DBP differences among the groups.



Graph 3 FHR differences among the groups.

Table 2: Durations of labour stages (mean±SD).

	Grup I (EEA) (n=25)	GrupII (LEA) (n=25)	Grup III (C) (n=25)
Phase 1 (min.)	18583.5	125±87.4*	207 ± 144.7
Phase 2 (min.)	21.867.5	24.4±10.4**	17.4 ± 4.2

(*) p<0.05: Difference between Group II (LEA) and Group III (C), Group II (LEA) and Group I (EEA)
(**) p<0.05. Difference between Group II (LEA) and Group III (C), Group I (EEA) and Group III (C)

detected when comparing the second stage of labour between early and late epidural analgesia groups (p>0.05).

In the evaluation of pain scores (Graph 4), significant decline was observed in the first 30 minutes in VAS scores regarding the basal values in the analgesia groups (p<0.05). There were no statistical differences between cases in Group I (EEA) and Group II (LEA) regarding VAS values (p>0.05).

In comparison between the drug amounts (Table 3), the dosage demanded by the patients in Group I (EEA) and the total drug amounts were stated to be statistically significantly more than Group II(LEA) (p<0.05).

Any of the cases in three groups did not need interventional labour with vacuum or forceps. In Group I (EEA), 3 cases of 25 (12 %) were applied cesarean section by an obstetrical indication because of stagnant travail (no progression in cervical dilatation for 2 hours) or fetal bradycardia. In Group II (LEA), on the other hand, cesarean necessity didn't arise in any of the cases. In Group III (C), which was not applied labour analgesia, only 1 case of 25 (4%), was practiced cesarean delivery because of stagnant travail.

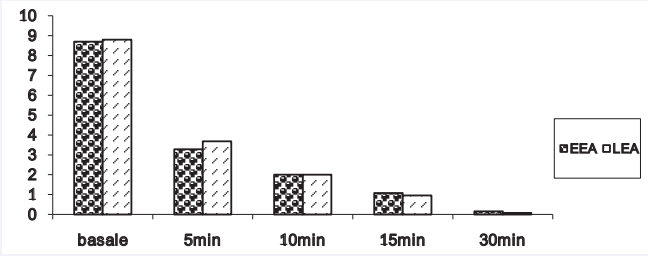
None of the cases given epidural analgesia had problems such as hypotension, bradycardia, respiratory depression, sedation, itching, nausea-vomiting and urinary retention.

DISCUSSION

Epidural analgesia technic is today the best accepted method of labour analgesia, because it can relief the pain during the labourl and also enables the mother to get involved in birth process both physically and emotionally [7-9].

In this study where we searched the effect of epidural analgesia on labour phases, it was stated that in the groups we applied analgesia the first phase of labour was significantly shorter, and the second phase was significantly longer in comparison to the control group. However, this statistically significant extension of time in the second phase is within acceptable limits for second phase. We also stated that the epidural analgesia never increased interventional labour incidence, and the rate of necessity for cesarean delivery was not so much different from the control group. There were again no significant differences between analgesia groups and the control group regarding maternal hemodynamic data and FHR changes.

Publications about the effects of epidural analgesia on the phases of labour travail are controversial [10-13]. There are also studies reporting that it does not affect the duration of travail [14-17].



Graph 4 VAS values in analgesia groups.

Table 3: The drug amounts (Average + SD*).

	Grup I (EEA) (n=25)	Grup II (LEA) (n=25)
Delivery dosage	8.05±4.2*	4.45±2.4
Demand dosage	32.47±29.51*	12.04±7.62
Total dosage	63.67±21.29*	35.90±16.72

(*) p<0.05

In the meta-analysis carried out by Halpern and his colleagues [18], 2369 patients were examined and it was stated that the first and second phases of travail were significantly longer. There are similar studies supporting this finding [19-22].

Leighton and his colleagues [12], on the other hand, stated that there were no changes in the first phase of labour, while the second phase was longer. Results of the study carried out by Gomer and his colleagues [19] also support this. On the contrary of all these findings, Lurie and his colleagues [17] detected that the first and second phases got shorter.

Genc M and colleagues [23] informed that starting epidural analgesia application during the active phase of the first stage of labour may shorten the duration of the first stage compared with the group of nulliparous women not undergoing epidural analgesia.

