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Prevalence of Cesarean Section and Analysis of Neonatal Apgar Score and the Mean Time of Second Phase of Labor in Pregnant Women

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ABSTRACT

Introduction: The labor pain is probably the most severe pain a mother experiences in her lifetime and is usually severe and prolonged in women with pregnancy, **Aim:** To evaluate the effects of labor epidural and spinal analgesia on the incidence of cesarean section in painless delivery. **Methods:** This randomized clinical trial was conducted on pregnant women aged 37-42 weeks of pregnancy. Female candidates for painless labor were divided into two groups: Epidural Analgesia (EA) and Spinal Analgesia (SA). Patients in the labor epidural group underwent analgesia using marcaine and fentanyl and after fully assuring the normal hemodynamic status of the mother and fetal hearth rate (FHR), labor spinal analgesia was used for other group. **Results:** The average age of mothers was 27.5 years, their mean gestational age was 39 weeks and their mean weight was determined to be 72 kg. Frequency of cesarean delivery in mothers was found as 12.9%. Significantly, the incidence of cesarean section in the labor epidural analgesia group was higher than the labor spinal analgesia group (P = 0.02). In addition, the mean second phase of delivery in the labor epidural analgesia group was significantly higher than the labor spinal analgesia group (P = 0.03). There was no significant in 1st and 5th min Apgar scores between groups in infants (8.6 and 9.6, respectively). **Conclusion:** Labor epidural analgesia and labor spinal analgesia result in a significant reduction in pain due to normal delivery. Due to the similarity of Apgar and arterial blood gas (ABG) in neonates, labor epidural analgesia may serve as an alternative in childbirth delivery.

Keywords: Painless delivery, Cesarean section, Natural delivery, Spinal and epidural analgesia.

1. INTRODUCTION

Labor pain is probably the most severe pain a mother experiences during her lifetime, and is usually more severe and longer than expected in primigravidas (1). According to evidence, the most painful pain experienced by human is labor pain (2). Childbirth is an important phenomenon in maternal life, and although this experience is the desire of every mother, it also raises maternal worries due to labor pain and possible risks (3). The American College of Obstetricians and Gynecologists (2002) have reiterated their position in a joint statement with the American Society of Anesthesiologists and has stated that the request for pain relief from the woman provides adequate medical indication for the use of pain relief methods. Between 1970 and 2007, the incidence of cesarean delivery in the United States ranged from 4.5% in all deliveries to 35%. One of the reasons for the increase in cesarean section is elective cesarean section due to personal desires. Although emergency cesarean delivery is associated with a 9-fold increase in vaginal delivery, even the delivery of elective cesarean section increases the risk of death by about 3-fold. The severity of labor complications in the United States has increased from 1999 to 2005. The major part of this increase was related to an increase in cesarean section. In the case of cesarean delivery, maternal morbidity is 2 times higher than vaginal delivery. The rate of re-admission in 30 days after delivery has been estimated for cesarean delivery to be 2 times more than vaginal delivery, 75% vs. 19 per 1,000 deliveries (4).

In Iran, especially in large cities, the rate of cesarean section has risen sharply and continues to rise. In many other countries, the situation is the same. Interestingly, in a community where people are demanding drug treatment, instead of accept-

ing small surgeries, they do not have such an opinion about cesarean section and sometimes urge to do so. While cesarean section is one of the great operations that is associated with great complications, sometimes it is very dangerous and rarely fatal. In painless delivery, goals such as decreasing the rate of cesarean section, increasing tendency to normal vaginal delivery, mental relaxation during delivery, reduction of morbidity due to cesarean section and difficult childbirth are followed. In this regard, painless delivery in our country can be a good alternative to unprofessional cesareans (5).

