

Comparison of 27 G Quincke and 25 G Quincke Needles for Post Dural Puncture Headache in Caesarean Section

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Abstract

Introduction: Although modern anaesthesiology has made great progress in the last decades and spinal anaesthesia is popular for its effectiveness, Post Dural Puncture Headache (PDPH) is a significant and well known complication of spinal anaesthesia that may be incapacitating for patients. A few decades ago less refined and thicker spinal needles were being used and the incidence of PDPH was high. But within the last 15 years more refined and thinner needles have been used and the incidence of PDPH is grossly reduced.

Objective: To compare the incidence and severity of post dural puncture headache using 25 G Quincke and 27 G Quincke needle during spinal anaesthesia in case of caesarean section.

Materials and Methods: This randomized prospective study was carried out in the Border Guard Hospital, Dhaka, during the period of January to July, 2015. Patients were selected randomly from the age group of 20-35 years having a pregnancy of at least 34 weeks gestation with a single uncompromised fetus and uncomplicated pregnancy. Patients with a history of migraine, convulsion, cerebrovascular accident, Pre-eclampsia, eclampsia, spinal deformity, coagulopathy or previous neurological disease were excluded. They were randomly allocated into two groups. Each group consisting of 50 patients. Data was collected by interviewing and observation results. Data were processed and analyzed by using statistical test.

Results: There was no statistically significant difference found in age, height, weight and ASA status between two groups. 27G Quincke needle had significantly higher failure rate of successful lumbar puncture in first attempt than the 25G Quincke needle (20% vs 6%, $P < 0.05$). There was no difference

difference regarding the incidence of intraoperative complications between two groups. The overall incidence of PDPH was 2(4%) in group A and 12 (24%) in group B ($P < 0.05$). Decreased severity of headache was noted in the 27G group Quincke needle. There was no difference regarding the duration of headache in between two groups.

Conclusion: This study suggests that the risk of PDPH was much lower in 27G Quincke needle as compared to 25G Quincke needle though it had a higher failure rate of successful lumbar puncture in first attempt. For spinal anaesthesia 27G Quincke needle should be used.

Key-words: 27 G Quincke, 25 G Quincke Needle, Post Dural Puncture Headache, Caesarean Section.

Introduction

Spinal anaesthesia is one of the oldest modalities for providing pain relief in patient undergoing surgery. Its fast and efficient effectiveness in addition to an acceptable complication rate makes it very reliable and safe resulting in a world-wide application¹. In contrast to this, PDPH remains a troublesome complication of spinal anaesthesia which occurs in 36.5% of patients receiving spinal anaesthesia². In 1898 Bier suffered and was the first to report post lumbar puncture headache (PDPH). He proposed that ongoing leakage of cerebrospinal fluid (CSF) through the dural puncture site was the cause of the headache. This belief is maintained today; it is supposed that CSF production, resulting in low CSF volume and pressure. Up to date there is still no approach which has demonstrated to offer complete prevention or treatment of PDPH. A few decades ago less refined and thicker spinal needle were being used and the incidence of PDPH was high^{3,4}. The currently proposed suggestion regarding prevention of PDPH

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consists of choosing the optimal needle size and tip in addition to technique of insertion⁵. The incidence of headache is 70% if the needle size is between 16 and 19G, 40% if the needle size is between 20 to 22 G and 12% if the needle size is between 24 to 27G⁶. It is found to be more common after caesarian section in young parturient. They would be benefited greatly from a reduction in the rate of PDPH. Therefore the present study was designed to compare the incidence of post lumbar puncture headache after use of 25G Quincke and 27G Quincke needle during spinal anaesthesia in case of caesarean section.

Materials and Methods

This prospective study was carried out in the anaesthesia department of Border Guard Hospital, Peelkhana, Dhaka, Bangladesh, during the period of January to July, 2015. Following Institutional Ethical Committee approval and written informed consent patients were selected randomly from the age group of 20-35 years having a pregnancy of at least 34 weeks gestation with a single uncompromised fetus and uncomplicated pregnancy. Patients with a history of migraine convulsion, cerebrovascular accident, preeclampsia, eclampsia, spinal deformity, coagulopathy or previous neurological disease were excluded.

They were randomly allocated into two groups each group consisting of 50 patients.

Group A: Patients who received spinal anaesthesia with 27G quincke needle.

Group B: Patients who received spinal anaesthesia with 25G quincke needle.

Following intravenous administration of one liter of Hartmann's solution spinal anaesthesia was given in sitting position by the same anaesthesiologist using either 25G or 27G Quincke needle. Standard monitoring (heart rate, blood pressure) was ensured before the start of the anaesthetic procedure and thereafter at five minutes intervals.

