Incidence of Post Dural Puncture Headache and Association with Number of Attempts during Spinal Anaesthesia in Obstetric Patients- An Observational Study

Deepika Hatila¹, Suman kumari²
¹Senior Resident, ²Senior resident Sawai Man Singh Medical College, Jaipur

Corresponding Author:
Suman Kumari
Senior Resident Sawai Man Singh medical college, Jaipur

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ABSTRACT

Aim and objective: This study was done to find out the incidence of PDPH and its relation to number of attempt in young pregnant female after using 25 G Quincke’s needle to give spinal anaesthesia.

Material and method: This prospective, observational single hospital based study was conducted in 150 obstetric patients of ASA grade I and II undergoing elective or emergency caesarean section under spinal anaesthesia at Sawai man singh medical college, Jaipur. Demographic data, number of attempt, incidence and severity of PDPH along with other data were noted.

Result: Out of 150 patients, PDPH has been found in 11 patients which is 7.33% of the study population. There were no cases of failed spinal. Of 119 who got spinal anesthesia in first attempt 6 (5.04%), Out of 25 people in whom spinal anesthesia was successfully given on second attempt 3 (12%) people and out of 6 people were given spinal on third attempt 2 (33.33%) people developed PDPH. In our study out of 11, 2(18.18%) patients developed PDPH on day 1, 6(54.55%) patients developed PDPH on day2 and 3(27.27%) patients developed PDPH on day3. None of the patients developed PDPH on day 4. The onset of PDPH in our study was between 24-72 hours (1-3 days). Of total 11 cases 4(36.36%) cases had grade 1/mild headache on the day of presentation of the symptoms, 6(54.55%) patients presented headache of grade 2/moderate and 1(9.09%) patient presented with grade 3/severe headache. None of the patients had very severe or grade 4 headaches.

Conclusion: Presence of PDPH is significantly influenced by number of attempts at spinal. However it was not influenced by age, weight and parity in this particular study group

Keywords: Spinal anaesthesia, PDPH, Obstetric patients

INTRODUCTION

Any breach of the Dura may result in a post dural puncture headache (PDPH). The onset of headache is usually 12–72 hours following the procedure. Typically, PDPH is bilateral, frontal or retro-orbital, and occipital and extends into the neck. It may be throbbing or constant and associated with photophobia and nausea. The hallmark of PDPH is its association with body position. The pain is aggravated by sitting or standing and relieved or decreased by lying down flat. Untreated, the pain may last weeks, and in rare instances has required surgical repair.

PDPH is believed to result from leakage of CSF from a dural defect and decreased intracranial pressure. Loss of CSF at a rate faster than it can be produced causes traction on structures supporting the brain, particularly the dura and tentorium. Increased traction on blood vessels also likely contributes to the pain. Traction on the cranial nerves may occasionally
cause diplopia (usually the sixth cranial nerve) and tinnitus. The incidence of PDPH is strongly related to needle size, needle type, and patient population. The larger the needle, the greater the incidence of PDPH. Cutting-point needles are associated with a higher incidence of PDPH than pencil-point needles of the same gauge. Factors that increase the risk of PDPH include young adults, especially in the 18–30 year age group,[i], a lower body mass index and pregnancy.[ii] The incidence of PDPH is low in elderly patients.[iii] A less stretchable duramater either due to atherosclerosis or age-related mechanical changes in the epidural space might explain the lower incidence of PDPH in elderly.

Conservative treatment involves recumbent positioning, analgesics, intravenous or oral fluid administration, and caffeine. Hydration and caffeine work to stimulate production of CSF. Caffeine further helps by vasoconstriction of intracranial vessels. Stool softeners and soft diet are used to minimize Valsalva straining. Headache may persist for days despite conservative therapy. An epidural blood patch is a very effective treatment for PDPH. It involves injecting 15–20 mL of autologous blood into the epidural space at, or one interspace below, the level of the dural puncture. It is believed to stop further leakage of CSF by either mass effect or coagulation.