In recent years, several studies have been conducted on the effect of epidural anaesthesia on labor progression, labor length, and the time of different phases of labor, the incidence of cesarean section and the use of auxiliary devices. Some of these studies have shown that epidural analgesia increases the total delivery time and delivery phases (6-8). Some of these studies have shown that active phase of labor is shortened (9), and some have concluded that the duration of labor without pain was significantly different from that of vaginal delivery 10. Therefore, there is a controversy about the effect of epidural analgesia on the time of different stages of labor progression (6).

In many countries, epidural analgesia has been suggested to mothers as the best choice for relieving pain in normal vaginal delivery (11). In many countries, epidural analgesia has been suggested to mothers as the best choice for relieving pain in normal labor (11), but in Iran analgesia (Spinal / General)) has not been welcomed due to concerns about the effects of epidural anaesthesia on mother and fetus in comparison with other methods. Therefore, comparing the different phases of labor in different types of analgesic methods can help in identifying the real concern (5). Unfortunately, in the central province of Iran, painless labor is often done less because of the reluctance of specialized physicians to perform painless delivery. Because they suppose the duration of normal delivery increases with epidural analgesia. Another reason for this is the unwillingness of pregnant mothers to think incorrectly about the complications of epidural anaesthesia (e.g., back pain).

2. AIM

Therefore, our study compared the incidence of cesarean section in painless delivery following use of spinal and epidural analgesia. This study was designed to replace the epidural anaesthesia as an alternative to other anesthetic procedures for providing patient satisfaction from the reduction or elimination of labor pain as compared to spinal analgesia.

3. METHODS

The present study was approved by the Ethics Committee of Arak University of Medical Sciences (IRCT registration number: IRCT2017050920258N46 and Registration date: 2017-06-21).All procedures performed in accordance with the ethical standards of the 1964 Helsinki declaration. Written informed consent was obtained from all participants .

This study was a randomized clinical trial on all pregnant women aged 42-37 weeks of pregnancy (PG). Non-probability sampling was applied in the current study. All pregnant women who are candidates for painless labor with informed consent were considered as the study population. A total of 126 mothers nominated for painless delivery in Taleghani Hospital of Arak. The data collection tool was a questionnaire completed by gynecologist.

Inclusion criteria included all pregnant women who were referred to Taleghani Hospital in Arak for painless deliver, having informed consent, primigravid mothers, patients with American society of anesthesiologists classification (ASA) class I and II, 37- 42 weeks pregnancy, and singleton pregnancy

Exclusion criteria included second time pregnant mother or more time, sensitivity to local drugs and opiates, patients with failure of painless delivery. Patients with double or multiple pregnancies, III ≤ ASA, patients with psychiatric disorders such as depression, anxiety, etc., patients with gastrointestinal disorders, patients with sleep disorders associated with premenstrual syndrome, and any use of sedative and hypnotic or soporific drugs.

Regarding the type of study, female candidates for painless delivery were divided randomly into two equal groups of epidural and Spinal analgesia using a randomized cube method. Patients without any underlying illness were randomly divided into two groups of epidural and spinal analgesia using randomized Q ball methods. The first group consisted of patients who were placed on an empty bed, in a dilation of 5 to 4 cm after proper intravenous (IV) line fixation and complete monitoring (Non-Invasive Blood Pressure (NIBP), pulse rate (PR), respiratory rate (RR), peripheral oxigen saturation (SPO2)) and normal fetal hearth rate (FHR). Patients underwent epidural block in sitting position from L4-L5 or L3-L4 space using epidural needles of G20 size and B Brown markers. The patients were under epidural analgesia using Marcaine 0.625 and FV50 with a total volume of 10 cc, then, after ensuring that the needle is properly inserted and the injection of the drug, the catheter will be fixed for patients. In addition, the preserver dosage of drug consisted of 2 ml of 0.5% bupivacaine (Marcaine; Sensocain Spinal 0.5%®, Brooks, Karachi, Pakistan) 0.125%w/v Solution and 0.5 ml of fentanyl (Sublimaze;Fentra, Brooks, Karachi, Pakistan) 0.0002%, 5-10 cc/h, was injected through the catheter. After complete assurance of the normal hemodynamic status of the mother and FHR, mothers were placed in a sitting position and placed under the spinal anesthesia (SA) from the L3-L4 or L4-L5 intervertebral space using a 25 gauge needle. Furthermore, patients underwent SA, using a combination of 100-75 μg of fentanyl. After painless delivery, both groups in supine position received 3-5 cc / kg of crystalloid injection followed by complete maternal monitoring (Pr, Rr, NIBP, SPO2, FHR). Moreover, cervical dilation and uterine contraction were evaluated. Finally, a questionnaire was filled out for all patients by

