

## Comparison of 26G Quincke versus Whitacre Needles for Post Dural Puncture Headache in Obstetric Patients

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### Abstract

**Introduction:** Caesarean section under sub arachnoid block is practiced worldwide due to its advantages over general anaesthesia. The greatest drawback is PDPH. The incidence of PDPH can be decreased by decreasing the size of the spinal needle, or by using pencil point needles, which separate rather than cut through the dural fibers. **Materials and methods:** 60 consecutive women of ASA I and II, aged 18- 35 years, with uncomplicated pregnancy undergoing caesarian section under spinal anaesthesia were recruited. They were randomly allocated to two groups of 30 patients each. Patients in group I received spinal anaesthesia using 26G Quincke spinal needles and in patients of group II, 26G Whitacre needles were used. Patients were followed up for 7 days. **Observations:** The incidence of PDPH was 20% in group I and 3% in group II. This difference in incidence was statistically significant (p value 0.011). In group II, 1 patient developed mild PDPH on the second postoperative day, which resolved on the 4<sup>th</sup> postop day. In group I, 6 patients developed mild PDPH on the 2<sup>nd</sup> postop day. The headache remained mild and resolved on the 4<sup>th</sup> postop day in 3 patients. Of the remaining 3 patients, 2 developed moderate headache and 1 developed severe headache on the 3<sup>rd</sup> postop day. Headache resolved on the 5<sup>th</sup> day in these 3 patients. There was a statistically significant difference in the severity of PDPH. **Conclusion:** The incidence of PDPH was significantly lower with 26G Whitacre needle (pencil point) when compared with 26G Quincke needle.

**Keywords:** Post- Dural Puncture Headache; Spinal Anaesthesia; Caesarian Section; Quincke Spinal Needle; Whitacre Spinal Needle.

### Introduction

The term spinal anaesthesia was coined in 1885 by Leonard Corning [1]. Corning performed two procedures but never mentioned about the escape of cerebrospinal fluid. Professor August Bier and Dr. Hildebrandt performed lumbar puncture on each other and developed post dural puncture headache (PDPH) due to the loss of large volumes of CSF. And so historical reference to PDPH was recorded by August Bier in 1899.

It has been revealed that post dural puncture headache (PDPH) is the most common complication of dural puncture, occurring in up to 36.5% of spinal

taps. Usually PDPH starts 24 hours after the procedure and may last up to 1 to 2 days or even two weeks. Sometimes it is accompanied by nausea, vomiting, vertigo, tinnitus, diminished hearing and blurred vision. The headache is due to leakage of CSF through the dural puncture site, formed by the spinal needle, faster than the production rate of CSF. In order to counter PDPH, decreasing the size of the puncture hole was the solution. So the use of small gauge needles was recommended.

Cruickshank [2] and his colleagues have demonstrated that there is little or no leak with a 29G spinal needle. However other authors have reported practical difficulties such as loss of feel, danger of bending or damage even when using an

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introducer and CSF is very slow to appear at the needle hub unless aspirated. 25G Quincke is the most popular needle and is in widespread use due to the ease of handling. But the incidence of PDPH is 25% with the use of 25G Quincke needle.

The Quincke (cutting) needle cuts through the dural fibers. On the other hand, the pencil point (non-cutting) needle separates the dural fibers.

Caesarean section under sub arachnoid block is practiced worldwide due to its advantages over general anaesthesia. The greatest drawback is PDPH. According to an obstetric anaesthesiology study in 1999 [3], PDPH was the 3rd most common claim accounting for 15% of the obstetric claims.

So in order to interpret the frequency and severity of PDPH between these two types of needles (26G Quincke and 26G Whitacre) we assessed the same among patients under going spinal anaesthesia for elective caesarean section.

## Materials and Methods

Institutional ethical committee clearance was obtained prior to start of the study. With informed patient consent, 60 consecutive women undergoing elective Caesarean section under spinal anaesthesia were recruited. Patients were allocated into two groups by randomization. Group-I patients received spinal anaesthesia with 26G Quincke spinal needles. Group-II patients received spinal anaesthesia with 26G Whitacre spinal needles.

