**Original Research Article**

The Effect of Intravenous Fluid Therapy before Spinal Anesthesia on Postnatal Postural Headache in Women Candidates for Elective Cesarean Section

Reyhaneh Abri¹, Mansour Rezaei² *

¹ Assistant Professor, Department of Anesthesiology and Operating Room, School of Allied Medical Sciences, Tabriz University of Medical Sciences (Email: Abri_r@yahoo.com/ ORCID: 0000-0002-8182-5025)

² Assistant Professor of Anesthesiology, Tuberculosis and Lung Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran (Email: M.rezaee@tbzmed.ac.ir/ ORCID: 0000-0002-3196-000X)

**ABSTRACT**

**Introduction:** Although postoperative fluid therapy has been mentioned as one of the primary treatments to improve the symptoms of this type of headache, but so far, no study has been done on fluid therapy before spinal anesthesia. Therefore, the aim of this study was to determine the effect of fluid therapy before spinal anesthesia on the incidence, duration and severity of postoperative postural headache in women with elective cesarean section. **Material and Methods:** This study was performed as a clinical experiment with the participation of 150 women candidates for elective cesarean section in Al-Zahra Hospital (Tabriz University of Medical Sciences). Half an hour before the onset of spinal anesthesia, patients were given 500 cc of serum, after which the incidence of anesthesia-induced headache was compared between participants. **Results:** The frequency of headache in the intervention group was 2 (2.7%) and in the control group was 12 (16%) and the results of chi-square test showed that the incidence of headache was significantly lower in the intervention group than the control group (0.005 = p). In order to evaluate other indicators of headache including severity, duration, starting day, number of painkillers used and the need for painkillers in the two groups, first people with headache were selected and their normality in the two groups was confirmed by Kolmogorov-Smirnov test. **Conclusion:** Administration of intravenous serum during fasting to expectant mothers who are candidates for elective cesarean section can reduce the incidence of postural spinal anesthesia in the days following cesarean section.

**Keywords:** Fluid Therapy, Cesarean Section, Spinal Anesthesia, Headache

*Corresponding Author: ORCID: 0000-0002-3196-000X
Email: M.rezaee@tbzmed.ac.ir*
Introduction

Spinal anesthesia for cesarean section is a routine and preferred method, even compared to the epidural method, this method is faster and easier, provides deeper anesthesia and is cost-effective. Benefits for the mother include waking the mother during the birth of the baby, avoiding the effects of general anesthesia, and facilitating the relief of postpartum pain [1-3]. The complication of this type of anesthesia is postural puncture headache (PDPH), for which no definitive preventive method has been proposed to prevent this headache. This type of headache is caused by a leak in the cerebrospinal fluid, followed by a stretch of the meninges due to a hole made in the Dora tissue [4-6]. According to the International Headache Society (IHS) classification, postural headache is a bilateral headache that occurs seven days after anesthesia and disappears within 14 days [7]. The headache starts within 15 minutes of standing and improves within 30 minutes of sleeping. The prevalence of this type of headache varies between 2 and 40%, depending on the size of the needle, the type of needle and other variables. In studies on postural headache in women candidates for elective cesarean section, the effect of maternal posture during anesthesia was evaluated, which was observed [8-10]. In the postpartum period, mothers with this type of headache usually have their symptoms improve on their own. Only a handful of mothers who have severe or less tolerable symptoms need analgesic treatment [11-13]. Research has also shown that taking ondansetron during elective cesarean section reduces the incidence of this type of headache. Reducing the incidence of postural headaches can be welcomed by mothers in adopting this technique to benefit from it [14]. In adults, in order to induce anesthesia for elective surgery, fasting is observed for eight hours, which can reduce the volume of systemic circulation if not receiving intravenous fluids during fasting hours. Since spinal anesthesia causes sympathetic system anesthesia, decreased heart rate, and cytolic blood pressure, low circulatory volume contributes to this condition and causes a further reduction in blood pressure [15-17]. Although postoperative fluid therapy has been mentioned as one of the primary treatments to improve the symptoms of this type of headache, but so far, no study has been done on fluid therapy before spinal anesthesia. Therefore, the aim of this study was to determine the effect of fluid therapy before spinal anesthesia on the incidence, duration and severity of postoperative postural headache in women with elective cesarean section.
Material and Methods

