

Comparing the Effect of Painless Labor Methods on the Duration of Active Phase of Labor

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Abstract

Background: Applying an appropriate method of analgesia in labor without alteration in its progression is of high importance. Previous literature did not provide much information about the effect of various kinds of anesthesia on the duration of active phase of labor.

Objectives: To assess the effect of painless labor methods on the duration of active phase of labor.

Patients and methods: 80 pregnant women referring to Najmieh hospital in 2013, with tendency to painless labor, were randomly selected for this analytical cross-sectional study using simple random sampling technique. After taking history and physical examination, cases were under observation of an obstetrician. After achieving a 4 cm cervical dilation, cases underwent analgesia by epidural, spinal or general anesthesia. Applying analgesia to complete dilation and complete dilatation to fetus delivery, time intervals were recorded by an obstetrician.

Results: Studied individuals had a mean age of 25.95 years. Type of applied analgesia for painless labor was epidural in 6 (7.5%) nulliparous cases, spinal in 58 (72.5%) cases and general anesthesia was applied in 16 (20%) individuals. There was no significant difference for analgesia to complete dilation time interval between analgesia methods ($P > 0.05$). Also, there was no significant difference between applied analgesia methods for complete dilation to fetus delivery time interval ($P > 0.05$). While, analgesia to fetus delivery time interval was significantly lower in general anesthesia method rather than epidural method ($P = 0.034$).

Conclusions: We found that analgesia-assisted labor shortens active phase and prolongs second stage of labor, it does not increase the risk of cesarean section as well.

Keywords: Epidural Analgesia, Spinal Analgesia, Labor, Active Phase

1. Background

Labor is defined as regular uterus constrictions which results in cervix dilation (1). Labor progression is divided into two separate stages based on cervix dilation. First stage includes two different phases: latent and active. The second stage starts with completion of cervix dilation and terminates in childbirth (1). Plenty of factors are involved in labor progression; pain feeling in mother, parity, fetal position, applied drugs or technics for anesthesia and analgesia. Over prescribing of drugs or early induction of anesthesia are delaying factors of labor progression.

Some previous studies have concluded that applying epidural anesthesia, as local anesthesia, neither increases the likelihood of cesarean nor the duration of active phase (2, 3) and some disagree (4, 5). Although predictability of anesthesia's effect on labor progression is higher after its activation, related references do not provide much information about the effect of various kinds of anesthesia on the duration of active phase of labor.

Achieving a low-cost method in labor with low complication rate as well as highest maternal satisfaction is of great importance. Regarding low complications of local anesthesia, its application in vaginal and cesarean delivery and also high compliance of patients, this method has higher superiority rather than the other methods.

It is recommended that pregnant women be informed about various and abundant complications of cesarean and also be encouraged for natural vaginal delivery (NVD). So the fear of severe and intolerable pains of NVD in different stages of labor should be reduced in association with no delays in labor progression (6). Painless labor seems to be an appropriate solution.

2. Objectives

To assess the effect of painless labor methods on the duration of active phase of natural vaginal delivery in pregnant women, with tendency to painless labor, referring to Najmieh hospital in 2013.

3. Patients and Methods

This Analytical cross-sectional study was approved in ethics committee of Baqiyatallah university of medical sciences. After being informed of the process and signing an informed consent form, 80 pregnant women referring to Najmieh hospital in 2013, with tendency to painless labor, were randomly selected for this study using simple random sampling technique.

At first, a medical history was taken and all the cases underwent physical examination by gynecologist and then they were under observation of an obstetrician. All the cases reached a 4 centimeter cervical dilation, which is the indicator of active phase inception; therefore, there were no contraindications for anesthesia.

Regarding the possibility of application of all three methods of analgesia and anesthesia (epidural, spinal and general) in our hospital, each method was applied according to the patients' condition. Epidural and spinal methods were used in cases with a cervical dilation of 4 cm, while general anesthesia was used in cases with higher ranges of cervical dilation when there was not enough time for application of other two methods. We used identical drug protocols for all the cases based on the selected method.

In epidural method, after making patient in sitting position and sterilizing selected site, 3 milliliters of lidocaine 1% solution was injected into the L3-L4 level for local analgesia. Then 18 gauge Tuohy needle was used to inject 15 milliliters of Bupivacaine 0.125 % solution in to the epidural space within 15 minutes. Then, epidural catheter was fixed for patients and they underwent continuous injection of 15 mL Bupivacaine 0.0625% per hour. In spinal method the patient was in lateral or sitting position and 2 mL of Bupivacaine 0.125% was injected into L3-L4 or L4-L5 levels using 25-gauge Double Quincke spinal needle. Spinal analgesia was injected with single shot. General anesthesia was applied in second stage of labor using 50 % NO₂ inhalants by mouthpiece mask and analgesics for decreasing anxiety during labor. After taking drugs, patient's vital signs, fetus

blood pressure and heart rate were controlled by anesthesia technician every 2 and 5 minutes, respectively. Patients were under observation of an obstetrician and the duration of different phases, complete dilatation and delivery were recorded in a questionnaire.