A gynaecologist not knowing the type of needle used, did postoperative observations. On the first, second, third and fourth postoperative day patient were enquired for possible occurrence of spinal anaesthesia induced headache. The criteria for PDPH

and its severity were assessed by following-criteria:

Characteristics of PDPH⁷:

1. Bilateral headaches.
2. Usually occurs within 24-48 hours after dural puncture.
3. Worsens within 15 min of resuming the upright position.
4. Disappears or improves within 30 min of resuming the recumbent position.

Criteria for severity of PDPH⁸:

Mild: No limitation of activity

No treatment required

Moderate: Limited activity

Regular analgesics required.

Severe: Confined to bed; anorexic

Unable to feed baby

Women who developed PDPH were managed on pain medications conservatively. Data was analyzed on SPSS version 15. Age height and weight of the patients were presented in Mean±SD. Frequencies and percentages were presented for American Society of Anaesthesiology (ASA) physical status, PDPH and its severity. Chi square test was applied to compare PDPH and its severity between two groups. P<0.05 was considered level of significant.

Results

Patient's characteristics are shown in Table-I. Value of age, body weight, height and ASA status are expressed as mean±SD. There was no statistically significant difference found in age, height, weight, and ASA status between two groups. Successful dural puncture in 1st attempt was 40 (80%) in group A and 47(94%) in group B (Table-II). 10(20%) in group A and 3(6%) in group B required more than one attempt for successful dural puncture. Statistically significant result was observed (P>0.05).

Table-III shows the incidence of intraoperative complications. In this study 09(18%) patients in group A and 13(26%) patients in group B were complicated by intraoperative hypotension. 5(10%) patients from both group experienced shivering during the intraoperative period. We observed 4(8%) patients from group A and 6(12%) patients from group B developed nausea or vomiting.

The overall incidence of PDPH was 2(4%) in group A and 12 (24%) in group B as shown in Table-IV. Statistically significant result was observed ($P < 0.05$). Table-V shows the comparison of onset, severity and duration of PDPH in both groups. None of the patients experienced headache on 1st post-operative day in either group. On 2nd post-operative day 1(2%) and 7(14%) patients experienced headache in group A and group B respectively. On 3rd postoperative none in group A and 4(8%) in group B developed headache. 1(2%) from each group experienced headache on 4th post-operative day.

Regarding the severity of headache, mild pain was observed in 2(4%) and 5(10%) in group A and B respectively. None in the group A experienced moderate to severe headache whereas 4(8%) and 3(6%) in group B experienced moderate and severe headache. 2(4%) in group A and 10(20%) in group B, the headache lasted 25-48 hours. None in group A and 2(4%) in group B, the headache lasted >48 hour.

Table-I: Demographic data of all the patients

Variables	Group A (n=50)	Group B (n=50)
Age in years Mean±SD	Mean=25.74±4.4	Mean = 25.72±4.3
Weight in kg Mean ± SD	Mean = 68±6.7	Mean = 68.34±7.5
Height in cm Mean ± SD	Mean = 153.98±2.7	Mean = 154.36±2.8
ASA I	41(82%)	40(80%)
ASA II	09(18%)	10(20%)

Table-II: Successful dural puncture in first attempt

No of Attempts	Group A (n=50)		Group B (n=50)		P Value
	Observed Cell Totals (Expected Cell Total) [chi-square statistic]	%	Observed Cell Totals (Expected Cell Total) [chi-square statistic]	%	
1 attempt	40 (43.50) [0.28]	80%	47 (43.50) [0.28]	94%	0.03752*
>1 attempt	10	20%	3	6%	0.01876*

*The result is significant at $p < 0.05$.

Table-III: Incidence of intraoperative complications

Variables	Group A (n=50)		Group B (n=50)		P Values
	Observed Cell Totals (Expected Cell Total) [Chi-square statistics]	%	Observed Cell Totals (Expected Cell Total) [Chi-square statistics]	%	
Hypotension	9(11.00) [0.36]	18%	13 (11.00) [0.36]	26%	>0.05
Shivering	5 (5.00) [0.00]	10%	5(5.00) [0.00]	10%	>0.05
Nausea/Vomiting	4 (5.00) [0.20]	8%	6(5.00) [0.20]	12%	>0.05
No Complain	32(29)[0.31]	64%	26(29.00) [0.31]	52%	>0.05

The result is not significant at 95% confidence interval.

Table-IV: Comparison of PDPH frequencies in both groups

Variables	Group A(n=50)		Group B(n=50)		P value
	Observed Cell Totals (Expected Cell Totals) [chi-square statistic]	%	Observed Cell Totals (Expected Cell Totals) [chi-square statistic]	%	
PDPH occurred	2 (7) [3.57]	04%	12 (7) [3.57]	24%	$P < 0.05$
PDPH not occurred	48 (43) [0.58]	96%	38 (43) [0.58]	76%	

The chi-square statistic is 8.3056. The p-value is 0.003952. This result is significant at $p < 0.05$.

