

STUDY OF POST DURAL PUNCTURE HEADACHE WITH 27G QUINCKE & WHITACRE NEEDLES IN OBSTETRICS / NON OBSTETRICS PATIENTS

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Abstract

The proposed study was carried out in the department of Anaesthesiology, Intensive care & Pain management, Himalayan Institute of Medical Sciences. Swami Rama Nagar, Dehradun.

A total of 120 patients of ASA I & II obstetric & non-obstetric undergoing elective/emergency surgery under subarachnoid block were included under the study.

Aim: To evaluate the frequency of PDPH during spinal anaesthesia using 27 gauge Quincke vs 27G whitacre needle in obstetric/non obstetric patient.

Observation: In our study patients were in the age group of 15-75 years. Most of the patients in our study belong to ASA Grade I. There was 2%, 1%, 4% and 3% hypotension in-group A, B, C, D respectively. There was 2%, 4% shivering in-group A, C respectively and 1% each in group B, D. In our study failed spinal with 27G Quincke needle was in one case (3.33%) in-group C where successful subarachnoid was performed with a thickened spinal needle 23G Quincke. There was no incidence of PDPH in-group A and D, while 1(2%) patient in-group B and 2(4%) in group C.

Results: All the three patients were for lower section caesarean section and were young and had undergone more than one attempt to perform spinal block. The headache severity was from mild to moderate and no epidural blood patch was applied.

Key words: 27G Whitacre, 27G Quincke needle, post dural puncture headache

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Introduction

Spinal anesthesia is one of the commonest techniques used in anaesthetic practice, though popular still it is not without any unwanted side effects and one of the common complications is post dural puncture headache¹.

Postdural puncture headache (PDPH) has been a complication of neuroaxial anesthesia since 1898 when Bier and Hildebradt produced a 100% incidence of this complication while performing spinal anaesthesia on each other².

The pathophysiology of PDPH has been investigated for decades. Two aspects of its pathophysiology are evident excessive loss of cerebro spinal fluid (CSF) through the dural puncture into the epidural space and resultant downward traction on intracranial vessels, which respond with painful vasodilatation^{3,4}.

Post dural puncture headache usually occurs 12-48 hours after dural puncture with frontal bilateral or occipital headache⁵.

Risk factors for PDPH have been exhaustively researched and includes patients characteristics like pregnancy, youth and female sex or intraoperative variables such as patient position, bevel orientation, type & size of needle, type & baricity of anaesthetic agent, addition of opioid and intraoperative sedation^{6,7}.

After tip design needle gauge is the second most important factor determining the rate of post dural puncture headache. To minimize such problem, pencil point conical tipped spinal needles like 26G Whitacre, 24G Sprotte and Green have become popular which are basically designed to spread dural fibres rather than cutting like Quincke. The incidence of PDPH is assumed to be less since pencil point needle separates dural fibres, rather than cutting it during dura puncture⁸.

PDPH may lead to patient distress, prolonged hospitalization and require an epidural blood patch.

Early studies have reported the incidence of PDPH with Quincke needle to range from 1.5-3.7% and as high as 10.4% and with Non-cutting needle to be 0.02 %. But later studies have shown the incidence with non-cutting Sprotte to be as high as 8.2 %^{9,10}.

For years after the first applications of Spinal

anaesthesia (SA) in obstetrics by Kreis, Doloris and Malartic in 1900, this method of analgesia was condemned by obstetric authorities. The high degree of complications, poor results and lack of understanding of the interaction between the physiological changes occurring in pregnancy with the changes associated with SA were cited as a reason for concern¹¹.

In the 1950s, it was the most widely used method of anaesthesia and analgesia in obstetrics but it fell out of fashion with the arrival of the epidural technique which allowed a continuous method of delivering analgesia with relatively few complications. Hypotension and the high incidence of PDPH were the two main reasons for the decline in the popularity of SA in the young, otherwise healthy pregnant population. With the development of newer needles, bevel designs and methods whereby incidence of hypotension can be minimized, spinal anaesthesia is making reappearance in obstetrical anaesthesia spheres¹².

As pregnant patients appear to be at the higher risk of PDPH than non-pregnant and would benefit greatly from the reduction in the rate of PDPH. Therefore we designed this study to compare the incidence of PDPH after use of 27G Quincke and Whitacre needle in obstetric and non-obstetric patients.

