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Original Research Article

Impact of Lateral Vs Sitting Position for Spinal Anesthesia Administration on Intraocular Pressure and Post Dural Puncture Headache in Cesarean Section

Aparajita Banerjee[1], Meenakshi Pandey[2], Trishna Sahu[3], Ambika Prasad Panda[4]

[1]Assistant Professor, Department of Ophthalmology, SCB Medical College, Cuttack, Odisha, India
[2]Assistant Professor, Department of Anesthesiology, Government Medical College, Sundargarh, Odisha, India
[3,4]Assistant Professor, Department of Anesthesiology, SCB Medical College, Cuttack, Odisha, India

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Corresponding author: Dr. Ambika Prasad Panda
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Abstract

Aim: Our aim of study was to determine the effect of spinal anesthesia administered in either sitting or right lateral position on post dural puncture headache (PDPH) and intraocular pressure during cesarean section.

Materials and Methods: 100 patients posted for cesarean section under spinal anesthesia were divided into two groups of 50 each. Spinal anesthesia was administered either in the sitting position (Group S) or right lateral position (Group RL). Hemodynamics were monitored during perioperative period. Intraocular pressure before and after the operation was measured. Post dural puncture headache was assessed postoperatively up to 5 days. Patients requiring more than 1 attempt for spinal anesthesia were excluded.

Results: There was no statistical difference between the two groups regarding demographic data. Post dural puncture headache was seen in 13 patients in Group S and 5 patients in Group RL, the difference being significant. There was no significant difference between the groups regarding intraocular pressure. ($P > 0.05$)There was no significant different between the groups regarding heart rate, SBP and SpO_2 at various time points in perioperative period.

Conclusion: Spinal anesthesia administered in the sitting position for cesarean section resulted in higher incidence of post dural puncture headache than in the right lateral position, but no significant change was found in the intraocular pressure.

Keywords: Lateral, sitting, spinal anesthesia, intraocular pressure, PDPH.

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Introduction

Spinal anesthesia is the most frequently used for cesarean sections because of its ease, dependability, and rapidity in attaining proper anesthesia. Spinal anesthesia is becoming more common for cesarean sections because of its superior maternal and fetal benefits.[1] Spinal anesthesia is performed in various positions, such as sitting or lying in the lateral decubitus position. In the sitting position, patients should be encouraged to keep their spines flexed while sitting with one leg hanging off the side of the bed to help the interspace open up.[2] The lateral position is defined as side-lying with a pillow carefully situated along the patient's back, possibly buttocks, and a pillow positioned between the patient's flexed legs to prevent hip adduction and internal rotation.Studies showed that the incidence of post-dural-puncture headache (PDPH) could be affected when performing spinal anesthesia in both positions.[3,4] Spinal anesthesia can produce hypotension which can have impact on intraocular pressure (IOP) in patients during cesarean section. We investigated the effect of sitting or lateral position during administration of spinal anesthesia in patients posted for cesarean section, on the incidence of PDPH and intraocular pressure change.

Material and Methods

The study was conducted at a tertiary care hospital in Odisha after obtaining informed consent and approval of institutional ethics committee. Patients posted for cesarean section under spinal anesthesia aged between 21and 40 years of weight between 40 to 80kg and height more than 150cm were included in study. History of multiple pregnancies, pre-eclampsia–eclampsia, and coagulopathy were excluded from the study. A total of 100 patients were

randomized into two groups using numbers generated from randomization table and allocation concealment was made by sealed opaque envelope. The envelope was opened by the investigator who prepared the patient accordingly. Group S received spinal anesthesia performed in the sitting position.(n = 50) Group RL received spinal anesthesia performed in the right lateral position.(n = 50). The anesthesiologist involved in the perioperative monitoring of the patient were unaware of position in which spinal anesthesia was administered. After shifting the patients to operation theatre intraocular pressure measurement was done using the Schiotz tonometer, and it was calibrated before each reading. An 18 G IV cannula was put. Noninvasive blood pressure, ECG, HR, and SpO_2 were monitored. Ringer lactate solution was infused at the rate of 15 mL/kg/h) for 20 minutes followed by a maintenance dose of 6-8 mL/kg/h. The patients were positioned in the right lateral decubitus (Group RL) or seated (group S), respectively. Spinal anesthesia was administered with 26GQuinke spinal needle at the level of the L_{3-4} space after disinfecting the puncture site. When free cerebrospinal fluid flow was observed, 12.5 mg bupivacaine heavy 0.5% was injected into the subarachnoid space. Immediately after the procedure, the patients were placed at supine position. Spinal anesthesia of all patients was administered by the same anesthesiologist. Patients requiring more than one attempt were excluded from study. The number of attempts for spinal block was recorded. HR and NIBP values were measured and recorded at preoperative period, 1st, 5th, and 10th minutes after spinal anesthesia, and subsequently at 10-minute intervals. During the surgery, when there was a fall of more than 20% in SBP compared to the baseline value, the patients were treated with 5 mg IV bolus ephedrine. When the fall in heart rate become less than 50, 0.5 mg of atropine was administered. Intraocular pressures of the patients were measured at the postoperative first hour. Patients were followed for PDPH until discharge.

