

Original Research Article

Comparison of post-dural puncture headache- incidence and severity in obstetric patients after spinal anesthesia for caesarean section with 25G and 27G quincke needle

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ABSTRACT

Background: The use of neuraxial anesthesia for caesarean section has dramatically increased in last 2 decades because it is easier to perform, safe to the mother and the fetus, and has a high degree of success rate. However, post-dural puncture headache is a well-known complication of spinal anesthesia. It is a common and incapacitating complication following dura-arachnoid puncture and results in increased morbidity, prolonged hospital stay, increased cost, and patient dissatisfaction.

Methods: It was a double-blinded comparative study conducted on 75 consecutive pregnant patients meeting the inclusion criteria of the study. Patient and anesthesiologist involved in collection of data were blinded to the gauge of the needle used. Standard anesthesia protocol was followed in all the patients and spinal anesthesia performed using 25G Quincke needle in 38 patients and 27G Quincke needle in 37 patients.

Results: we included 75 consecutive patients in the age group 20-35 years in the study. Overall incidence of PDPH was 14.67% (11/75) in present study. 23.68% (9/38) and 5.4% (2/37) patients who received spinal anesthesia with 25G and 27G needles respectively developed PDPH. Difference was statistically insignificant.

Conclusions: The incidence of PDPH was less in patients who underwent caesarean section under spinal anesthesia with 27G needle compared to that of patients in whom block was performed using 25G needles. However, there was no definite advantage of 27G Quincke needle over 25G Quincke needle as far as the incidence of PDPH is concerned.

Keywords: Caesarian section, PDPH, Spinal anaesthesia

INTRODUCTION

The use of neuraxial anesthesia for caesarean section has dramatically increased, and the data since 1997 suggest that the use of general anesthesia for caesarean section has been steadily declining.¹ Neuraxial anesthesia

techniques have several advantages, like decreased risk of failed intubation and aspiration of gastric contents, avoiding the use of depressant agents, and the ability of mother to remain awake and enjoy the birthing experience, and reduced blood loss.² Spinal anesthesia seems to be particularly well suited for caesarean section

because of rapid onset of dense block that is achieved, moreover, failures are very infrequent.³ However, since the introduction of spinal anesthesia, post-dural puncture headache has remained a well-recognized complication. The overall incidence of post-dural puncture headache varies from 0.1%-36%.⁴

It may be mild or severe and debilitating headache, and may be associated with neurological symptoms. Post-dural puncture headache occurs very rarely immediately after dural puncture. 60% of PDPHs will begin within 2 days of having had dural puncture, 90% within 3 days, though it may occur up to 14 days later.⁵

Classically PDPH is a bilateral fronto-occipital headache, radiating to the neck and shoulders, exacerbated within 15 minutes of standing or sitting, is aggravated by coughing or straining and is alleviated within 30 minutes of recumbency, and further so by lying prone.⁶ It may be associated with nausea (up to 60% of cases), vomiting, hearing loss, tinnitus, vertigo, dizziness and paraesthesia of the scalp. Photophobia, diplopia, and blindness have also been described.⁷ These symptoms may lead on to grand mal seizures and sub-dural haematomas.

Factors increasing the incidence of post-dural puncture headache are female gender, pregnancy, younger age, history of headache prior to the dural puncture, beveled needle, larger needle and the number of attempts.⁸ Post-dural puncture headache causes considerable morbidity and is a complication that should not to be treated lightly. The parturient is at particular risk of PDPH because of her sex and young age.⁹

The relatively high incidence of postdural puncture headache in the obstetric patients is a major disadvantage of subarachnoid block. The most important modifiable risk factors for patients whose dura is intentionally violated (e.g., spinal anesthetic, CSE, DPE) are related to the needle selection.⁷ Needle gauge is the second most important factor after tip design that determines the rate of post-dural puncture headache.¹⁰

This comparative study was conducted to observe the frequency and severity of post-dural puncture headache after spinal anaesthesia for caesarean section using 25G and 27G Quincke cutting spinal needles.

METHODS

This cross-sectional double-blinded comparative study was conducted on 75 consecutive ASA I and II pregnant patients undergoing elective or emergency caesarean section after obtaining approval from institute ethical committee.

The patients selected were from the age group of 20- 35 years with a single uncompromised fetus and uncomplicated pregnancy. Patients meeting the inclusion criteria were randomly allocated to one of the two groups.

Patients presenting with foetal distress, toxemia of pregnancy, CVS/CNS disorders, neuromuscular diseases (eg. myopathies and neuropathies), hypovolaemia, acid base disturbances and electrolyte imbalance, obese, infection on the back, on anticoagulant therapy and vertebral anomaly were excluded from the study. Before recruiting the patient to the study, detailed written informed consent was taken. Patients were divided into two groups.

Group I: Patients who received spinal anaesthesia with 25 gauge quincke needle consisted of 38 patients.

Group II: Patients who received spinal anaesthesia with 27 gauge quincke needle consisted of 37 patients.

