Incidence of Headache, Low Back Pain and Rate of Regression of Spinal Sensory Level Following the Median and PARAMEDIAN Approaches in Spinal Anesthesia

Shima Sheybani, Tahere Khazaie, Mahmoud Ganjifard, Bibi Fateme Shakhs Emampour, Narges Moradi

Spinal anesthesia has been used for over a century, and it is safer than general anesthesia because of low mortality and morbidity. Post-dural puncture headache, backache, and remainders of sensory, motor, and sympathetic blocks are the most common complications of spinal anesthesia. This study aims to compare median and paramedian approaches to spinal anesthesia in terms of the incidence of headache and backache, and the regression of spinal sensory level. In this double-blind clinical trial study, 140 patients undergoing elective cesarean section of classes I and IIASA underwent spinal anesthesia. Seventy patients went through median, and the other 70 were blocked by the paramedian spinal anesthesia with 25-gauge needle. The patients were assessed in terms of headache and backache on the basis of VAS scales every two hours in the ward and in the recovery room. The level of anesthesia was checked by a needle before the operation and after entrance in the recovery room until the level reached T10. The time span between these two was calculated in minutes. The data was analyzed in SPSS by chi square and t-test. The results showed that in the recovery room, 14.3% of the patients experienced headache of which 12.9% belonged to the paramedian group and 15.7% to the median group. Also, 48.6% experienced backache, 27.1% of who were in the paramedian and 7% of the median group. The average regression rate of spinal sensory level was 72±22.2 in the paramedian and 66.0±19.7 in the median group. In light of the results, the paramedian approach is a more comfortable technique because it has a bigger laminar window, and is of fewer headache and backache complications.

INTRODUCTION

Spinal anesthesia which involves the injection of local anesthetics into the subarachnoid space of the lumbar region is employed in many forms of surgery as urogenital organs, caesarian, and lower limb operations [1]. The subarachnoid space is accessible through median and paramedian techniques in sitting or lateral position [2]. In the midline technique, the needle is inserted below the lower edge of the spinous process of the selected upper vertebrae and passes through the skin, subcutaneous tissue, supraspinous ligament, interspinous ligament, ligamentum flavum as well as the epidural space until it reaches dura arachnoids and pierces it.

In paramedian technique, needle is inserted 1cm and 1cm caudal to the caudal edge of more superior selected upper vertebrae and passes through the skin, subcutaneous tissue, spinous ligament, interspinous ligament, ligamentum flavum as well as the epidural space until it reaches dura arachnoids and pierces it.

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Post-dural puncture headache, backache and prolonged sensory, motor, and sympathetic blocks are among the most common complications of spinal analgesia.

Post-dural puncture headache is caused by loss of cerebro-spinal fluid from the intrathecal space as well as saturation of cranium vessels. Some contributing factors to the incidence and intensity of headaches such as
female sex and adolescence ages have been identified; however, the technique and instruments used have a role as well [4]. Studies have shown that needles with sharp and pointed tip increase the incidence of headache. Moreover, the number of dural punctures has an essential role in creating this complication [5].

Short-term backache following spinal and epidural analgesia is a common complication which is mostly improved in a few days. Reasons for post-spinal anesthesia backache may be ligament trauma resulting from needle and local inflammation, reflexive spasm of the paraspinal muscles, desmectasia resulting from changing the patient’s position or relaxation, or an incidence of transient neurologic syndrome [6].

In her study, Hamiri has shown that the percentage of post-spinal anesthesia backache incidence is 46.5% and factors such as age, weight, number of pregnancies, and type of the needle have a closed relation with backache [7]. Compared with median approach, researches have also shown, backache is less severe in paramedian technique (10% vs. 50%) [5, 8].

One of the most common conditions of spinal anesthesia is the lasting of sensory, sympathic block which might cause high blood-pressure, retention of urine, movement and balance disorder and finally delayed patients’ discharge [9].

Timely discharge of patients in outpatient surgeries and reduction of post-spinal block recovery time are extremely important.

Different measures including the application of local anesthetic drugs with transient effects, and reduced density and amount of drugs have been taken in order to reduce the incidence of cardiovascular complications, recovery time, and accelerating patients’ discharge [10]. With a view of the available literature, we have tried in this paper to compare the incidence of headache and backache, and rate of regression of spinal sensory level by using median and paramedian techniques in spinal anesthesia.

