FREQUENCY OF POST DURAL PUNCTURE HEADACHE WITH 25G QUINCKE NEEDLE IN PATIENTS SCHEDULED FOR ORTHOPAEDIC SURGERY UNDER SPINAL ANAESTHESIA

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ABSTRACT

Objectives: *To determine PDPH frequency among patients scheduled for orthopaedic surgery after spinal anaesthesia with a 25G Quincke needle.*

Materials and Methods: *A 25-G Quincke needle was used to give standard spinal anaesthesia. The participant was 196 patients who underwent orthopaedic surgery at Mardan Medical Complex. The study enrolled all patients who met the inclusion criteria. Patients with infectious diseases, coagulopathy, severe hypovolemia elevated intracranial pressure were excluded from this study. On postoperative days the patients were examined for the existence, features, and severity of headache. Only posture-dependent headaches were classified as PDPH, with severity levels ranging from mild to severe.*

Results: *The mean age of observed participants was 41.17 (± 15.5). The prevalence of PDPH after administering 25G Quincke spinal needles was 29.5% (58/196. Mild PDPH was observed in 32(55.1%) patients, in 23 (39.6%) patients moderate and severe in 3(5.1%) patients. It appeared in the majority of PDPH patients during the first and second postoperative days. There was a significant ($p<0.05$) association between PDPH status and the number of attempts to obtain Cerebrospinal Fluid.*

Conclusion: *When a 25G Quincke spinal needle was used, the frequency of PDPH was substantially higher. The low rate of severe headaches and the number of attempts to acquire CSF affect the status of PDPH.*

Key words: *Orthopedic surgery, Spinal Anesthesia, Post Dural Puncture Headache, Quincke spinal needle.*

INTRODUCTION

Spinal anaesthesia is neuraxial anaesthesia. A local anaesthetic is injected directly into the intrathecal region (subarachnoid space)[1]. The faster the local anaesthetic diffuses across a nerve sheath, the faster the onset of action and the medicine numbs or blocks. Then feeling in a specific part of your body so that you either feel less or no pain at all and decrease patients' morbidities after a major surgical procedure, failure is infrequent. In the late 1800s,

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Bier demonstrated spinal anaesthesia by subjecting himself to experimenting intrathecal (cocaine) on the following day subject came across PDPH. Bier assumed that the headache was due to cerebrospinal fluid loss[2]. Cons of spinal anaesthesia include hypotension, finite duration of anaesthesia and Post Dural Puncture Headache (PDPH)[3]. Post-Dural Puncture Headache is a common and incapacitating side-effect following an intentional puncture of the dura-arachnoid, whether for diagnosis, therapy, or spinal anaesthesia or accidentally during an epidural operation[4]. Factors responsible for PDPH after spinal block include big calibre needles, cutting needle tips, low-normal body mass index rather than obesity, and more attempts to obtain CSF[5].

A study concludes that the prevalence of PDPH was much greater in the 25G cutting (23.3%)[6]. Another study revealed that the PDPH incidence was 5% with a 25G cutting needle and was absent with 25G noncutting[7]. The rate of PDPH is very low with modern small needles. PDPH complication is more common in females. Think about the benefits of 25-Gauge When it comes to PDPH, the Quincke needle has a clear advantage over the 22-gauge and 23-gauge needles. The number of tries, length of operation, and occurrence of a hypotensive episode all substantially impact the Frequency of PDPH[8]. An increase in needle gauge from 27G will increase the chance of failure and are more difficult to utilize technically. While 22G and 25G, represent adequate spinal anaesthesia needle size[9]. Zeger et al. revealed that the overall incidence of PDPH lies in the range of (0 to 30%)[10]. A study concluded that cutting needle has a great prevalence of PDPH compared to using a spinal needle with a pencil point[11]. Post Dural puncture headache: Post Dural puncture headache is defined as a headache within 72 hours following spinal anaesthesia due to a breach of dura matter. It will be detected by history taking and categorized as a headache aggravated by sitting or standing and relieved by lying down flat which will be labelled as Post Dural Puncture Headache. A pain of more than 3 on the visual analogue scale will be considered PDPH for this study.

The research aimed to determine PDPH frequency among patients scheduled for orthopaedic surgery after spinal anaesthesia with a 25G Quincke needle. PDPH is a very distressing complication of spinal anaesthesia and can put an extra financial burden on the patients and hospital resources. This study will give us local and firsthand evidence of the frequency of PDPH with a 25G needle.

