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Prevalence of Headache after Dural Puncture using Different Size Quincke Spinal Needles in Participants Undergoing Cesarean Section: A Cross-Sectional Study

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Abstract

Aim: To determine the prevalence of headache after dural puncture using different size quincke spinal needles in participants undergoing cesarean section

Study design: A cross-sectional study

Place and Duration: This study was conducted at Tawam hospital Al ain United Arab Emirates from March 2020 to April 2021

Methodology: The study comprised 100 participants with ASA I and II who were receiving elective SCS and were between the ages of 18 and 35 years. They were divided into three groups at random: Group 1- 25G, Group II-26G, and Group III-27G. The number of people who attempted to locate the subarachnoid space was recorded. Patients were kept in the clinic until they were discharged, and the occurrence, severity, and duration of post-dural puncture headache (PDPH) were reviewed.

Results: In individuals with PDPH-like symptoms, the Visual Analogue Scale was used to gauge the severity of the pain. Documentation and statistical analysis of PDPH's occurrence, severity, and intensity were all carried out. Big bore spinal needles and several dural punctures, enhance the occurrence of PDPH in women.

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Conclusion: With large-bore Quincke spinal needles, Post-dural Puncture Headache is more common, more intense, and more severe. As a consequence, to limit the incidence of PDPH, we recommend using micro bore needles with a diameter of 27 G or less during cesarean procedures.

Keywords: cesarean section**,** Post-dural Puncture Headache, lumbar puncture needles, pregnant women

Introduction:

Wynter, Quincke, and Corning worked together in the late 1800s to create spinal anesthesia. Karl August Bier, a German surgeon, was the first to put spinal anesthetic into clinical practice in 1898 [1]. Bier also had firsthand experience with the incapacitating headache caused by dural puncture by performing spine surgery on himself [2]. Post Dural Puncture Headache (PDPH) is the most prevalent, annoying, and inconvenient consequence of spinal anesthesia, and it is exceedingly unpleasant and burdensome for the patient [3]. The anesthesiologist has a difficult and stressful job in dealing with this unexpected consequence.

In 1902, extradural leakage of cerebrospinal fluid (CSF) was suggested by Sicard as a possible cause of Post Dural Puncture Headache [4]. The term "post-dural" is synonymous with "peri dural" and means "behind the dura."

After either a planned or unplanned dural puncture, an epidural needle can be used. PDPH might develop [5]. The symptoms normally appear within three days and increase when the patient takes an upright position, such as sitting or standing. Pain is mainly occipital or frontal, but may also be nuchal, extending to the neck and shoulders, and is accompanied by dragging. Neck stiffness is noted less often as a source of pain [6].

The symptoms of a headache include heaviness, a tightening band, vacuum-like as well as scorching and spreading out like a heated metal [7]. Nerve palsies of the craniosacral system can occur as a complication of the procedure. Recovery from CSF leakage into the epidural space takes 3 to 4 weeks. In the first 48 hours following surgery, 66% of patients report experiencing headaches, which account for 90% of all headaches [8, 9]. Five to fourteen days following the procedure, the headaches begin to appear. Within a week, the headache normally goes away.

The purpose of this study was to evaluate how frequently, how severe, and how common PDPH was in patients who underwent an elective Lower Segment Caesarean Section (LSCS) under spinal anesthesia with various Quincke spinal needle diameters (25 G, 26 G, and 27 G).

Methodology

The study was carried out after the ethical committee at the institution authorized the study and the patient provided informed permission. The study comprised 100 patients with ASA I and II who were receiving elective LSCS and were between the ages of 18 and 35 years. Spinal needle

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sizes were utilized to categorize each patient into one of three groups: Group I (25 G), Group II (26 G), and Group III (27 G).

Patients in the ASA I and ASA II categories who do not have any systemic disorders such as hypertension, diabetes, or thyroid disease were included in the study. Participants in this trial were required to be free of any contraindications in general to spinal anesthesia. Patients having a history of the headache of any kind were excluded from the study.

Tablet Ranitidine 150 mg and Tablet Metoclopramide 10 mg were given orally to all patients undergoing elective LSCS the night before and two hours before surgery, respectively. An 18 G cannula was used in the preoperative area to set up an intravenous line, and twenty to thirty minutes before the spinal blockade, patients were given Ringer's lactate solution at a dose of 10 ml/kg body weight. Patients were continuously monitored in the operating room after being transferred, including with an ECG, blood pressure measurement, heart rate, oxygen saturation, and urine output.

After wiping the back with a solution of 10% povidone-iodine and 70% alcohol, sterile draping was conducted when the patient was placed in the proper lateral position. The Quincke spinal needle's bevel was kept facing the caudal end. Once the free flow of CSF was established, 2 ml of 0.5 percent Bupivacaine Heavy was injected intrathecally. Hudson's mask was used to supplement oxygen for patients who had been turned supine till the baby was born. Intravenous fluids and vasopressors were used to treat systemic hypotension when needed.