Data were analyzed by statistical package for social sciences (SPSS) version 16 (SPSS Inc. Chicago, IL) for windows. Chi-square, t-test and ANOVA were used for analysis of data.

4. Results

The studied individuals had a mean age of 25.95 years which ranged from 17 to 44 years old. In primary examination prior to analgesia 59 (73.8%) cases had a cervical dilation less than 4 centimeters, while 21 (26.3%) cases had a dilation of 4 centimeters or more. Most (65%) of the cases were nulliparous and other parities had a lower prevalence.

History of abortion was positive in 10 (12.5%) cases and none of them had the history of preterm birth. Four cases (5%) had referred following bleeding and 19 cases (23.8%) following premature rupture of membranes (PROM). Only one (1.3%) studied individual had a history of painless labor using epidural analgesia. Two cases (2.6%) underwent cesarean due to lack of progression in labor and one (1.3%) case made us to use vacuum.

The time interval between applying analgesia to complete dilation had a mean of 55.37 minutes in nulliparous and 36.57 minutes in multiparous cases ($P = 0.006$). Time interval between complete dilatation to fetus delivery was 42.31 minutes in nulliparous and 25.93 minutes in multiparous cases ($P = 0.055$). Total time interval between applying analgesia and fetus delivery was 96.25 minutes in nulliparous and 61.25 minutes in multiparous cases ($P = 0.034$). Details are demonstrated in Table 1.

Studied individuals had a mean gestational age (GA) of 39.36 weeks. Analgesia to complete dilation, complete dilation to fetus delivery and analgesia to fetus delivery time intervals are demonstrated in Table 2 based on GA.

Table 1. Mean of Active Phases Time Intervals in Studied Individuals

Time Periods, min	Parity				P Value
	Nulliparous	One	Two	Four	
Analgesia to complete dilatation	55.37 ± 52.67	35.19 ± 15.18	25.83 ± 21.25	130 ± 98.23	.006
Complete dilatation to fetus delivery	42.31 ± 34.13	26.95 ± 12.25	25 ± 18.3	10 ± 3	.055
Applying analgesia to fetus delivery	95.28 ± 51.43	60.48 ± 49.27	50 ± 48.75	140 ± 71.25	.034

Table 2. Mean of Labor Time Intervals Based on Gestational Age

Time Periods, min	Gestational Age, wk			P Value
	40 (N = 76)	30 - 33 (N = 3)	16 (N = 1)	
Applying analgesia to complete dilatation	49.51 ± 41.64	41.67 ± 16.07	15	> .05
Complete dilatation to fetus delivery	36.6 ± 31.16	17.67 ± 21.93	70	> .05
Applying analgesia to fetus delivery	84.28 ± 52.4	59.33 ± 37.89	85	> .05

Table 3. Mean of Analgesia to Complete Dilatation, Complete Dilatation to Fetus Delivery and Analgesia to Fetus Delivery Time Intervals Based on Parity Frequency

Time Periods, min	Parity Frequency				
	One (N = 49)	Two (N = 19)	Three (N = 8)	Four (N = 2)	Five (N = 2)
Applying analgesia to complete dilatation	58.35 ± 41.45	68.29 ± 21.59	33.75 ± 23.71	25 ± 7	80 ± 70.71
Complete dilatation to fetus delivery	43.47 ± 35.12	27.68 ± 18.2	23.13 ± 17.3	5	37.5 ± 38.89
Applying analgesia to fetus delivery	99.24 ± 53.51	55 ± 24.57	53.13 ± 25.76	30 ± 7.07	117.5 ± 31.81

Cases had a mean parity frequency of 1.61. Minimum frequency was 1 for 49 (61.25%) cases and maximum was 5 for 2 (2.5%) cases. Analgesia to complete dilation, complete dilation to fetus delivery and analgesia to fetus delivery time intervals are demonstrated in Table 3 based on parity frequency.

Type of applied analgesia for painless labor was epidural in 6 (7.5%) nulliparous cases, spinal in 58 (72.5%) cases and general anesthesia was applied in 16 (20%) individuals. Mean of applying analgesia to complete dilation time interval was 60.83 minutes for epidural, 49.55 minutes for spinal and 41.5 minutes for general anesthesia group. This time interval was the least among general anesthesia group. There was no significant difference for applying analgesia to complete dilation time interval between analgesia methods ($P > 0.05$). Mean of complete dilatation to fetus delivery was 53.33 minutes in epidural, 37.71 minutes in spinal and 26.19 minutes in general anesthesia group. There was no significant difference between applied analgesia methods for complete dilation to fetus delivery time interval ($P > 0.05$). Applying analgesia to fetus delivery time interval took 120.38 minutes in epidural, 83.62 minutes in spinal and 68.31 minutes in general anesthesia group. This time interval was significantly lower in general anesthesia method in comparison with epidural method ($P = 0.034$).