Table-V: Comparison of onset, severity and duration of PDPH in both groups

Variables	Group A(n=50)		Group B(n=50)		
	number	percentage	number	percentage	
Onset	1st day	00	00%	00	00%
	2nd day	01	02%	07	14%
	3rd day	00	00%	04	08%
	4th day	01	02%	01	02%
Severity	Mild	02	04%	05	10%
	Moderate	00	00%	04	08%
	Severe	00	00%	03	06%
Duration	<24 hrs.	00	00%	00	00%
	25-48 hrs.	02	04%	10	20%
	>48 hrs.	00	00%	02	04%

Discussion

Post dural puncture headache has been regarded as the most common complication of spinal anaesthesia. It occurs most commonly in young female patients, particularly parturient and correlates with the configuration of spinal needle used⁹. In the last 50 years the development of fine gauge spinal needles has enabled a significant reduction in the incidence of PDPH¹⁰. In this study we compared 27G and 25G Quincke needle for spinal anaesthesia in cesarean section to compare the frequency and severity of PDPH.

In this study, patients of both groups were young healthy parturients. There was no statistically significant difference found in age, height, weight, and ASA status between two groups. There are a few studies, which examine the technical difficulties involved in the use of different spinal needles. In a study by Dittmann and Renk¹¹ the failure rate was 1.4 % and 1.2 % in 29 and 26 gauge groups respectively. In the present study, the same anaesthesiologist with enough experience gave spinal anaesthesia and found that 10(20%) in group A and 3(6%) in group B required more than one attempt for successful dural puncture. This is in contrast to study conducted by Dr. Vibhu Srivastava et al¹² who observed 10% failure rate with the 27G

Quincke needle. The 25 G Quincke needle was associated with the greatest incidence of successful dural puncture in first attempt (94%).

In this study, it was observed that hypotension following spinal anaesthesia remains common place in caesarean delivery (18% vs 26%). Most of the patient was managed with i.v. fluid and oxygen supplementation. Only 2 from group A and 4 patients from group B required ephedrine for correction of hypotension. In contrast to this study, Campbell et al did not observe hypotension in their study and stated that it may be the result of greater prehydration¹³.

In this study, it was observed 5(10%) patients developed shivering in both groups which correlates the study of Dr Vibhu Srivastava et al¹². Nausea and vomiting is the another per operative complications of spinal anaesthesia. This nausea vomiting could be a secondary effect relating to maternal hypotension which in turn causes decreased cerebral blood flow. In our study 4(8%) patients from group A and 6(12%) patients from group B developed nausea or vomiting and no statistical significant result was observed.

The incidence of PDPH in the present study with the 27G Quincke needle was 4% and with the 25G Quincke needle was 24%. The difference is statistically significant ($P < 0.05$). Studies with the 27 gauge Quincke needle in obstetrical patients suggested a PDPH rate of between 1.5% and 3.7%^{14,15}. This rate is closer to our PDPH rate with the 27G Quincke needle. The reported PDPH rates, for the 25 gauge Quincke needle vary considerably and it ranges from 7.8% to 37.2%¹⁶⁻¹⁸ which also correlates our study. In contrast to this study, Hwang¹⁹ observed the incidence of headache was only 3.65 % with the 25G Quincke needle.

Onset of headache was from 24 to 96 hrs after dural puncture. There is no significant difference in between two groups regarding the onset. In a study by Shutt et al²⁰, onset of headache was from 18 to 57 hrs and Anju shah et al²¹ the onset was from 24 to 96 hrs. All the patients in group A, who developed PDPH had mild headache, none of the patients developed a severe headache or neurological sequelae. In the study of Dittmann and Rankl¹¹ a decreased severity of headache was noted in the 29G

group Quincke needle. In group B, 5 patients developed mild headache, 4 patients developed moderate headache and 3 patients developed severe headache. Moderate form of headache was observed in 1 and 6 patients in 29 and 26G groups respectively by Shah et al²¹. There was no difference regarding the duration of headache in between two groups.

In this study, headache was relieved by re-assurance, rest, analgesics and IV fluids. When the present study is compared with others using the 27G Quincke needle and 25G Quincke needle it appears that the thicker the lumbar puncture needles, higher could be incidence of PDPH^{12,21,23}.

Conclusion

The size of dural tear is directly proportionate to the amount of CSF leakage. As a smaller needle diameter produces a smaller tear in the dura, there is less potential for leakage and incidence of headache after lumbar puncture. In the present study the frequency and severity of PDPH was lower in 27G Quincke needle as compared to 25G Quincke needle though it had a higher failure rate of successful lumbar puncture in first attempt. For spinal anaesthesia 27G Quincke needle should be used.

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