Preoperative evaluation included detailed history, general, spine examination and routine laboratory investigations. All patients' received gastric aspiration prophylaxis. In the operating room, 3-lead ECG, non-invasive blood pressure and pulse oximetry were recorded. A good intravenous access was established. After recording baseline vital parameters patients were preloaded with 500-1000ml of crystalloid solution. Standardised anaesthetic technique was employed for every patient.

After proper asepsis spinal anesthesia was performed by the same anesthesiologist using 25 gauge or 27G Quincke needles, at L3-L4 or L4-L5 interspaces with patients in the sitting position. All the patients received a standard local anesthetic consisting of hyperbaric Bupivacaine 0.5% 12.5 mg plus fentanyl 12.5 µg injected over 20-30 seconds. After withdrawal of needle patients were placed in supine position with the left uterine displacement and oxygen was administered via a facemask at the rate of 5 liters/min.

After about five minutes, level of block (sensory, motor) was assessed. Surgeons were asked to proceed for surgery after adequate block to T5 was confirmed using hot and cold test-tubes. Demographic details of each patient were filled in the study questionnaire during the procedure.

Each patient was visited 6, 24, 36, 48 and 72 hours postoperatively to check for the presence or absence of PDPH, its onset and severity. PDPH was defined as headache aggravated by upright position, exacerbated by coughing or straining and relieved or reduced by lying flat. Severity of headache was graded as per Lybecker classification.¹¹

Patients diagnosed as having PDPH were not discharged till they became symptom free. Patients were advised to take bed-rest, avoid straining and were additional fluids and analgesics in the form of NSAIDs, Paracetamol or opioids as required. All data was entered into the SPSS (statistical package for social science) version 19 and statistical analyses were performed. Incidence of PDPH

with different needle was compared by using Chi-square test. $p < 0.05$ was considered significant.

Table 1: Lybecker classification.

Category	Signs and symptoms
Mild	<ul style="list-style-type: none"> • Postural headache with slight restriction of daily activity • Not bedridden • No associated symptoms • Responds well to non-opiate analgesics.
Moderate	<ul style="list-style-type: none"> • Postural headache with significant restriction of activity • Bedridden part of the day • With or without associated symptoms • Requires addition of opiate derivatives
Severe	<ul style="list-style-type: none"> • Postural headache with complete restriction of activity. • Bedridden all day • Associated symptoms present • Not responsive to conservative management

RESULTS

A total of 75 patients were included in the study. The patient characteristics like age, weight, height and ASA grades were comparable in both the groups (Table 2).

Table 2: Demographic distribution.

	Group I mean (SD)	Group II mean (SD)
Age (years)	25.6 (5.5)	26.2 (4.8)
Weight (kg)	53.4 (4.8)	54.1 (3.9)
Height (cm)	153.1 (2.2)	152.8 (3.8)
ASA		
I	27	24
II	11	13

Out of the total of 75 patients, 35 patients underwent elective caesarean section, 16 in Group I and 19 in Group II whereas 40 patients had an emergency caesarean section (22 in Group I and 18 in Group II). Indications for caesarean section were varied like failure of normal progression of labor (n=36), cephalopelvic disproportion (n=16), bad obstetric history (n=13), obstructed labour (n=3), and post maturity (n=7).

Overall 35 parturients (46.67%) complained of headache, but only 11 (14.67%) presented with headache showing features consistent with the definition of post-dural puncture headache. Out of these 11 patients, 9 patients belonged to group I and 2 patients to group II. The difference in PDPH between groups was not statistically significant. None of the patients developed PDPH during

first 24 hours of the procedure. In nearly all the patients PDPH resolved within 24 hours of treatment. 2 patients in group I had headache lasting more than 24 hours. 10 patients out of these 11 had mild headache and responded well to conservative management and one patient in Group I had moderate headache requiring weak opioids additionally.

Table 3: Post-dural puncture headache.

	Group I (n=38) & %	Group II (n=37) & %
Incidence	09 (23.88%)	02 (5.4%)
Onset		
6 hours	-	-
24 hours	-	-
36 hours	3	1
48 hours	5	-
72 hours	1	1
Severity		
Mild	8	2
Moderate	1	-
Severe	-	-
Number of attempts/PDPH		
1	34/5	31/0
≥1	4/4	6/2
Duration		
<24 hours	7	2
25-48 hours	2	-
>48 hours	-	-

Patients with mild PDPH were given conservative management in the form of adequate hydration, regular simple analgesia (NSAIDS, Paracetamol) and oral caffeine 200mg tds and all the patients responded well. 1 patient in Group I developed moderate PDPH and this patient in addition to receiving conservative management was treated with tramadol 50-100mg qds and was prescribed laxatives. Epidural blood patch was discussed with this patient, nevertheless, was not required.

