



## Evaluation of post dural puncture headache (PDPH) after caesarean section delivery under spinal anaesthesia

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### Abstract

CSF acts as a cushion supporting and protecting the brain. Leakage of CSF from the subarachnoid space through a dural breach, can lead to loss of this support. The resulting traction on the innervated tissues around the brain can be responsible for the headache that follows. This headache, called post-dural puncture (PDPH), or low-pressure headache (LPH), is postural and usually self limiting, appearing on the first or second day after dural puncture and lasting less than seven days.

The data from the total 50 females undergone the caesarean sections were collected and presented as below. Spinal anaesthesia was performed using a midline approach. 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.

In the present study for PDPH using three fine gauge needles for spinal anaesthesia, the incidence was found to be Minimum with small size needles.

**Keywords:** anaesthesia, caesarean, anaesthetic technique: spinal, complication: headache

### Introduction

CSF acts as a cushion supporting and protecting the brain. Leakage of CSF from the subarachnoid space through a dural breach, can lead to loss of this support. The resulting traction on the innervated tissues around the brain can be responsible for the headache that follows. This headache, called post-dural puncture (PDPH), or low-pressure headache (LPH), is postural and usually self limiting, appearing on the first or second day after dural puncture and lasting less than seven days.

Post-dural-puncture headache (PDPH) is a complication of puncture of the dura mater (one of the membranes that surround the brain and spinal cord) <sup>[1]</sup>. The headache is severe and described as "searing and spreading like hot metal," involving the back and front of the head, and spreading to the neck and shoulders, sometimes involving neck stiffness. It is exacerbated by movement, and sitting or standing, and relieved to some degree by lying down. Nausea, vomiting, pain in arms and legs, hearing loss, tinnitus, vertigo, dizziness and paraesthesia of the scalp are common <sup>[1]</sup>.

It is a common side-effect of spinal Anaesthesia and lumbar puncture and may occasionally accidentally occur in epidural Anaesthesia. Leakage of cerebrospinal fluid through the dura mater puncture causes reduced fluid levels in the brain and spinal cord, and may lead to the development of PDPH hours or days later. Onset occurs within two days in 66 percent and within three days in ninety percent of PDPH cases. It occurs so rarely immediately after puncture that other possible causes should be investigated when it does <sup>[1]</sup>. PDPH typically occurs hours to days after puncture and presents with symptoms such as headache (which is mostly bi-frontal or occipital) and

nausea that typically worsen when the patient assumes an upright posture.

The rate of PDPH is higher with younger patients, complicated or repeated puncture, and use of large diameter needles, in females, in pregnancy, and with darker skin. Modern, atraumatic needles such as the Sprotte or Whitacre spinal needle leave a smaller perforation and reduce the risk for PDPH. It is thought to result from a loss of cerebrospinal fluid <sup>[1]</sup> into the epidural space. A decreased hydrostatic pressure in the subarachnoid space then leads to traction to the meninges with associated symptoms.

The conventional medical wisdom over the last several decades for avoiding PDPH has been to use smaller gauge or modern needles which traumatize the dura less or make a smaller dura puncture, thereby lessening CSF leakage that causes PDPH. While these approaches have been effective at lowering PDPH rates, they have been unsuccessful at completely preventing PDPH. There is evidence that a more effective preventative approach is to make a self-closing puncture in the dura, using a simple beveled needle with a specific angle and bevel orientation <sup>[2, 3]</sup>. This approach can also prevent PDPH headaches caused by over-penetration during epidural Anaesthesia (where dural puncture was never intended), since withdrawal of the needle allows the dural puncture to self-close.

The use of a 3-bevel (Quincke) needles is highly associated with PDPH as the geometry of the needle can create a "flap" that allows CSF leakage when inserted in standard horizontal position (open face of needle cephalad). Inserting the needle vertically (open face directed left or right) splits the dural

fibers and reduced the flap size. However older clinicians advocate completely inverting the needle and inserting horizontally but upside down so the open face of the Quincke is directed caudad. This also creates a flap but the geometry is inverted so that the flap is on the inside of the dura and is forced closed by hydrostatic pressure. The incidence of PDPD using a Quincke needle in standard orientation is approximately 3%-7%, Approximately 1.5%-3% when inserted vertically; Approximately 0.1% when inserted inverted. Evidence does not support the use of bed rest or intravenous fluids to prevent PDPH [4].

