ISSN2515-8260 Volume 09,Issue 01,2022

PDPH after Cesarean Section (CS) delivery under spinal anesthesia: An observational study

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Abstract
Aim: Assessment of the prevalence and associated risk factors of post dural puncture headache (PDPH) after cesarean section delivery under spinal anesthesia
Methods: This Cross Sectional study conducted in the Department of Anesthesia, Madha Medical College Research Institute, Kovur, Chennai, Tamil Nadu, India for the period of 1 year. The entire procedures were performed at sitting position. The backside of the patients was cleaned with Iodine and alcohol. Spinal anaesthesia was done using a midline approach at the L2-3 or L3-4 interspaces by using different size of spinal needles and 0.5 % isobaric bupivacaine 2.5-3.0ml was injected.
Results: The 100 Patients were included in this study with fulfilling the criteria. 8 patients had a previous history of spinal anesthesia exposure and 3 of them complained a PDPH like headache after the procedure. All patients had given spinal anesthesia on sitting position. 23 G needle is the most frequently used spinal needle. There were 1 cases (1%) diagnosed as failed block which were converted to general anesthesia. Hosmer-Lemeshow test of goodness of fit was performed to check the appropriateness of the model for analysis. Variables found to be significant at a binary logistic regression were: needle size and number of attempts. After analysis with multivariate logistic regression needle size and number of attempts were found to be significant at p-value<0.05. Size of the needle used to administer spinal anesthesia is significantly associated with the development of PDPH. In this study PDPH was present in 43 patients (43%).
Conclusion: In conclusion, the prevalence of PDPH was higher, 43% compared with most other studies.
Keywords: PDPH, cesarean section, spinal anesthesia

Introduction

Spinal anesthesia, also known as subarachnoid block, is a common type of regional anesthesia that involves the injection of an anesthetic agent into the subarachnoid space[1].It was first performed accidentally by Corning in 1885[2].Since then, it has been widely used, especially in obstetric patients undergoing cesarean delivery. However, despite its widespread use, the procedure is still associated with several complications[1];the most recognized is postdural puncture headache (PDPH)[3].

According to the International Classification of Headache Disorders criteria, PDPH is a headache that develops within 5 days after dural puncture which worsens in an upright position and improves with lying down and accompanied by neck stiffness, tinnitus, photophobia, and nausea. It may disappear spontaneously within 1 week or up to 48 h after an epidural blood patch. Conservative therapies such as bed rest, hydration, and caffeine are commonly used as management[4].

According to literature the incidence of PDPH after spinal anesthesia ranges from 0.3% to 40%. The patterns of development of PDPH depend on a procedure and non-procedure-related risk factors[5, 6].Several risk factors have been attributed to PDPH including age, weight, needle size and design, and number of puncture attempts[8, 9].For example, it has been reported that there is an inverse relationship between the incidence of PDPH and both age and

weight[8].In addition, needle size and design appear to play a crucial role in the incidence of PDPH[7-9].Reducing the size of the spinal needle has been shown to significantly reduce the prevalence of PDPH[7, 8].

Material and methods

This Cross Sectional study conducted in the Department of Anesthesia, Madha Medical College Research Institute, Kovur, Chennai, Tamil Nadu, India for the period of 1 year, from October 2020 to September 2021, after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

All consecutive cesarean section patients at postoperative period were included by fulfilling the inclusion criteria of ASA status I-II patients after Cesarean Section was done upon spinal anesthesia. There were cases rejected as exclusion criteria of Uncooperative patients, Patients with impaired cognitive ability and Patients with eclampsia. Independent variables are age, body mass index (BMI), and American society of Anesthesiologist (ASA), needle size, neddle design, position, and number of attempts and previous history of PDPH. Total 100 patients were included in this study.

The entire procedures were performed at sitting position. The backside of the patients was cleaned with Iodine and alcohol. Spinal anaesthesia was done using a midline approach at the L2-3 or L3-4 interspaces by using different size of spinal needles and 0.5 % isobaric bupivacaine 2.5-3.0ml was injected. The intra operative information could be collected by one of the data collector from each patient chart. Patients were interviewed by another data collector on day 1, 2, 3 and were questioned as regard to headache, location, character, and duration, associated symptoms like neck stiffness, tinnitus, hypoacusia (partial loss of hearing), photophobia, and nausea. PDPH was diagnosed as fulfilling the following criteria. These are headache develops within 3 days after dural puncture, headache that worsens within 15 minutes after sitting or standing and improves within 15 minutes after lying down, and with at least one of the following symptoms : neck stiffness, tinnitus, hypoacusia, photophobia and nausea were included.

Data analysis

Data were analyzed in SPSS version 20 by using bi-variant and multi-variant logistic regression. Odds ratio with 95% confidence interval and p-value were computed to determine the strength of the association. A p-value <0.05 was considered as statistical significant.