Statistical Analysis: Statistical analysis was performed by SPSS Statistics for Windows, version 23.0. After descriptive statistics values were expressed as mean ± standard deviation (SD), n, or percentage appropriately. Independent sample t-test was used in the analysis of quantitative independent data and Chi-squared test was used in the analysis of qualitative independent data to compare the demographic data, hemodynamic parameters, intraocular pressure, and early complications of spinal anesthesia between the two groups. $P < 0.05$ was considered as statistically significant.

Results

There were no statistically significant differences between the two groups regarding demographic variables like age, height, weight, and ASA status. Table 1 shows the mean arterial pressure measured at different time interval after spinal anesthesia and the difference was not significant except at 10 min after spinal anesthesia.

Table 1: Comparison of changes in intraoperative MAP(mmHg) among study groups

MAP at various time point	Group RL(n=50) (Mean±SD)	Group S(n=50) (Mean±SD)	P value
Baseline	96.2±4.8	96.3±10.7	0.904
1min after SAB	88.7±5.9	90.8±6.7	0.383
5min	86.7±5.6	85.8±8.7	0.912
10min	85.4±8.9	89.1±12.3	0.004
20min	78.3±6.5	81.7±7.2	0.072
30min	78.9±5.1	83.5±6.2	0.327
40min	76.8±5.8	77.1±3.4	0.164
50min	77.5±4.8	78.9±3.9	0.317

Table 2: Comparison of intraocular pressure(mmHg)

	Side	Group RL(n=50) (Mean±SD)	Group S (n=50) (Mean±SD)	P value
Pre op	Left eye	17.34 ±3.15	18.11± 3,62	0.34
	Right eye	17.12± 2.99	18.52± 2.81	0.41
Post op	Left eye	18.21± 2.95	18.93±2.59	0.27
	Right eye	18.94±2.79	18.91±2.88	0.29

There were no statistically significant differences in preoperative and postoperative values of intraocular pressure among the groups. (Table 2) Table 3 shows incidence PDPH on first five postoperative days. Incidence of post dural puncture headache was significant on 3rd postoperative day.

Table 3: Incidence of PDPH

Incidence of PDPH	Group RL(n=50) (n)	Group S (n=50) (n)	P value
Postoperative day 1	0	1	0.214
Postoperative day 2	2	3	0.262
Postoperative day 3	2	5	<0.05
Postoperative day 4	1	3	0.113
Postoperative day 5	0	1	0.147

Discussion

In our trial we concluded that spinal anesthesia in the lateral position resulted a lower incidence of PDPH in patients posted for cesarean section but there was no significant change in intra ocular pressure among the groups. The PDPH is typically a headache that occurs bilateral, frontal, retro-orbital or occipital region extending to the nape, which is severe, throbbing, continuous, and its symptoms exacerbate in upright position. The headache may associate with nausea and vomiting. [5] The pain may begin after spinal anesthesia or within 72 hours. The mechanism of pain is due to leakage of cerebrospinal fluid as a result of the damage that occurs in dura.[6]

Although it is known that needle thickness, young age, female sex, and pregnancy are predisposing factors for puncture headaches after spinal anesthesia, there are also some publications stating that the position of patients during spinal anesthesia is a cause of puncture headaches.[7] Davoudi et al.[8] examined the effect of patient position on post dural puncture headache and showed that spinal anesthesia performed in sitting position caused higher PDPH than in lateral position.

Our study showed that PDPH developed after spinal anesthesia performed in the lateral position was significantly lower than in the sitting position. Majd SA et al.[9] found that the incidence of PDPH was significantly less in the lateral posture (16.6%) as compared to the sitting posture (45%). The meta-analysis by Zorilla-Vaca A et al [10] showed results which was similar to our study.

