

Research Article**Frequency of post-dural puncture headache in elective cesarean section patients following spinal anesthesia**

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ABSTRACT

Objective: To study the incidence of PDPH in elective cesarean section patients undergoing spinal anesthesia

Material and methods: This was a prospective observational descriptive study conducted at Department of Obstetrics & Gynecology Nishter Hospital, Multan from August 2015-February 2016. ASA I and ASA II patients scheduled for elective C/S under spinal anesthesia were consecutively recruited into the study.

Results: The incidence of PDPH in elective CIS mothers following spinal anesthesia was 47.5% and the mean age of the mothers was 29.3 years. Orientation of the needle bevel perpendicularly to the longitudinal dural fibres was associated with 2.6 times more risk of developing PDPH compared to parallel orientation. This was statistically significant, (p-value 0.013).

Onset of headache after dural puncture among the patients who developed PDPH was 84.5% on the first day, 12.1%, and 1.7% on the second and third days respectively.

Headache severity was found to be mild in 29.3%, moderate in 69% and severe in 1.8% of the patients.

Conclusion: Results of present study showed a higher number PDPH. In most of cases severity of the PDPH was moderate. Insignificant association between occurrence of PDPH and the number of dural puncture attempts was noted. Significant association between the occurrence of PDPH and orientation of spinal needle was noted.

Keywords: Median; Parmedian; Post dural puncture headache; Anesthesia, Spinal; Cesarean Section; Spinal

INTRODUCTION

Post dural puncture headache (PDPH) is an iatrogenic complication of neuraxial anesthesia and results from the puncture of the dura mater. The signs and symptoms of PDPH result from loss of cerebrospinal fluid, traction on the cranial contents, and reflex cerebral vasodilatation.¹ As female sex and young age are purported risk factors, the complication is common in the obstetrical population, who frequently receives epidural or spinal analgesia and anesthesia during labour and delivery.¹⁻² Young women with a lower body mass index and those who are pregnant have the highest risk of developing headache after lumbar puncture.³⁻⁴ The following definite

demographic risk factors were identified, based on Class II evidence: younger age, female gender, and headache before or at the time of the lumbar puncture.³

PDPH occurs twice as often in women as in men.² Most of the increased frequency in women is during the child-bearing years.²⁻³ The highest frequency is in the 18 to 30 years age group. The frequency is less in children younger than 13 years and in both men and women older than 60 years.²⁻³

Today the use of fine gauge pencil-point needles, such as the Whitacre and Sprotte has produced a greater reduction in the incidence of post-

dural puncture headache, which varies with the type of procedure and patients involved.⁵ It is related to the size and design of the spinal needle used, the experience of the personnel performing the dural puncture, and the age and sex of the patient.⁵⁻⁸

Anesthetists have been active in attempting to reduce the incidence of postspinal headache.⁵ Reducing the size of the spinal needle has made a significant impact on the incidence of post-spinal headaches.⁵ The incidence is 40% with a 22G needle; 25% with a 25G needle; 2%-12% with a 26G Quincke needle; and <2% with a 29G needle.^{5,9,10-11}

This study assessed the incidence, severity, and onset time of PDPH, in elective cesarean section patients who had spinal anesthesia.

MATERIAL AND METHODS

This was a prospective observational descriptive study was conducted at Department of Obstetrics & Gynecology Nishtar Hospital, Multan from August 2015-February 2016. Total 122 ASA I and ASA II patients scheduled for elective CIS under spinal anesthesia were consecutively recruited into the study. ASA I and ASA II elective cesarean section mothers who had spinal anesthesia that:

- did not give consent.
 - had failed spinal anesthesia and general anesthesia was substituted.
 - developed complication, other than PDPH, during or after surgery that required ICU admission.
 - Mothers who had pre-existing chronic or recurrent headache.
- were excluded from the study.

This study was approved by the institutional review committee. Written informed consent was taken from every patient. Anesthesia was given by consultant doctor having at least 5 years. After c-section PDPH was assessed and entered in pre-designed proforma along with demographic profile of the patients. Data was entered in SPSS version 18 and analyzed. Mean and SD was calculated for

numerical data and frequencies were calculated for categorical data.

RESULTS

A total of 122 mothers were recruited in the study. All patients were ASAI and ASA II mothers who had elective CIS under spinal anesthesia. Results are summarized below.