whom the demographic and hemodynamic status was evaluated.

In addition, the incidence of cesarean section and Apgar score of the newborns was evaluated and the ABG parameters of the newborns were recorded in the questionnaire. The sample size is calculated as 124 using the following formula:

$$n = n = \frac{\left(Z_{1-\alpha/2} + Z_{1-\beta}\right)^2 (\delta_1 + \delta_2)^2}{(\mu_1 - \mu_2)^2} = 62 + 62 = 124$$

$Z_{1-\alpha/2} = 1.96$

$Z_{1-\beta} = 2.33$

$\delta_1 = 1.1$

$\delta_2 = 1.46$

$\mu_1 = 2.63$

$\mu_2 = 1.22$

Data analysis

Data was analyzed using SPSS 19 software. The difference between the incidence of cesarean section in two groups and the Apgar score of the newborns' mothers and their ABG parameters in newborns was assessed using T-test, ANOVA and $\chi 2$ tests. The variables were considered significant at $P < 0.05$.

4. RESULTS

The average age of mothers was determined as 27.5 years, their mean gestational age and mean weight were determined to be 39 weeks and 72 kg, respectively. There was no significant difference between the two groups in terms of maternal age, gestational age and maternal weight, and the frequency of cesarean section was 12.9% (Table 1 and 2).

Groups	Epidural group	Spinal group	P Value
Mother's age (Per year)	27.06±5.2	28.1±4.9	P = 0.3 Not significant
Gestational age (Per week)	38.92±1.5	38.95±1.3	P = 0.6 Not significant
Mother's weight (Kilograms)	71.4±11.1	73.1±10.6	P = 0.2 Not significant

Table 1. Comparison of mean age, gestational age and maternal weight of painless delivery in two groups of epidural and spinal analgesia

Groups	Normal delivery	Cesarean	Total
Numbers	108	16	124
Percent	87.1%	12.9%	100%

Table 2. Frequency of cesarean delivery in mothers as candidates for the painless delivery in two groups

There was a significant difference between the two groups in terms of the cesarean section, so that the incidence of cesarean section was significantly higher in the epidural group than the spinal group (P = 0.02; Table 3).

Groups	Epidural group	Spinal group	P value
outbreak percentage of cesarean	16.12%	9.6%	P=0.02 Significant

Table 3. Comparison of the incidence of cesarean section in mothers as candidates for the painless delivery in two groups of epidural and spinal analgesia

Our findings revealed that the incidence of nausea and vomiting in all of the mothers (in two groups) was 2.3%. There was no significant difference in the incidence of nausea and vomiting between the two groups, Nevertheless, the incidence of nausea and vomiting was found to be similar in two groups (P = 0.2). On the other hand, no significant difference was found between the two groups in terms of headache and dizziness in two groups, where the incidence of headache and dizziness was almost the same in the two groups (p = 0.3; Table 4 and 5).

