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Investigation of the changes in fetal heart in the first hour of epidural or spinal anesthesia at the beginning of the active phase of labor and comparison of the fetal outcome with similar cases without anesthesia

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ABSTRACT

Background*: The aim of this study was to determine changes in fetal heart rate and fetus outcome in the first hour of the onset of local anesthesia at the beginning of the active phase of labor and comparison with similar cases without local anesthesia* ***Materials and Methods****: In this randomized clinical terial study, 99 healthy women with singleton term pregnancy requesting analgesia during active labor were divided into two groups: 54 women in case group(receive epidoral or spinal analgesia) and 45 women in control group(receive normal saline). Fetal heart rate and fetus outcome (apgar scores, weight and umbilical cord pH) were mesured after labor analgesia.* ***Results****: According to acquired data, no significant differences were found in underlying diseases (mellitus diabetes, hypertention, hypothyroidism, and hemoglobin level). The comparison of two groups showed that no significant differences were found in fetal heart rate patterns, Apgar scores and umbilical cord pH between groups. However, in case group, there was a nonsignificant increase in the incidence of abnormal fetal heart rate patterns (p> 0.05). These fetal heart rate changes did not affect neonatal outcome.* ***Conclusion:*** *The results of this study indicate that the use of both epidural and spinal anesthesia have no a significant effect on fetal heart rate. So, there is no concern for application of anesthesia for vaginal delivery.*

Keywords: *Viginal delivery, Umbilical cord pH, Apgar, Epidoral and spinal analgesia, Fetal heart rate*

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INTRODUCTION

Anually, more than 150 million women become pregnant in developing countries and most pregnancies lead to birth of a living baby from a healthy mother (1). But for some women, pregnancy and childbirth are associated with pain, suffering, fear, and even death; so that half a million pregnant women lose their lives due to pregnancy problems every year, and 50 million people have a serious problem. Among the stages of human reproduction, one of the most important stages is the delivery phase (2, 3). This stage and and its related disorders can have a profound effect on the health of the mother and baby. Childbirth is the mechanism by which the embryo and the placenta are pulled out of the womb. This action is done almost entirely by the uterine muscle activity. The goal of labor science is that each pregnancy ultimately ends in the presence of a healthy mother and baby. In order to achieve this ultimate goal, it is attempted to prevent even the deaths of mothers and infants who are affected by maternal and maternal complications (4). Identifying methods that can be effective in managing various stages of labor is a step toward achieving this great goal (5). Although natural or vaginal delivery is less preferred by mothers in recent periods compared with cesarean due to pain, but due to subsequent complications of cesarean section, it seems that appropriate strategies should be developed to encourage women to natural delivery. Vaginal delivery is the preferred method of delivery for most fetuses (6). In spontaneous vaginal delivery compared with delivery of cesarean, there is low risk for most maternal and neonatal morbidity. The maternal complications associated with childbirth such as infection, bleeding, anesthetic complications, and hysterectomy are lower in maternity. In women with cesarean delivery, the probability of delivery with cesarean section is much higher in pregnancies and the risk of thromboembolism, hysterectomy, hospitalization due to infection, wound complications, and increased risk of uterine

rupture or abdominal placental abnormalities in subsequent pregnancies is also much higher (7). The feeling of labor pain is a completely personal response. Labor begins without warning. Physiological responses of the mother to the labor force may affect the health of mother and fetus. Undesirable stress and anxiety lead to release of stress hormones such as cortisol and endotracheal endothelium, which may have an effect on the activity of the uterus (8). A request for labor relief from the mother is an adequate medical indication for the use of analgesic methods. Apgar score is used to describe the asphyxiation and predict the prolonged neurological outcomes. Various factors, such as fetal malformations, maternal prescriptions, and other factors, affect Apgar score (9). Due to the encouragement of natural delivery and the reduction of labor pain during epidural or spinal anesthesia, we found that fetal heart rate at the onset of epidural or spinal anesthesia is not always due to maternal hypotension, and there are other reasons. In order to prove this finding, we decided to study a pregnant woman for determination of changes in fetal heart rate and fetus outcome in the first hour of the onset of local anesthesia at the beginning of the active phase of labor and comparison with similar cases without local anesthesia.