DISCUSSION

The present trend of the anesthetic technique in caesarean section is spinal anesthesia because it's easier to perform, safe to the mother and the fetus, and has a high degree of success rate. However, post-dural puncture headache is a well-known complication of spinal anesthesia. It is a common and incapacitating complication following dura-arachnoid puncture and results in increased morbidity, prolonged hospital stay, increased cost, and patient dissatisfaction. Therefore, PDPH remains a cause for concern for anaesthesiologists and many studies have been published describing its pathophysiology, prevention and treatment.¹²⁻¹⁴ The signs and symptoms arise due to creation of a hole in the dura-arachnoid leading to the leakage of cerebrospinal fluid. This loss of cerebrospinal fluid creates traction on the cranial contents

and meninges and reflex cerebral vasodilation. Also sudden decrease in CSF volume may activate adenosine leading to arterial and venous vasodilatation and subsequently clinical symptoms of PDPH.¹⁵

Clinical features range from mild headache with no limitation of activity to very severe and distressing headache. Many factors influence the frequency of PDPH such as age, gender, pregnancy, needle size and type. The frequency of disabling headache after dural puncture in spinal anaesthesia ranges from 0.3 to 20%. The headache is self-limiting and 88% resolve with simple measure without intervention.¹⁶ In the present study 35 (46.67%) patients reported having headache after spinal anaesthesia. 32% of these had non-specific mild headache, most of them presenting within first 6-12 hours and were not classified as PDPH.

Overall incidence of PDPH after intentional dural puncture varies from 0.1-36%.⁴ The most important modifiable factor determining the incidence of PDPH after spinal anaesthesia are needle gauge and tip design. One of the authors reported an incidence of 40% with a 20 G needle, 25% with a 25G needle, 2-10% with a 26G needle, and less than 2% with a 29G needle.¹⁴ The observed incidence of PDPH (14.67%) in our study was in accordance with the above finding. The incidence of PDPH was 23.68% in Group I (25G Quincke needle) and 5.4% in Group II (27G Quincke needle). The difference in PDPH between groups was not statistically significant. All the patients diagnosed with PDPH were managed conservatively and none of the patients required epidural blood patch.

As all the patients of this study were in the same age group and gender, and also since similar needle types (Quincke) were used, it appears that needle size did affect the occurrence and severity of PDPH. This assertion is substantiated by data from Turnbull and Shepherd that has directly linked the needle size with the incidence of PDPH. After reviewing different studies, the data they compiled has shown the incidence of 40% with 20G; 3%-25% with 25G; 1.5(5.6%) with 27G, and less than 2% with 29G Quincke needles.¹⁴ Even as the incidence of PDPH is <2% with 29G Quincke needle, failure of subarachnoid block is common due to technical difficulties with finer gauge needles.^{17,18} Therefore, 25G, 26G, and 27G Quincke needles are in widespread use. In another study conducted by Shah et al on 75 patients to determine the incidence of PDPH following spinal anaesthesia with 25G Quincke, 27G Quincke, and 27G Whitacre needles, they found that 9 patients had post-dural puncture headache and the incidence of PDPH was 20%, 12.5% and 4.5% with 25G Quincke, 27G Quincke, and 27G Whitacre needles respectively.¹⁹ The observations in both these studies correlated with that of our findings.

In the present study all the patients in group I (4/4) who underwent Subarachnoid block with multiple attempts

developed PDPH, whereas in group II (6/2) only 2 patients developed PDPH and both had more than 1 attempt at Subarachnoid block.²⁰ Present findings are in congruence with that of Rasooli S et al whose observations again linked the occurrence of PDPH with multiple attempts at subarachnoid block.

Post-dural puncture headache being a debilitating complication of spinal anaesthesia has been extensively researched. There is a lot of published data suggesting that besides needle gauge, tip design can also considerably affect the incidence of PDPH. Hart and Whitacre, in the 1950s, designed the first pencil-point needle and claimed a decrease in incidence of PDPH from 5 to 2%, using 20 gauge needles.²¹ Similarly, Vallejo et al in their study of one thousand and two obstetric patients, undergoing elective Caesarean delivery, studied the difference in incidence of PDPH, using five different types of spinal needles, and found that the 25G Quincke needle had a higher frequency of PDPH compared to the pencil-point needles (which included 25G Whitacre).²² Another study conducted by Shaikh et al on 480 patients who were given spinal anaesthesia with 25G and 27G Quincke needles and 27G Whitacre spinal needles found that 27G Whitacre spinal needles had favorable outcome compared to other two needles.²³

We did not observe a statistically significant reduction in the incidence of PDPH by using the 27G Quincke spinal needle compared to the 25G Quincke needle (5.4% versus 23.68%, *P* value>0.05). We suggest additional studies be conducted to see the impact of tip design on the incidence of post-dural puncture headache to attain greater patient satisfaction.

CONCLUSION

We concluded that there was no statistically significant difference in the incidence of post-dural puncture headache in patients who underwent spinal anaesthesia using 27G Quincke needle compared to those in whom block was performed using 25G Quincke needle. Ostensibly literature on PDPH suggests that non-cutting pencil-point needles offer advantage over cutting needles with respect to the frequency and severity of PDPH, therefore, further studies in this field should be conducted to determine the impact of tip design on the incidence of PDPH.

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