This study was performed as a clinical experiment with the participation of women candidates for elective cesarean section in Al-Zahra Hospital (Tabriz University of Medical Sciences). The questionnaire form was completed by an uninformed evaluator of the type of intervention with the informed consent of the mothers. Inclusion criteria included women candidates for elective cesarean section with a fasting time of at least 8 hours in 2018 in Tabriz. The statistical population consisted of 150 people in the form of two groups of control and intervention with the same number of 75 people, whose number (n) was determined based on a similar study. In this regard, the standard deviation of headache severity in patients in the intervention group and in the control group has been estimated. The minimum difference in the mean severity of headache in the two groups was also considered as α value equal to 0.05 and β value equal to 0.2. Random assignment of participants in this study to intervention and control groups was done using a table of random numbers. In the control group, women went to the operating room without receiving serum. In the intervention group, women received 500 cc of Ringer serum one hour before the onset of spinal anesthesia. Demographic information including age, height, weight and fasting time of the mother before surgery was then asked. Primary and secondary systolic blood pressure, primary and secondary heart rate after spinal anesthesia were determined by a monitoring device and recorded in a questionnaire. Body mass index was calculated using the formula of weight to height to the power of two. Headache status information such as the incidence, number of days the patient suffers from the headache and its severity, day of headache, need to take painkillers (oral acetaminophen) and number of times to relieve the headache by the expert in charge of completing the form within a week after Delivery was followed up and recorded. In addition to bradycardia (heart rate less than 45 beats per minute) and more than 20% reduction in maternal systolic blood pressure after spinal anesthesia compared to primary systolic blood pressure as a drop in blood pressure was also recorded by the anesthesiologist in a questionnaire. The severity of the headache was measured according to the standard visual analog scale (VAS). Understanding the severity of pain is a personal experience that after explaining to the mother to express the intensity of pain, marking on a 100 mm graph of pain intensity was used. These two groups in terms of all technical factors, including the type of needle, its number, patient's position during anesthesia, level of anesthesia, median technique, placement of the end hole of the needle in the horizon or vertical
plane and the statistical population of the study were. In all cases of anesthesia, half a percent of marcaine was used. Exclusion criteria included women with a history of migraine or tension headache or headache due to high blood pressure. Also excluded were women whose anesthesia failed for the first time or who underwent partial anesthesia and were therefore forced to use analgesics and hypnotics to continue the operation. After collection, the data were analyzed using SPSS software version 20. The results were reported as "standard deviation ± mean" for quantitative variables. In order to compare the mean age, fasting time, number of deliveries, initial heart rate, primary systolic blood pressure and body mass index in the two groups before the intervention, t-test of two independent samples (Independent Two-Sample t Test) was used. Also, to compare the frequency of headache and other related indicators in the two groups after the intervention, two independent sample tests (Independent Two-Sample t Test) and Fisher's exact test (Fisher's exact test) were used. From the Kolmogorov-Smirnov test. To evaluate the normality of headache score and other related quantitative indicators in both groups before the intervention was used. Also, the equality of variances in the intervention and control groups was evaluated by Levene test. Significance level was considered 0.05. This study was carried out with the approval of the ethics committee of Tabriz University of Medical Sciences and obtaining informed consent from all participants.

Results

The frequency of headache in the intervention group was 2 (2.7%) and in the control group was 12 (16%) and the results of chi-square test showed that the incidence of headache was significantly lower in the intervention group than the control group (0.005 = p). In order to evaluate other indicators of headache including severity, duration, starting day, number of painkillers used and the need for painkillers in the two groups, first people with headache were selected and their normality in the two groups was confirmed by Kolmogorov-Smirnov test (p > 0.05). Then, the distribution of these variables in two groups was investigated by Independent Two-Sample t test and Fisher's exact test (Table 1). The results of the above tests showed that in none of the studied variables except the day of headache onset, there is no significant relationship between the two groups, which due to the low frequency of headache in the intervention group, this significance will not have much value for clinical judgment.
Table 1: Comparison of measured indices in patients with postural headache in the control and intervention group of women elective cesarean section candidates