Results

The 100 Patients were included in this study with fulfilling the criteria. The mean age of patients participated in study was 28.24 years old with a standard deviation of 4.23 years old and 18 years old is the minimum age of patients participated in this study, where as 44 years old is the maximum age. All patients were either ASA I or ASA II. (Table 1)

Table 1: Demographic profile of the patients

Variable	Frequency: n (%)
Age in years	
18-30	77 (77%)
31-45	23(23%)
BMI	
< 18.5 (underweight)	3(3%)
18.5-24.9 (normal)	88 (88%)
>24.9 (over weight)	9 (9%)
ASA status	
ASA I	90(90%)
ASAII	10(10%)

8 patients had a previous history of spinal anesthesia exposure and 3 of them complained a PDPH like headache after the procedure. All patients had given spinal anesthesia on sitting position. 23 G needle is the most frequently used spinal needle. There were 1 cases (1%) diagnosed as failed block which were converted to general anesthesia. None of patients developed PDPH (Table 2).

Table 2: Spinal anesthesia

Variables	Frequency: n (%)
Previous spinal anesthesia	
Yes	8(8%)
No	92(92%)
Previous history of PDPH	
Yes	2(2%)
No	98(98)
Position of spinal anesthesia done	
Sitting	100(100%)
Lateral	0(0%)
Number of attempts	
Single attempts	79(79%)
Twice attempts	16(16%)
>2 attempts	5(5%)
Size of spinal needle	
23 Gauge	79(79%)
25 Gauge	12(12%)
26 Gauge	9(9%)
A successful block	
Yes	99(99%)
No	1(1%)
Associated symptoms	
Neck stiffness	37(37%)
Tinnitus	2(2%)
Hyper accuses	1(1%)
Photophobia	2(2%)
Nausea	18(18%)
None	40(40%)

Hosmer-Lemeshow test of goodness of fit was performed to check the appropriateness of the model for analysis. Variables found to be significant at a binary logistic regression were: needle size and number of attempts. After analysis with multivariate logistic regression needle size and number of attempts were found to be significant at p-value<0.05 (Table 3). Size of the needle used to administer spinal anesthesia is significantly associated with the development of PDPH. Patients received spinal anesthesia using bigger spinal needles were more than eight times more likely to develop PDPH than patients who received spinal anesthesia using smaller needles. Another significant association was found between number of attempts and PDPH. Patients who received spinal anesthesia (SA) with multiple attempts were four times likely to develop PDPH than their counter part patients who had a single attempt.

Table 3: Factors associated with PDPH

Variables	Syringe	PDPH		AOR(95% CI)	P -value
		Yes	No		
Spinal needles	Big needles 23 G	40	39	8.1 (0.05-0.41)	0.002
	Small needles (25G, 26G)	3	18	1	
Attempt	Multiple	5	16	4.64 (0.57–38.11)	0.17
	Single	9	70	1	

Discussion

Post dural puncture headache (PDPH) has been believed to be a major problem of patients after spinal anesthesia. The overall postdural puncture headache in this study was 42.6% which is comparable to Egypt study[13] but excessively higher than other studies report [10-13].
The high percentage of prevalence of PDPH in this study might be related with the most 79 % of participants were received spinal anesthesia using big spinal needle. Specifically, the contribution of big needle was strongly significant association for the over all of PDPH as compared with small needles. This higher PDPH percentage after spinal anesthesia by using big needles were 8.1 times more likely to develop PDPH than small needles (AOR= 8.1; 95% CI: 0.05, 0.41; p = 0.0001). This might be linked with larger needles put down wider opening on the dura which allowed more CSF pour out than smaller hole caused by smaller needles. Our finding is in line with different studies[14-17]. However, we couldn't see the associations to the outcome variable on type of design of needle, because of all were Quincke type.
The other significant association was found linking the number of attempts and the development of PDPH. The spinal anesthesia was successful at first attempts with 79% which is less likely to develop PDPH than those patients who have repeated attempts. In addition, patients who had an attempt of more than once are about 4.5 times at risk to develop PDPH than those patients who had a single attempt (AOR=4.64; 95% CI: 0.57, 38.11; p=0.015). This could be correlated with the number of attempt to increase the probability of piercing the dura matter repeatedly will increase the volume of CSF leak, thus increasing the probability of development of intracranial hypotension & PDPH. This finding is aligned with other studies.[13] The proportion of repeated attempts of spinal needles related PDPH reports from a population based study in University of Basel, Switzerland (4.2%)[18] was somehow lower than our report (15%). However, some other studies couldn't come across significant association between the number of attempts and PDPH[19, 20].Even though different studies showed on variables of the lower BMI, younger age and previous history of PDPH are listed as risk factors for PDPH development[15, 21],our observation study did not bring into being significant association between these variables and PDPH. This might be due to the lack of sample size to compare lower to higher BMI, young to old age and patients with versus without previous history of PDPH. There are some limitations in our study.

Conclusion

In conclusion, the prevalence of PDPH was higher, 43% compared with most other studies. This study also showed that big spinal needles and repeated number of attempts were the independent associated risk factors for PDPH. We recommend the higher magnitude of PDPH has to be reduced by avoiding use of big needles and the repeated dura puncture.

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