Some people require no other treatment than pain medications and bed rest. A 2015 review found tentative evidence to support the use of caffeine [5]. Persistent and severe PDPH may require an epidural blood patch. A small amount of the person's blood is injected into the epidural space near the site of the original puncture; the resulting blood clot then "patches" the meningeal leak. The procedure carries the typical risks of any epidural puncture. However, it is effective [6], and further intervention is rarely necessary. However, very short-term use of IV hydrocortisone was found effective in reducing headache following spinal Anaesthesia. But, its clear mechanism of action is yet to be determined. Large-scale studies are recommended to consider the steroid therapy as a standard treatment for post dural puncture headache [7].

The incidence of PDP H does not occur in all patients who received lumbar puncture for diagnostic or anaesthetic reasons and is found to be more common after Caesarean section in young parturients. The present study was designed to compare the incidence of Post Dural puncture headache using difference needle during spinal anaesthesia in cases of Caesarean section.

### Methodology

The study is conducted in Anugrah Narayan Magadh Medical College and Hospital in Surgery department. The approval of ethical committee had been taken along with the consent from the patients were also taken. Total 50 females having are group of 22-40 year were enrolled in to the study.

### Inclusion criteria

Females having a pregnancy of at least 26 weeks gestation with a single uncompromised fetus and uncomplicated pregnancy.

### Exclusion criteria

Females having foetal distress, toxemia of pregnancy, CVS/CNS disorders, neuromuscular diseases (e.g. myopathies and neuropathies), hypovolaemia, acid base disturbances and electrolyte imbalance, obese, infection on the back, on anticoagulant therapy and vertebral anomaly.

A thorough and detailed history of present and past medical illness, past history of anaesthetic exposure with concomitant history of drugs taking in pre-operative period was also recorded. Routine investigation including coagulation profile was done. General and systemic examinations of all the patients were done. All procedures were performed in sitting position by same anaesthesiologist with enough experience. The back of the patients was cleaned with Povidone Iodine and spirit and draped with sterile towels. Spinal anaesthesia

was performed using a midline approach at the L2-3 or L3-4 interspace using one of the above spinal needles and 0.5 % hyperbaric bupivacaine 2.5 - 3.0 ml was injected. After withdrawal of the needle, the patient was turned to the supine position with left uterine displacement.

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.

### Results & discussion

The data from the total 50 females undergone the caesarean sections were collected and presented as below. Spinal anaesthesia was performed using a midline approach. 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.

**Table 1:** Demographic Data

Parameter	Observations
Age	22-40 years
Weight	49 – 68 kg
Height	151.2 – 154.6
ASA I	44
ASA II	6

**Table 2:** Spinal Anaesthesia Procedure Related Parameters

Parameter	Observations
Previous spinal anaesthesia	
Yes	3
No	47
Previous history of PDPH	
Yes	2
No	48
Position of spinal anaesthesia done	
Sitting	50
Lateral	0
Size of spinal needle	
20 gauge	3
21 gauge	22
22 gauge	15
23 gauge	3
24 gauge	4
25 gauge	3
A successful block	
Yes	50
No	0
PDPH Positive using needles	
20 gauge	12
21 gauge	4
22 gauge	2
23 gauge	2
24 gauge	1
25 gauge	1
Total	22 Cases

There is a universal consensus about the fact that the thicker the lumbar puncture needles, the higher could be the incidence of PDPH. A cutting type of needle inserted through the dural wall tears off a number of fibres in the wall and a permanent

opening in it is ensured. The puncture site has typical crescent like appearance produced by the cutting type of needle. The anatomical feature of Dura is such that longitudinal dispersion of its fibre plus a copious interspersed of elastic fibres keeps the hole open once the dural fibres are cut. Cappe<sup>[8]</sup> suggested the use of a pencil point lumbar puncture needle and the tip of the pencil point needle separates the longitudinal dural fibres without producing serious injury.

When the needle is withdrawn the fibres return to a state of close approximation. In the present study, bevel of the needle was inserted parallel to the longitudinal dural fibres, so that these fibres are separated and are not damaged and an arrow slit like opening is obtained, with a greater tendency to contraction and plugging of the hole, decreasing the leakage of CSF. In a study by Ly Becker *et al.*<sup>[9]</sup> 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.

There are a few studies, which examine the technical difficulties involved in the use of different spinal needles. Post dural puncture headache is due to loss of CSF through the dural hole. Increase in blood volume by means of hydration facilitates choroid plexus to produce more CSF. Therefore increase in the cerebrospinal pressure by means of increasing the production of CSF will neutralise the loss due to leakage and when the balance is maintained, there should be no post spinal headache. All the patients were hydrated in a similar manner. There are some limitations in our study. The sample size was not sufficient for different size of needles. For this reason, it was not possible to determine the proportion of PDPH in each of small needles.

### Conclusion

In the present study for PDPH using three fine gauge needles for spinal anaesthesia, the incidence was found to be minimum with small size needles.

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