It was counted how many times people tried to find the subarachnoid space. Multiple attempts were defined as any attempt to move or reroute the spinal needle following one or more unsuccessful an effort to find it in the subarachnoid space. The patients' vital signs were recorded throughout the surgery, and they were then transferred to the recovery room. All of the patients were kept hydrated, and they were given Injections for postoperative pain treatment, Ketorolac sodium eighth hourly, and Injection Pethidine hydrochloride 10 mg is administered as required.

The patients were monitored in the ward until they were discharged. The following questions were asked at each visit: Does your headache originate from the occipital or frontal regions? Does it become worse when you cough, sneeze, or strain? When did you initially sit up following surgery, and when did you start walking? Is there any position that aggravates the headache, such as sitting, standing, or upright posture? What exactly is the cause of your headache? Is there any other symptom that goes along with it? and is it alleviated when you lay down?

When the following criteria are present, patients are diagnosed with PDPH. Within 3 days, the symptoms appear, frontal or occipital site, the pain of a dragging kind, sitting, standing, erect posture, coughing, straining, or sneezing is aggravating factors, lying down or supine posture is a relaxing aspect, nausea, dizziness, neck stiffness, tinnitus, auditory and visual hallucinations are all common symptoms.

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On a Visual Analogue Scale (VAS), the pain level of patients who complained of symptoms suggestive with PDPH was categorized as mild, moderate, or severe. A scale ranging from 0 to 10 was used to assess the patient's subjective pain intensity. Using the T-test and the Chi-square test, the incidence, severity, and intensity of PDPH were reported and statistically assessed. SPSS version 23 was used for data analysis.

Score	**Intensity of pain**	**Features of PDPH**
0-3	Mild	· Physical activity is restricted somewhat. · The patient is not restricted to his or her bed. · Headache in the occipital or frontal region with postural changes
4-6	Moderate	· There are no symptoms that go along with it. · Activities of daily living are severely restricted, forcing the patient to spend most of the day in bed. · Signs that aren't normally present
7-10	Severe	· The patient has been confined to her bed all day and has not attempted to stand or raise her head. · Symptoms that go along with it

Table 1: Scoring of the intensity of pain

Results

The incidence, intensity, and severity of PDPH were measured in 100 ASA Grade I and II participants who had elective LSCS with various size Quincke spinal needles.

Table 2 shows that effective subarachnoid puncture was achieved in 67% of first attempts (67 out of 100), 26% in second attempts (26 out of 100), 6% in third attempts (6 out of 100), and 1% in fourth attempts (1 in 100). With a single puncture, no one developed PDPH in any of the three groups, but with a second attempt and subsequent attempts, the incidence was 16.31 percent, 17.79 percent, and 34.22 percent in Groups I, II, and III, respectively, there was a tight relationship between many punctures and the incidence of PDPH, which was statistically significant at the $p<0.05$ level.

Table 1: Age Distribution of the study participants

Age	**Group - I**		**Group -II**		**Group - III**	
(Years)	**N**	**%**	**N**	**%**	**N**	**%**
18-25	11	32.4	10	30.3	9	27.3
26-30	14	41.2	14	42.4	13	39.4
31-35	9	26.4	9	27.3	11	33.3

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Table 2: Attempts at penetration during the spinal puncture

Number of Punctures	Group - I (25G)	Group - II (26G)	Group - III (27G)	X^2	Level of Significance
1	21	13	33	19.14	0.05
2	7	14	5		
3	4	2	0		
4	1	0	0		

Table 3: Incidence of PDPH

Gauge	Incidence	X^2	Level of significance
Group - I	7	9.49	0.01
Group - II	3		
Group - III	1		

Table 4: Intensity of pain using 't-test

Needle	N	Mean	S.D	T	Level of significance
Group – I	34	0.4500	1.373	0.375	0.05
Group – III	33	0.4200	1.820		
Group – I	34	0.4500	1.373	1.73	
Group – II	33	0.2100	0.735		
Group - III	33	0.4200	1.820	1.23	
Group - II	33	0.2100	0.735		

Table 5: Onset of PDPH

Onset	Spinal needle	N	X^2	Level of significance
<24 hours	Group – I	2	3.87	0.35
	Group – II	3		
	Group – III	2		
24-48 hours	Group – I	7	7.33	0.28
	Group – II	5		
	Group – III	3		
48-72 hours	Group – I	8		

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	Group – II	3	14.21	0.05
	Group - III	7		

Table 6: Duration of PDPH

Duration (Days)	Gauges			X^2	Level of significance
	Group -I	Group -II	Group -III		
1	2	1	0	13.37	0.15
2	0	2	3		
3	0	1	2		
4	3	2	1		
5	2	0	1		
6	1	0	1		

