Proceeding S.Z.P.G.M.I. Vol: 23(2): pp. 55-60, 2009.

Comparison of 22, 23 and 25 Gauge Quincke Needles for Post Dural Puncture Headache and Identification of Other Significant Factors for PDPH in A Tertiary Care Hospital

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ABSTRACT

Spinal anaesthesia is the most common and widely practiced regional anaesthesia. It is used for various surgeries involving lower abdomen and lower limbs. However Spinal anesthesia also has some drawbacks and one of its well recognized complications is Post dural puncture headache (PDPH). **Aims and Objectives:** The objective of this research was to identify different factors significantly influencing PDPH in over patient population. **Material and Method:** It was a single blinded, cross-sectional study carried out from January 2008 to December 2009, at the department of anesthesiology, Shaikh Zayed Hospital, Lahore. Patients admitted for any surgical procedure involving the region below the umbilicus and requiring spinal anesthesia for it, were included in our study. Every patient was given spinal anesthesia between L2-L3 or L3-L4 space , using the drug Bupivacaine (upto 2ml of 0.75%concentration) with the Quincke needle of a size 22G, 23G or 25G depending on the availability. All patients were blinded to the size of needle being utilized. **Results:** We studied 227 patients aged 17-90 years. Needle 22G was used on 52 patients (22.9%), 23G on 128 patients (56.4%) and 25G on 47 patients (20.7%). Frequency of PDPH was 13/52 (25%) in patients receiving 22G needle, 14/128(11%) in 23G and 4/47(8%)in 25G.This relation was statistically significant with a P value of 0.024 .PDPH occurred in 11% of males and in 24% of females. P value for this difference was also significant (0.019). All the other variables studied did not have a significant P value. **Conclusion:** PDPH is more common in females. 25-Gauge Quincke needle has definite advantage over 22-gauge and 23 -Gauge needles as far as frequency of PDPH is concerned. Level of expertise, duration of surgery , number of attempts and occurrence of a hypotensive episode have no significant effect on the frequency of PDPH.

Key Words: Spinal Anesthesia, PDPH, Quinke needle.

INTRODUCTION

Spinal anaesthesia was developed in the late 1800s with the work of Wynter, Quincke and Corning[1].However August beir was the first person to perform spinal block in a planned manner[1] It has gained a lot of popularity for operative procedures because of the reliability of its speed of onset and predictability of analgesia[2]. Small dose of the anesthetic, profound muscular relaxation and reduced operative blood loss are also its main advantages[3]. It is particularly popular in obstetrics as it avoids the fetal and maternal risk of general anesthesia and requires minimum postoperative care[4].

As no surgical procedure is free of risks, spinal anesthesia also has some drawbacks and one of its well-recognized complications is postdural puncture headache (PDPH). The overall incidence of postdural puncture headache remains between 0% to 37% after spinal anesthesia[5]. The need to study PDPH lies in the fact that it is associated with significant postoperative morbidity. There are reports of PDPH symptoms lasting for months or

years[6] Untreated PDPH lead to subdural hematoma and even death from bilateral subdural haematomas[7]. Many authors have reported cases in which patients suffer from chronic complications. Abouleish et al. reported patients suffering from cephalalgia for 180 days.[5] Wilton et al. describes a case of PDPH lasting 19 months[8].

German surgeon, Karl August Bier gained first-hand experience of the disabling headache related to dural puncture[1]. He correctly deduced that the headache was related to excessive loss of cerebrospinal fuid[9]. Ninety per cent of headaches occur within 3 days of the procedure.[10] The common distribution is over the frontal and occipital areas radiating to the neck and shoulders. The temporal, vertex and nuchal areas are reported less commonly as the site of discomfort, although neck stiffness may be present. The pain is exacerbated by head movement, and adoption of the upright posture, and relieved by lying down[11].

According to the Global literature on PDPH, well known factors effecting the incidence of PDPH are patient's age, needle shape , size, the number of attempts, gender and weight of the patient[12,13].

The objective of this research was to identify different factors significantly influencing PDPH in over patient population. It was aimed at investigating and concluding the optimum size of Quincke (cutting type) needle that, produces the least frequency of PDPH and should be chosen for routine use in this hospital. Other factors being studied were, the number of attempts, duration of surgery, level of expertise, occurrence of a hypotensive episode, age and sex.

