

Compare the incidence of post dural puncture headache of two different age groups and gender in elective lower limb surgeries: A prospective, observational study

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Abstract

The incidence of post dural puncture headache of two different age groups and gender in elective lower limb surgeries: a prospective, observational study.

Aims and Objective: To estimate the incidence of post dural puncture headache in two different age groups in both male & female patients and associated development of post dural puncture headache with time duration, severity and common site of PDPH and study association of other symptoms such as nausea, vomiting and diplopia and also dose of I.M. diclofenac sodium needed in PDPH patient.

Materials and Methods: Lumbar puncture was performed with 23G Spinal Needle. All patients were interviewed after 12, 24, 36, 48, 60 and 72 hours as regard to headache, its severity, location, character, duration, associated symptoms like nausea, vomiting, auditory and ocular symptoms.

Result: PDPH incidence was 9.0%. The incidence of PDPH of young patients were 14.0% and of old patients were 4.0%. Difference of incidence of PDPH was statistically significant $p=0.0262$. PDPH incidence in females were 13.97% and in males were 4.67%. The difference in incidence of PDPH was statistically significant $p=0.0408$.

Conclusion: PDPH incidence is significant but proportion is inverse to the age of the patients. Female has more risk of PDPH. Most common severity of PDPH is grade II. No patient develops PDPH before 24 hours and after 48 hours. The most common location of PDPH is fronto-occipital. Nausea and vomiting are associated with severe PDPH. No patients develop any other associated symptoms. Among PDPH patients, 4 patients had treated with inj. Diclofenac sodium intramuscularly.

Introduction

Spinal anaesthesia is a safe and effective alternative to general anaesthesia for surgeries below the abdomen and has been widely practised. The most common complication of lumbar puncture is post-dural puncture headache (PDPH). It can significantly interfere with the functional capacity and post-operative well being. Risk factors for PDPH have been researched and includes pregnancy, young age, female, history of PDPH, bevel direction to the dural fibers, needle type and size, tip shape of needle, previous lumbar puncture attempted, median versus paramedian approach. The incidence of PDPH varies with different studies depending on various factors. With introduction of fine gauge atraumatic spinal needle the incidence gradually decreased. PDPH is mainly postulated to be due to two mechanisms. One is due to loss of CSF from the dural rent which leads to stretching of the pain sensitive receptors in brain. Other hypothesis is cerebral vasodilatation for increase the blood volume secondary to monro-kellie doctrine. This leads to the excruciating positional headache which may be accompanied by occiput, neck and shoulder

pain, nausea, vomiting, photophobia, cranial nerve palsies, diplopia, hearing loss. Seizures through the mechanism of CSF hypotension resulting in anatomic brain displacement inciting intense vasospasm have been reported. The morbidity associated with PDPH can be more significant than just this debilitating pain. Considering the significant morbidity associated with CSF leak after lumbar puncture, anesthesiologists and neurologists alike should take all practical precautions. Reduction in size of needle can significantly reduce risk of post-dural puncture headache. In this study, major patient related factors associated with PDPH are young age and female. Here the estimation of incidence of post-dural puncture headache is done in government medical college and Sir T hospital, Bhavnagar according to gender and age of patient.

Materials and Methods

Inclusion Criteria

Informed written consent for participation in study.

Age: 20 to 80 years.

Gender: Either gender.

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Patients scheduled for elective lower limb surgeries

ASA physical status I, II

Exclusion Criteria

Patient Refusal: Chronic illness e.g. Ischemic heart disease, diabetes mellitus, bronchial asthma, bronchitis, sinusitis, hypertension

Chronic Headache Like: Migraine

Previously operated under spinal anaesthesia with past history of PDPH.

Patients with multiple dural punctures during procedure.

Patients having any spinal deformity.