The pathophysiology of PDPH has been investigated for decades. Two aspects of its pathophysiology are evident viz. excessive loss of cerebrospinal fluid (CSF) through the dural puncture into the epidural space and resultant downward traction on intracranial vessels, which respond with painful vasodilatation.[iv] Post dural puncture headache usually occurs 12-48 hours after dural puncture with frontal bilateral or occipital headache.[v]

Risk factors for PDPH have been exhaustively researched. Factors reported to influence the incidence of PDPH are age, sex, pregnancy, needle size,[vi,vii] needle tip shape,[viii] bevel orientation to the dural fibres, the number of lumbar puncture attempts,[ix] midline versus lateral approach, the type of local anaesthetic solution, and clinical experience of the operator.[x] Among these, the gauge and configuration of the needle tip seem to be of great importance. Developments in needle design since that time have led to a significant reduction in the incidence of post dural puncture headache.

Pregnant patients appear to be at the higher risk of PDPH than non-pregnant patients and would benefit greatly from the reduction in the rate of PDPH. Keeping these things in mind, we designed this study to find out the incidence of post dural puncture headache after spinal anaesthesia, using a 25G Quincke’s needle in obstetric patients undergoing caesarean section under spinal anaesthesia in Sawai Man Singh Medical College and Hospital, Jaipur.

METHOD

After approval from the ethical committee and written informed consent this prospective study was conducted on 150 patients between 18 to 40 years of age, ASA grade I & II with singleton pregnancy scheduled for caesarean section (elective/emergency) under spinal anaesthesia in Sawai Man Singh Medical College Hospital, Jaipur. Those who did not give consent, or had previous history of neurological/psychological disorder, infection at the site of dural puncture, spinal deformity, fetal distress, severe pregnancy induced hypertension, deranged coagulation profile or previous history of PDPH were excluded from study.

A thorough and detailed history of present and past medical illness was recorded. Any past history of anaesthetic exposure with concomitant history of drugs taken in pre-operative period was recorded. Any previous history of PDPH or chronic headache was noted. General and systemic examination of all the patients was done. Local examination of the back and spine was done. Investigations checked. Peripheral intravenous line with 18 G cannula was secured in the non-dominant hand. Intravenous drip ringer lactate was started. Standard multichannel monitor was attached and patient’s heart rate, pulse rate, oxygen saturation, non-invasive blood pressure and ECG were monitored.

With the patient in left lateral position the back of the patient was prepared with 10 % povidone iodine solution and rectified spirit and skin towel was placed following which a skin wheal was raised with a local anaesthetic solution. Under strict aseptic precautions the Quincke’s spinal needle 25G (0.53 X 88 mm) was introduced using a midline approach at L2-3 or L3-4. The bevel end of the needle was kept facing parallel
to the floor. After lumbar puncture a free flow of CSF was documented. 0.5 % hyperbaric Bupivacaine 2.0-2.8 ml was injected over 30 seconds with the needle’s bevel facing upwards. This was considered first attempt. If the subarachnoid space could not be located in the midline, the needle was withdrawn up to the subcutaneous tissue and redirected in the same space. This was considered to be the second attempt. If the difficulty persisted, the space was changed and the space above or below it was used. This was considered the third attempt. If the spinal anaesthesia could not be given on third attempt, it was abandoned and converted to general anaesthesia.

The patients were placed in the supine position after injection of the drug. All the patients were given oxygen @ 4L/min via face mask. Following confirmation of spinal block by loss of sensation to pinprick at the T6 level, or loss of cold sensation at T4 level and adequate motor block, surgery was started. Intraoperative fluid was administered in relation to body weight of the patient, vital signs and intraoperative losses. Intra operative management of the patients was carried out as per the discretion of the consultant anaesthesiologist. At the end of surgery the patients were shifted to the postoperative ward.

Postoperatively patients were interviewed and examined on day 1, 2, 3, 4 for occurrence of PDPH. They were asked about the type and location of headache, the onset of headache was noted. Patients were examined for severity of PDPH and if there was any associated signs and symptoms. Neck stiffness, tinnitus, photophobia, hyperacusis, nausea and any other symptoms were looked for.

