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INCIDENCE OF POST DURAL PUNCTURE HEADACHE AMONG THE PATIENTS OF AGE 30 TO 70 YEARS UNDERGOING ORTHOPEDIC SURGERY UNDER SPINAL ANESTHESIA AT KHYBER TEACHING HOSPITAL, PESHAWAR, PAKISTAN

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ABSTRACT

Objectives of Study: The objectives of this study is to determine the incidence of post dural puncture headache among the patients of age 30 to 70 years and to determine the frequency at different age group of district Peshawar. **-Materials and Methods:** The hospital based cross sectional study was conducted using convenience sampling technique. A total of 127 patients were randomly selected after taking written inform consent. The International Headache Society Criteria was used for diagnosing the PDPH. Any case with no contraindications to spinal anesthesia was included in the study, While all cases with contraindications to spinal anesthesia such as refusal, emergency, coagulopathy, infection, bleeding was excluded. **Results:** In the current study, the overall occurrence of PDPH was 18.9%. The female patients was more effected from PDPH which were 25% and 16.1 % male population was affected. Two groups were created 30-50 years and 51- 70 years in which the incidence was 20% and 17.3% respectively. **-Conclusion:** CSF leaks was the most important factor in triggering the PDPH. In our study population the most needle gauges used were 22G, 24G, and 25G. If we use less diameter spinal needles, pencil point needles and avoid cutting point needles with the support of an experienced anesthetist. Due to applications of all these techniques we can decrease the incidence of PDPH.

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INTRODUCTION

Regional anesthesia is preferred over general anesthesia for lower limb orthopedic surgery and spinal anesthesia is frequently a choice [1]. Spinal anesthesia is best reserved for all operations below the umbilicus e.g. urological and gynecological procedures, hernia repair [2]. Numerous benefits of spinal anesthesia include a reduced intraoperative blood loss, reduced occurrence of deep vein thrombosis and as well as the prevention of pulmonary aspiration in case of emergency, specially patients with identified respiratory diseases and possible airway problems [3]. Spinal anesthesia includes the use of lesser quantities of local anesthetic injected into the subarachnoid space to produce a reversible loss of sensation and motor function. To avoid trauma to the spinal cord the workers of anesthesia places the needle below L2 in the adult patients. It is significant not to use a spinal anesthetic in patients who are hypovolemic or severely dehydrated. Patients receiving a spinal anesthetic should be preloaded with 1-1.5 liters of a crystalloid solution, such as ringers lactate, instantly prior to the block [4]. PDPH is the most common complication of subarachnoid anesthesia, which can cause major patient discomfort [5]. The onset of PDPH most commonly occurs between 12 h and 72 h of post spinal anesthesia [6].

August Bier first used it on 16th August 1898 with 3 ml of 0.5% cocaine. On 24th August, he was administered spinal anesthesia by his assistant. During the attempt, a lot of Cerebrospinal Fluid was lost and Bier developed Post Puncture Headache (PPH). [7]. August Bier was suggesting that the mechanism of PDPH is leaks out of CSF from puncture site. Although the exact mechanism of PDPH is unknown [8]. But the cause of pain was probably due to intracranial arterial and venous dilatation [9]. The features of post dural puncture headache are dull, severe headache usually locating in the fronto-occipital region which is get worse in erect or sitting positions, coughing, sneezing and standing position [10]. The most common symptoms associated with PDPH are nausea, vomiting, dizziness auditory and visual disturbances [11]. The most serious but very rare complication after dural puncture is cranial nerve palsy [11]. The incidence of PDPH was similar in orthopedic patients (13.6%) and parturient (14.3%) [5]. One of the study of a student in Sheri-Kashmir institute of medical sciences Srinagar suggest that immediately after dural puncture the incidence of PDPH is very rare, 90% may occurs within 3 days or in late [12]. The overall occurrence of PPH varies from 0.1% to 36% [12, 11]. Spontaneous intrathecal CSF leaks are uncommonly leading to headache, approximately with a prevalence of 1:50,000 individuals, with a female-male ratio of 3:1, and is more common in females [13].