MATERIALS AND METHODS

This study was a double blind clinical trial conducted on 140 pregnant mothers (18-45 year-old; grade I,IIASA) who underwent cesarian using spinal anesthesia. The exclusion criteria included having a medical history of diabetes or acute asthma as well as headache (migraine, stress and other headaches), backache, contraindications to spinal anesthesia, hemodynamic disorders, severe bleeding and fetal distress, high blood pressure, pre-eclampsia, and heart diseases. In addition, patients who needed dural puncture for more than once or those in need of general anesthesia were excluded.

Before performing the block, all the patients received 10 ml of Ringer’s lactate serum per bodyweight kilogram, and were divided into two random groups (n=70 each) based on the random numbers table.

All patients underwent spinal anesthesia in sitting position by needle 25 G through L4-L5 or L3-L4 spaces in a fully sterile condition following the drep and prep.

In the median group, the needle was inserted below the lower edge of the spinous process of the selected upper vertebrae, and then 15 mg marcaine0/5% was injected. In the paramedian group, the needle was introduced one centimeter away from and below the caudal edge of spinous process and then 15 mg marcaine 0/5% was injected.

The level of analgesia was checked by needle before the operation and its time was written down. After surgery and upon recovery, the headache and backache were assessed. The level of analgesia was checked as well. When the analgesia reached the navel level (T10), the patient was transferred to the ward and the time interval between the start of analgesia and the time it reached navel level was calculated.

The start of headache and backache as well as their intensity were evaluated using was criterion 24 hours after the operation by an expert nurse who had no knowledge of the type of technique.

The data were analyzed in SPSS (version 11.5) using chi-square and T-test where P<0.05 was taken to be significant.

Findings:

In this study, 140 cesarean patients who were candidate for spinal anesthesia were examined in two groups (n=70 each) using median or paramedian techniques.

The results showed that there were no significant differences between the two groups in terms of the background variables age (P=0.24), weight (P=0.2), height (P=0.5) and the duration of surgery (P=0.3) (Table 1).

Moreover, out of the 140 patients who participated in the project, 20 (14.3%) suffered from headache in the recovery room from which 9 (12.9%) were in the paramedian group and 11 (10.7%) in the median. The number of people who experienced post-spinal backache was 68 (48.6%) from which 19 (27.1%) were in the paramedian and 49 (70%) in the median group.

The patients were also examined for post-blockage headache and backache in the ward. From among them, 51 (36.4%) suffered from headache out of which 24 (34.3%) were in the paramedian and 27 (38.6%) were in the median group.
The frequency of post-spinal headache in the two median and paramedian groups was different, but it did not show a statistically significant difference (both in recovery and in the ward) (Table 2). Nonetheless, the post-spinal backache frequency was different in the median and paramedian groups and revealed a statistically significant difference (Table 3). The comparison of mean regression of spinal sensory level (in minutes) in the two groups showed no significant difference either (Table 4).

### Table 1: Mean and standard deviation of background variables in the median and paramedian groups.

<table>
<thead>
<tr>
<th>Group variable</th>
<th>Median, mean and standard deviation</th>
<th>Paramedian, mean and standard deviation</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30.48±7.70</td>
<td>33.85±30.83</td>
<td>P=0.2</td>
</tr>
<tr>
<td>Weight</td>
<td>69.77±12.17</td>
<td>71.25±16.09</td>
<td>P=0.2</td>
</tr>
<tr>
<td>Height</td>
<td>160.36±6.2</td>
<td>158.36±8.7</td>
<td>P=0.5</td>
</tr>
<tr>
<td>Operation duration</td>
<td>35.72±11.8</td>
<td>37.56±9.2</td>
<td>P=0.3</td>
</tr>
</tbody>
</table>

### Table 2: Comparison of post-spinal anesthesia headache in the median and paramedian groups.

<table>
<thead>
<tr>
<th></th>
<th>Ward headache</th>
<th>Median Percentage frequency</th>
<th>Paramedian Percentage frequency</th>
<th>Chi -square test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery</td>
<td>+</td>
<td>15.7% 11</td>
<td>12.9% 9</td>
<td>X²=0.23</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>84.3% 59</td>
<td>87.1% 61</td>
<td>DF=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>34.3% 24</td>
<td>P=0.4</td>
</tr>
<tr>
<td>Woman's surgery</td>
<td>+</td>
<td>38.6% 27</td>
<td>65.7% 46</td>
<td>X²=007</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>61.4% 43</td>
<td></td>
<td>DF=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P=0.3</td>
</tr>
</tbody>
</table>

As the above table reveals, there seems to be no significant difference between median and paramedian groups regarding headache.

