ORIGINAL ARTICLE

A retrospective evaluation of the effect of patient position on postdural puncture headache: *is sitting position worse?*

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ABSTRACT

Background: Postdural puncture headache is an unpleasant complication of spinal anesthesia. We aimed to investigate the association between the position in which spinal anesthesia was performed and occurrence of postdural puncture headache.

Methodology: Records of patients who underwent cesarean section between January 2013 and November 2013 with spinal anesthesia were examined retrospectively. Patients older than 18 were included in the study. Convertion to general anesthesia was the exclusion criteria. Demographic data of patients (age, weight, height and physical status), comorbid diseases, position of patient while performing spinal anesthesia, the number of spinal puncture attempts and the incidence of postdural puncture headache were recorded.

Results: A total of 149 records of patients, who met the inclusion criteria, were analysed (sitting position n=72 and lateral position n=77). Postdural puncture headache developed in 11 (15.2%) in the sitting position and 10 (12.9%) in the lateral position ($p>0.05$). There was no difference between groups in terms of age, weight, height, American Society of Anesthesiologists (ASA) physical status, comorbid diseases, attemp numbers and frequency of postdural puncture headache ($p>0.05$).

Conclusion: We conclude that the patient position during spinal anesthesia performance does not affect postdural puncture headache incidence. Therefore, one of them may be preferred according to the experience of anesthesist.

Key words: Patient Positioning; Post-Dural Puncture Headache; Anesthesia, Spinal

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INTRODUCTION

Postdural puncture headache (PDPH) is an iatrogenic complication observed usually after spinal anesthesia (SA), but occasionally after epidural anesthesia and diagnostic lumbar puncture, and requires an effective treatment. It was probably the first reported complication of SA.[1] August Bier reported that four of nine patients experienced PDPH in his first report. [1]

Although over a century has elapsed since the first SA application, there has been no specific method or treatment that may successfully prevent the occurrence of PDPH. Numerous methods have been used e.g. spinal needles with a smaller diameter, atraumatic needle tips, pencil point needles, intravenous crystalloids, caffeine, non-

steroidal antinflamatory drugs and bed rest, with varying success rate.[2,3]

SA is classically administered to the patient in the lateral decubitis or the sitting position. Doğan et al. showed in their research that the prone position of the patient during surgery reduced PDPH.[4] The researchers claimed that the reduction of the frequency of PDPH was caused by the lesser cerebrospinal fluid (CSF) leakage in the prone position. In this sense, it can be thought that the the patient position during SA performance (in sitting or lateral decubitus position) can affect the CSF leakage. To our knowledge no study investigated the relation of the patient position during SA performance and PDPH. We retrospectively examined whether applying SA in sitting position caused more frequent PDPH or not. In our opinion, sitting position may cause PDPH more than lateral position due to more CSF leakage under gravity. Therefore, we aimed to compare the incidence of PDPH between lateral decubitis position and sitting position.

METHODOLOGY

Medical records of patients who experienced headache after cesarean section with SA were retrospectively evaluated. Ethical aproval and informed patient consent was obtained. (ClinicalTrials.gov ID: NCT02122419)

The pregnant patients, older than 18 years, were included and conversion to general anesthesia was the exclusion criteria. We included the patients who underwent cesarean section procedure, because female sex and pregnancy is the risk factors for PDPH. This retrospective case control study took place between January 2013 and November 2013. Data were obtained from the intraoperative anesthesia reports and emergency service electronic recording system and also during control examination after operation.

The following data were recorded for all patient: age, height, weight, American Society of Anesthesiologists (ASA) physical status, co-existing diseases, spinal needle size and type of spinal needle and number of attempts, local anesthetic drug, dose and concentration and the position in which SA was performed. PDPH was diagnosed according to the 'The International Classification of Headache Disorders, 3rd edition (beta version)' presented by Headache Classification Committee of the International Headache Society (IHS)[5] (Box 1).]