MATERIALS AND METHODS

Department of Anaesthesiology, Mardan Medical Complex (MMC) carried out this cross-sectional six-month-long investigation from July 2021 to January 2022. A sample size of 198 patients had a significance level of 5%, and a confidence interval of 95%, for which the Epi sample size calculator is free to access on the website https://www.openepi.com/SampleSize/SSCohort.htm was availed. After taking formal ethical approval from Bacha Khan Medical College, Mardan, Pakistan [No 48/RC/BKMC]. Both oral and written consent forms were obtained from patients and explained the study's purpose and benefits. This research strictly adhered to the highest ethical standards outlined in the Helsinki Declaration (Revised 2013) and the International Ethical Guidelines for Human Research in Health Care (2016). All patients with ASA I & II scheduled orthopaedic surgery were included. Patients with Known intracranial space-occupying lesions or any condition as detected by medical records are known to be associated with headaches. Patients left out of this study: with a preoperative complaint of headache, tension headache, temporal arteritis, and history of migraine. All the enrolled participants were carefully scrutinized with detailed history and clinical examination, including anaesthesia fitness. The past medical records were also carefully checked in consultation with the referring surgeon to control confounders regarding potential bias in the study outcomes. A single consultant anesthesiologist (using a 25G Quincke needle) with a minimum of five years of experience in the anaesthesia department subjected to spinal anaesthesia for all the patients. Postoperatively, all the patients were followed for 72 hours to determine the post-dural puncture headache. Under spinal anaesthesia, the above information, such as name, age, and address, was written down on a pre-made form. So that the study results wouldn't be affected by outside factors or bias, strict exclusion criteria were used.

Visual analogue scales (VAS) are psychometric measuring tools used to record the severity of disease-related symptoms in each patient and use this information to quickly classify the severity of symp-

toms and how well the disease is being controlled. A picture printed on an A4 size page. At the dotted line, the page was folded. The patient was then asked to put a handwritten mark on a 10-cm line representing a pain continuum ranging from "no pain" to "worst pain". The patient was blinded while calculating the corresponding score[12].

SPSS version 26.0 was used to enter and analyze all of the data. For quantitative variables like age, mean + SD was calculated. No attempts. For categorical variables like frequency and percentages of PDPH were calculated. The Chi-square test was used to compare Post Dural Puncture Headaches, and the number of attempts with a p-value of 0.05 was considered significant. Tables and graphs were used to present all of the results.

RESULT

This study enrolled a total of 196 patients who met the inclusion criteria. Among all patients, 137(69.9%) were male, while the rest, 59(30.1%), were female, as shown in figure 1.

As 196 patients were included, an evaluation of these patients occurred in the incidence of PDPH. The mean age of the sample observed was 41.17 ± 15.5 years, the mean weight was 69.69 ± 9.9 kg, and the mean Hight found was about 65.10 ± 3.8 inches.

Further obtaining the data regarding the appearance of symptoms and duration of PDPH, a total of 57 appeared to have symptoms of PDPH, with the average days of symptom appearance to be 1.4±0.79 days. The duration of PDPH remained at a mean of 32.98±18.8 hours.

In detail, n=42 which is about 21.4% of the total 196, has shown symptoms on their 1st day of post-Dural puncture. Other than that, 4.6%, which is n=9 have shown symptoms in 2 days, n=5 about 2.6% in 3 days and 0.5% that is n=1 have shown symptoms in 5 days

Further, it was recorded for attempts of spinal anaesthesia to visualize CSF flow through the catheter to confirm subarachnoid placement and to administer anaesthetics. About 76.5 attempts were successful just in the first attempt, which counts for n=150.