Bleeding Disorders

All necessary investigations were done as per institutional protocol eg- haemoglobin, total WBC count, platelet count, random blood sugar, serum urea and creatinine, serum electrolyte, chest x ray, ECG with reporting. On the day of surgery before 1 hour of surgery, Inj. Ondansetron 4mg intravenously was given. Standard monitoring like non-invasive blood pressure, ECG and heart rate, SpO₂ by pulse oximetry was attached and all baseline parameters were recorded. After explaining the procedure, Lumbar puncture was performed with 23 G quincke needle in lateral decubitus position with bevel facing parallel to the direction of dural fibers in all patients. After appearance of free flow of clear CSF, hyperbaric bupivacaine (0.5%) 3.5 ml was injected slowly with bevel facing cephalad. Level of sensory blockage and changes in parameters like heart rate, BP were recorded. Hypotension was treated with bolus iv fluids as well as inj. Mephentermine 5 mg intravenously. Nausea and vomiting treated with inj. Metoclopramide 10 mg i.v. and bradycardia with inj. Atropine 0.6 mg i.v. and respiratory depression, skin reaction were managed symptomatically. All patients were interviewed after 12, 24, 36, 48, 60 and 72 hours as regard to headache, its severity, location, character, duration, associated symptoms like nausea, vomiting, auditory and ocular symptoms. PDPH was define as the occipital, frontal, fronto-occipital or generalized headache brought on by erect posture and relieved on supine position. Patients with a headache were evaluated for the severity and duration of the headache and their response to treatment. Initially, PDPH was treated with bed rest, proper hydration and analgesics (inj. Diclofenac 75, 150, 225 mg i.m.).

Statistical Analysis

Sample Size Calculation

Necessary sample size = $(z\text{-score})^2 * \text{std.dev} * (1\text{-std.dev})$
(margin of error)²

The sample size has been determined by the following formula by fisher et al

$$N = t^2 \times p \times (1 - p) / m^2$$

Where

N = sample size.

P = prevalence of PDPH

M = margin of error at 5% (standard value 0.05)

T = confidence level at 95%

Therefore:

$$N = (1.96)^2 \times 0.2(1-0.2) / 0.05^2$$

$$N = 3.8416 \times 0.2 \times 0.8 / 0.0025$$

$$N = 0.6145 / 0.0025$$

$$N = 245.$$

Then fisher et al. advised the another formula which uses the required sample. Size got from the previous formula, was be applied.

$$N_f = n / (1 + n/N)$$

Description

N_f = expected sample size when the population studied in <10,000.

n = sample size required if the population would have been >10,000 which is 245 in my study.

N = estimated population size, in my case which is number of surgeries done under spinal anaesthesia per year is 900.

Therefore

$$N_f = n / (1 + n/N)$$

$$= 245 / (1 + 245 / 900)$$

$$= 192.57 \text{ which is rounded off to } 193$$

Hence we selected the sample size of minimum 200 patients during the study period.

Demographic data was compared using student t test where appropriate.

The influence of age and gender on incidence of PDPH was analysed by using χ^2 test.

P value of less than 0.05 was considered significant.

Observation and Results

A total of 200 patients were recruited in the study. All patients were of ASA grade I and II posted for lower limb surgeries by central neuraxial block.

All patients were given spinal anaesthesia with 23 G quincke needle.

Demographically both age groups were comparable with respect to sex, height, weight and BMI. Age of both gender groups was comparable where as there was some difference in height, weight and BMI. This difference can be expected due to normal anatomical and physiological differences in both genders.

Table 1 show that out of 200 patients, total 18 patients had classical PDPH according to defined criteria. The overall incidence of PDPH was 9.0%. 14 out of total 100 patients in young age group (20-40 yrs) and 4 out of 100 patients in old age group (60-80 yrs) developed Post Dural Puncture Headache. Incidence of PDPH in young age group was 14% and in old age group, it was 4.0%. The difference in PDPH incidence was statistically significant $p=0.0262$ ($p<0.05$) in the two different age groups.