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intervention Group</th>
<th>Control Group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of days of headache</td>
<td>5.14±2.85</td>
<td>12.15±5.25</td>
<td>0.001</td>
</tr>
<tr>
<td>The day the headache starts</td>
<td>55.01±2.15</td>
<td>5.59±5.56</td>
<td>0.001</td>
</tr>
<tr>
<td>Severe headache</td>
<td>2.01±0.59</td>
<td>6.41±2.14</td>
<td>0.005</td>
</tr>
<tr>
<td>Frequency of need for acetaminophen</td>
<td>2 (25)</td>
<td>6 (75)</td>
<td>0.009</td>
</tr>
<tr>
<td>Frequent use of acetaminophen</td>
<td>3.85±1.55</td>
<td>14.85±5.56</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Discussion

The aim of this study was to determine the role of fluid therapy before spinal anesthesia on the incidence and severity of headache due to Dora rupture in women candidates for elective cesarean section [18-20]. The results of pre-spinal anesthesia fluid therapy in the study population showed that the incidence of this type of headache in the postpartum period can be significantly reduced with a simple measure and in general the maternal population will have a better result [21-23]. As the results showed, the incidence of headache in the intervention group was 2.7% versus 16% in the control group, which was also statistically significant. To date, no study has been performed on the role of intravascular fluid supply before spinal anesthesia during fasting in cesarean section mothers and its effect on postural headache [24-26]. Induction of anesthesia by spinal anesthesia provides excellent analgesia and muscle relaxation and has no systemic side effects of anesthesia drugs, but headache after spinal anesthesia is a reported complication of this anesthesia technique that can disturb the mother and infant. In the study conducted in Ghana, all mothers of emergency and elective cesarean section received one liter of crystalloid serum before cesarean section [27-29]. Although in this study there was no comparison in terms of receiving and not receiving fluid before cesarean section, but the incidence of postural headache was generally reported to be as low as 8.3%. In this study, despite the use of large needles (which increases the incidence of headache), the low incidence of headache can be attributed to receiving serum before cesarean section [30]. Although the main mechanism of postural headache after dorsal rupture has not been determined, the reasons for the stretching of the meninges due to cerebrospinal fluid leakage in the days after
anesthesia have been reported. Providing intravascular volume in the hours before surgery in a mother who is fasting by cesarean section for at least eight hours can reduce the incidence of this type of headache and the mother can take better care of herself and her baby in the days after surgery [31-33]. It is not yet clear how providing intravascular volume before spinal anesthesia significantly reduces the incidence of this type of headache, as the exact mechanism of occurrence of this particular type of headache is also unclear [34-36]. It can only be said that the lack of volume in the arteries delays the repair of the anesthetic needle in the dorsum and arachnoid and the leakage of cerebrospinal fluid from this hole continues and the meningeal stretch occurs in the following days when sitting and especially standing, causing this headache [37-39]. The next indicator evaluated in this study was the severity of headache, which was evaluated in both intervention and control groups within one week after spinal anesthesia. Although there is no internationally accepted scale for assessing the severity of this type of headache in the postpartum period, mothers with this type of headache can express their headache severity numerically between one and ten, which is the same scale in the present study [40-42]. Headache severity assessment (from 1 to 10) was used based on mother's expression and marking on the chart [43].

**Conclusion**

Administration of intravenous serum during fasting to expectant mothers who are candidates for elective cesarean section can reduce the incidence of postural spinal anesthesia in the days following cesarean section. Therefore, this simple and accessible action can be useful. In some studies, the criteria for assessing the severity of headache in the postoperative days based on the degree of limitation of maternal activity has been expressed as mild, moderate and severe headache. In the present study, in the intervention group, both patients who had a headache chose five to express the severity of their headache, while in the control group, out of 12 patients who had a headache, five were 10, two were 5, and one was numerical. 4, two people announced the number 3, one person the number 2 and one person the number 1 to express the severity of their headache. The mean severity of headache was 5 in the intervention group and 6 in the control group, although it was not statistically significant. So far, no study has been done on intravascular volume before spinal anesthesia and assessment of headache severity, only in the review study of Nguyen et al., The nature of this type of headache was severe. In the present study, the severity of headache was moderate in both groups.
References

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