

Post Dural Puncture Headache After Spinal Anaesthesia and Chance Of Spinal Failure: A Comparative Study Using 23 G Quincke, 25G Quincke, And 25 G Whitacre Needle

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Objective: To compare the frequency and severity of postdural puncture headache (PDPH) and technical difficulties in patient of age 18 -60 year planed for lower abdominal surgery.

Method: 75 patient of age group 18-60 years with ASA I and ASA II, scheduled for abdominal surgery in spinal anaesthesia were taken and were divided into three groups of 25 patient each, accordingly to the size and shape of the needle, 23 G Quincke (Group I) , 25 G Quincke (Group II) and 25 G Whitacre (Group III) . Parameters observed are frequency of PDPH, severity of PDPH and technical problem in term of number of attempt and failure rate.

Result: The incidence of PDPH was 24% in Group I, 12% in Group II, and 4% in Group III. (p -value >0.05), Group III patient were having very mild headache. Subarachnoid space was located successfully in first attempt in 92% cases in Group I, 52% cases in Group II , 40% cases in Group III .

Conclusion: 25 G Whitacre needle seems to be suitable choice in patient because of its ease of handling with low incidence PDPH.

I. Introduction

August Bier (1898) introduced spinal analgesia in clinical practice, since then the technique has been widely practice to provide Anesthesia for lower abdominal surgery. It is simple to introduce, rapid in effect and produces excellent operating condition,¹ less need of postoperative monitoring and provides adequate postoperative analgesia.² Post dural puncture headache (PDPH) is a well known complication of spinal anaesthesia, especially in younger patient.³ Although it may be transient and self limiting sometimes it may persist for hours or weeks and can be intolerable, leading to prolonged hospital stay and increased cost.⁴ Factor reported to influence the incidence of PDPH are age ,sex , pregnancy , previous history of PDPH⁵ ,needle size^{5,6}, needle tip shape^{5,6} bevel orientation to the dual fiber⁵⁻⁷ The two strategies which decreases the incidence of PDPH are, to reduce gauge of the needle ,and to change the design of needle tip .Studies have indicated that decreasing the needle gauge reduces the incidence of PDPH ; however , it increases the technical difficulty , leading to increase in failure rate⁸⁻¹² .

The purpose of this study is to show that, how thin needle can be used in clinical practice to achieve the lower incidence of PDPH without compromising success rate.

The present study was undertaken to compare the technical difficulty, spinal failure and PDPH by using the three needle, 23G, 25G, Quincke, and 25G Whitacre needle in three groups.

II. Method

The present study was conducted in OT and informed consent was obtained from 75 patients. American Society of Anesthesiologist (ASA Group I and II) of either sex in the age group between 18 to 60 years who receive spinal anesthesia, to undergo lower abdominal surgery were taken. Exclusion criteria were, Infection at the site of needle insertion, coagulation disorders and neurological symptoms. Pre anesthetic checkup of all patients prior to 24 hours of surgery was done and they were informed of the procedure. Detailed history of the patients were taken and recorded, all patients were premeditated with 1 tab of Alprazolam 0.25mg at bed time, and kept NPO for 6 hours. On arrival in the operation theatre preloading with 10-15 ml /kg of Ringer Lactate over 15 minute was done, after all aseptic precaution spinal anaesthesia was administered in L3-L4 space with 3.0-3.5ml of 0.5% heavy Bupivacain, through either 23 G Quincke, 25 G Quicke or 25 G Whitacre needle using midline approach in sitting position. The number of attempts given for spinal block were recorded, all patient were administered 5-6 lite/min of O₂ intraoperatively with Hudson mask. BP, Heart rate, ECG, and oxygen saturation were monitored continuously every 5 minutes during surgery, 15 minute during immediate postoperative period for 2 hour and than 2 hourly for 24 hours. In case if patient developed hypotension it was managed by intravenous crystalloid. Hypotension associated with bradycardia was managed with intravenous atropine 15µg/kg. If hypotension did not respond to I.V. fluid, injection Mephentamine 1ml (6mg) was used as bolus.

Postoperatively all patient were assessed 24 hourly for next 2 days. Resident monitoring the patient was blinded to the type and size of the needle .PDPH was defined as headache which was aggravated in upright position and relieved in the supine positions. Severity of PDPH was graded as mild, moderate and severe.