Table 1: Incidence of PDPH in two age groups

Age distribution	With PDPH	Without PDPH	Total
Young age	14(14%)	86	100
Old age	4(4%)	96	100
Total	18	182	200

$P=0.0262$ (<0.05)

Statistically significant

Table 2 show that out of 200 patients 107 were males and 93 were females, out of which 5 males and 13 females developed PDPH. The incidence of PDPH in males was 4.67% and in females, it was 13.97%. In my study, females show 3 times more incidence of post-dural puncture headache than males. Difference in incidence of post dural puncture headache was statistically significant $p=0.0408$ ($p<0.05$).

Table 2: Incidence of PDPH in male & female

	With PDPH	Without PDPH	Total
Male	5(4.67%)	102	107
Female	13(13.97%)	80	93
Total	18	182	200

$P=0.0408(<0.05)$

Statistically significant

Table 3 shows that the maximum severity of headache in all patients varies between grade I to grade III. Out of 18 patients 6(33.33%) patient had grade I and 8(44.44%) patients had grade II and 4(22.22%) patients had grade III PDPH. No patient in both the groups had headache of grade IV.

Table 3: Severity of PDPH in two groups

Grade of headache	No of patient
Mild (grade I)	6(33.33%)
Moderate (grade II)	8(44.44%)
Severe (grade III)	4(22.22%)
Very severe (grade IV)	0

Table 4 shows that the time of onset of development of PDPH was between 24 to 72 hours after dural puncture which is shown in the table 6. Out of 18 patients 6(33.3%) had PDPH in 24 hrs, 6(33.3%) had PDPH in 30 hrs and 4(22.22%) had PDPH in 36 hrs and 2(11.11%) had PDPH in 48 hrs.

Table 4: Time of onset of PDPH in 200 patients.

Time	No of patient
24 hours	6(33.33%)
30 hours	6(33.33%)
36 hours	4(22.22%)
48 hours	2(11.11%)
60 hours	0
72 hours	0

Table 5 showing the location of PDPH. Location was Fronto-occipital in 11(61.11%) generalized in 4(22.22%) patients, and occipital in 3(16.66%) patients.

Table 5: Location of PDPH in 200 patients

Location	No. of patient
Generalized	4(22.22%)
Fronto – occipital	11(61.11%)
Occipital	3(16.66%)

PDPH cases were initially treated with bed rest and oral and intravenous hydration. Patients were treated with intramuscular inj. Diclofenac 75mg when headache was moderate to severe. Total dose of diclofenac required for each patient was noted. Table 6 shows that out of 18 patients, 3(16.66%) patients needed 75mg, 1(5.55%) patients needed 150mg and no patient needed 225mg diclofenac. All the patients who developed PDPH responded well to the treatment.

Table 6: Total dose of inj.diclofenac sodium I.M required during 72 hours following lumbar puncture