The majority of mothers 63 (51.6%) were in the 20-29 years age group, followed by 48 (39.3%) mothers in 30-39 years age group, and 6 (4.9%) and 5 (4.1 %) were in above 40 years and below 20 years respectively. The mean age of the study patients was 29.03 years, median age of 29 years and their ages ranged between 16 and 43 years. (Table 1)

Fifty eight patients, who represented 47.5%, experienced post dural puncture headache. Sixty four patients, representing 52.5%, did not experience any headache. (Fig. 1)

Spinal anesthesia performed with the needle orientation in relation to the long axis of the spine was parallel in Sixty nine (56.6%) patients and perpendicular in 53 (43.4%) patients. Only Quincke point needles G25 were used to administer spinal anesthesia in all the cases. (Fig. 2)

Patients who had more than one attempt were 1.2 (0.6-2.4) times more likely to develop PDPH. However, this was not statistically significant ($p > 0.05$). (Table 2)

The frequency of PDPH was related to the direction of the bevel during introduction of the spinal needle. This was statistically significant, p -value 0.013. Patients who were administered spinal anesthesia when the spinal needle bevel was directed perpendicular to the longitudinal dural fibres were 2.6 times (95% CI) more likely to develop PDPH compared to when the needle bevel was oriented parallel. ($p < 0.05$). (Table 3)

Out of the 58 mothers who developed PDPH, 17 (29.3%) mothers had mild headache, majority 40 (69%) mothers had moderate headache and only 10 (0.8%) mothers had severe headache. All the mothers responded well to conservative management of bed rest, good rehydration, 1M

Opioids and NSAID. The patient who developed severe headache had associated agitation that necessitated the patient to be restrained because she had developed altered consciousness. She too

responded well to conservative management. No patient required the use of an epidural blood patch.(Table4)

Table 1:Age distribution

| Age | Frequency | Percentage |
|-------|-----------|------------|
| <50 | 5 | 4.1 |
| 20-29 | 63 | 51.6 |
| 30-39 | 48 | 39.3 |
| >40 | 6 | 4.9 |
| Total | 122 | 100 |

Fig. 1:Incidence of PDPH

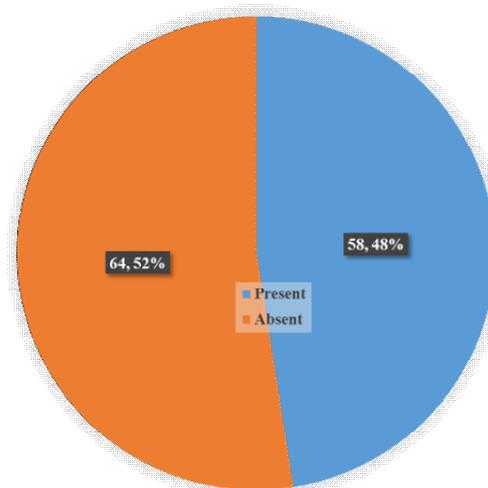


Fig. 2:Orientation of the Needle bevel in relation to longitudinal duralfibres

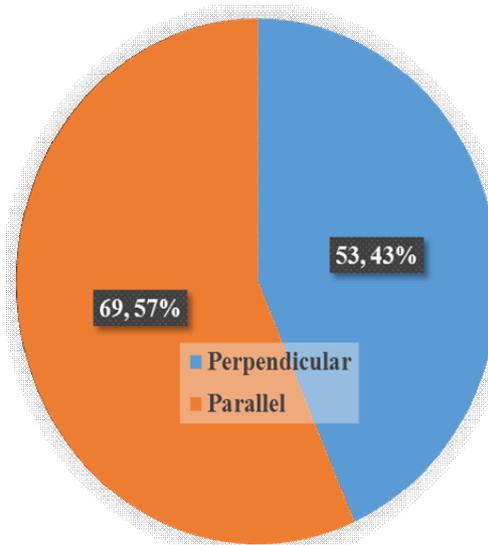


Table 2:Occurrence of PDPH and the number of dural puncture attempts

| Attempts | PDPH | | OR (95% CI) | P value |
|----------|----------------|---------------|-----------------|---------|
| | Present, n (%) | Absent, n (%) | | |
| > 1 | 26 (50.0) | 26 (50.0) | 1.2 (0.6 - 2.4) | 0.639 |
| 1 | 32 (45.7) | 38 (54.3) | | |

Table 3: Association between the Occurrence of PDPH and Orientation of spinal needle

| Orientation | PDPH | | OR (95% CI) | P value |
|---------------|----------------|---------------|-----------------|---------|
| | Present, n (%) | Absent, n (%) | | |
| Perpendicular | 32 (60.4) | 21 (39.6) | 2.6 (1.2 - 5.3) | 0.013 |
| Parallel | 26 (37.7) | 43 (62.3) | | |

Table 4: Classification of PDPH according to its severity

| Severity | Frequency | Percentage |
|----------|-----------|------------|
| Mild | 17 | 29.3 |
| Moderate | 40 | 69.0 |
| Severe | 1 | 0.8 |