PATIENTS AND METHODS

It was a single blinded, cross-sectional study carried out from January 2008 to December 2009, at the department of anesthesiology, Sheikh Zayed Hospital, Lahore. Patients admitted to Sheikh Zayed Hospital between January 2008 – December 2009, for any surgical procedure involving the region below the umbilicus and requiring spinal anesthesia for it, were included in our study.

After all aseptic measures, every patient was given spinal anesthesia between L2-L3 or L3-L4 space , using the drug Bupivacaine (upto 2ml of 0.75%concentration) with the needle at 90 degrees to the skin. All patients were blinded to the size of needle being utilized. Quincke needle of a size (22G, 23G or 25G was utilized each time depending on the one available. Any backward movement of the needle followed by redirection was classified as a further attempt. Level of sensory block was assessed by pinprick and motor by using the bromage scale. Blood pressure, pulse and oxygen saturation were being monitored automatically throughout the procedure. 500 to 1000 ml of fluid (normal saline or ringer lactate) was given to every patient.

Study questioners were filled out during the procedure. The details noted down were, patient name, patient ID, sex, number of attempts, level of expertise i.e. (1. junior resident <2 years, 2. senior resident <4 years, 3. junior consultant <5 years, 4. senior consultant >5 years), duration of surgery, name of the surgical procedure, volume of drug administered, volume of fluid given per operatively and blood pressure reading after every 5 minutes for the first 20 minutes. Any patient whose systolic blood pressure reading at any one of the time intervals , dropped by 20% of his baseline systolic blood pressure, was noted to have been hypotensive during the procedure. Hypotension in these patients was managed by giving Iv fluids or Ephedrine 5mg top ups.

Each patient was visited 6, 24, 36 and 48hrs postoperatively to check for the presence or absence of PDPH. PDPH was defined as headache aggravated in upright position and reduced on lying down. Patients having complained of PDPH were given conservative treatment i.e. (giving I.V fluids, oral analgesics ,lying flat and avoiding straining). Epidural blood patch was not required on any patient.

All data was entered into the SPSS (statistical package for social science) version 13 and statistical analyses were performed. Incidence of PDPH with different needle sizes, age, sex, number of attempts, level of expertise, surgery durations and positive or negative hypotensive episodes was compared by using Chi-square test. $p<0.05$ was considered significant.

RESULTS

We studied 227 patients aged 17-90 years undergoing spinal anesthesia. Mean age of the patients was 50 years. There was no division of patients into any form of groups. There were 181 males (80%) and 46 females(20%). Needle 22G was used on 52 patients (22.9%), 23G on 128 patients (56.4%) and 25G on 47 patients (20.7%).

31 out of 227 patients developed PDPH, giving an overall frequency of 14% (Table 1).

Table 1. Frequency of PDPH.

PDPH	Number	Percentage
Present	31	14%
Absent	196	86%
Total	227	100%

Frequency of PDPH was 13/52 (25%) in patients receiving 22G needle, 14/128(11%) in 23G and 4/47(8%)in 25G.This relation was statistically significant with a P value of 0.024 .PDPH occurred in 11% of males and in 24% of females. P value for this difference was also significant (0.019). All the other variables studied did not have a significant P value. Frequencies of PDPH in relation to all the other variable being investigated are given in Table 2.

DISCUSSION

PDPH is one of the most distressing complications of Spinal anaesthesia. It results from the loss of CSF through the dural puncture, traction on the cranial contents and reflex vasodilatation[14].

In our study, we intended to identify the needle size among Quincke needles that produces the least frequency of PDPH and to demonstrate other factors significantly affecting the frequency of PDPH.

Needle size and sex were the only factors in our study that significantly affected the frequency of PDPH.

Affect of age, number of attempts, duration of surgery, level of expertise and occurrence of a hypotensive episode on the frequency of PDPH was not significant in our study population.

Helper and colleagues reported the use of Whitaker (non-cutting) needles to be more suitable than Quincy (cutting) needles, therefore Whitaker and smallest gauge needle available should be used for all patients.[15]Needle design despite being the most well known factor influencing PDPH was constant in our study, as only the cutting- type needles (Quincke) are available in Sheikh Zayed Hospital. One previous study reported that PDPH progressively reduced with the use of thinner Quinki type spinal needles.[15] We intended to determine the size of the cutting type needle that produces the least frequency of PDPH and, therefore, should be recommended for routine use.