Groups	Outbreak of nausea and vomiting	Non outbreak of nausea and vomiting	Total
Numbers	4	120	124
Percent	3.2%	96.8%	100%

Table 4. Frequency of nausea and vomiting in mothers as candidates for the painless delivery in two groups

Groups	Epidural group	Spinal group	P value
outbreak percentage of nausea and vomiting	3.2%	3.2%	P=0.2 Not significant

Table 5. Frequency of nausea and vomiting in mothers in the mothers candidate for the painless delivery

There was a significant difference between the two groups in terms of mean second phase of delivery. As a matter of fact, the mean of the second phase of delivery in the epidural group was significantly higher than the spinel group (P = 0.03; Table 6).

Groups	Epidural group	Spinal group	P value
The mean of the second phase (Minute)	191.4±32.2	138.6±48.2	P=0.03 Significant

Table 6. The mean of the second phase of delivery in mother's candidate for the painless deliveryin two groups of epidural and spinal analgesia

No significant difference was observed between the two groups in terms of mean of 1- and 5-min apgar scores, where both scores were approximately determined to be 6.8 and 9.6, respectively (Table 7).

Groups	Epidural group	Spinal group	P value
Average 1 minutes apgar	8.69±0.75	8.56±0.80	P=0.1 Not Significant
Average 5 minutes apgar	9.65±0.61	9.63±0.86	P=0.5 Not Significant

Table 7. Mean apgar score of neonates of mothers candidate for painless delivery in two groups

Both two groups did not show a significant difference in average ABG parameters of newborns. In addition, the average of ABG parameters was the same in both groups (Table 8).

Groups	Epidural group	Spinal group	P value
PH	7.31±0.08	7.31±0.07	P= 0.6 Not significant
PCO2 mmHg	36.34±3.9	36.36±8.9	P= 0.7 Not significant
HCO3 mEq/L	17.4±2.1	18.1±2.8	P= 0.3 Not significant
BE mEq/L	-7.1±2.2-	-7.3±1.7	P= 0.3 Not significant
PO2 mmHg	290.1±8.1	295±6.9	P= 0.7 Not significant

Table 8. Mean ABG Parameters of infant among mothers candidate for painless delivery in two groups

5. DISCUSSION

Achieving a suitable method for painless delivery is one of the most important goals for gynecologists and anesthesiologists. The labor pain is probably the most severe pain a mother experiences in her lifetime and is usually severe and prolonged in women with PG. The most important reason for maternal stress is the natural process of delivery (1, 2). Therefore, achieving preventive methods for this pain and reducing the complications of painless delivery has always been a concern for gynecologists and anesthesiologists (2, 3). In painless delivery, goals such as decreasing cesarean section, increasing tendency to normal delivery, mental psychological relaxation during the delivery stages and reduction of morbidity and mortality due to cesarean section are always followed (4, 5). In this study, we aimed to compare the incidence of cesarean section and neonatal Apgar score and to assess ABG parameters in two methods of spinal and epidural analgesia in mothers candidate for painless delivery.

The results of our study indicated that the average 1- and 5-min Apgar scores did not differ significantly between the two methods of painless delivery. Approximately, the ABG parameters were the same in the two groups.

The findings of the current study depicted similarities and differences with the results of previous studies. For example, in a study conducted by Djaković et al in 2012 on 3158 mothers who were candidates for delivery, they concluded that epidural analgesia was capable of increasing instrumental deliveries and the number of emergency caesarean sections. However, dystocia was not significantly increased in deliveries with epidural analgesia (P value <0.01) (12). The results of aforementioned study were consistent with our study, so that in our study, the incidence of caesarean section in epidural analgesia was significantly increased.

Okazaki and colleagues conducted a retrospective study to evaluate the effects of labor epidural analgesia on maternal and neonatal outcomes and found that the ABG parameters were not different between all groups (≥40 with labor epidural analgesia group; ≥40 without LEA group; <40 with LEA group) (13).

The PH and mean of PCO2 and HCO3 were the same in both groups. Also, the incidence of CS in the EA group increased compared to the control group (13). The results of mentioned study are in direct agreement with our study, because in our study, the incidence of caesarean section in the epidural analgesia group was higher than that of spinal analgesia. On the other hand, the ABG parameters obtained from umbilical cord of the newborns were the same in the two groups. Therefore, the results of both studies were consistent with each other.