AIMS

To compare frequency of post dural puncture headache and failure rate of spinal anesthesia using 27G Quincke and Whitacre spinal needle in obstetric and non obstetric patients.

To compare the frequency of post dural puncture headache and failure rate between 27G Whitacre and Quincke spinal needles in obstetrics and non obstetrics patients individually.

Material & Methods

The proposed study was carried out in the Department of Anaesthesiology, Intensive Care and Pain Management, Himalayan Institute of Medical Sciences (HIMS), Dehradun. After taking due permission from institutional Ethics Committee, proper written consent was taken from the patients.

The study involved 200 patients of either sex; of

age group 14-75 years and ASA (American Society of Anaesthesiologists) grade I and II, admitted in for elective or emergency lower segment caesarian section and other surgical procedures. Patients were randomly allocated into four groups.

1. Group A – Non Obstetric patients with Whitacre 27 G.
2. Group B – Obstetric patients with Whitacre 27 G.
3. Group C – Obstetric patients with Quincke 27 G.
4. Group D – Non Obstetric patients with Quincke 27 G.

Exclusion criteria

5. Patient did not give consent.
6. Any incidence of local sepsis.
7. Pregnancy with PIH.
8. Pregnancy with fetal distress.
9. Patients with spinal deformity/surgery.
10. Multiple pregnancy.
11. Severe pregnancy induced hypertension.
12. Patients with coagulation profile deranged.

After detailed history, physical examination and routine investigations the patients were explained about the procedure.

Patients for elective surgery were kept fasting for 6 hours prior to spinal analgesia/anesthesia surgery and premedicated with Tab. diazepam 10 mg hs in the night prior to the day of surgery accordingly. The patients taken up for emergency cases were given inj. ranitidine 50mg iv, inj. metoclopramide 10mg iv. On arrival in operating room, IV cannulation was done on non-dominant hand with 18G canula and ringer lactate was started.

All the patients were blinded to the needle utilized. The anaesthetist conducting the procedure was not blinded as the two needles have different appearance making blinding impossible. In operating room each patient was continuously monitored with a pulse oximeter, an electrocardiogram and non-invasive BP were placed and baseline readings were noted.

The following data: patient's age, sex, height, weight, ASA classification, elective or emergency nature of the surgery, number of attempts, position during induction of spinal anesthesia (sitting or lateral)

and type of anesthetic agents (lidocaine or bupivacaine) administered to the patient were recorded. The patients were positioned in the left lateral or sitting position and instructed not to move while performing the procedure.

Under all aseptic precautions back of the patient was cleaned and draped as the hospital infection control protocol. After preparing the back with antiseptic solution local block with 2% lignocaine was given.

Lumbar puncture was performed in the midline between L₃₋₄ or L₄₋₅. The spinal needle was introduced with the ejection orifice parallel to the dural fibres. Upon entering the subarachnoid space, as evidenced by clear, free flowing CSF, the needle was rotated so that the ejection orifice was directed cephalad. Following injection, CSF was again aspirated to confirm placement of the needle and local anaesthetic solution in the subarachnoid space. 0.5% hyperbaric Bupivacaine 2.25–3.5ml was injected over 90 sec. After the block patient was placed in supine position obstetric patient were also given 15–20° left displacement of uterus until birth by keeping a wedge under right buttock. Sensory level was assessed bilaterally with the use of temperature (by cold water swab) and by pin prick at the midclavicular line while motor block was assessed by using Bromage score: -

(1 = unable to move feet or knees).

(2 = able to move feet only).

(3 = just able to move knees).

(4 = full flexion of knee and feet).

In cases of failed anesthesia or inadequate anesthesia even after 15 minutes general anesthesia was given.

No sedation was given to any patients intraoperatively. Oxygen (5 L/min) by facemask was given until delivery of the baby. Fluid therapy was maintained with lactate ringer solution (10 ml/kg/hr).

Heart rate, SpO₂, non-invasive arterial BP were evaluated at every 2 minutes for first 20 minutes after giving the block and then every 5 minutes subsequently until the end of surgery.

All episodes of hypotension nausea & vomiting, shivering, somnolence, respiratory depression, inadequate analgesia & pruritis were recorded.