Diagnosis of PDPH was carried out according to the criteria as set by the headache classification subcommittee of the International Headache Society (IHS), in ICDH II[xii]

The criteria is:

1. Headache that worsens within 15 minutes after sitting or standing and improves within 15 minutes after lying, with at least one of the following:
   a. Neck stiffness
   b. tinnitus
   c. hyperacusis
   d. photophobia
   e. nausea

2. Dural puncture has been performed
3. Headache develops within 5 days after dural puncture
4. Headache resolves either:
   a. spontaneously within 1 week
   b. within 48 hours after effective treatment of the spinal fluid leak (usually by epidural blood patch)

Severity of headache was assessed on 1-4 scale [xii]

1. Mild headache which permitted long periods of sitting / erect position. May be accompanied by nausea, vomiting, auditory and ocular symptoms.
2. Moderate headache, which made it difficult for the patient to stay upright for more than half an hour. Occasionally accompanied by nausea, vomiting, auditory and ocular symptoms.
3. Intense headache immediately upon getting up from bed, alleviated while lying horizontal in bed. Often accompanied by nausea, vomiting, ocular and auditory symptoms.
4. Headache that occurred even while lying horizontal in bed and greatly aggravated immediately upon standing up, eating is impossible because of nausea and vomiting.

Treatment of the headache was individualized, and ranged from bed rest to hydration and non-opioid analgesics. Depending on the severity of headache none of the patients were found eligible for epidural blood patch.

STATISTICAL ANALYSIS

Data was recorded on a predesigned proforma and managed on excel spread sheet. Fisher’s exact test was performed to calculate the p value. Multivariate analysis for variables age, weight, height, parity and number of attempts at spinal was done. Data analysis was performed using SPSS 19.0 software. In this study p value less than 0.05 was considered as statistically significant.
RESULTS

Demographic data showed that the mean value for age (years) was 26.5 with standard deviation (SD) 4.06. The mean value for weight (kg) was 54.70 with SD 5.38. The mean value for height (cm) was 146.57 with SD 4.75. The mean value for body mass index (kg/m$^2$) is 25.50 with a SD of 2.21. Out of 150 cases 119 (79.33%) are in age group of 18-29 years. The other 31 (20.67%) are in the 30-40 years age group. Of 150 cases 131 (87.33%) are of ASA I physical status and 19 (12.67%) are of ASA II physical status.

Spinal anesthesia was given in first attempt 119(79.33%) times, in 25 (16.67%) cases two attempts and in 6 (4.0%) cases three attempts were required. A failure was defined as when even after successful lumbar puncture and delivery of anesthetic drug there was no autonomic, sensory or motor blockade for 30 minutes. No such incidence occurred. Out of 150 patients a total of 11(7.33) cases developed post dural puncture headache. 139 (92.66%) patients did not have any such complain.

The following table shows association between PDPH and age group of the study population. Nine (9) patients in the age group of 18-29 years and 2 patients in the age group of 30-40 developed PDPH. The p value is more than 0.05 and hence it is not statistically significant.

<table>
<thead>
<tr>
<th>TABLE.1: ASSOCIATION OF PDPH WITH AGE GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDPH</td>
</tr>
<tr>
<td>PESENT</td>
</tr>
<tr>
<td>ABSENT</td>
</tr>
</tbody>
</table>

The following table shows relation between number of attempts and incidence of PDPH.

<table>
<thead>
<tr>
<th>TABLE.2: INCIDENCE OF PDPH IN VARIOUS ATTEMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTEMPTS</td>
</tr>
<tr>
<td>ONE ATTEMPT</td>
</tr>
<tr>
<td>TWO ATTEMPT</td>
</tr>
<tr>
<td>THREE ATTEMPT</td>
</tr>
</tbody>
</table>

This following table shows association of PDPH with spinal given in one attempt or more than one attempt. In the group of people in who spinal was given in first attempt 6 patients developed PDPH. 5 patients developed PDPH among those in whom spinal as given in more than one attempt. The p value is 0.0502, since it is slightly more than 0.05 it is not statistically significant.

<table>
<thead>
<tr>
<th>TABLE.3: ASSOCIATION OF PDPH WITH ONE ATTEMPT AND MORE THAN ONE ATTEMPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDPH</td>
</tr>
<tr>
<td>PRESENT</td>
</tr>
<tr>
<td>ABSENT</td>
</tr>
</tbody>
</table>

This table shows correlation between PDPH with upto two and more than two attempts at spinal. The p value calculated is more than 0.05 and hence not statistically significant.
### TABLE .4: ASSOCIATION OF PDPH WITH UP TO TWO ATTEMPTS AND MORE THAN TWO ATTEMPT

