

A Comparative Study using 27 G Quincke's and 27 G Whitacre's Spinal Needle for Post Dural Puncture Headache Following Spinal Anaesthesia: A Randomised Clinical Trial

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Abstract

Background and objectives: Spinal anaesthesia is one of the most commonly used technique in anaesthesia. It is economical, safe, cost effective, easy, needs less sophisticated anaesthetic equipment, drugs, post operative care hence preferred over general anaesthesia and most popular because of its profound analgesia and muscle relaxation. Objectives of the present study were to know the incidence of post dural puncture headache (PDPH), number of attempts for successful sub arachnoid block and incidence of failed spinal anaesthesia by using 27G Quincke's and Whitacre's spinal needles. *Methodology:* This one and half year randomized clinical trial was conducted in the Department of Anaesthesiology, BLDEU'S Shri. B.M. Patil Medical college hospital and research centre, Bijapur during the period of Dec 2012 to August 2014 on 110 patients. The incidence of PDPH, number of attempts and failed spinal anaesthesia were assessed. *Results:* In this study female preponderance was seen. In the present study the 12.73% patients had PDPH in Quincke group and 1.82% patients in Whitacre group and this difference was statistically significant using test of proportion ($p=0.02759$). *Conclusion:* Overall the Whitacre 27G needle has better results with respect to PDPH and number of attempts required for successful subarachnoid block whereas the incidence of failed spinal anaesthesia was less with Quincke 27G needle.

Keywords: Post Dural Puncture Headache; Failed Spinal Anaesthesia; Sub-Arachnoid Block; Quincke Needle; Whitacre Needle.

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Introduction

Pain has been defined as A conscious Sensation of distress, suffering or agony with or atleast potential tissue damage [1]. Pain is an abnormal sensation which any person or individual who suffers or experience will only be able to appreciate it. It is one of the most complex dramatic and one sensation for which mankind is responsive to others.

The relief from the pain which the patient experiences can be treated and cured by the Anesthesiologist. Spinal anaesthesia is also know as SAB or intrathecal analgesia or central neuraxial blockade. When we administer local anaesthesia in the sub arachnoid space it induces spinal Anaesthesia. Spinal Anaesthesia is advantage over general anaesthesia (GA) in many ways like its easier, safe and even cost effective [2].

Spinal anaesthesia was accidently discovered by J. Leonard Corning who was working as a

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neurologist in New York in 1885. He accidentally pierced the duramater while experimenting with cocaine on spinal nerves of a dog. The spinal anaesthesia was not an acceptable for many people until safe and predictable means of lumbar puncture was discovered [3].

Spinal anaesthesia, also referred to as SAB, intrathecal analgesia or central neuraxial blockade. Spinal anaesthesia is produced when a local anaesthetic agent is injected into the subarachnoid space and was the first major regional technique attempted.

The most common complication after the spinal anaesthesia is the Post Dural Puncture Headache. The incidence of the PDPH after spinal limited the use of it in the beginning . The incidence of PDPH is directly related to the size of the needle used in spinal and type of the needles. Hence various needles have been developed by various institute to reduce the incidence of PDPH. Various experiements comparing with the Non cutting (Whitacre's) needle and cutting needle (Quincke's) to determine the reduced incidence of PDPH have been tried out [5,6].

Post Dural Puncture Headache is seen among post spinal anaesthesia patient , they experience bilateral either in frontal or occipital region headache and it gets sometimes extends to the neck. Pain will be of throbbing type of pain and constant in nature and it gets aggravated by sitting or standing and relieved by lying down, usually occurs 12 to 72 hours following the spinal anaesthesia or lumbar puncture (LP).

Post Dural Puncture Headache will be due to leakage of CSF from Dura Mater and increased intracranial Pressure It is believed to result from leakage of CSF from a dural defect and decreased intracranial pressure. Loss of CSF at a rate faster than it can be produced causes traction on the structure supporting the brain, particularly the dura and tentorium

Hence we have little information and manuscript available regarding the use of 27 G Quincke's and 27 G Whitacre's needles in reducing the incidence of PDPH. In this scenario this study was done to check the effectiveness of two needles used in Subarachnoid block with respect to PDPH .

Objectives

To Evaluate the incidence of Post Dural Puncture Headache following spinal Anesthesia on using 27 G Quincke's and Whitacre's spinal needles.

Materials and Methods

This study was carried out in the Department of Anaesthesiology of B.L.D.E.U'S Shri BM Patil medical college, hospital and research centre, Bijapur. The Study was conducted from Dec 2012 to August 2014.

The incidence rate of PDPH by using Quincke and Whitacre spinal needle is 23.3% and 4.8% respectively [5].