Inj. Diclofenac sodium	No of patient
75 mg	3(16.66%)
150 mg	1(5.55%)
225 mg	0

Discussion

Spinal anaesthesia is a safe and effective alternative to general anaesthesia for surgeries below the abdomen. Even with its obvious advantages of spinal anaesthesia, post-dural puncture headache is the most common complication of spinal anaesthesia which causes prolonged hospital stay and morbidity in patient. It can significantly interfere with the functional capacity and post-operative well being. Risk factors for PDPH have been researched and includes pregnancy, young age, female sex, history of PDPH, bevel direction to the dural fibers, needle type and size, shape of needle tip, previous of lumbar puncture attempted, median versus paramedian approach. The incidence of PDPH varies with different studies depending on various factors. This may be due to the use of large gauge needle, needle with medium bevel, cutting needles. Due to fine gauge atraumatic spinal needle incidence decreased Dinesh et al² studied evaluation of PDPH using different sizes of spinal needles a total of 75 patients who were undergoing lower limb or lower abdomen surgery by spinal anesthesia were randomized into 3 different groups each having of 25 patients. Patients in group I, group II & group III received spinal anesthesia by 23 gauge quinckes spinal needle, 25 gauge quinckes spinal needle, and 26 gauge quinckes spinal needle. The incidence of PDPH in this study was 20%, 12.5%, and 4.5% in group I, II and III respectively. Ali jabbari et al¹⁰ incidence of post-dural puncture headache for various types of spinal needle. Incidence of PDPH 25 G quincke cutting 8.7%, 26 G atraucan cutting 5%, 24 G atraumatic 4%, 24 G sprotte atraumatic 2.8%, 25 G whitacre atraumatic 3.1%, we obtain its incidence around 17.3%. decreasing the needle gauge used for lumbar puncture may be a solution to decrease incidence of PDPH. In my study of incidence of PDPH in the study group of 200 patients of two different age groups and genders with 23 guage quincke spinal needle in Sir T. Hospital, Bhavnagar is 9.0% Aneel aslam et al⁴ incidence of PDPH in comparison with 23 G, 25 G and 27 G needles in relation to total of 1500 patients were studied in 9 different groups (A1, B1, C1, A2, B2, C2, A3, B3, C3) with group A,B and C for 23 G, 25 G and 27 G

respectively and 1, 2 and 3 for 26-40yrs, 41-55yrs, and 56-70yrs respectively. A1 included younger age group with 23 G spinal needle and C3 included older age group with 27 G spinal needle. The frequency of PDPH in A1(6%), B1(3%), C1(2%), A2(3%), B2 (1.33%), C2(0%), A3(0%), B3(0%), C3(0%). The study clearly shows at incidence is much higher in younger age group. Waseem et al³ comparison of 22,23 and 25 gauge quinke spinal needles for PDPH in 227 patients. Frequency of PDPH was 13/52 (25%) in patients receiving 22 G needle, 14/128(11%) in 23 G and 4/47(8%) in 25 G. This relation was statistically significant with 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. Wadud R et al⁸ studied two hundred patients in a cross-sectional comparative study, in younger(30-50 yr) and older age group(51-75 yr) and their result showed that the PDPH occurred in 30 patients in group A and 5 patients in group B (p<0.05). In the group A 20 female patients (40%) had PDPH as compared to 10 male patients (20%), while in group B, 4 female patients (8%) had PDPH as compared to 1 male patient (2%). They concluded that the incidence of PDPH was less in older age group than younger age group and more frequent in females than males. J Singh and S. B. Marahatta et al⁷ studied 120 patients in a cross sectional study who underwent spinal anaesthesia to study PDPH. It showed that PDPH was seen in 25% of the total patients. The incidence of the PDPH is 30% in males and 70% in females. It showed that it was 2.33 times more in the age group of 18-30 years than age group of 31-45 years. Incidence of postdural puncture headache is high among young age. Pjević M, Gvozdenović et al¹¹ spinal.

Anaesthesia was performed in 776 adult patients with 22 G and 25 G spinal needle. Incidence of PDPH was 3.5%. Its association to age, sex, needle size, duration of postoperative recumbency was analyzed. Our results show that the age was a significant predictor of postlumbar puncture headache. PDPH was more often found in younger patients (p < 0.001). Kang sb et al⁶ studied 730 patients in whom spinal anaesthesia was given with 26 G and 27 G needles were studied for incidence of postdural puncture headache, postoperative backache & patient acceptance. They showed that overall incidence of postdural puncture headache with 26 G needle was 9.6%. Incidence in young age group and old age group were 11.9% and 4.8% respectively and in young age group incidence of post-dural puncture headache in males & females was 7.5% and 16.4% respectively which was statistically significant. In my study the incidence of postdural puncture headache in young and old patients was 14.0% and 4.0% respectively. Difference in the incidence of postdural puncture headache was statistically significant p=0.0262 (p<0.05) in 2 age groups. So incidence of postdural puncture headache was significant but it was inversely proportional to age of patients. Incidence of postdural puncture headache in female and male was 13.97% and 4.67% respectively. Difference in the incidence of postdural puncture headache was statistically significant p = 0.0408 (p<0.05). Thus female significantly has more risk of developing PDPH. Lybecker