<table>
<thead>
<tr>
<th>PDPH</th>
<th>UP TO TWO ATTEMPT</th>
<th>MORE THAN TWO ATTEMPT</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT</td>
<td>9</td>
<td>2</td>
<td>p &gt; 0.05</td>
</tr>
<tr>
<td>ABSENT</td>
<td>135</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Out of 11(7.33%) patient, 2(18.18%) patients developed PDPH on day 1, 6(54.55%) patients developed PDPH on day2 and 3(27.27%) patients developed PDPH on day3. None of the patients developed PDPH on day 4. Of total 11 cases 4(36.36%) cases had grade 1 type of PDPH on the day of presentation of the symptoms, six(54.55%) patients presented PDPH of grade 2 and 1(9.09%) patient presented with grade 3 PDPH. None of the patients had very severe or grade 4 headache. 4 patients had neck stiffness, 5 patients had nausea and vomiting, 1 had photophobia and two patients had hyperacusis and tinnitus.

**Multivariate analysis**

Multivariate analysis was done for age, weight, height, parity and number of attempts at spinal.

Let, Y be the response variable, which is binary (i.e. present or absent) and g₁ and g₂ are independent variable that are also dichotomas in nature.

\[
Y = \begin{cases} 
1, & \text{Present} \\ 
0, & \text{Absent} 
\end{cases}
\]

\[P(Y=1) = 1 - P(Y=0)\]

\[g_3 = \begin{cases} 
1, & \text{Multi} \\ 
0, & \text{Primi} 
\end{cases}\]

\[g_1 = \text{Age, } \quad g_2 = \text{weight, } \quad g_4 = \text{Height, } \quad g_5 = \text{number of attempts at spinal (1/2/3)}\]

After doing the logistic regression for mutation it came out as positive

\[
\text{logit}(Y) = -9.745 + 0.211g_1 - 0.021g_2 + 1.917g_3 + 0.002g_4 + 0.988g_5
\]
Table.5: Variables in the Equation

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM(1)</td>
<td>1.917</td>
<td>1.323</td>
<td>2.098</td>
<td>1</td>
<td>.147</td>
<td>6.800</td>
</tr>
<tr>
<td>Weight(kg)</td>
<td>-.021</td>
<td>.085</td>
<td>.063</td>
<td>1</td>
<td>.801</td>
<td>.979</td>
</tr>
<tr>
<td>Height(cm)</td>
<td>.002</td>
<td>.085</td>
<td>.001</td>
<td>1</td>
<td>.977</td>
<td>1.002</td>
</tr>
<tr>
<td>Age(years)</td>
<td>.211</td>
<td>.160</td>
<td>1.736</td>
<td>1</td>
<td>.188</td>
<td>1.235</td>
</tr>
<tr>
<td>Number of attempts at Spinal</td>
<td>.988</td>
<td>.454</td>
<td>4.727</td>
<td>1</td>
<td>.030</td>
<td>2.686</td>
</tr>
<tr>
<td>Constant</td>
<td>-9.745</td>
<td>12.716</td>
<td>.587</td>
<td>1</td>
<td>.443</td>
<td>.000</td>
</tr>
</tbody>
</table>

Variable(s) entered on step 1: P/M, Weight (kg), Height (cm), Age (years), Number of attempts at Spinal.

Table.5 shows the estimate of parameters corresponding to the exploratory variable. From the significant column corresponding to Number of attempts at Spinal (P-value = .030 < 0.05) indicates that PDPH present is significantly influenced by Number of attempts at Spinal.

DISCUSSION

Post dural puncture headache is a complication that should not be treated lightly. There is the potential for considerable morbidity due to postdural puncture headache. There are reports of PDPH symptoms lasting for months or years, untreated PDPH leading to subdural haematoma and even death from bilateral subdural haematomas. Therefore anaesthesiologists are advised to follow up the cases regularly and properly during the post-operative period. They should try to prevent PDPH by optimizing the controllable factors like spinal needle size as well as shape while conducting spinal anaesthesia.

The incidence of PDPH is more common among women than men, particularly prone are the parturients. Postpartum decreases in intra-abdominal and peridural pressure in obstetric patients may contribute to increase in the incidence of PDPH in this patient population by promoting extra leakage of CSF than usual. Other factors like dehydration secondary to NPO status, blood loss, postpartum diuresis, hormonal imbalance, high serum estrogen level can also lead to more incidence of PDPH.