Taking the average incidence rate as 14% at 95% of confidence interval and 80% power the work load sample size is 55 using the following statistical formula

$$n = \frac{2 \times (Z\alpha + Z\beta)^2 \times p \times q}{d^2}$$

Hence, 55 cases will be included in each of the groups

A total of 110 patients are allocated randomly into group A and group B by lottery method till 55 cases have been included in each group.

Inclusion Criteria

All Patients who underwent lower abdominal surgery and aged between 20-60 years with no clinical significant or past history of Cardiovascular, respiratory or Central Nervous System diseases and who gives consent to the study.

Exclusion Criteria

Patients who have history of bleeding disorders and sensitive to Bupivacaine and with any known history of infection, injury to back or any systemic complication in the past were excluded from the study.

Procedure

Patients was allocated into group A and group B by computer generated randomisation number .

1. Group A had received spinal anaesthesia with 27 G Quincke's spinal needle.
2. Group B had received spinal anaesthesia with 27 G Whitacre's spinal needle.

As per the Standard Procedure, using the midline approach of Spinal Anesthesia using Quincke's or Whitacre's spinal needle was inserted into L₃- L₄ sub arachnoid space and 0.5% of Bupivacaine of around Two to Four ml (depending on the case) was

injected after confirming for needle is in Sub Arachnoid Space.

All the Vitals was recorded every three minutes for the first 15 minutes, and then every five minutes for the next 30 minutes. All patients was examined on the day of surgery and there after for every day for the next three days.

The patient was examined and enquired about the Post Dural Puncture Headache symptoms if present or absent.

Its called *post dural puncture headache* If the Headache is seen after spinal anaesthesia within 48 to 72 hours in the Occipital or frontal region which can get aggravated by making the patient in erect or sitting position and in coughing or during straining and gets relived by lying down in supine position.

PDPH was assessed on the basis of standard Numeric Analog Scale (NAS) between 0-100. If the score is less than 33 then its mild and 34-66 its called moderate and greater than 67 then its Severe.

Statistical Data

Statistical tests like Mean±SD, percentages will be used to analyze the data.

Chi square test will be applied where ever necessary.

Results

In our study total of 55 cases were included in the study in each group.

In the present study majority (38.18%) of the patients had age between 20 to 29 years in Quincke group compared to (34.55%) of the patients in the age ranging from 50 to 60 years in Whitacre group. The mean age in Whitacre group was 41.59±23.33 years whereas in Quincke group it was 39.6±1.41 years.

In this study females outnumbered males in both the groups (56.36% and 58.18%) with male to female ratio of 1:1.29 in Quincke group and 1:1.39 in Whitacre group.

In this study the mean weight of the patients in Quincke group was 55.38±4.94 kg whereas in Whitacre group it was 56.69±16.26 Kg (Table 1).

In the present study the 12.73% patients had PDPH in Quincke group and 1.82% patients in Whitacre group and this difference was statistically significant using test of proportion (p=0.02759).

In the present study, 61.82% of the patients in Quincke group required one attempt, 36.36% required two attempts and 1.82% required three attempts for successful block. Whereas in Whitacre group 83.64%, 14.55% and 1.82% of the patients required one, two and three attempts respectively. When these values were compared using chi-square test

Table 1: Socio Demographic profile of the Study Group

Socio Demographic Profile		Quincke group (n=55)		Whitacre Group (n=55)	
Age Groups	20 to 29	21 (38.8%)	17 (30.9%)		
	30 to 39	8 (14.5%)	8 (14.5%)		
	40 to 49	14 (25.4%)	11 (20%)		
	50 to 60	12 (21.8%)	19 (34.5%)		
Gender	Male	24 (43.6%)	23 (41.8%)		
	Female	31 (56.3%)	32 (58.2%)		
Mean Weight in kg		55.3 ± 4.94	56.6 ± 16.2		

Table 2: Incidence of Post Dural Punctural Headache (PDPH) and other parameters

Parameters		Quinck e group		Whitacre Group		P value
		Number	Percentage	Number	Percentage	
PDPH	Present	7	12.73	1	1.82	P=0.02*
	Absent	48	87.27	54	98.18	
No. of attempts	One	34	61.82	46	83.64	P=0.03*
	Two	20	36.36	8	14.55	
	Three	1	1.82	1	1.82	
Spinal Anaesthesia	Successful	54	98.18	53	96.36	P =0.55
	Failed	1	1.82	2	3.64	

significant association was recorded between the type of needle and number of attempts ($p=0.0356879$). In the present study incidence of 1.82% failed spinal anaesthesia in Quincke Group and 3.64% in Whitacre Group was recorded. However, no statistically significant association between the type of the needle and the number of failed spinal anaesthesia could be recorded ($p=0.5582$) (Table 2).

Discussion

Spinal anaesthesia has many advantages over general Anaesthesia because of its effectiveness by having profound Analgesia and good muscle relaxation [2].