Three needle sizes were used in our study, 22G, 23G AND 25G, to see if there was any significant difference in the influence of each on PDPH. Needle sizes smaller that 25G such as 27G or 29 G were excluded from the study. One previous study has shown that the use of fine gauge needles i.e. the 29-guage or smaller decreases the incidence of PDPH but is associated with higher failure rate for spinal anaesthesia.25G, 26G or 27G needles therefore represent the optimum needle size.[4] In our study the incidence of PDPH using 25G needle was 8%, which is comparable to the results of Jan Mohammad et al(8.3%)[16] Ross et al(9%)[17] and Imarengiaye CO (10%)[18] but was not comparable to Anju et al (20%)[19]. The incidence of PDPH with 22G and 23G needles was 25% and 11% respectively.

In our study female population had a higher incidence of PDPH (24%) compared to males (11%). Results known to us from previous studies were that female sex was related with higher incidence of PDPH.[20, 21] The results were consistent with our study.

The effect of age on PDPH was studied by dividing the patients into 2 age groups for the purpose of analysis i.e. (group 1 below 50 years and group 2 above 50 yrs). This division followed the standard age group division in the studies done by Wadud et el[22] and Roheena et al[20]. Previous studies showed that younger age group had a higher frequency of PDH and its incidence decreased with advancing age[20,21]. However, in our study the difference of incidence of PDPH between two groups was not statistically significant. Frequency

Table 2. PDPH frequency with relation to all the variables.

Variables		Frequency	Percentage	P value
Needle size				0.024, **significant**
	22G	13/52	25%	
	23G	14/128	11%	
	25G	4/47	8%	
Sex	male	20/182	11%	0.019 **significant**
	female	11/45	24%	
Hypotension	yes	5/45	11%	*Insignificant*
	no	15/182	8%	
Level of expertise	Junior resident	8/64	13%	*insignificant*
	Senior resident	13/67	19%	
	Junior consultant	3/35	9%	
	Senior consultant	6/59	10%	
No. of attempts	1	25/187	13%	*insignificant*
	2	5/26	19%	
	3	0/11	0%	
	4	1/1	100%	
	5 or above	0/2	0%	
Duration	Less than 60 min	13/118	11%	*insignificant*
	Longer than 60min	16/104	15%	
Age	Less than 50yrs	20/124	16%	*Insignificant*
	Older than 50yrs	11/103	11%	

of PDPH in group 1 (below 50 yrs) was 16% and 11% in group 2 (above 50 yrs). This can be attributed to the certain limitations of our study, such as unequal distribution of females age-groups two and randomization of the use of needle gauge on each patient.

Through our study we aimed to test 4 new variables, duration of surgery, occurrence of an episode of hypotension during the surgery, number of attempts and the level of expertise of the anesthetist .

Mean duration of surgery in our study was 60 minutes. 104 surgeries out of 227 took longer than 60minutes and the incidence of PDPH in either cases was calculated. The frequency of PDPH was higher (15%) in the group taking longer than 60 minutes compared to the group taking less than 60 minutes (11%), but this difference was not statistically significant and so we can conclude that the duration of surgery has no effect on the incidence of PDPH.

Hypotensive episode occurred in 45/227 patients and 11% of these developed PDPH. 182 out of 227 patients had no episode of hypotension and only 8% out of them developed PDPH. This difference does indicate a higher chance of PDPH in those with hypotensive episodes , but this result was again not statistically significant. We can, hence, conclude that hypotension has no influence on the incidence of PDPH.

Number of attempts the anesthetist made when giving spinal anesthesia and their level of expertise was noted down in the form during the procedure. We expected the incidence of PDPH to increase with increasing number of attempts and decrease with the increasing level of expertise, but the results completely failed to match the expectations of the study. This could be attributed to the failure of defining the number of attempts only as the number of times the Dura was punctured on insertion.

CONCLUSION

PDPH is more common in females.25-Gauge Quincke needle has definite advantage over 22-gauge and 23 -Gauge needles as far as frequency of PDPH is concerned. Therefore, we recommend routine use of 25-guage Quincke needles instead of 22 and 23 –Gauge for spinal anesthesia in Sheikh Zayed Hospital.

Level of expertise, duration of surgery , number of attempts and occurrence of a hypotensive episode have no significant effect on the frequency of PDPH.

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