The maximum number of hours recorded for the duration of PDPH after symptoms appeared was about 72 hours. This is based on observation (n=7) patients out of 196, which accounts for 3.6%. The minimum hours for PDPH duration were recorded for

Table:1 Frequency Table for patient age groups

Age (yrs.)	Frequency	Percent
20-30	55	28.1
31-40	63	32.1
41-50	29	14.8
51-60	22	11.2
61-70	15	7.7
71-80	9	4.6
81-90	3	1.5
Total	196	100.0

Table:2 Descriptive statistics for Symptoms Appearance and duration of PDPH

		The appearance of Symptoms (days)	Duration of PDPH (hours)
N		57	57
Mean		1.40	32.98
Median		1.00	24.00
Mode		1	24
Std. Deviation		.799	18.815
Minimum		1	12
Maximum		5	72
Sum		80	1880
Percentiles	25	1.00	24.00
	50	1.00	24.00
	75	2.00	48.00

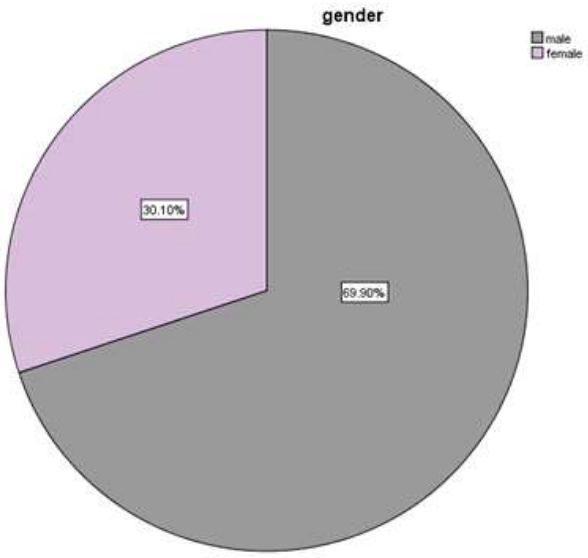

Figure 1 Gender Distribution.

n=9, which is 4.6%. The duration was 18-20 hours and 30 hours for 3 separate individual patients, each accounting for 0.5% of the total 196. n=26, 13.3%, and n=12, 6.1% of patients had PDPH for about 24 and 48 hours, respectively.

n=138 had no PDPH symptoms, accounting for about 70.40%, remaining n=58, 29.59% had

Table:3 Frequency of symptoms appeared within a day(s)

The appearance of Symptoms (days)			
		Frequency	Percent
Days	1	42	21.4
	2	9	4.6
	3	5	2.6
	5	1	.5
	Total	57	29.1
Total		196	100.0

Table 4: Frequency of CSF confirmation as per attempts of Spinal approach.

	Frequency	Percent
First attempt	150	76.5
More than one attempt	46	23.5
Total	196	100.0
Total	196	100.0

Table 5: Duration of PDPH after symptoms have appeared.

The appearance of Symptoms (days)			
		Frequency	Percent
Hours	12	9	4.6
	18	1	.5
	20	1	.5
	24	26	13.3
	30	1	.5
	48	12	6.1
	72	7	3.6
	Total	57	29.1
Total		196	100.0

Table 6: PDPH cases against the severity of PDPH

PDF * Severity of PDPH Cross Tabulation					
PDPH	Severity of PDPH				Total
	Mild	Moderate	Severe	Not Applicable	
No	0	0	0	138	138
Yes	32	23	3	0	58
Total	32	23	3	139	196

Table7. Type of surgery * PDPH Crosstabulation

Type of surgery * PDPH Cross Tabulation			PDPH		Total
			No	yes	
Type of surgery	DHS	Count	26	10	36
		% within Type of surgery	72.2%	27.8%	100.0%
		% of Total	13.3%	5.1%	18.4%
	Tibia Plating	Count	27	16	43
		% within Type of surgery	62.8%	37.2%	100.0%
		% of Total	13.8%	8.2%	21.9%
	Meniscectomy	Count	7	3	10
		% within Type of surgery	70.0%	30.0%	100.0%
		% of Total	3.6%	1.5%	5.1%
	Malus screw fixation	Count	7	2	9
		% within Type of surgery	77.8%	22.2%	100.0%
		% of Total	3.6%	1.0%	4.6%
	Ankle Knee Fixation	Count	8	5	13
		% within Type of surgery	61.5%	38.5%	100.0%
		% of Total	4.1%	2.6%	6.6%

PDPH with a varying range of severity, among those with PDPH, n=32(55%) had mild symptoms, n=23(39.6%) had moderate and 3(5%) had severe symptoms.