After Lumbar Puncture (LP) headache is of a common existence (32%) with signs long-lasting for many days, at times severe enough to immobilize the patient. It can cause serious complications like seizures and subdural hematoma which might be deadly, if leaves untreated [14]. Two large studies had reported a very low incidence of PDPH with 27-G spinal needles (0.5- 1.8%) [15]. Using a 25 gauge spinal needle the incidence rate was 25% [12, 16]. Another group from Denmark, described the rate of PPH was 7.3% in patients underwent operations inferior to the diaphragm after spinal anesthesia (SA) [17]. International headache society criteria for PDPH should contain a headache which is happened in 7 days after dural puncture worsens within 15 minutes in the upright position and relieves within 30 minutes in the recumbent position [18]. Mostly the incidence of post dural puncture headache is commonly related to the diameter of needle used. The large diameter needle can cause increase chances of occurring post dural puncture headache while this incidence rate may be reduced with using small diameter spinal needle [19]. The incidence and severity of PDPH is progressively reduced with pencil-point spinal needles (Whitacre, Sprotte), without increasing the risk of the procedure failure [5]. Due to the high occurrence of PDPH, for spinal anesthesia cutting edge needles are not suggested, [3]. The disadvantage of a smaller needle is the increased technical difficulty of dural puncture. Smaller needles tend to bend during insertion [20].

The most commonly practiced technique is the midline approach. Calcification of supraspinous and interspinous ligaments in the geriatric age group makes midline approach difficult. Paramedian approach is not routinely practiced [14]. Modern anesthetic techniques have reduced the incidence of PDPH considerably. However, because of the current popularity of spinal and epidural anesthesia in fields such as obstetrics and orthopedics and the widespread usage of post dural puncture in radiologic and diagnostic procedures, PDPH to be a major problem continuously for inpatients and outpatients [20].

On the hazard influences of PDPH a surveys exposed that age, females, perpendicular bevel orientation, recurrent dural puncture, design and needle gauge and pregnancy are features largely related with the PDPH occurrence. About 18% patients developed PPH after spinal anesthesia in non-obstetric patients [21]. PDPH may be accompanied by hearing loss, neck stiffness, tinnitus, nausea or photophobia [4]. The headache must disappear in 14 days after a dural puncture, when persists than it is called a CSF fistula headache. A popular therapy for PDPH is Caffeine and was 75% to 80% effective in the early cure of PDPH; however, follow-up 48 hours later revealed that all patients had a return of their headache [13]. Also, Saline injection into the epidural space or epidural blood patch has been used to prevent PPH with different rate of success, or the need for an. An epidural saline injection, a prophylactic epidural blood patch and intrathecal catheter placement, due to lack of substantial evidences all these techniques are not considered routine preventative therapies. Because of the lack of evidences a careful decision regarding the use of these prophylactic interventions is recommended. [8].

Depletion of CSF volume is directly related to the development of headaches. In an elegant series of experiments in 1943 Kunkle, Ray and Wolff demonstrated that removal of 15 to 20 mL of CSF by lumbar puncture rapidly and uniformly produced a headache [20]. The two common methods used in spinal anesthesia are Paramedian and Median approaches and each technique has drawbacks and advantages. The most common technique used is median approach, but it is difficult technically in geriatric patients especially, because of having degenerative changes in their structural components of the spine. Because of the fast insertion of catheter the paramedian approach is selected [22].

MATERIALS AND METHODS

The Hospital based cross sectional study, for which Convenience sampling method were used. The selection of patients was made randomly. Those patients were included in the study who was undergoing orthopedic surgery under spinal anesthesia at orthopedic department of KTH, Peshawar Pakistan. Both male and female patients were considered in the study. According to the sign and symptoms of the post dural puncture headache each research subject was diagnosed and was determined by an expert in the department. This study is approved from the undergraduate research comity of Institute of Paramedical Sciences, Khyber Medical University Peshawar.