On Puncturing the Subarchanoid Space there will be loss of CSF from the punctured site

leading to lower CSF pressure and leading to increased Venous dilation and differences in pressure between intracanium and intravertebral part leads to Headache.

Needle tip configuration and needle size greatly influenced incidence of headache in patients was reported by August Bier [7].

In the present study, 56.36% and 58.18% were females in Quincke and Whitacre groups, 43.64% and 41.82% were males in Quincke and Whitacre groups respectively whereas, in a study [8] 108 were males and 91 were females in Quincke group and 116 were males and 83 were females in Whitacre group. Another study [9] reported male predominance that is 74 males and 23 females in Quincke group and 71 males and 26 females in Whitacre group.

In this study the mean age in Quincke group was 39.6 ± 1.41 years whereas in Whitacre group it was 41.59 ± 23.33 years. A study [8] reported similar results that is, mean age of 37 ± 14 years in Quincke group and 36 ± 15 years in Whitacre group whereas, another study [9] reported average age of 32.5 years in Quincke group and 31.7 years in Whitacre group.

In the present study mean weight of the patients in Quincke group was 55.38 ± 4.94 kg whereas in Whitacre group it was 56.69 ± 16.26 Kg. Similar findings were reported by authors in a study [10] that is 52.8 ± 5.20 in Quincke group and 52.6 ± 6.10 in Whitacre group. Whereas another study [8] reported mean weight of 73 ± 12 Kg in Quincke group and 74 ± 13 Kg in Whitacre group.

In this study the incidence of PDPH was 12.73% in Quincke group and 1.82% patients in Whitacre

group and this difference was statistically significant using test of proportion ($p=0.02759$). A study [8] conducted to assess failed spinal anaesthesia and PDPH in orthopaedic patients using 27 G Whitacre and Quincke needles reported incidence of one percent in Quincke group and 0.5% in Whitacre group. The incidence of PDPH with the Quincke 27 gauge needle compares well with several other studies which report zero to four percent with highest occurrence in obstetric population.

Whereas another study [9] conducted to assess PDPH after spinal anaesthesia in young orthopaedic patients reported higher incidence of PDPH in Quincke 27 G group compared to Whitacre 27 G group (10.3% versus 8.2%).

A similar Indian study [10] conducted to assess PDPH in caesarean section using 27 G Whitacre and Quincke needles reports 12.5% incidence in 27 G Quincke and 4.5% in 27 G Whitacre.

In the present study, 61.82% of the patients in Quincke group required one attempt, 36.36% required two attempts and 1.82% required three attempts for successful block. Whereas in Whitacre group 83.64%, 14.55% and 1.82% of the patients required one, two and three attempts respectively. When these values were compared using chi-square test significant association was recorded between the type of needle and number of attempts ($p=0.0356879$).

A study [8] conducted to assess failed spinal anaesthesia and PDPH in orthopaedic patients using 27 G Whitacre and Quincke needles reported one attempt in 81% patients, two attempts in nine percent and three attempts in four percent among the patients with Quincke group and 82.5%, 9.5% and three percent patients in Whitacre group required one, two and three number of attempts for successful spinal anaesthesia.

In the present study incidence of 1.82% failed spinal anaesthesia in Quincke Group and 3.64% in Whitacre Group was recorded. However, no statistically significant association between the type of the needle and the number of failed spinal anaesthesia could be recorded ($p=0.5582$). A similar Indian study [10] conducted to assess PDPH in caesarean section using 27 G Whitacre and Quincke needles reports four percent failure rate in 27 G Quincke group and 12% in 27 G Whitacre and these failure rates were not statistically significant. Whereas in another study [8] failure to achieve dural puncture was more common with Quincke group than with Whitacre needle (5.5% versus 3.5).

This variation of failure rates may have attributed to the difference in tactile sensation on dural puncture. Another possible explanation may be that the appearance of CSF in Quincke needle hub is no guarantee of the needle bevel being completely within the subarachnoid space. Another possibility may be side port may straddle the dura causing leakage into the subdural or epidural space which is most commonly seen in Whitacre needles and as with all finer gauge needles, pain staking care is required to avoid dislodging the needle tip in subarachnoid space leading to loss of some local anaesthetic.

To summarise the Whitacre 27 G needle has better results with respect to PDPH and number of attempts required for successful subarachnoid block whereas the incidence of failed spinal anaesthesia was less with Quincke 27 G needle. More studies have to be done in this regard to find out the effectiveness of these needles.

Summary

The most commonly used Anaesthesia Procedure is spinal due to its easy, cheap and safe technique. If the Post Dural Puncture Headache complication involving Spinal is reduced by using better needle and procedure it can be regarded as the best and effective Anaesthesia technique

The use of Whitacre 27 G needle showed us its much better than the other needle in the incidence of PDPH and number of attempts required for successful subarachnoid block blockage but the incidence of failed spinal anaesthesia was less with Quincke 27 G needle.

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