### *Inclusion Criteria*

- Patient age group 17-35 years
- ASA (American Society of Anesthesiology) physical status I and II
- Elective procedure
- Singleton uncomplicated pregnancy of gestational age more than 37 weeks

### *Exclusion Criteria*

- Patient refusal
- ASA physical status > II
- Emergency procedure
- Pregnancy Induced Hypertension/ Pre-eclampsia
- Cardiovascular disorders
- Hypovolemia/ shock

- Patients with neurological disease/deficit
- Infection at the site of insertion
- Anti-coagulation therapy/ history of bleeding diathesis
- History of migraine/occipital neuralgia
- Abnormal spine
- Failure of spinal anaesthesia and administration of general anaesthesia

### *Materials Required*

- Monitors
- Intravenous cannula (18G)
- 26G Quincke and 26G Whitacre spinal needles
- General Anaesthesia drugs in case of inadequate blocks

### *Anaesthetic Procedure*

Detailed history, general examination and routine investigations were done as for all patients. An 18G intravenous cannula was secured in all patients. One hour before the procedure, Injection Ranitidine 50mg and Injection Metoclopramide 10mg were administered intravenously in a slow manner. Patients were preloaded with 500mL Ringer Lactate.

On arrival at the operating room, monitors including Pulse Oximetry, ECG and Non Invasive Blood Pressure were connected to the patient, and the baseline values were recorded. Under strict aseptic precautions, subarachnoid blockade was administered in the sitting position. The needle was introduced by midline approach in the L2-L3 or the L3-L4 interspace. After free flow of cerebrospinal fluid, 2mL of 0.5% hyperbaric bupivacaine was injected into the subarachnoid space. On withdrawal of the needle, the patient was made to lie in the supine position with a left uterine displacement.

The level of sensory blockade was assessed. Vitals were recorded immediately and from then on for every three minutes till the end of the procedure. Any fall in blood pressure of more than 30% below the baseline was treated with intravenous fluids and Injection Ephedrine 6mg IV in an incremental manner. Patients were given Injection Oxytocin 10 units IM, 10 units IV after the delivery of the baby. Every patient was given at least 1L of crystalloid intra-operatively and followed by post-operative intravenous fluids at 1.5mL/kg/hr until oral fluids were started.

Post-operatively the patients were followed up for seven days for development of PDPH. The PDPH and its severity were assessed as per criteria given in Tables 1 and 2.

All patients were allowed to ambulate on the first post-operative day. Patients with headache were treated symptomatically with bed rest, adequate hydration, Injection Paracetamol 1g IV followed by Tablet Paracetamol along with caffeine twice to thrice daily.

## Observation and Results

The data was expressed as Mean and Standard Deviation. Paired t-test and Chi-square test was used to determine the statistical significance between the groups. A P value  $\leq 0.05$  was considered statistically significant.

### Demographic Profile

The demographic profile between the groups were compared in distribution of age, weight and height. There was no significant difference in distribution of age, weight and height between the two groups.

With regard to the ASA physical status, Group I's composition was 73% of ASA I and 27% of ASA II whereas in Group II there were 50% patients each of ASA I and II. There was a statistically significant difference found in the ASA level between the two groups (chi-square test applied, P Value 0.011).

### Lumbar Puncture Attempts

In Group I, 97% of the cases were done in the 1st attempt, 3% were done in the 2nd attempt and none of the cases needed a 3rd attempt. In Group II, 83% of the cases were done in the 1st attempt, 10% were done in the 2nd attempt and 7% of the cases needed a 3rd attempt. There was a statistically significant difference found in the number of lumbar puncture attempts between the two groups, as shown in table 4. (Chi-square test applied, P Value 0.001).

### Incidence of PDPH

In Group I, 80% of patients had no incidence of headache and 20% had PDPH whereas in Group II, 97% had no incidence of headache and 3% had PDPH. There was a statistically significant difference found in the incidence of PDPH between the two groups. (Chi-square test applied, p-value - 0.011).

**Table 1:** Criteria for PDPH

1.	Headache that occurred after mobilization
2.	Aggravated by erect or sitting position and coughing, sneezing or straining
3.	Relieved by lying flat
4.	Mostly localized in occipital, frontal or generalized

**Table 2:** Criteria for Severity of PDPH

Mild	No limitation of activity and no treatment required
Moderate	limited activity and regular analgesics required
Severe	Confined to bed, anorexic and unable to feed the baby

**Table 3:** Demographic profile

	Group I	Group II	p- value
Age (yrs) mean $\pm$ SD	27.03 $\pm$ 4.40	26.87 $\pm$ 4.67	0.616
Height (cms) mean $\pm$ SD	155.07 $\pm$ 3.83	154.80 $\pm$ 3.98	0.718
Weight (kgs) mean $\pm$ SD	73.27 $\pm$ 6.25	73.33 $\pm$ 6.48	0.187
ASA I : ASA II	73:27	50:50	0.011