Among the patients who presented for surgeries under spinal anesthesia included in the study, N=196, the ones who presented for DHS were n=36, about 18.4%. Among these, about ten patients have shown PDPH symptoms, 27.8% of n=36. Those submitting for Tibial Plating were n=43, about 21.9% of N=196, and 16 had PDPH, accounting for 28.1%. For meniscectomy, a total of 10 cases were presented, accounting for 5.1%, out of these 3 had shown PDPH symptoms. The range of that about 30.0%. Patients for malus screw fixation were n=9, 4.6% of total; 22.2% had shown PDPH symptoms, n=2. Ankle knee fixation cases were about 6.6%, in counting they were n=13, with n=5 of the cases having PDPH, about 38.5%.

Tibial Condyle Knee Screw Fixation cases presented were n=13, and among them 46.2% had Post Dural Puncture Headache case for tibial plating with no PDPH (n=1), femoral IN (=N: 36), Malus screw fixation (n=9), 25% cases of PDPH, anterior cruciate ligament reconstruction (n=22), and with anterior cruciate ligament reconstruction.

As shown in table 8, there is a statistically significant link between the number of attempts and the status of PDPH ($p<0.05$).

Table???. ??

Type of surgery * PDPH Cross Tabulation			PDPH		Total
			No	yes	
Type of surgery	Tibial condyle knee screw fixation	Count	7	6	13
		% within Type of surgery	53.8%	46.2%	100.0%
		% of Total	3.6%	3.1%	6.6%
	Tibia Plating	Count	1	0	1
		% within Type of surgery	100.0%	0.0%	100.0%
		% of Total	0.5%	0.0%	0.5%
	Femur IN	Count	27	9	36
		% within Type of surgery	75.0%	25.0%	100.0%
		% of Total	13.8%	4.6%	18.4%
	Anterior cruciate ligament reconstruction	Count	18	4	22
		% within Type of surgery	81.8%	18.2%	100.0%
		% of Total	9.2%	2.0%	11.2%
	Austin Moore'S Prosthesis AMP	Count	11	2	13
		% within Type of surgery	84.6%	15.4%	100.0%
		% of Total	5.6%	1.0%	6.6%
Total		Count	139	57	196
		% within Type of surgery	70.9%	29.1%	100.0%
		% of Total	70.9%	29.1%	100.0%

Table 8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.223a	1	.000		
Continuity Correction	26.295	1	.000		
Likelihood Ratio	26.389	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	28.079	1	.000		
N of Valid Cases	196				

DISCUSSION

The most practice anaesthesia technique for orthopaedic surgery is spinal anaesthesia. Despite of all advantage, there is some complication that occurs with spinal anaesthesia. PDPH is a common and serious complication[13]. The number of PDPH cases decreased when thinner and different-shaped bevels were used. With a 25G Quincke needle, the number of PDPHs was high. This was similar to a study by Malik MA et al., which found that the number of PDPHs was much higher in the Quincke (23.3%)[14].

According to several publications, the total incidence of PDPH ranges from 0% to 37%[15]. However, a study by Shah and colleagues, similar to ours, found a 20% PDPH incidence in patients with 25G Quincke[16]. In another study, Jabbari et al. found that the rate of PDPH was as high as 17.3% when they used a 25G Quincke needle.

Post-Dural Puncture Headache is affected by the size and kind of spinal needle in addition to other variables. PDPH levels are gradually lowered with the use of thinner Quincke-type spinal needles[17,18]. As 196 patients were included and evaluated for the cross-sectional study of PDPH. The mean age of the sample observed was (41.17 ± 15.5) years. And the incidence of PDPH was high for (30 to 40 years). According to a study, the prevalence of PDPH among persons between the ages of 30 and 40 was high (20%).

The rate of PDPH was 8.5 percent, according to a research study by Vitanen et al., In which 4% of patients, it was mild; in 3%, it was moderate; and in 1% it was severe. Symptoms may persist for up to three days and manifest on the first or second day after a spinal injection. Our study showed PDPH symptoms in the first 24, 48, and 72 hours. A study by Sharmaetal[95] found 2 patients with severe PDPH in Quincke. In our study, only three patients were found to have severe PDPH. Another study reported (7.1%) PDPH with Quincke with two cases of severe PDPH, which is quite lower than our result [21].

CONCLUSION

The incidence of PDPH was dramatically elevated when a 25G Quincke spinal needle was utilized. The low rate of severe headache and the number of attempts to acquire CSF affect the status of PDPH.

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