Patients were observed on postoperative day 1, 2 and 3 for post dural puncture headache. Post dural puncture headache was defined if it fulfilled the following two criteria:

1. Location in the occipital/frontal areas of the head.
2. Exacerbation of symptoms while sitting or standing.

Table 1
Headache Severity¹³.

Mild	No limitation of activity No treatment required
Moderate	Limited activity Regular analgesics required
Severe	Confined to bed; anorexic Unable to feed baby

To analyze the data, ANOVA Scheffe's test made comparisons between the groups $p < 0.05$ was considered as statistically significant $p > 0.05$ was considered non significant, whereas $p < 0.01$ was considered as statistically highly significant. Data are presented as mean \pm SD, median (range) values and numbers (percent).

Observations

Patient's characteristics were comparable in all the groups. Most of the patients belonged to ASA grade I (Table 1). There was no significant difference in the ease of needle insertion, dose of local anaesthetic and the position in which the block was performed. In majority of the patients 182 (91%) the block was performed in sitting position.

Table 1
Demographic data of all the patients

	Group A	Group B	Group C	Group D
Age in Years Mean \pm SD	38.43 \pm 14.15	26.63 \pm 9.18	29.33 \pm 9.22	42.5 \pm 14.11
Weight in kg Mean \pm SD	57.46 \pm 8.51	52 \pm 7.61	54.76 \pm 8.34	56.25 \pm 7.72
Height in cm Mean \pm SD	167.53 \pm 9.31	143.66 \pm 13.89	149.33 \pm 14.90	165.03 \pm 9.54
ASA Grade I:II	38:12	42:8	43:7	40:10

Table 2
Number of attempts for performing subarachnoid block in all the groups

No. of attempts	Group A n=50 %	Group B n=50 %	Group C n=50 %	Group D n=50 %
One attempt	49 98	49 98	45 90	50 100
Two attempts	- -	1 2	3 6	- -
Three attempts	1 2	- -	1 2	- -
Failed			1 2	

Table 3
Identification of CSF in seconds

	Group A n=50 %	Group B n=50 %	Group C n=50 %	Group D n=50 %
Identification of CSF (sec)	6 \pm 4.47	6 \pm 3.74	6 \pm 2.23	6 \pm 6.36
Frank :Blood Mixed	49:1	48:2	49:1	49:1

Table 4
Height of sensory and motor blockade was comparable between 4 groups

	Group A		Group B		Group C	Group D
Time taken for the sensory block	10-15min		8-10min		8-10 min	10-15min
Vol. of local anaesth. 0.5% heavy Bupivacaine	3-3.5ml		2-2.25ml		2-2.25ml	3-3.5ml
Mean SD	2.93 ± 0.25		2.5 ± .29		2.58 ± .34	3.01 ± .33
Height of sensory block	T4	-	10		11	
	T6	2	18		17	-
	T 8	6	2		2	14
	T 10	20	-		-	15
	T 12	2	-		-	1
Height of motor block (Bromage Motor Score)	1 or 2	45 pt 5 pt	47 pt 3pt		48pt 2pt	46pt 4pt
	3 or 4	-	-		-	-

Table 5
Incidence of intraoperative complications PDPH and associated symptoms

Incidence	Group A		Group B		Group C		Group D	
	N1	%	N2	%	N3	%	N4	%
PDPH	-	-	1	2	2	4		
Hypotension	6	12	4	8	4	8	4	8
Shivering	4	8	2	2	1	2	4	4
Nausea/ Vomiting	-	-	1	2	-	-	1	2

In this study the most common intraoperative complication observed was hypotension in 18 (9%) patients followed by shivering 11(5.5%).

Table 6
Incidence of PDPH in 4 groups

Groups	No. of PDPH	Onset	Severity	Blood patch required
Group A	0	-	-	-
Group B	1	> 24 Hrs	Mild	No
Group C	2	> 24 Hrs > 36hrs	Mild - Moderate	No
Group D	0	-	-	-

Discussion

PDPH remains a frequent complication of spinal anesthesia in the obstetrical population. It occurs most commonly in young female patients, particularly parturient and correlates with the configuration of spinal needle used¹⁴.

In the last 50 years the development of fine gauge spinal needles has enabled a significant reduction in the incidence of PDPH. In this study we compared two different lumbar puncture needle designs with smaller needle diameter¹⁵.