Box 1: Diagnostic criteria[5]:

A. Any headache fulfilling criterion C

B. An intrathecal injection has been given

C. Evidence of causation demonstrated by at least two of the following:
   1. headache has developed within 4 days of the intrathecal injection
   2. headache has significantly improved within 14 days after the intrathecal injection
   3. signs of meningeal irritation

D. Not better accounted for by another ICHD-3 diagnosis.

SA was performed by the same experienced anesthetist (İ.S.) in all patients. Position of patients during performing SA was determined by performer according to presence of patients' anxiety. Patients with high level of anxiety were placed in lateral position for keeping them immobile by an assistant.

Statistical Package for the Social Sciences (SPSS) 16.0 was used for statistical analysis. Kolmogorov-Smirnov Z test was used to test the normality, and Levene and Welch tests was used to test the homogeneity of variables. Results were expressed as mean ± standard deviation, median (data range, minimum, maximum) or percentage. Parametric data were evaluated by the Independent sample test, and nonparametric data were evaluated by the Mann-Whitney U test. Sperman's Rho correlation test was used to determine the correlations between variables. P value <0.05 was considered statistically significant.

RESULTS

A total of 154 patient records were evaluated. Six patient records were excluded because of conversion to general anesthesia. The rest 149 patients records were included in the study for data analysis. There was no difference between the patients in terms of patient charecteristics (Table 1). The mean age was 29.1 ± 7.4 years, mean weight was 69.9 ± 5.1 kg and the mean height was 163.3 ± 4.1 cm. The majority of the patients were classified as ASA I (n=124).

It was observed that performance of SA was successful in the first attempt for most patients (n=98, 65.8%). The position of the patient and the number of attempts to perform SA was not

Table 1: Demographic data of patients, number of spinal anesthesia attempts and frequency of PDPH

Vriables		Lateral group n=77	Sitting group n=72	p
Age (year)		28.1 ± 6.4	30.1 ± 8.2	0.26
Weight (kg)		70.2 ± 5.3	69.9 ± 5.0	0.55
Height (cm)		162.9 ± 4.7	163.8 ± 3.3	0.15
ASA	I	67 (87%)	59 (81%)	0.39
	II	10 (13%)	13 (18%)	
Co-existing disease	No	63 (81.8%)	61 (84.7%)	0.63
	Yes	37 (18.2%)	39 (15.3%)	
Attempt Number	1	53 (68.8%)	45 (62.5%)	0.50
	2	19 (24.7%)	22 (30.6%)	
	3	5 (6.5%)	5 (6.9%)	
PDPH		10/77	11/72	0.69

Mean of the opinion that standard deviation, number of appearance (percentage), PDPH, postdural puncture headache

correlated. SA was performed at the L_{3-4} interspace with 2.5 mL 0.5% hyperbaric bupivacaine and a 25 G Quincke needle was used in all patients. Bevel of spinal needle was parallel to longitudinal of parturient at both positions. SA was performed in the lateral position in 77 patients (51.7%) and in the sitting position in 72 (48.3%) patients. PDPH was observed in 21 (14.1%) patients (n=11, 15.2 % in sitting position vs. n=10, 12.9 % in lateral position).

The incidence of PDPH was not correlated with the patient position during SA performance (Table 2).

Table 2: Correlation between postdural puncture headache and variables

Variable	r	p
Age	-.058	0.479
Weight	-.055	0.503
Height	.104	0.208
ASA	-.66	0.422
Co-existing disease	-.020	0.812
Attempt Number	.038	0.69
Position	.033	0.641

DISCUSSION

The risk factors for PDPH after SA are either patient related or technique related. Patient related factors are; young age, female gender, pregnancy and history of headache.[1]The technique dependent factors are the preventable ones and they are; the spinal needle size, the shape of the spinal needle tip and the experience of the anesthesist[7] The most widely accepted precaution to prevent headache is to use a smaller sized spinal needle. Using a larger dimeter spinal needle leads to a larger defect in the dura and consequently to more CSF leakage and more chances of PDPH.[3] However, PDPH can be observed despite using smaller sized spinal needles. In this direction, researches have investigated different possible factors; however, while performing SA the positions of patient has not been researched.