Materials and Methods

This study is a randomized clinical trial study. The study population consisted of 120 pregnant women referring to the delivery room. In the normal case of CBC tests, the patient undergoes local anesthetic during the onset of the active phase of labor. After performing a vaginal examination and having a cervical dilatation of 5 cm, patients is located to local anesthesia in spite of monitoring the normal heart rate of the fetus.

In the spinal and epidural methods, hydration was carried out with 500-1000 ml of Ringer's lactate solution. After the onset of anesthesia, the mother undergoes continuous monitoring of heart rate, blood pressure and oxygen saturation by the anesthetist during the entire period. At the onset of anesthesia, the patient undergoes continuous monitoring for an hour. In the event of a fall in the patient's fetal monitoring, the patient is left to the left side of the lumbar circle, and a 1-liter of ringer is taken within one hour and the oxygen is monitored and the vaginal examination is performed to assess the progress of delivery.

In the event of a premature drop in the heart rate, anesthesia continues, and if the heart rate continues to be delayed and variable, cesarean section delivery will be done. If the decrease in the heart rate of the fetus continues, monitoring will continue and the course of labor in each two groups are checked.

If the delivery was normal, after performance of vaginal delivery, the neonate was examined in term of Apgar score and umbilical cord. In the case of cesarean delivery, the ABG cord and the neonatal Apgar score are checked.

Results

Ninthy nine women entered the study. These women were divided into two groups: 54 women in the anesthetic group and 45 women in the control group. There were no significant differences between the two control and case groups in term of diabetes, blood pressure, hypothyroidism and hemoglobin.

In Table 1, three variables (dilation, effacement and fetal position) were compared in two groups before and after using epidural or spinal anesthesia. The results of this table show that in terms of dilatation, in both groups, more women were located in positon of 0-4 cm due to the moment of delivery. There was no significant difference between two groups. The effacement were similar in both groups and did not show any significant difference. The position of the fetus was more appropriate in the case group, since the highest number of cases was located at positions -3 and -2, indicating the ease in the process of embryo removal and delivery. However, in the control group, most women were in position -3. After the use of anesthesia, dilatation is in the range of 6-5 cm in most cases. Effacement has reached 70-60% after anesthesia. The embryo position is also in position 2 after injection. There was no statisticall difference between the two groups in terms of the number of deliveries, pregnancy with appropriate gestational age and the number of abortions. In terms of heart rate, as in Table 2, in the case group, the highest number was in the category of pulse latency, and in control, the largest number is in the normal group. Therefore, the use of anesthesia has been causing a decrease in the rate of beating, but this decline is in the range of the late decline and does not cause concern about the effect of the drug. Regarding the type of delivery, both groups occurred in most cases of normal delivery, and only 5 in the case group and 1 in the control group were suffering from cesarean section. The embryo was evaluated during birth in terms of sex, weight, apgar score and umbilical cord pH. The results is shown in Table 3. According to the results of the table, gender distribution was homogeneous between the two groups. In terms of weight index, the embryo's weight during birth in both groups was in most cases in the range of 2500-3500 and there was no significant difference between the two groups. No significant difference was observed between the two groups in term of Apgar score.