5. Discussion

In the present study the mean duration of analgesia to complete cervical dilation showed that time interval (active phase) was 55.37 minutes in nulliparous and 36.57 in multiparous women which shows a decrease in both groups rather than regular labor (1). Active phase is estimated to take 4.90 hours in nulliparous and 2.20 hours in multiparous women in average (1).

In the present study, applying analgesia to complete cervical dilation (active phase) indicated that time interval is not significantly different between women with gestational age (GA) of 30 to 33 weeks and full-term gestational ages. However, it shows a decrease in duration in comparison with regular labor. Also no significant difference is seen between women with GA of 30 to 33 weeks and full-term gestational ages for duration of second stage of labor. Studied individuals showed a decrease in duration of second stage rather than regular labor, except 70-minute duration in one case with 16 weeks of GA which may be due to time of analgesia.

The second stage of labor, complete cervical dilation to fetus delivery, shows a decrease rather than regular

labor in both group (1). This time interval has decreased by higher frequency of previous labors; 26.95 minutes in multiparous women with single, 25 minutes in cases with two and 10 minutes in cases with three previous labors.

Mean duration of active phase and second stage of labor showed a decrease in cases with both full-term and preterm GA in comparison with regular labor, regardless of type of analgesia. Active phase time interval showed a slightly prolongation in cases with epidural analgesia which may be affected by GA and time of analgesia, while it was shorter in spinal analgesia and general anesthesia. Second stage of labor was slightly longer in epidural analgesia rather than regular labor in both nulliparous and multiparous cases, while it was shorter in nulliparous and longer in multiparous cases using spinal analgesia and general anesthesia in comparison with regular labor.

Active phase and second stage of labor had a mean of 120.83 minutes in epidural, 83.62 minutes in spinal and 68.31 minutes in general anesthesia groups. Applying analgesia to fetus delivery time interval was significantly shorter in general anesthesia group in comparison with epidural analgesia. Vacuum was used in one case with general anesthesia due to fetus delivery alteration and two cases with spinal analgesia underwent cesarean due to lack of progression in labor.

Simmons et al. in a review article, assessing the relative effects of combined spinal-epidural (CSE) technique versus epidural analgesia, concluded that there is no meaningful priority for CSE over epidural analgesia. They mentioned no significant difference in maternal satisfaction, ability to mobilize or rate of cesarean birth for CSE and epidural analgesia (7).

In another review article, evaluating effectiveness and safety of early versus late epidural analgesia, Sng et al. reported similar effects on all measured outcomes like time to birth, risk of instrumental delivery and cesarean section for both methods (8).

Assessing labor length in cases with and without epidural analgesia in a case-control study, Hasegawa et al. reported that epidural analgesia is more associated with slowly progressing labor and increased rate of instrumental delivery which causes adverse effects on neonatal outcomes (9).

Anim-Somuah et al. confirming convenient pain-relief effect of epidural analgesia, concluded that this method has no significant impact on the risk of cesarean section and long-term backache. However, it was associated with

increased risk of instrumental delivery, maternal hypotension and fever, oxytocin administration and longer second stage of labor (10).

Feng et al. concluded that applying CSE method, in either latent or active phase, has no effect on labor duration, postpartum hemorrhage and Apgar score of newborn. They also mentioned that labor analgesia will decrease the rate of cesarean and increase the use of oxytocin (11).

Cheng et al. evaluated the length of the second stage of labor with and without epidural analgesia and concluded that the 95th percentile duration is more than 2 hours longer in both nulliparous and multiparous women (12).

Agrawal et al. reported that epidural analgesia in nulliparous women shortens duration of first stage and prolongs duration of second stage of labor in comparison with parturients without analgesia. They also mentioned that epidural analgesia does not increase risk of instrumental or cesarean delivery (13). Alexander et al. reported that epidural analgesia increases the length of both first and second stage of labor (14). It seems that applicable methods of obstetrics are the main determining factors of cesarean operations rate (15).

It has also been reported that fear of childbirth prolongs the duration of labor (6). So using painless labor methods and consequent decreased fear in pregnant women may resolve this problem.

In conclusion, we found that analgesia-assisted labor shortens active phase and prolongs second stage of labor, it does not increase the risk of cesarean section as well. Also there is no significant difference between different analgesic methods for duration of applying analgesia to fetus delivery. Thus analgesia-assisted (painless) labor can decrease the pain of labor as well as various complications of cesarean with lower costs and medical facilities.

Further studies with a larger volume of cases are recommended for more accurately determining the effects of epidural analgesia on the different phases of labor.

Footnote

Authors' Contribution: Afsaneh Lalooei designed the study and helped in data acquisition; Razieh Hashemi helped in data collection and data analysis and manuscript drafting; Mohammad Hossein Khosravi analyzed the data and drafted the manuscript; All authors have read and approved the final version of manuscript.

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