In our study, the incidence of PDPH in group S was maximum on day 3. Our results coincide with the results of Davoudi M et al.[8]After the dural puncture, the dural defect is healed by fibrosis of the nearby tissues. There are several possible mechanisms for the increased incidence of PDPH in the sitting posture. First, dural healing may be delayed because the spaces between two vertebrae are more noticeable, and hence, needle puncture is easier and less traumatic.[11]

Second, the CSF pressure is more in the sitting position (40 cm H2O) than in the lateral position (5-20 cm H2O). This higher CSF pressure increases the duration of the CSF leak. Third, the spinal needle is at a 90° angle to the dural fibres, thus making a larger hole and an extended duration of CSF leakage.[12] Nevertheless, all the patients were treated with positive reassurance, bed rest, avoidance of pillow, adequate hydration, caffeine, analgesics and antiemetics. The average IOP is around 15 mmHg. Normally the right and left IOP are similar and the difference of 4 mmHg between both eyes is observed in only 4% of normal individuals. Intraocular pressure is affected by volatile anesthetics, intravenous anesthetics, myorelaxants, and position.[13] Şekeryapan et al.[14] measured IOP before spinal anesthesia and 20 minutes after spinal anesthesia in patients who underwent lower limb surgery. In their study, they found that despite a decline in IOP, which was not statistically significant. Hatipoglu et al.[15] administered spinal anesthesia to 38 patients undergoing surgery below umbilicus. IOP measurements were done before spinal anesthesia, after spinal anesthesia, and after postoperative 24th hour, but no difference was found. In our study, we also did not found any significant difference between the IOP values before spinal anesthesia and postoperative 1st hour which was similar to these two studies.

Conclusion

The incidence of post dural puncture headache was more after spinal anesthesia administered in sitting position compared to the lateral position after elective cesarean section. But either sitting or lateral position during spinal anesthesia administration had no effect on intraocular pressure. There was no correlation between post dural puncture headache and intraocular pressure.

References

1. Hirachan N. Incidence of post dural puncture headache in parturients following early ambulation and recumbency. Journal of Patan Academy of Health Sciences. 2017; 4:14–20.
2. Öztürk İ, Sirit I, Yazicioglu D. A retrospective evaluation of the effect of patient position on post dural puncture headache:Is sitting position worse? Anaesth Pain Intensive Care. 2015; 19:130–4.
3. Ali DM, Sharif A, Naqvi SE. Comparison of the hemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for caesarean section using Hyperbaric Bupivacaine. Pak Armed Forces Med J. 2018; 68:45–9.
4. Chekoi B, Yetneberk T, Teshome D. Prevalence and associated factors of post dural puncture

headache among parturients who underwent cesarean section with spinal anesthesia: A systematic review and meta-analysis. Ann Med Surg. 2021; 66:102456.
5. Chen LK, Huang CH, Jean WH, Lu CW, Lin CJ, Sun WZ, et al. Effective epidural blood patch volumes for postdural puncture headache in Taiwanese women. J Formos Med Assoc 2007; 106:134-40.
6. Mosaffa F, Karimi K, Madadi F, Khoshnevis SH, Daftari Besheli L, Eajazi A. Post-dural puncture headache: A comparison between median and paramedian approaches in orthopedic patients. Anesth Pain Med 2011; 1:66-9.
7. Bordlee JW, Beakley BD, Mody R, McConville AP, Weed JT, McClure BP, et al. A case of paradoxical presentation of a postural postdural puncture headache after combined spinal-epidural anesthesia. J Clin Anesth. 2017; 38:156-7.
8. Davoudi M, Tarbiat M, Ebadian MR, Hajian P. Effect of position during spinal anesthesia on postdural puncture headache after cesarean section: A prospective, single-blind randomized clinical trial. Anesth Pain Med 2016;6:e35486.
9. Majd SA, Pourfarzam S, Ghasemi H, Yarmohammadi ME, Malati A, Jaberian M. Evaluation of pre lumbar puncture position on post lumbar puncture headache. J Res Med Sci. 2011; 16:282–6.
10. Zorrilla-Vaca A, Makkar JK. Effectiveness of lateral decubitus position for preventing post-dural puncture headache:A meta-analysis. Pain Physician. 2017;20: E521–9.
11. Chakraborty A, Sinha A. The incidence of post dural puncture headache following spinal anaesthesia:A comparison of sitting versus lateral decubitus position. J Contemp Med Res. 2016; 3:2096–9.
12. Tığ U. The reasons of false measurement in intraocular pressure. Medical Journal of Süleyman Demirel University. 2006; 13:32-5.
13. Şekeryapan B, Tomak Y, Türkyilmaz K, Öner V, Durmuş M. Acute effect of spinal anesthesia on intraocular pressure. J Glaucoma Cataract 2013; 8:185-8.
14. Kelly DJ, Farrell SM. Physiology and role of intraocular pressure in contemporary anesthesia. Anesth Analg. 2018; 126:1551-62.
15. Hatipoglu S, Abdullayev R, Kucukebe OB, Guler M, Hatipoglu F, Celik B, et al. Intraocular pressure changes after spinal anesthesia--acute and subacute effects on surgery patients. Adv Clin Exp Med 2015; 24:857-61.