DISCUSSION

PDPH is a common complication for parturients undergoing neuraxial blockade. Female sex, pregnancy and young age are purported to be associated with increased risk of developing PDPH following durapuncture. The study has shown the incidence of PDPH in elective CIS patients following spinal anesthesia. Only Quincke point needles G25 were used to administer anesthesia in all the cases. The Quincke type is the standard needle with a medium cutting bevel and an orifice at the needle tip. In a meta-analysis of obstetric studies, Peter et al in 2003, noted that atraumatic needles and smaller diameter needles were associated with lower frequencies of PDPH compared to cutting needles and larger diameter needles respectively.¹² The mean age of study patients was 29.3 years. This mean age group lies within 18-30 years age group which is associated with the highest frequency of PDPH.^{5,9-10} Vallejo et al in their study noted a mean age of 32.1 years in the 172 patients in whom spinal anesthesia was performed using G25 Quincke point needles.¹³ In this study the incidence of PDPH was 47.5%. This is higher than the reported average of 25% associated with the use of G25 Quincke needle. Similar studies have been done in CIS mothers under spinal anesthesia using G25 Quincke point needles, Anju et al¹⁴ noted an incidence of PDPH of 20% in a group of 25 CIS mother in whom G25 Quincke needles were used for spinal anesthesia, Nafui et al¹⁵ in their study done in a teaching hospital in Ghana (West Africa) noted a much smaller incidence of PDPH of 4% in a group of 46 CIS mothers in whom G25 Quincke point needles were used. The above two studies had fewer cases 25 and 46 mothers respectively as

compared to our study of 122 mothers. Vallejo et al¹⁶ noted an incidence of PDPH of 8.7% in a group of 172 elective CIS mothers using 25G Quincke needles. In all the above studies the incidence of PDPH was much lower compared to our study. The incidence of PDPH is related to the size and design of the spinal needle used, the experience of the personnel performing the dural puncture, and the age and sex of the patient.^{5,7-8} The needle orientation in relation to longitudinal dural fibres during lumbar puncture was parallel in 56.6% and perpendicular in 43.40% of the cases in this study. The frequency of PDPH was related to the direction of the bevel during introduction of the spinal needle. Patients who were administered spinal anesthesia when the spinal needle bevel was directed perpendicularly to the longitudinal dural fibres were 2.6 times (95% CI) more likely to develop PDPH compared to when the needle bevel was oriented parallel. This was statistically significant, p-value 0.013. Lybecker et al had a similar observation.¹⁷ They noted that the incidence of PDPH among patients in whom the bevel was inserted parallel to the longitudinal dural fibres was 0.56 times the incidence among patients in whom the bevel was inserted perpendicularly to the longitudinal dural fibres.¹⁷ It is presumed that parallel orientation separates the dural fibres whereas perpendicular cuts the dural fibres thereby creating bigger hole in the dura. In this study 57.4% patients had only one dural puncture attempt. The rest 42.6% had multiple dural punctures ranging between 2-6 times. Anju et al¹⁴ in their study in a group of 25 patients, who had spinal anesthesia using 25G Quincke needles, all had one dural puncture attempt. In their study

all the procedures were performed by the same anesthesiologist with enough experience. Vallejo et al in their study done in Magee hospital in a group of 172 CIS mothers who had spinal anesthesia using G25 Quincke needle only 5 patients had 2 dural puncture attempts the rest had one attempt.¹⁶

It has been shown that PDPH is more common if two verified punctures into the subarachnoid space are made.¹⁸ Patients who had more than one attempt were 1.2 times more likely to develop PDPH. However, this was not statistically significant ($p > 0.05$). Lybecker et al¹⁷ in their study also did not find any statistically significant association between PDPH and the number of attempted dural punctures ($p = 0.091$).

In our study, onset of headache occurred in 84.5% of the patients in the first day, 12.1% of patients on the second day and 1.7% on the third day after dural puncture. Anja et al in their study noted that the onset of headache was within 24 hrs to 72 hrs after dural puncture. The onset of headache after lumbar puncture is usually within 24-48 hrs after dural puncture, but could be delayed up to 1 Zdays", This is consistent with our study.

Of the 58 mothers who developed headache, 40% had moderate headache, 29.3% had mild headache and 0.8% had severe headache. Similar studies have classified headache according to severity. Anja et al¹⁴ in their study, the severity of headache was mild in the entire 9 CIS mother who developed PDPH. Nafuiet al¹⁵ in their study most patients rated their headache as mild to moderate on a 10-cm visual analog scale. Kuntz et al³ in their study, of the 107 patients who developed headache, the severity of PDPH on the 1st day of occurrence was mild in 54%, moderate in 31% and severe in 15%. The criterion for the determination of the severity of headache was different for each of the studies quoted above thus they are not easy to compare though there is some consistency with our study.

CONCLUSION

Results of present study showed a higher number PDPH. In most of cases severity of the PDPH was

moderate. Insignificant association between occurrence of PDPH and the number of dural puncture attempts was noted. Significant association between the occurrence of PDPH and orientation of spinal needle was noted.

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