In the present study of 120 patients for elective or emergency surgery (Obs vs non-obs) under spinal anaesthesia with 27 gauge spinal needles (Quincke vs

Whitacre), of ASA grade I & II, were studied. After taking informed consent, detailed preanaesthetic checkup and necessary investigations these patients were randomly allocated to 4 groups of 30 patients each. These 4 groups were:

13. Group A – Non Obstetric patients with Whitacre 27 G.
14. Group B – Obstetric patients with Whitacre 27 G.
15. Group C – Obstetric patients with Quincke 27 G.
16. Group D – Non Obstetric patients with Quincke 27 G.

There was significant difference in mean age of

patients in Group A and B, Group A and C and Group B and D ($p < 0.05$). In groups A and D the patient were posted for non obstetric surgery and the age ranged from 15 to 72 years while in group B and C the subjects were young healthy parturients and their age ranged from 18 to 40 and 22 to 40 years. But statistically there were no significant differences between the groups A and D ($P > 0.05$) and group B, C. When the present study is compared with others using 27 gauge Whitacre and Quincke spinal needles, it appears that there was no difference in the age group of the subjects¹⁶.

There was significant difference in mean height of patients in Group A and B, Group A and C and Group B and D ($p < 0.05$). This could be because in group A and D majority of the patients were male who were comparatively taller than their female counterparts in group B and C.

In obstetric patients, the height of sensory block was upto T4 or T6 while in non-obstetric patients; it was from T6 to T10. There were statistically no significant differences between the groups with respect to the maximum sensory block height reached. The degree of motor block with the use of Bromage criteria showed a motor score of 1 or 2 in all the patients. This is in accordance with a study conducted by Tabedar S et al on 60 parturients where in Quincke group the sensory block achieved was T4 in 26 patients T6 in 1 and T8 in 1 patient and no anaesthesia at all in another 2 parturients as compared to T4 in 29 and T3 in 1 in Eldor group. The degree of motor block by all the patients was 1 or 2 in both the groups¹.

In-group C the sub arachnoid block in 1st attempt was in only 25 (83.34%). In 3 patients second attempt was used and in 1 patient sub arachnoid block was achieved third attempt where the patient was then given a successful sub arachnoid block with 23G Quincke spinal needle. This patient post operatively developed PDPH of operatively intensity and was advised bed rest, iv fluids and analgesics. The PDPH resolved after 3 days.

This is in accordance with the study conducted by de Diego Fernandez et al¹⁶, Bano et al¹⁷ and Shutt Le et al¹⁸ who concluded that fewer cases of PDPH developed and the puncture is easiest to accomplish with 27G Whitacre needle than with a Quincke point spinal needle. This is in contrast to studies conducted

by Jost U et al¹⁹ and Tabedar S et al¹ who observed that Quincke needle was easier to handle, insert and was cheaper.

As compared to a study by Tabedar et al¹ who observed blood mixed CSF in 8 patients in whom spinal anaesthesia was performed with 25G Quincke needle and none in the Eldor spinal needle group, we observed blood mixed CSF in 1 patient each in all four groups. In our study we limited the use of the Quincke needle with the bevel in the parallel orientation as it has been found to decrease the incidence of PDPH after spinal anaesthesia²⁰.

In our study we observed that hypotension (8.3%) following Spinal Anaesthesia remains common place in caesarean delivery. Its incidence and severity depend on the spread of the block, circulating blood volume and aortocaval compression²¹. In our present study none of the patient required ephedrine for correction of hypotension. It was managed with i.v. fluid and oxygen supplementation.

In contrast to our study Campbell et al did not observe hypotension in their study and stated that it may be the result of greater prehydration²².

Bradycardia results from the blockade of sympathetic cardio accelerator fibers and decreased venous return to the heart²³. None of our patients experienced bradycardia during the intraoperative period, probably because the level of sensory blockade achieved in our study did not exceed T4.

In our study we observed shivering in group A, B and D 2% while in group C 1%. The exact mechanism of shivering under SA has not been fully established. Possible contributing factors that decrease the core temperature such as: (1) sympathetic blockage which results in peripheral vasodilatation, increased cutaneous blood flow and subsequently increased heat loss via the skin (2) a cold operating room, or the rapid infusion of crystalloid solutions at room temperature (3) decrease the vasoconstriction and shivering thresholds or (4) the direct effects of cold anaesthetic solution upon thermosensitive structures within the spinal cord²⁴.