PDPH incidence in different two group having knee arthroscopy and pilonidal sinus operation was investigated by Do□an et al.[4] in a research including 120 patients. PDPH occurred more often in the patients who lay in supine position during the operation than those who lay in prone position. The higher incidence of PDPH in the supine position has been attributed to gravity and to more CSF leakage caused by increased abdominal pressure. In that study overall incidence of PDPH was 17.5% (21 of 120), but it was 14.1% (21 of 149) in our trial. We think that the reason of lower incidence in our study is due to smaller size of spinal needle. We used 25G spinal needle, whereas Doğan et al.[4] used 22G needles.

Gil et al.[6] demonstrated that the negative pressure in the thoracic epidural increases in the sitting position. Authors have attributed this difference to the distribution of intravascular blood volume

to the lower part of the body under the influence of gravity. These results from Doğan et al.[4] have indicated that gravity could increase PDPH incidence by influencing the CSF pressure due to position of the opening. However, Abel et al.[7] investigated with fluoroscopy and they stated that the CSF opening pressure was not different between the prone position and the lateral position. The CSF pressure was 26.5 cmH_2O in the prone position and 27.7 cmH_2O in the lateral position.

The experimental and clinical studies have demonstrated that there has been CSF pressure difference between the sitting position and the lateral position. Klarica et al.[8] studied the CSF pressure in cats and they have observed that CSF pressure in the cranial and the spinal region changes by lifting the head up. Spinal CSF pressure increased from 11.8 ± 0.6 cmH_2O to 13.8 ± 0.7 cmH_2O and 18.5 ± 1.6 cmH_2O pressure respectively with lifting the head 5 cm and 10 cm up from the horizontal plane. [8] Carlson et al.[9] also investigated the CSF pressure for an animal model in the 0º, 30º, 60º and 90º reverse trendelenburg position, and observed that the pressure in the lumbar region increased, by bringing the slope of body from 0° to 90°.

A study in infants, demonstrated that the wideth of the lumbar subarachnoid space was not different in the lateral position and sitting position, therefore the more success of dural puncture in the sitting position than lateral position, could depend on another reason like increase in CSF pressure.[10] Another researcher demonstrated that the lumbar opening pressure of CSF in a normal adult has risen from 6-10 cmH_2O in the lateral position to 20-25 cm H_2O standing.[2] In our study, performing SA by the same anesthesist (I.S.) and using the smaller diameter spinal needle (25G Quincke) was important in relation to development of PDPH. And also, majority of the punctures were successful at the first attempt from the same level (L3-L4). Any correlation was not detected between PDPH and the position of the patient in these circumstances. Patients lied down in supine position after the performance of SA because of use of hyperbaric local anesthetic agent. It was thought that supine position of the patients can cause this result. However, it was considered that different results could be achieved about the effects of the position in blocks as saddle block or unilateral SA after the application.

LIMITATIONS

There have been some limitations of our study. First of all, there was no data on pain level or frequency for patients who developed PDPH. Secondly, patients were chosen only from obstetric setting, who underwent cesarean section. The main limitation of our study is the retrospective design. For this reason, we intend conducting a new study including different surgical groups for a larger randomized prospective study, and especially by evaluating pain levels.

CONCLUSION

In conclusion the results of our study could not demonstrate a relation with the PDPH incidence and the sitting or lateral position of the patient during spinal anesthesia performance. Therefore, one of these positions may be chosen according to the experience of anesthesist or dictates of the time.

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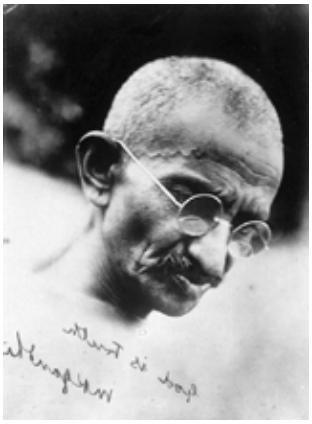

It is not our patient who is dependent on us, but we who are dependent on him. By serving him, we are not obliging him; rather, by giving us the privilege to serve him, he is obliging us

MAHATMA GANDHI