There are also a number of studies that claim the early application of epidural analgesia makes the first phase of travail evidently longer [24,25]. In our study, we observed that the first phase was longer in the group which was applied early epidural analgesia in comparison to the late epidural analgesia group, but this duration was shorter than that of the control group with no analgesia.

Wong CA and his colleagues concluded that the early epidural analgesia did not increase cesarean delivery rate, but it shortened the period of delivery and provided better analgesia [26,27]. Wang *et al.,* informed that epidural analgesia in the latent phase of labor at cervical dilation of 1.0 cm or more did not prolong the progression of labor and did not increase the rate of cesarean in nulliparous women compared with the delayed analgesia at the cervical dilation of 4.0 cm or more [28].

Philips KC and Thomas TA carried out a study on 58 nulliparous women about the effect of epidural analgesia on the second phase of labour, and they could not find a difference on progression of labour [29]. On the other hand, Chesnut DH and his colleagues found out that it extended the second phase of nulliparous woman's labour, and also increased the rate of interventional vaginal delivery [30]. Thorp and his colleagues reported that epidural analgesia extended the second phase prominently, but it did not increase cesarean incidences [24].

The study of Luxman and his colleagues showed that the effect of early epidural block administration did not change the progresion of labour and interventional labour [31].

Chesnut DH and his colleagues showed that the early administration of epidural analgesia did not prolong labor or increase the incidence of operative delivery in primaparous women who were on spontaneous travail or who got intravenous oxytocin [32,33]. Ohel and his colleagues compared a group with 3 cm or less cervical dilatation to another with dilatation more than 3 cm with epidural analgesia. They could not detect a difference between these two groups regarding interventional labour rates [34].

For our epidural analgesia method which we applied both in early and late periods, the cesarean incidence rate was similar to the control group with no analgesia application. While no cesarean delivery was performed in the group which was applied epidural in the late period, one case needed cesarean delivery in the control group with no analgesia.

In our study, cesarean rate in the early period analgesia group was 12%, while no cesarean delivery occurred in the late period analgesia group. However, the fact that there were 4% cesarean cases in the group with no analgesia makes us think that epidural doesn't affect cesarean incidence.

In their study carried out on 449 primiparous women, Ohel and his colleagues [35] performed epidural analgesia in the early (2.4 cm of cervical dilatation) and late (4.6 cm of cervical dilatation) phases. They stated that analgesia did not increase cesarean and interventional labour rate between these two groups, but it shortened the first phase of labour. We have also come to a similar conclusion in our study. In another study, however, it was stated that the epidural analgesia which was performed early (1 cm of cervical dilatation) increased cesarean delivery rate [36].

There are publications arguing that epidural analgesia increases, decreases and does not change the rate of interventional labour. While Halpern and his colleagues [18] submitted an interventional labour rate that increased 2.19 times, Zhang and his colleagues [36] submitted a rate that increased 4.72 times. There are many publications supporting this view [13,37]. On the other hand, as a result of a wide scale meta-analysis carried out by Leighton and his colleagues, it was stated that there wasn't any increase in interventional labour rate [12]. Some studies showed that epidural analgesia did not increase cesarean rate, but it could increase interventional labour rate [38-41]. There are also some publications expressing that it does not increase the risk of interventional labour [42,43]. None of the cases in our study needed interventional labour either.

Although there are some publications expressing epidural analgesia increases cesarean incidence, there has been a strong consensus in recent years arguing that in fact it does not [18,44-47].

Epidural anesthesia may increase interventional labour frequency by limiting the mother's movements and contentment, because there is a motor blockade potential during the travail. In order to minimize this effect, opioids are added to local anesthetics during epidural labour analgesia [48.49]. Interventional labour frequency arising from motor blockade can be connected to reduced muscle force and slacked midriff. Beilin and his colleagues [50] showed, as a result of their study, that levobupivacaine had less incidence of generating motor blockade. In our study, we used levobupivacaine at 0.1 % concentration combined with fentanyl. Thus, we increased the analgesic effectiveness while avoiding motor blockade arising from local anesthetics. None of the patients in our study had motor blockade. We obtained the desired quality of analgesia in all patients within the first 30 minutes.

At the end of our study, we have concluded that it is unnecessary to wait for the cervical dilatation to progress and delay the application of epidural analgesia in case that the labour pain comes up the VAS values (≥3).

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