We observed nausea and vomiting in group B and D, one patient each. This nausea vomiting could be a secondary effect relating to maternal hypotension

which in turn causes decreased cerebral blood flow.

Incidence of Post Dural puncture Headache in obstetric patients using 27G Quincke & Whitacre spinal needles.

The incidence of headache has varied greatly between the studies. Our study has observed age; pregnancy, number of dural punctures and tip of the needle to be the important determinant for PDPH.

In group B 1 patient (2%) developed PDPH while in group C 2 patients (4%) developed PDPH. After 24 hours of performing sub arachnoid block in 2 patients and after 36 hours in 1 patient in group C. The severity of headache ranged from mild to moderate. No epidural blood patch was required in any patient. Headache

was relieved with reassurance, rest, analgesics and iv fluids. In all the patients the headache apart from the needle type the contributing factors could be that all the patients were young and pregnant.

As compared to other studies we did not observe PDPH in non-obstetric patients but 10% parturient developed PDPH.

Conclusion

We can conclude from this study that in non obstetric cases the incidence of PDPH is same whichever needle is used while in obstetric cases the incidence of PDPH is 2% with 27G Whitacre needle and 4% with Quincke spinal needle

Studies in obstetric patients

		Study	Sprotte	Quincke	Whitacre	Results
1.	Shutt Le et al 1992. ¹⁸	On 150 women	-	26G	25G	PDPH more in Quincke (4%) Whitacre (1%)
2.	Campbell et al 1993 ²²	300 women	24G	-	25G	PDPH more in Sprotte (5%) Whitacre (2%)
3.	Hwang JJ, HO ST et al. 1995 ²⁵	90 women	-	26G	25G	PDPH more in Quincke (6.66%) Whitacre (1.52%)
4.	Jost U et al 2000 ¹⁹	600 women	-	26G	27G	PDPH more in Quincke (6%) Whitacre (1%)
5.	Landau R et al 2001 ²⁶	400 women	-	-	25G & 27G	PDPH more in 25G Whitacre (1.32%) 27G (0.03%)
6.	Tabedar 2003 Obstetric patients ¹	60 pregnant women	-	25G	26G	PDPH more in Quincke (8%) Whitacre (2.2%)
7.	Bano F et al 2004 ¹⁷	100 women	-	25G	25G	PDPH more in Quincke (4%) Whitacre (0.75%)
8.	Gosch UW et al 2005 ²⁷	18-30 yrs	-	22G	27G	PDPH more in Quincke (5.75%) Whitacre (0.5%)
9.	Our study 2009.	Women 60 women	-	27G	27G	PDPH more in Quincke (6.67%) Whitacre (3.33%)

Studies showing incidence of PDPH in non obstetric patients

		Study	Sprotte	Quincke	Whitacre	Results
1.	Lynch et al 1992 ²⁸	400 < 40 yrs pts	-	29G	22G	PDPH more in Quincke (3.5%) Whitacre (2%)
2.	Buettner et al 1993 ²⁹	400 pts	-	25G	25G	PDPH more in Quincke (8.5%) Whitacre (3%)
3.	Hafer J et al 1997. ³⁰	500 pts	-	26G	27G	PDPH more in Quincke (17.6%) Whitacre (8.8%)
4.	Vallejo MC et al 2000 ³¹	1000 pts	-	26G	25G	PDPH more in Quincke (8.7%) Whitacre (2.8%)
5.	De Diego et al 2003 ¹⁶	1555 pts	-	27G	27G	PDPH more in Quincke (1.85%) Whitacre (0.53%)
6.	Santanen U et al 2004 ¹⁰	529 pts	-	27G	27G	PDPH more in Quincke (2.70%) Whitacre (0.37%)
7.	Luostarinen L et al 2005)	80 pts	22G	-	22G	PDPH more in Sprotte (42%) Whitacre (33%)
8.	Kokki et al 2005 ³³	300 pts	26G	-	27G	PDPH more in Sprotte (10%) Whitacre (2%)
9.	Our study2009	60 pt	-	27G	27G	No difference

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