Criteria of Post Dural puncture headache:

1. Occurred after mobilization
2. Aggravated by erect or sitting position, coughing, sneezing or staring and relieved by lying flat.
3. It may be localized in occipital, frontal or it may be generalized.

Severity of headache was assessed on 1-4 scale. (Crocker 1976)

1. Mild headache, which permits long periods of sitting / erect position with no other symptoms.
2. Moderate headache, which made it difficult for the patient to stay upright for more than half an hour. Occasionally accompanied by nausea, vomiting, auditory and ocular symptoms.
3. Intense headache immediately upon getting up from bed, alleviated while horizontal in bed. Often accompanied by nausea, vomiting, ocular and auditory symptoms.
4. Headache that occurred even while lying horizontal in bed and greatly aggravated immediately upon standing upright. Eating is impossible because of nausea and vomiting.

The primary objective of the study was to find out any difference in the incidence of PDPH between the three groups. The secondary objective was to find out the incidence of failure of lumbar puncture and the number of attempts required achieving lumbar puncture.

Quantitative variables were expressed as Mean ± SD (standard deviation) while qualitative variables were expressed as percentage. PDPH was analyzed using Chi square test. P–value <0.05 was considered significant.

III. Result

We studied 75 patients, ASA physical status I -II, age 20 to 60 years, undergoing spinal anesthesia for lower abdominal surgery using 23 G Quincke ,25 G ,Quincke , and 25G whitacre spinal Needles.

Table -1: Demographic data of the patients.

	Group I	Group II	Group III	p- value
	23 G Quincke	25G Quincke	25 G Whitacre	
Age (yrs) Mean ± SD	44.48±12.7	41.6±10.1	44.1±17.7	NS
Weight Mean ±SD	61.4±15.6	60.96±11.3	64.6±11.8	NS
Sex (M/F)	4/21	6/19	10/15	
Physical Status				NS
ASA I				
ASA II				

ASA I = Normal healthy patient

ASA II = A patient with mild systemic disease with no functional limitation.

Table -2: Frequency of PDPH

PDPH	Group I	Group II	Group 3	p –value
	23 G Quincke n(%)	25 G Quincke n(%)	25 G Whitacre n(%)	
Present	6(24%)	3(12%)	1(4%)	NS
Absent	19(76%)	22(88%)	24(96%)	

Table -3 : Severity of PDPH Total incidence

PDPH	Group I	Group II	Group III	p – value
	23G Quincke n (%)	25 G Quincke n(%)	25 G Whitacre n (%)	
Mild	4 (16%)	3(12%)	1(4%)	NS
Moderate	1(4%)	0	0	
Severe	1(4%)	0	0	
Duration				
<24 hrs	5	1	1	
25- 48 hours		2		
>48 hours	1			

Table 4 : Technical problem

	Group I 23G Quincke n(%)	Group II 25 GQuincke n(%)	Group III 25 G Whitacre n(%)	<i>p</i> – value
First attempt	23 (92%)	13 (52%)	10 (40%)	NS
Second attempt	1 (4%)	8 (32%)	11 (44%)	
Third attempt	1(4%)Partial effect	4 (16%)	4 (16%)	

IV. Discussion

In 1898, Karl August Bier, a German surgeon and his assistant were the first to report the symptoms associated with PDPH.¹³ Bier presumed that the headache was due to loss of CSF.

The present trend of the anesthetic technique for lower abdominal surgery in the world wide is Subarachnoid block (SAB), because it is safe, easier to perform, high degree of success rate, and required less drug and monitoring¹⁻³.

Headache after Dural puncture is a complication of spinal anesthesia and it believed to result from leakage of CSF both at the time of dural puncture and continuous leak afterward.

Dural puncture headache depends upon its association with body position, the pain is aggravated by sitting or standing and relieved or decreased by lying down¹³

Besides these factors, post dural headache is related to the size as well as type of the spinal needle used¹⁴ it is progressively reduced with use of thinner and pencil tip needles,^{15,16} but attempt to eliminate it by using needles as small as 29 G to 32 G have limited success rate. They are associated with high failure rates or multiple attempt.^{9,17} If there are multiple holes in the dura, no matter how small, they will increases the incidence of headache and defeat the purpose of using the smaller gauge needle^{5,18}

In the current study, successful subarachnoid puncture at first attempt decreases progressively with smaller gauge needle, and in pencil point needle more force is required.¹⁹

To overcome the problem PDPH, Hart and Whitacre in 1950, designed the first pencil point needle and claimed to decrease of PDPH from 5 to 2%²⁰. In our study out of 75 patient, 10 were complicated by headache postoperatively, the overall incidence of PDPH was 24% In Group I, 12% In group II and 4% in group III . The difference in PDPH between group was not statistically significant.