A study conducted by Ismail et al in 2015 revealed that labor epidural had no effect on the incidence of cesarean section, but it markedly elevated the rate of assisted and painless delivery (14). The results of this study were not consistent with our study because our findings revealed that the incidence of cesarean section in the labor epidural analgesia increased compared to the labor spinal. The reason for the difference in the results of these two studies may be due to difference in the groups of both studies, where Ismail and colleagues evaluated labor epidural analgesia and control group (painless group), while labor epidural analgesia and the labor spinal analgesia were compared in the current study.

Another study by Yegane et al. found that the mean second stage of labor in patients with labor epidural analgesia was not significantly different from that of vaginal delivery without analgesia (15). In other words, epidural analgesia had no effect on the time of delivery phases. While we concluded in our study that the duration of the second phase of delivery in labor epidural analgesia is longer than labor spinal analgesia, the results of the study by Yegane et al., were not consistent with our findings. The reason for this difference is probably due to the difference in study groups because aforementioned study compared labor epidural analgesia with vaginal delivery without analgesia.

Talebi et al. showed that nitrous oxide 50% had a significant effect on labor pain. Despite the reduction in labor pain in the Entonox group, it significantly reduced the maternal SaO2 in the Entonx group compared to the control group. Moreover, no significant differences have been found in 1st and 5th min Apgar scores between groups (16). Meanwhile, based on the findings presented herein, maternal SaO2 was similar in the two groups, and there was no decrease in Pao2 and maternal SaO2.

Another study compares vaginal delivery in painless labor with epidural and spinal analgesia. The results of this study indicate that the mean second phase of delivery in the control group was not altered in comparison with the patients with painless labor, either by spinal analgesia or by epidural analgesia. Furthermore, in aforementioned study, painless delivery was not effective and the three groups did not show significant differences in the first phase of labor (17). It is worth noting that the results of this study were not consistent with our study, where our findings depicted that the first phase of labor increased in groups of analgesics, the reason for this difference may be due to the difference in the groups.

Another study showed that there was no significant difference between the three groups in terms of the first stage of labor. However, the mean duration of the second labor phase in the control group was longer than the other two groups, however, it has been found to be higher in the epidural group in comparison with the Entonox

group. However, there was no significant difference between the two groups in the epidural analgesia and spinal analgesia in terms of mean second phase of delivery. Also, no significant differences have been found in 1st and 5th min Apgar scores between groups (18).

The results of this study were not consistent with our study, because we found that the mean second phase of delivery in the labor epidural analgesia was longer than labor spinal analgesia. However, neonatal outcomes were not different in both studies in terms of 1st and 5th min Apgar scores, and no significant difference was observed between the groups. The results of our study in general indicate that all of the two epidural and spinal analgesia methods lead to an appropriate analgesia for candidates of vaginal delivery. This analgesia is capable of reducing the complications of normal delivery and makes it easier and more rational for mothers to tolerate normal delivery.

In the current study, it was clearly seen that the second phase of labor was increased in the labor epidural analgesia group, and the incidence of cesarean section was also higher in the labor epidural analgesia group than in the labor spinal analgesia. Many previous studies also emphasized the increase in the mean of the second phase of labor. However, the increase in the rate of cesarean in the epidural analgesia group was opposed to the results of many previous studies. In a limited number of studies, the increase in cesarean section rates has been reported by applying labor epidural analgesia, therefore, this result contradicts with many published studies.

The most important limitation of the present study, it is that we did not consider the patients with psychiatric, gastrointestinal and sleep disorders and any use of sedative and hypnotic or soporific drugs.

6. CONCLUSION

Both epidural and spinal analgesia result in a significant reduction in the pain associated with normal delivery. Given the similarity of Apgar score and ABG parameters in neonates, epidural analgesia can be used as an alternative in childbirth delivery.