et al.¹ The incidence of PDPH was observed in 873 patients who were undergoing total 1021 spinal anesthetics prospectively. In the patients who developed PDPH, 65% developed symptoms within 24 hours of the lumbar punctures and 92% developed symptoms within 48 hours. The headaches in the PDPH patients were localized to the frontal region bilaterally, occipital region and in both regions in 25% of the patients, 27% of the patients and 45% of the patients respectively. Frenkel caltscher et al¹⁴ Two hundred and two male patients between 19 and 30 years of age were included in this study and a standard lumbar puncture with 25-gauge spinal needle. All PDPHs occurred on the first 2 postoperative days with a maximum duration of 4 days (1 patient). Shaikh jm et al¹² investigated to measure the frequency and severity of PDPH in the obstetric patients with 25 G quinke spinal needle, 27 G quinke spinal needle & 27 G whitacre spinal needles. 480 subjects of full term pregnant women of 18 to 45 years of age, posted for elective caesarean section, by spinal anaesthesia. For severity In group I, PDPH was mild, moderate and severe in 5, 7 and 2 patients respectively. In group II, it was mild, moderate and severe in 2, 3 and 1 patient respectively. In group III, it was mild and moderate in 2 and 1 patient respectively. Sung R Kim et al⁹ seventy patients were prospectively investigated in study. 35 patients were kept in supine position for 4 hours after spinal anaesthesia (group 1) and 35 patients were kept in supine position for 1 hour (group 2). They were shown that short duration of supine position may be as effective as long duration of supine position to prevent PDPH. Castrillo A, et al⁵ patients fulfilling eligibility criteria were randomly allocated to one of two kinds of spinal needle: atraumatic or s-type or traumatic or q-type. Incidence of post-dural puncture headache was 22.43% with q-type of needle & 8.51% with s-type of needle (p=0.04). Duration of post-dural puncture headache in patients in s-type was 1 day or less, compared with a median of 4.14 days in the q-type (p=0.00). Seyed Ali et al.¹³ This is a cross sectional study was performed on 94 patients patients between 17 to 70 years old with lower limb fracture with ASA class I/II were included. Spinal anesthesia was performed by using the needle size 25 quinke and multiple complications. (9.6%) patients had PDPH accompanied by nausea and back pain. In our study out of 18 PDPH patients 17 (94.44%) patient had grade I and grade II PDPH. No patient in both groups had headache of grade IV. Out of 18 PDPH patients, 16(88.8%) patient develops PDPH within 36 hours. The most common location of PDPH was fronto-occipital. PDPH cases were initially treated with bed rest and oral and intravenous hydration. Patients were treated with intramuscular inj. Diclofenac 75mg when headache was moderate to severe. Total dose of diclofenac required for each patient was noted. Out of 18 patients, 3(16.66%) patients needed 75mg, 1(5.55%) patient needed 150mg and no patient needed 225mg diclofenac. All the patients who developed PDPH responded well to the treatment. Nausea and vomiting was associated with severe PDPH. No patients develop any other associated symptoms.

Conclusion

This prospective observational study of incidence of post-dural puncture headache in group of 200 patients of 2 age groups and genders. Overall incidence of post-dural puncture headache in my study is 9.0%. Thus incidence of post-dural puncture headache is significant but it is inversely proportional to age of patients. Females significantly has more risk of developing PDPH than males. Most common severity of PDPH in our study had grade II. No patient in both groups had very severe headache of grade IV. None of the patient developed post-dural puncture headache before 24 hours & after 48 hours. the most common location of PDPH is fronto-occipital. Nausea and vomiting were associated with severe PDPH. No patients developed any other associated symptoms. Among PDPH patients, 4 patients had treated with inj. Diclofenac sodium intramuscularly.

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