Sample size: Sample size was calculated by using the formula. $N = P (1 - P) (Z/E)^2$

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Where the number of sample size was N.

The prevalence P, which was about 18% and its actual value used in formula was 0.18

The z-score Z, at 95% confidence interval was 1.96.

The error E, which was taken as 7%.

Through putting values in the equation of sample size we get;

$$N = 0.18(1 - 0.18) (1.96/0.07)^2$$

$$N = 115.5$$

From the time when an expected 10% non-subject rate was added, so an extra margin of 11.5 was added. Therefore $N = 115.5 + 11.5 = 127$. So, the calculated sample size for the study was 127.

Study Design:

Cross-sectional study

Sampling technique:

The sample was collected through convenience sampling. Written consent was taken from each research respondent and only the agreeable subjects were included in the study. All the important characteristics of the research were discussed with the research subjects.

Inclusion criteria:

Any case with no contraindications to spinal anesthesia was included in the study.

Exclusion criteria:

While all cases with contraindications to spinal anesthesia such as refusal, emergency, coagulopathy, infection, bleeding was excluded.

Data collection procedure:

Reports were obtained from each research subject who fulfilled the inclusion criteria and expert in the concerned department carefully checked the reports to determine the presence of PDPH. A written consent was taken from all participants and only the agreeable subjects were included in the study.

Data analysis procedure:

Statistical Package for Social Sciences (SPSS) 22 version was used for the data analyses. Frequencies and percentages of the study variables was calculated and data was represented graphical (bar graph, pie charts).

RESULTS

Total of 127 patients were selected randomly, and each patient was with no contraindications to spinal anesthesia. Every patient was given spinal anesthesia with first attempt without failure of the spinal block. The overall incidence of PDPH was 18.9% (24 patients) out of 127 patients (Table No 3.1).

Table 3.1 Number of total patients including incidence of PDPH.

PDPH	Patients
Incidence of PDPH	24
Non-Incidence Rate	103
Total Patients	127
Percentage (%)	18.9 %

In the study, out of 127 patients, 87 were male and 40 were female patients. According to gender, one group (Group-1) was comprising of only male patients and one group (Group-2) was of female patients. In Group-1, total 87 patients were studied and only 14 were diagnosed with PDPH, which was 16.1%. In Group-2, total 40 female patients were studied and only 10 were with PDPH, which was 25% of all female patients (Table No 3.3).

Table No: 3.3 Incidence of PDPH in Male vs Female patients in orthopedic procedures.

Variables	Incidence Rate	Non-Incidence Rate	Total Patients	%age
Female	10	30	40	25%
Male	14	73	87	16.1%

Incidence of PDPH was (3 persons were those whose signs and symptoms of PDPH occurrence was appeared within 15 minutes), (13 persons were those whose signs and symptoms of PDPH occurrence was appeared within 24 hours and 8 persons were those whose signs and symptoms of PDPH occurrence was appeared within 48 hours).

Every patient with headache was suffering from severe dull pain which was radiating from frontal to occipital bone. We made variables according to the age and gender. Two groups were created on gender basis and other two groups were based on age. In Group-1, 30-50 years of patients was included that were comprising of both genders (M/F) and 75 patients were included in this group. Out of 75, 15 patients were those who has been appeared with the signs and symptoms of PDPH which was 20%. In Group-2 51-70 years of patients of both gender was included and that were 52 patients, out of these, 9 persons had appeared the signs of the PDPH which was 17.3% (Table No 3.2).

Table No: 3.2 Age related Incidence of PDPH.

Variables	Male	Females	Incidence	Percentage %
Age(30-50)	54	21	15	20 %
Age(51-70)	33	19	9	17.3 %

The incidence rate was 9 out of 54 patients which is 16.66% in Age 30-50 year's male patients. The incidence rate was 5 persons out of 33 patients which is 15.15% in Age 51-70 year's male patients (Table No 3.4).

Table No: 3.4 Incidence of PDPH in Male Patients at different Group of Age.

