

Original Article

Incidence of post dural puncture headache among parturients undergoing caesarean section under spinal anaesthesia using median or paramedian approach: A comparative study

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Abstract

Background: Post dural puncture headache (PDPH) is a common complication of spinal anaesthesia. Median and paramedian approaches are used for spinal anaesthesia. Incidences of PDPH is more common among parturients due to hormonal effect leading to thinning of Ligamentum Flavum.

Objectives: To compare the incidence of post dural puncture headache in parturients undergoing caesarean section under spinal anaesthesia using median and paramedian approaches.

Materials & Methods: This was a prospective, observational study, carried among 60 parturients undergo caesarean section under spinal anaesthesia at Dhaka National Medical Institute Hospital, Dhaka from May 2018 to April 2019. Patients were randomly allocated into two equal groups of thirty patients each, where Group M received spinal anaesthesia with median approach and Group P received spinal anaesthesia with paramedian approach. Incidence of PDPH, intensity of headache, complication of PDPH (nausea, vomiting, coughing) for a period of 3 days postoperatively. Haemodynamic parameters, heart rate, systolic and diastolic blood pressure were recorded for 10 minutes interval during operative procedure.

Results: Among 30 patients of Group M, mean age was 26.53 ± 5.9 years, height was 151.27 ± 3.8 cm and weight was 63.77 ± 9.5 kg, while in Group P mean age was 27.00 ± 6.2 years, height was 152.10 ± 4.7 cm and weight 62.97 ± 9.1 kg. In median approach (Group M), 2 patients (6.6%) had PDPH; whereas in paramedian approach (Group P), 3 patients (10%) had PDPH and the difference was statistically insignificant (P -value=0.64). Regarding other complications, in Group M, 3 patients (10%) developed nausea, while in Group P, 4 patients (13.33%) complained nausea. 1 patient (3.33%) in Group M had vomiting, while 2 patients (6.67%) had vomiting in Group P. But the difference was not significant statistically.

Conclusion: There is no statistically significant difference regarding the incidence of PDPH between median and paramedian approach among parturients undergoing caesarean section.

Keywords: Post dural puncture headache, caesarean section, spinal anaesthesia, median approach, paramedian approach.

Introduction

Spinal anaesthesia or subarachnoid block (SAB), the first major regional technique evolved at the end of 19th century,¹ remains one of the most popular forms of anaesthesia, particularly for surgery involving the lower abdomen, lower extremities and the perineum.² Most of the caesarean sections are done by spinal anaesthesia because of its advantages like dense block, simplicity, ease of performance, requirement of minimum apparatus, avoidance of airway manipulation, reduces the metabolic stress response to surgery, reduction in blood loss, has minimal effect on blood biochemistry, ensures optimum level of arterial blood

gases, patient remains conscious during surgery, requires minimal postoperative care and analgesia, decrease in the incidence of venous thromboembolism.^{3,4} Although major complications are rare but possess risk of hypotension, bradycardia, cardiac arrest, intraoperative discomfort, post dural puncture headache and neurologic toxicity.^{5,6}

Since introduction of spinal anaesthesia, post dural puncture headache (PDPH) has remained as a major complication. Post dural puncture headache presents as a dull throbbing pain with a frontal-occipital distribution, headache develops within 5 days after dural puncture, mostly within 48-72 hours and

disappears spontaneously within 1 week, or up to 48 h after an epidural blood patch. The headache may be accompanied by neck stiffness, tinnitus, hypoacusia, photophobia, and nausea, and typically the headache is aggravated by sitting or standing, and is reduced by lying down.^{7,8} The actual mechanism producing the headache is unclear. There are two possible explanations. First, the decrease in CSF pressure may cause traction on the pain-sensitive intracranial structures in the upright position, leading to the characteristic headache. Secondly, the loss of CSF may produce a compensatory vasodilatation.^{9,10} Causes reported to influence the incidence of PDPH are age, sex, pregnancy, previous history of headache (migraine, tension or cluster headache), previous history of PDPH, needle tip shape, needle size, bevel orientation, number of lumbar puncture attempts, median versus paramedian approach, type of local anesthetic solution and clinical experience of the person operating the procedure.¹¹⁻¹⁷ The parturients are at particular risk of PDPH because of their sex, pregnancy, and the widespread application of spinal anaesthesia.^{18,19}

Spinal anaesthesia can be achieved either median or paramedian approach. For most patients, the median approach is faster, easy to administer and less painful.²⁰ The paramedian approach is a useful technique that allows for successful identification of the subarachnoid or epidural space, especially in difficult cases, in obese patients, in pregnant patients and in geriatric patients. The median approach involves passage of the needle through supraspinous, interspinous ligaments and ligamentum flavum, while the paramedian approach avoids supraspinous and interspinous ligaments and hits ligamentum flavum directly after passing through paraspinal muscles.^{21, 22} Researchers around the world conducted several studies to compare the median and paramedian approach regarding the incidence of PDPH but yet now no consensus is achieved.²³⁻²⁷ So current study was done to compare the incidence of post dural puncture headache among parturients undergoing caesarean section under spinal anaesthesia using median and paramedian approach.