Table 7: Severity of PDPH by VAS

Severity	Group - I	Group - II	Group - III	X^2	Level of significance
Mild	6	1	4	13.28	0.01
Moderate	3	4	0		
Severe	0	2	2		
Total	3	7	6		

Table 8: Severity of pain duration

Needle Gauge	<24 hours				X^2	Level of significance
	No pain	Mild	Moderate	Severe		
Group - I	32	1	0	1	4.93	0.52
Group - II	31	1	2	1		
Group - III	30	0	1	0		
	24 - 48 hours					
Group - I	29	2	1	0	5.32	0.38
Group - II	27	3	0	1		
Group - III	31	2	3	1		
	48 - 72 hours					
Group - I	24	5	3	0	9.31	0.05
Group - II	21	7	8	2		
Group - III	19	6	4	1		

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Discussion:

Dura mater CSF leaks out of a hole in the membrane produced with a spinal needle are suspected to be the cause of PDPH, which results in a reduction in CSF pressure and CSF hypotension [10]. The absence of the brain's cushioning function, or the downward traction of the CNS and blood vessels connected with the dura mater and skull's pain-sensitive parts, may result in PDPH. Arachnoiditis or a local inflammatory condition, according to new data, may be the cause of these symptoms, which are linked to urine and fecal incontinence [11].

Double vision, blurred vision, photophobia, and trouble concentrating are all ocular symptoms. Due to the lengthy intracranial course of the sixth cranial nerve, the abducens, it is particularly susceptible to low-pressure paralysis [12]. Due to endolymphatic enlargement caused by perilymphatic hypotension, auditory symptoms include reduced hearing and tinnitus [13]. The CSF and the pressure fluctuations in the perilymph are quite similar [14].

The development of PDPH appears to be associated with younger patients, females, large gauge spinal needles, needle tip design, numerous punctures into the dura mater, pregnancy, and early ambulation [15]. The stress of labor, disturbed hormone levels, and dehydration, according to Spielman (1982), are the reasons for the higher prevalence of PDPH in pregnant women.

According to our findings, big bore spinal needles and numerous dural punctures increase the risk of PDPH in young obstetric patients [16]. On the other hand, there was no statistical significance in the patients' age groups.

The total incidence of PDPH was 11%, which was comparable to the incidence reported by Galinski et al [17], which varied from 1.5 percent to 11.2 percent. In our research, PDPH was found in 20.59 percent (7 out of 34) of Group I participants, 9.09 percent (6 out of 33) of Group II participants, and 3.03 percent (1 out of 33) of Group III participants. The bulk of the cases was found during the summer season, and the other explanation might be the young parturient. Statistical research revealed a tight relationship between needle gauge and PDPH incidence, with a p value< 0.01 for the Chi-square test.

The VAS was used to measure the severity of headaches reported by the patients on different days of the week, with non-statistically significant findings [18]. In our research, the headache lasted for a maximum of 6 days. After the first week, none of our patients experienced a headache.

In our study, the majority of patients got PDPH within 24 to 48 hours after being exposed to the procedure. According to the severity of PDPH in our study, patients were divided into three groups: mild, moderate, and severe. It is possible that the increased severity in Group II (26 G) compared to Group I (25 G) was caused by differences in patient characteristics and the number of punctures attempted in this group. A slight headache was the most common side effect experienced by all participants of Group III following the administration of 27 G needles. The

statistical analysis found a significant association between the severity of PDPH and the use of large-bore needles, with a p-value of <0.01, between the two variables.

It was revealed that the degree to which a person is suffering from pain between 25 G and 27 G was significantly different when the t-test and the chi-square test were employed to investigate the intensity and severity of the PDPH. After 48-72 hours, the chi-square test revealed that the level of pain had become significantly more significant, demonstrating that there is a relationship between large-bore needles and pain severity.

The conventional conservative methods of bed rest, supine or comfortable position, plenty of fluids, intravenous fluids, and analgesics were used to treat patients with PDPH in our study, as was the case in the literature. None of the individuals with PDPH needed the use of an epidural blood patch. Neither before nor after the onset of headaches, there is any clinical evidence that the use of a supine position can help to alleviate the symptoms [19]. Increased intra-abdominal pressure, which is conveyed to the epidural space, reduces CSF leakage from the spinal space into the epidural space, and, as a result, helps to reduce headache [20].

Conclusion

With large-bore Quincke spinal needles, Post-dural Puncture Headache is more common, more intense, and more severe. As a consequence, to limit the incidence of PDPH, we recommend using micro bore needles with a diameter of 27 G or less during cesarean procedures. In our study, patients with PDPH were given conservative therapy such as bed rest, supine or comfortable posture, plenty of fluid intake, IV fluids, and painkillers. Because of the increased intra-abdominal pressure in the prone position, less CSF leaks into the epidural area, resulting in a reduction in headache.

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None

CONFLICT OF INTEREST

None

PERMISSION

Permission was taken from the ethical review committee of the institute

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