The mean duration of headache was found to be 24 to 78 hours. In 7 out of 10 patients, the duration of headache lasted less than 24 hours. The headache was mild to moderate in nature after dural pucture and was relieved by rest, hydration and analgesics. Study by Anuja et al have similar results as our study. In the study by Shutt et al⁸, onset of headache was from 18 to 57 hour after dural puncture, which was higher than our study.

The overall incidence of PDPH has varied from 0% to 37.2%, As reported by various authors⁸.Shah VR & Bhosle GP²⁰ data showed that a 25 G Whitcare needle would be best choice with regard to high success rate low PDPH, they used 25 G Quincke needle and concluded that incidence of PDPH was 14%, in our study it was 12% .The results of these study were similar to our result but 23 G needle was technically easy to use with 96% success rate in single attempt, but in case of 25 G Quinke single attempt success rate are 64% .

Hwang et al²² in their study with in 93 caesarean section patients, using 25 G Whitcare and 25 G Quincke found that in case of 25 G Whicare there was lower incidence of PDPH, but their results were not statistically significant and our results were similar to that study.

Vallego et al²³: in their study found that 25 Quincke needle has a high frequency of PDPH, as compared to the pencil point needle, our result are similar to this. Nevertheless, they concluded that in addition to PDPH, cost consideration, ease of insertion, rate of CSF flow, and the ease with which the needle bends or breaks when excessive forward force is applied, to be taken into consideration while choosing the spinal needle .

Kang SB and his colleagues²⁴ noticed that some PDPH were severe enough to require an epidural blood patch ,the therapy of epidural patch is invasive, cumbersome and hazardous , thus there is no doubt , that prevention is a better option. One patient of Group 1 had severe headache , associated with nausea and vomiting and it persisted for 7 days , but we did not used epidural patch and was treated by hydration, bed rest , and analgesic. Cruik Shank et al²¹ could not demonstrate any significant difference in CSF leakage by aligning the bevel of the needle either parallel or across the dural fibers, and their observation was that the CSF leakage rate was related to the needle size. However, we chose to insert the Quincke needle with the bevel parallel to the longitudinal axis of the spinal cord , as per the classical teaching.

There are few studies which examine the technical difficulties involved in the use of different spinal needle. In the study by Shutt et al (1992) the failure rate was 2% with 23G needle .In our study failure rate was 4% with 23 G needle and 96% case were successfull in first attempt . This 4% failure rate could be due to any technical problem ,or small sample size . But by using 25 G needle, success rate was 100%, but number of attempt was variable. 64% patient required 1st attempt and 16% patient were successful in 2nd attempt and 16% patients required multiple attempt. In case of whitacre 40% patient had required one attempt , 44% required two

attempts , and 16% patient required three attempts by the same anesthetist with enough experience of spinal anesthesia.

Bano et al²⁵ Compared the Whitacre group, frequency of postdural puncture headache was significantly higher in Quincke group (*p=0.015), while the overall occurrence of non-postdural puncture headache (PDPH) did not differ significantly between two groups (p=0.736). Most of PDPH developed on 2nd postoperative day, were mild in nature and resolved within 48 hours of their onset. There was no significant difference in the failure rate of spinal anesthesia in both groups (p=0.149). In our study the frequency of headache was 12% in in Group II and 4% in Group III (p=1.2) which was not statistically significant. In our study there was no statistically significant difference in the failure rate of spinal anesthesia in the three groups .

Vishal Joshi²⁶ et al concluded in their study that incidence of PDPH using 25 g needle was 8%, Jan Mohammad et al 8.3%²⁷, Ross et al 9%⁷. These results are not comparable to our study. Anuja et al found out that incidence was 10% with 23 g needle .In our study it was 24% which was quite higher.

V. Conclusion

Pencil point needle are associated with lower incidence of PDPH compared to Quincke cutting needles. Whitacre 25G needles appears to be the preferred choice in terms of high success rate , and low incidence of PDPH. By Whitacre number of attempt could be increased, however, the cost of the Whitacre spinal needles has to be weighed against the risk of PDPH, the associated cost of a longer hospital stay , and the hazardous therapy of an epidural blood patch.

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