Material & Methods

Place and duration of the study

This was a Prospective Observational study, conducted in Dhaka National Medical Institute Hospital, Dhaka from May 2018 to April 2019

Procedure

This study was carried out with patients who undergo caesarean section under SAB in Dhaka National Medical

Institute Hospital, Dhaka according to inclusion and exclusion criteria. During pre-anesthetic assessment, every patient underwent thorough physical examination with ASA classifications. Total anaesthetic procedure was explained and informed consent was taken from the participants of the study.

Age eligibility for study: 18-45 years old (child bearing age)

Genders eligibility for study: Female

Screening method: The preliminary screening panel for each patient was included the complete history, physical examination and the necessary laboratory tests.

Inclusion criteria:

1. ASA class I & II
2. Patients agree to participate in the study signing an informed written consent

Exclusion criteria:

- 1 . Patient with psychiatric disorder
- 2 . Patient with cluster headache, tension headache, H/O migraine or any chronic headache
- 3 . Previous H/O of PDPH
- 4 . Patient with chronic pain e.g. chronic low back pain
- 5 . More than one dural puncture
- 6 . Patient with preeclampsia, eclampsia
- 7 . Patient with neurological disorder
- 8 . Abnormalities of vertebral column
- 9 . ASA class III and IV
10. Coagulopathy

Sixty (60) patients, scheduled for Caesarean section under spinal anaesthesia were included in this study. They were divided into two groups (Group M- received spinal anaesthesia with median approach and Group P received spinal anaesthesia with paramedian approach) of thirty patients each.

Intravenous access was established with 18 G cannula. Premedication was done with intravenous (IV) Ranitidine 1mg/ kg body wt and Ondansetron 0.1 mg/ kg body wt was given just before anaesthesia followed by preloading with 15-20ml/kg. Lactated ringers solution. Standard monitoring (ECG, non-invasive blood pressure, and pulse oxymeter) was done. Under full aseptic precaution, spinal anaesthesia was carried out in sitting position at lumbar 3-4 inter space using 25 G Quinke's spinal needle. The bevel of the spinal needle

was kept lateral, so that the dural fibers were splitted rather than cut due to longitudinal arrangement of the dural fiber. The spinal anaesthesia was given in the following technique,²⁸:

i) Median approach: The patient is placed in the sitting position. A stool/bench was provided as a footrest and a pillow placed on the lap. The patient is maintained in a vertical plane while the patient's neck was flexed and the patient's lower back pushed out. The needle was inserted below the lower edge of the spinous process of the selected upper vertebrae. After successful puncture 10 mg of 0.5% Inj. Bupivacaine heavy was used to achieve spinal anaesthesia.

ii) Paramedian approach: A skin wheal is raised 1 cm lateral and 1 cm caudal to the L4 spinous process. A longer needle is used to infiltrate deeper tissues in a cephalomedial plane. The spinal needle was inserted 10 to 15 degrees off the sagittal plane in a cephalomedial plane. Once the cerebrospinal fluid (CSF) was obtained after ligamentum flavum punctured, 10 mg of Inj. Bupivacaine heavy was injected to achieve spinal anaesthesia.

iii) In both Group: The level of analgesia and time to achieve were noted. After the block was administered, supine position was given and a wedge was placed to tilt the patient towards left side. In both the approaches, maximum of three attempts at L3-L4 space done. If not successful, the L4-L5 space was selected.

After the surgical procedure was done, the patient was shifted to postoperative care unit. The patients were observed for PDPH in post-operative period. Severity of the headache was measured by Visual Analogue Scale (VAS). The severity was defined as mild, moderate, and severe according to VAS (0–10), where 0 = no headache, 1–3 = mild headache, 4–7 = moderate headache, >7 = severe headache. Post dural puncture head was defined as headache developed within 6-72 hours from the day of spinal anaesthesia, increased with sitting or standing position and relieved or reduced in intensity by lying down.²⁹ PDPH was managed by advising the patient to lie down, drink plenty of fluids and coffee and with analgesics (Paracetamol or Tramadol). Data were collected regarding age, height, weight, type of approach, pulse, blood pressure (just before spinal anaesthesia, immediately after spinal anaesthesia, 3 minutes after spinal anaesthesia, 5 minutes after spinal anaesthesia, 10 minutes after spinal anaesthesia and 20 minutes after spinal anaesthesia), PDPH, intensity of headache, complication of PDPH (nausea, vomiting, coughing), ambulation of the patient, posture of the patient.