### Table 3: Comparison of the frequency of backache following spinal anesthesia in median and paramedian groups.

<table>
<thead>
<tr>
<th></th>
<th>Ward backache</th>
<th>Median Percentage Frequency</th>
<th>Paramedian Percentage Frequency</th>
<th>Chi square test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery</td>
<td>+</td>
<td>70% 49</td>
<td>12.9% 19</td>
<td>X²=25.73</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>30% 21</td>
<td>87.1% 51</td>
<td>DF=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>34.3% 11</td>
<td>P=0.001*</td>
</tr>
<tr>
<td>Woman’s surgery</td>
<td>+</td>
<td>37.1% 26</td>
<td>65.7% 59</td>
<td>X²=0.26</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>62.9% 44</td>
<td></td>
<td>DF=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P=0.003*</td>
</tr>
</tbody>
</table>

As the above table shows, there is no significant difference between median and paramedian groups in terms of backache.

### Table 4: Comparison of the mean regression of spinal sensory level (in min) in paramedian and median groups.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Anesthesia reduction speed</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Mean and standard deviation</th>
<th>Statistical T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td></td>
<td>120</td>
<td>15</td>
<td>66.0±19.75</td>
<td>P=0.7</td>
</tr>
<tr>
<td>Paramedian</td>
<td></td>
<td>140</td>
<td>25</td>
<td>72.1±22.22</td>
<td>DF=138</td>
</tr>
</tbody>
</table>

Based on the above table, there is no significant difference between the median and paramedian groups as regards rate of regression of spinal sensory level.

**Discussion:**

Studies have shown that the most common complication following spinal anesthesia is headache. Post-spinal anesthesia headache has been reported to have a 0-41% frequency [11]. Moreover, according to findings, the frequency of backache following spinal anesthesia in cesarean section is reported to be 46.5 % [5].

In this study, a high number of participants experienced headache and backache following spinal anesthesia, while the two groups did not differ significantly in terms of the occurrence of headache. However, concerning the onset of backache, the difference was significant.

Mirmansori’s study in which the patients were examined for the incidence of post-epidural backache showed that in the paramedian technique, the backache was significantly lower than the median approach, and the patients’ satisfaction in the paramedian technique was higher than median in two days following the operation [8]. This finding is in accordance with the results of our study.

In general, the paramedian route has a larger inter-laminar window in comparison with midline route. Moreover, ligament flavum, dura mater and caudal equine are accessible more easily through this route [12]. This might be an acceptable justification for the reduced backache in the paramedian technique.
Bloomberg et al (1989) compared the median and paramedian techniques with catheter insertion for painless childbirth. They showed that the paramedian technique can be performed more comfortably and inserting catheter in this technique is easier [13].

However, Brown et al concluded that 25% of the patients suffer from post-operative pain irrespective of the type of technique used; therefore, backache following segmental block should not be immediately related to inserting needle into the patient’s back [14].

By comparing backache following spinal and epidural analgesia, Dahl JB (1990) came to the conclusion that backache is more common in epidural analgesia (30% vs. 11%) and bothers the patient for a longer time [15].

Our findings showed that the mean regression of spinal sensory level of spinal anesthesia in the median and paramedian groups are different although it is not statistically significant. In other words, the level of analgesia in patients who received the spinal anesthesia through paramedian technique, reduced later and the block time was longer for them.

The duration of recovery in spinal anesthesia and timely discharge of patients in outpatient surgeries are highly important.

Khajavi has shown that lifting the feet of patients for 30 minutes following inter vertebral anesthesia reduces the recovery time; however, this is not possible for all patients. Thus, it would take a long time for us to understand the factors influencing the reduction and enhancement of the blockage time [16]. Based on the above-mentioned findings and other studies (8), the level of pain in the injection site during the implementation of paramedian technique and the level of post-operative backache in this technique are significantly lower than in the median approach. Moreover, compared with median technique, the patients are more satisfied with paramedian technique either in recovery or after two days following the operation.

Conclusion:

The results of this study showed that median and paramedian approaches are not significantly different in bringing about post-spinal anesthesia headache, but their effects on post-operative backache is different where it occurs more in the median technique. Therefore, implementing paramedian technique for patients with lower cooperation who do not have the ability to take the appropriate position is the efficient technique without running the risk of increasing backache or other nervous conditions. Moreover, using this approach for old patients with degenerative changes in their spine and inter vertebral space stenosis seems highly efficient.

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REFERENCES