Patients in years	Incidence Rate	Non-Incidence Rate	Total Patients	%age
Male (30-50 Y)	9	45	54	16.66 %
Male (51-70 Y)	5	28	33	15.15 %

The incidence rate was 6 out of 21 patients in Age 30-50 years female patients and 4 individuals appeared as PPH out of 19 patients in Age 51-70 year's female patients (Table 3.5).

Table No: 3.5 Incidence of PDPH in Female Patient at different Group of Age.

Female Patients Year vise	Incidence Rate	Non-Incidence Rate	Total Patients	%age
Female (30-50 Y)	6	15	21	22.22 %
Female (51-70 Y)	4	15	19	21.05 %

DISCUSSION

The results of the current study point out that the incidence of PDPH was 18.9% that were 24 patients out of 127 patients in both male and female. According to our results and data analysis, 127 patients was selected randomly, 87 patients were male and 40 female patients was also included in the same study. All patients undergoes spinal anesthesia for orthopedic surgeries. There was a little variations in our result as compared to DAGMAR OBERHOFER study of incidence of PDPH in young orthopedic surgery which was 13% and in our study the overall result was 18.9%. This high incidence in our study was due to the use of large diameter spinal needle in our research population. In our study population, more patients were given spinal puncture with 22 gauge, 24 gauge and 25 gauge spinal needles but DAGMAR OBERHOFER study was based on 27G spinal needle [5].

According to the sign and symptoms of the post dural puncture headache each research subject was diagnosed and determined by an expert in the department. We also used IHSC (International Headache Society Criteria) for detecting post dural puncture headache which states a headache which happens after dural puncture within 7 days and exacerbates within fifteen minutes in the vertical position and relieves within 30 minutes in the resting position. The incidence of PDPH in female patients 10 out of 40 having 25% which was higher than male patients (14/87, 16.1%). The incidence was higher in 30-50 years of age (15/75, 20%) than that of 51-70 years (9/52, 17.3%). It means that the incidence of PDPH also depends on gender (female is more affected than male) and age (low aged patients are more prone to PDPH).

One of the study indicates that incidence of PDPH in female patients was 20.4% which was just lower incidence as compare to our study results in female patients (25%), it means that the techniques used was not same and in our study population mostly used 22 gauge spinal needles, which is directly responsible to the increase chances of PDPH occurrence[23]. In the current study variables were made according to age and gender. Two groups were created according to gender and two groups was according to age. Group-1 was (30-50 years) of both genders (M/F), and 75 patients were included in this group. Out of 75, 15 patients were those who has been appeared the signs and symptoms of PDPH which was 20%. In Group-2 (51-70 years) of both genders 52 patients were included, out of these 9 patients had appeared the signs of the PDPH which was 17.3%. The incidence rate of PDPH for male and female was 9 and 6 patients out of 54 and 21 in the age of 30-50 year's respectively. And the incidence rate of PDPH for male and female was 5 and 4 patients out of 33 and 19 in the age of 51-70 year's respectively

CONCLUSION

The incidence of PDPH was just similar to other studies and to the spinal needle gauge used. From the most cases we concluded that the CSF leaks was one of the major factor involved in the PDPH occurrence, although the exact mechanism was unknown. In our study population the most needle gauges used were 22G, 24G, and 25G. Most of PDPH was occurred in those patients who exposed to 22 gauge spinal needles. However, in some cases 27 gauge was also used but the incidence was nil with this designed spinal needle. We concluded that by using less diameter spinal needles, pencil point needles and avoid cutting point needles with the support of an experienced anesthetist we can reduce the incidence.

ABBREVIATIONS

KMU	Khyber Medical University
IPMS	Institute of Paramedical Sciences
PMA	Paramedian Approach
PDPH	Post Dural Puncture Headache
KTH	Khyber Teaching Hospital
M/F	Male/Female
IHSC	International Headache Society Criteria
CSF	Cerebrospinal fluids
CSA	Continuous Spinal Anesthesia
CSEA	Combined Spinal Epidural Anesthesia
SA	Spinal Anesthesia
PPH	Post Puncture Headache

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