Statistical analysis

Data was compiled, presented and appropriate statistical test was done in this study for drawing an appropriate conclusion. Quantitative variables, i.e., age, height, weight, pulse, blood pressure and VAS score were calculated as mean \pm SD. Qualitative variables such as PDPH, intensity of headache, complication of PDPH (nausea, vomiting, coughing) were presented as percentage. Students' unpaired t-test was applied for comparison of quantitative variables in both groups. Chi-square test was applied for comparison of qualitative variables in both groups. $P < 0.05$ was considered statistically significant.

Observation and Results

Comparison of mean age, height and weight are presented in Table-1, and there were no significant difference between two groups.

Table-I: Demographic characteristics

Variable	Group-M	Group-P	P-value
Age (years)	26.53 \pm 5.9	27.00 \pm 6.2	0.77
Height (cm)	151.27 \pm 3.8	152.10 \pm 4.7	0.46
Weight (kg)	63.77 \pm 9.5	62.97 \pm 9.1	0.74

Data expressed as mean (SD) and analysed students unpaired 't' test, $P < 0.05$ - Significant

Table-II: Incidence of PDPH

Incidence of PDPH	Group-M (n=30)	Group-P (n=30)	P-value
Mild headache	1 (3.3%)	1 (3.33%)	-
Moderate headache	1 (3.3%)	1 (3.33%)	-
Severe headache	0 (0.00%)	1 (3.33%)	-
Total	2 (6.6%)	3 (10%)	0.64

Data analyzed using Chi square test, $P < 0.05$ - Significant

In Group M, 2 (6.6%) patients developed mild to moderate postdural puncture headache of which no incidence of severe headache. On the other hand, 3 (10%) patients of Group P developed postdural puncture headache. There was no significant difference between two groups.

Table-III: Incidence of adverse effects

Incidence of adverse effects	Group-M (n=30)	Group-P (n=30)	P-value
Nausea	3 (10%)	4 (13.33%)	0.69
Vomiting	1 (3.33%)	2 (6.67%)	0.55
Coughing	0 (0.00%)	0 (0.00%)	-

Data analyzed using Chi square test, $P < 0.05$ - Significant
In Group M, 3 (10%) patients developed nausea and 1

(3.33%) patient developed vomiting. On the other hand, 4 (13.33%) patients of Group P developed nausea while 2 (6.67%) patients vomiting, and regarding these adverse effects, two groups were statistically insignificant (P value 0.69 and 0.55). There was no incidence of coughing in studied groups.

There was no significant change in pulse and blood pressure (systolic and diastolic) in any patient of both groups.

Discussion

Post dural puncture headache (PDPH) is a common complication of spinal anaesthesia. Because of female gender, young age, pregnancy and widespread use of spinal anaesthesia, parturients undergoing caesarean section are more prone to develop PDPH. PDPH has a negative impact on quality of life, patient satisfaction, the postpartum experience with the mother's inability to bond with and care for her baby and it delay discharge of the patient. Therefore, it is necessary to prevent or decrease its incidence and severity. Current study was conducted to compare the incidence of PDPH with spinal anaesthesia using median & paramedian approach in patients undergoing caesarean section.

In this study, incidence of PDPH was 6.6% in median group, while 10% in paramedian group and difference was not statistically significant. This finding was similar to studies conducted on parturients women undergoing caesarean section.²⁷⁻³⁰ Our findings are different from study conducted by Haider et al as authors concluded that paramedian approach reduces the incidence of PDPH.²³ The reason could be due to the identical tearing of the longitudinal dural fibers. Alternatively, despite having a different angle, due to the cylindrical shape of the dura, the orientation of the needle insertion might be the same.²⁴

Although results were insignificant, incidence of PDPH is more frequent with paramedian approach and corresponds with study conducted in one developing country.²⁷ But the incidence is higher than other studies conducted on obstetric patients^{26,29} On the other hand, in median group, 6.6% patients developed PDPH which is similar to two recent studies.^{29,26}

Conclusions

It can be concluded that there is no statistically significant difference between median and paramedian approach for SAB regarding the incidence of post dural puncture headache among parturients. It should be mentioned that median approach is more easier than paramedian approach & commonly used technique. But

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paramedian approach can be used in difficult cases like obese patients.

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