**Table 4:** Lumbar puncture attempts

	Group I	Group II
1 <sup>st</sup> attempt	29/30 (97%)	25/30 (83%)
2 <sup>nd</sup> attempt	1/30 (3%)	3/30 (10%)
3 <sup>rd</sup> attempt	0/30 (0%)	2/30 (7%)

p- value- 0.001

**Table 5:** Incidence of PDPH

	Group I	Group II
No headache	24/30 (80%)	29/30 (97%)
PDPH	6/30 (20%)	1/30 (3%)

p value-0.011

**Table 6:** Severity of PDPH

Postoperative days	Group I	Group II	p- value
(no PDPH: mild: mod: sev)			
1	30:0:0:0	30:0:0:0	---
2	24:6:0:0	29:1:0:0	0.001
3	24:3:2:1	29:1:0:0	0.001
(no PDPH: mild: mod: sev: resolved)			
4	24:3:0:0:3	29:0:0:0:1	0.001
5	27:0:0:0:3	30:0:0:0:0	0.012

*Everity of PDPH*

In group I, 6 patients developed mild PDPH on the 2<sup>nd</sup> postop day. The headache remained mild and resolved on the 4<sup>th</sup> postop day in 3 patients. Of the remaining 3 patients, 2 developed moderate headache and 1 developed severe headache on the 3<sup>rd</sup> postop day. Headache resolved on the 5<sup>th</sup> day in these 3 patients. In group II, 1 patient developed mild PDPH on the second postoperative day, which resolved on the 4<sup>th</sup> postop day. There was a statistically significant difference in the severity of PDPH on the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> post-operative days (p- values of 0.001, 0.001, 0.001 and 0.012 respectively). No patient reported PDPH on the 6<sup>th</sup> and 7<sup>th</sup> post-operative day. Headache was treated conservatively in all patients.

**Discussion**

In a recent study, Anirban Pal et al [4], tried to find out whether a Whitacre needle of the pencil - point type is a better alternative over the classic cutting beveled, commonly used, Quincke spinal needle, in patients at risk of PDPH. 320 obstetric patients, in the age group of 20–36 years, ASA I and II, posted for Caesarean section under subarachnoid blockade, were randomly assigned into two groups. The incidence of PDPH was 5% in group Whitacre and 28.12% in group Quincke, and the difference in incidence was statistically significant (P<0.001). The observed incidence of PDPH in our study was 11.66% (7 out of 60). The incidence of PDPH in group Quincke was 20% (6 out of 30) and in group Whitacre was 3.33% (1 out of 30). The difference in incidence of PDPH was statistically significant (P=0.011).

In a study conducted in 2008 by Jan Mohammad Shaikh et al [5], the onset, frequency and severity of headache was studied. Of the patients who reported PDPH, the location was generalized in 10 patients, fronto-occipital in 7 and occipital in 4 patients. In our study, the headache was distributed over frontal and occipital radiating towards the neck. It was aggravated on straining and with upright posture, relieved by lying down. It was occasionally associated with nausea and vomiting.

Most headaches appear on the first and second post-operative day. In the analysis by Vandamet al [6], approximately 75% occurred by the end of the third post-operative day and 85% by the sixth post-operative day. In this study, none of the patients complained of headache on the first post-operative day and seven patients had complaints of the same on the second post-operative day.

In a study by Lynch et al [7], the mean duration of headache was 48 hours (range 24-64 hours) and 57.5 hours (8-80 hours) in 25G and 22G groups respectively. In our study, the duration of PDPH amongst four patients was approximately 48 hours and for three other patients the headache was for a duration of 48-72 hours.

The severity of PDPH ranges from mild to severe in which the patient was confined to bed. A study conducted by Brownridge et al [8], the severity of PDPH was mild in 8%, moderate in 3% and severe in 2.3% of the cases.

In this study four patients developed mild form of PDPH with no limitation of activity, two patients developed moderate form of PDPH with limitation of activity and one patient developed severe form of PDPH and was confined to bed associated with nausea and vomiting.

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### Conclusion

From this randomized controlled study of sixty patients undergoing caesarean section, it was concluded that the incidence of PDPH was significantly lower with 26G Whitacre needle (pencil point) when compared with 26G Quincke needle.

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