Discussion

In this study, the aim was to determine the changes in the embryo heart rate during the first hour after the onset of epidural or spinal anesthesia in the onset of the active phase of labor and to compare their fetal outcome with similar cases without anesthesia. Since demographic characteristics including age can affect the outcomes of labor and affect the outcome, therefore, based on these indicators, the subjects were examined in two age groups by statistical tests. The results indicated that the two groups were homogeneous in terms of age. According to the t-test, the two groups did not differ significantly in terms of mean age. The results of the study showed that the use of spinal and epidural anesthesia does not increase the prevalence of abnormalities in the fetus. Apgar score and umbilical cord pH and follow up of fetal heart rate showed that there was no significant difference between case and control group. The results obtained in this study was consistant with results of various studies in this field. In another study, the prevalence of cesarean in the two groups receiving spinal anesthesia and the control group was the same, but the time interval between the onset of anesthesia and the complete dilatation was clearly lower in spinal group (10). In our study, the number of deliveries of cesarean section was 5 in case group (more than the control group), but there was no significant difference between the two groups regarding the type of delivery. Therefore, anesthesia had no effect on increasing cesarean delivery.

In Malek Khosravi et al study, it has been shown that the use of combined (spinal-epidural) anesthetic technique can be effective in reducing pain and the advancement of delivery; on the other hand, there is no significant effect on increasing cesarean delivery. This result is also consistent with the results of our study. The results of this section are confirmed by other similar studies (11, 12). In term of apgar score at zero and five minutes, the mean of apgar scores was 8.8704 and 8.667 in the zero minute and 9.6667 and 9.8667 in the 5th minute in the case and control groups, respectively. There was no significant difference. Lieberman et al showed that the impact of using spinal anesthesia and epidural in comparison with other existing methods has a lesser impact on Apgar scores. In our study, the mean of apgar score was higher than 7 in both case and control groups, indicating no significant effect of using anesthesia on the neonate. The result of our study was consistent with the results of a similar study that examined only the effect of epidural anesthesia (13). In our study, the heart rate of the fetus was evaluated. The results were not consistent with the results of Cohen et al, so that the highest frequency was normal heart rate in the control group, while in the case group, more people were in the range of late-pulse cardiac arrhythmias. The results of this study showed that there is no significant difference in the fetal outcomes between the case and control groups. To examine and compare the fetal outcomes, heart rate drop, cord blood pH and minute and apgar score at zero and five minutes were analyzed. The results of the study showed that there was no significant difference in all the variables studied.

Conclusion

Regarding the results of this study, it seems that the use of spinal and epidural anesthetic methods is an acceptable method for eliminating the pain of labor and reducing the fear of normal labor pain and preventing an increase in the prevalence of cesarean section. Because the use of these anesthesia did not show significant maternal and fetal complications compared to normal vaginal delivery. Therefore, it is suggested that the use of epidural and spinal anesthesia in reducing labor pain and encouraging pregnant women to have normal delivery (due to lower side effects than cesarean section), is a suitable and preferred method.

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Table 1. Frequency of three variables: dilatation, Effacement and fetal position in two groups: control and case (before and after anesthesia)

Variables		Dilation				P value	Effacement				P value	Fetal position				P value
		0-4	5-6	7-8	8≤		0-30	40-50	60-70	80		-3	-2	-1	0	
case	Before anesthesia	44	10	0	0	0.088	14	36	4	0	0.000	26	26	2	0	0.000
	After anesthesia	0	39	15	0		0	11	39	4		1	28	20	5	
contol		31	9	2	3		27	13	1	4		21	9	9	9	

Table 2. Frequency of NTS, heart rate drop and type of delivery in two groups

Variables	NTS		P value	Heart rate drop				P value	Delivery type		P value
	Active	Inactive		Normal	Late drop	Early drop	Variable drop		vaginal	Cesarean	
Case	54	0	0.204	11	21	14	8	0.120	49	5	0.300
Contol	43	2		34	4	4	3		43	2	

Table 3. Frequency of embryo status indices during birth (sex, weight, and Apgar score) in two groups

Variables	Gender		P value	Weight			P value	Apgar		P value
	Male	Female		1500-2500	2500-3500	>3500		0	5	
Case	25	29	0.478	5	45	4	0.432	8.8704	9.8667	0.482
Contol	22	23		9	31	5		8.667	9.8667	