Since it has been seen that the incidence of PDPH is more in parturient we decided to conduct the study in cases of caesarean section. Past studies have mainly concentrated on the needle size and there are controlled studies that compare two different sizes of spinal needles in young patients. As pencil point needles are expensive and many obstetric units in developing countries may not be able to afford them. Keeping economic factors in mind we decided to use 25G Quincke's needle.

The overall incidence of postdural puncture headache ranges from 0% to 37% as reported by various authors. Ross et al reported PDPH in 9% of patients. In the present study out of 150 patients PDPH has been found in 11 patients that was 7.33% of the study population. In very similar study using 25 G quincke needle in parturients Tabedar et al 2003 found the incidence to be 8%. Sheikh et al (93) using 25 G Quincke’s needle in obstetric patients found PDPH in 8.3% patients. Vallejo MC et al found it in 8.7% patients. The observed incidence of PDPH in our study was in accordance with the above finding. In very similar studies in obstetric patients Bano F et al 1993 reported the incidence to be 4%, Beigh et al 1997 found it to be 14% Shah et al found the incidence of PDPH to be 20%. These variations may be due to factors like demographic profile, expertise of the anesthetist.

In present study out of 119 patients in the age group of 18-29 years, 9 people and out of 31 patients in age group of 30-40 years 2 people had PDPH the p value was >0.05 which is not statistically significant. Dittmann et al in 1994, Wadud R77 et al 2006

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have said that the incidence of PDPH is less in older population but since in our study patients more than 40 years were not included so the results may not have been similar in present study.

In the present study the direction of the needle tip was kept parallel to the dural fibers.

In a study by Lybecker et al14 (1990) 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 perpendicular to the longitudinal dural fibres.

In the present study the numbers of attempts at giving spinal are discussed here. Out of 150 patients 119(79.33%) patients were given spinal in first attempt, 25 (16.67%) patients in second attempt and 6(4%) patients in 3rd attempt. There were no cases of failed spinal. In a comparable study done by Chowdhury I H et al 52% patients were given spinal in first attempt, 28% in second attempt, 16% in third attempt and 4% in fourth attempt. Rasooli et al in a related study mentioned, 66.5% of patients were given spinal in first attempt and 34.5% patients were given spinal in second attempt.

In present study out of 11, 2(18.18%) patients developed PDPH on day 1, 6(54.55%) patients developed PDPH on day 2 and 3(27.27%) patients developed PDPH on day 3. None of the patients developed PDPH on day 4. In the study by Sheikh et al out of 8.3% people who had PDPH 3.5% of patient complained of headache on first day, 3% on second day, 1.2% on third day and 0.6% on fourth day. In a similar study by Beigh et al out of 14% people, 5.2% developed headache on first day, 4% developed it on second day, 2% people on third day, 2% people on fourth day and 0.7% people on fifth day. These data are analogous to previous studies. So the onset of PDPH in present study was between (1to3days) 24-72 hours, which is like the study by Dittmann et al69 where also the onset was between 24-72 hours. In study by Shutt lee, onset was between 18-57 hours.

Of total 11 cases 4(36.36%) cases had grade 1/mild headache on the day of presentation of the symptoms, 6(54.55%) patients presented headache of grade 2/moderate and 1(9.09%) patient presented with grade 3/severe headache. None of the patients had very severe or grade 4 headache. Sheikh et al found mild headache in 5(2%) patients, moderate symptoms in 7(4.1%) and severe symptoms in 2(1.2%). Beigh et al also had a parallel finding in their study. In a study by Viitanen et al grading of PDPH was mild in 4%, moderate in 3% and severe in 1% and our results are comparable.

In present study out of 11 cases of PDPH 4 patients had neck stiffness, 5 had nausea and vomiting, 1 had photophobia and 2 had both hyperacusis and tinnitus.

**CONCLUSION**

Our study found the incidence of PDPH to be 7.33% in this study population by using 25 G Quincke’s needle. The onset of PDPH was between 1-3 days (24-72 hours) and most of the cases had either mild grade 1 or moderate grade 2 PDPH. By doing a regression analysis it was found that the presence of PDPH is significantly influenced by number of attempts at spinal. Increased attempts at giving spinal lead to more chances of developing PDPH. Factors age, weight, height and parity were not found to be associated with the occurrence of PDPH but since the study population consisted of only young pregnant females any comment on this cannot be made with certainty.

**REFERENCES:**


xvii Chohan U, Hamdani G A. Post dural puncture headache.journal of Pakistan medical association, vol 53(8)