- **Declaration of patient consent**: The authors certify that they have obtained all appropriate patient consent forms
- **Author's contribution**: Each author gave substantial contribution to the conception or design of the work and in the acquisition, analysis and interpretation of data for the work. Each author had role in drafting the work and revising it critically for important intellectual content. Each author gave final approval of the version to be published and they agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
- **Conflict of interest**: There are no conflicts of interest
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REFERENCES

1. Koridze SH, Kintraia N, Machavariani P. Cesarian section - Higher Rate and Higher Challenges. Georgian Med News. 2015;(246): 13-17.
2. Kabiri D, Masarwy R, Schachter-Safrai N, et al. Trial of labor after cesarean delivery in twin gestations: Systematic review and meta-analysis. Am J Obstet Gynecol. 2018. pii: S0002-9378(18)31147-5.
3. Sharma M, Dhungel S, Niroula S, Karki M. Knowledge and Acceptance of Labour Analgesia in Pregnant Women. J Nepal Health Res Counc. 2018; 16(3): 302-306.
4. Conningham F, Leveno K, Bloom S, et al. Williams Obstetrics, 23rd Edition.
5. Zakerihamidi M, Latifnejad Roudsari R, et al. Vaginal Delivery vs. Cesarean Section: A Focused Ethnographic Study of Women's Perceptions in The North of Iran. Int J Community Based Nurs Midwifery. 2015; 3(1): 39-50.
6. Ronald D. Millers. Millers Anesthesia. 2010; 7 Edition.
7. Lolaei A, Teymori M, Javadipour M. Comparison of different methods of analgesia in delivery on the labor factors in Najmieh Hospital of Tehran. J Med Council Iran. 2011; 29(1): 38-42.
8. Rohr bach A, Viehweg B, Kuhnert S, Koster A, Konig F. Effect of peridaral analgesia on labor progress. Anaesthesia Reanim, 2001; 26(2): 39-43.
9. Diskinsom JE, Peach MJ, MC Donald SJ, Evans SF. The impeat of intrapartum analgesia on labor and delivery outcome in nulliparous women. Aust N Z J Obstet Gynaecol. 2002; 42(1): 59-66.
10. Howell GJ. Epidural versus non-epidural analgesia for pain relief in labor. Cochrane Database Syst Rev. 2000;(2):CD000331.
11. Alakeely MH, Almutari AK, Alhekail GA, et al. The effect of epidural education on Primigravid Women's decision to request epidural analgesia: a cross-sectional study. BMC Pregnancy Childbirth. 2018; 18(1): 124.
12. Djaković I, Sabolović Rudman S, Košec V. Effect of epidural analgesia on mode of delivery. Wien Med Wochenschr. 2017; 167(15): 390-394.
13. Okazaki A, Fukushima R, Nagashima S, et al. Outcomes of labor epidural analgesia among women aged over 40: A single-institution retrospective study. J Obstet Gynaecol Res. 2016; 42(12): 1712-1718.
14. Ismail S, Chugtai S, Hussain A. Incidence of cesarean section and analysis of risk factors for failed conversion of labor epidural to surgical anesthesia: A prospective, observational study in a tertiary care center. J Anaesthesiol Clin Pharmacol. 2015; 31(4): 535-541.
15. Yeganeh N. Study of effect of epidural analgesia on labor process. 2004: 6(1): 37-45.
16. Kamali A, Akbari S, Norouzi A, Shokrpour M. Comparison stage of vaginal delivery in painless labor with epidural & spinal analgesia. Comparison stage of vaginal delivery in painless labor. J Clin Anal Med 2018;9(1): 82-6.
17. Kamali A, Shokrpour M, Mashadi E, et al. Comparison of labor phases in painless delivery with epidural analgesia and entonox administration. Int J Life Sci Pharm Res2017;7(2):1-4.