

## Is the Atraumatic Spinal Needle a Better Choice in Younger Patients? A Comparison of 25G Spinal Needles in a Group of General Surgical Patients Below 40 Years of Age

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### Abstract

**Introduction:** One of the important spinal anesthesia complications is the occurrence of postdural puncture headache (PDPH). The incidence of PDPH is related to the age, the size and tip shape of the spinal needle used and the type of surgery. Incidence may vary depending on the type and size of needle. This study was conducted to compare the frequency of PDPH using different kind of spinal needles.

**Methods:** Data of 81 patients undergoing spinal anesthesia for lower abdominal surgery were collected for the study. Patients were divided into three groups as Group Q (n = 27), Group P (n=27) and Group A (n = 27) according to the spinal needle used for spinal anesthesia. Headache incidences during five days period postoperatively were noted.

**Results:** The overall incidence of PDPH in this young adult population was 13.6% (11 patients of 81). PDPH was encountered in 14.8%, 11.1% and 14.8% of patients in Groups A, Q and P, respectively.

**Conclusion:** All spinal needles used in our study have the potential to lead to PDPH in young patients undergoing spinal anesthesia for lower abdominal surgery. We did not see any advantage of using 25G Atraumatic spinal needle in young patients.

**Key Words:** Postdural puncture headache, spinal anesthesia complications, Atraucan, 25 gauge.

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### Introduction

Spinal anesthesia (SA) has been more frequently used for elective surgery below the umbilicus since its introduction by Bier a German surgeon in 1898 (1). Despite the several advantages of spinal anesthesia, side effects and complications of SA can be life threatening. One of its important complications is the occurrence of postdural puncture headache (PDPH), reported firstly by Wynter and Quincke after the treatment of raised intracranial hypertension associated with tuberculous meningitis (2).

PDPH is defined as severe pain that is localized over the frontal and occipital areas radiating to the neck and shoulders. The headache is exacerbated by head movement, by a sitting or standing position and relieved by lying down. PDPH commonly starts within 1–3 days after dural puncture, and resolves spontaneously within 1 week or will last within 48 hours by effective treatment (3-5).

The incidence of PDPH is related to the age, sex and previous history of the patient, the size and tip shape of the spinal needle used, the type of surgery, the number of lumbar puncture attempts and the

clinical experience of the personnel performing the dural puncture (4, 6). The use fine, pencil-point needles lead to decrease in the incidence of PDPH (4). Incidence may vary from 0% to 37% depending on the type and size of needle (7). The incidence has been reported between 0% and 25% with a 25 G needle (4, 8-10).

This study was conducted to compare the frequency of PDPH using the 25 G Quincke, 25 G Pencil point and 25 G Atraucan spinal needles in a population of patients less than 40 years of age undergoing spinal anesthesia for lower abdominal surgery.

### Material and Methods

After obtaining informed consent from patients and approval of the local Ethics Committee, 81 (18-40 years old) patients, ASA physical status I-II, scheduled to undergo elective lower abdominal surgery such as herniorrhaphy or hemorrhoidectomy with spinal anesthesia, were enrolled in the study. Patients were randomly divided by computer-generated random numbers into three groups as Group Q (n =



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27), Group P (n=27) and Group A (n = 27) according to the spinal needle used for spinal anesthesia. Patients who received spinal anesthesia via a 25-G atraumatic spinal needle (25-G Atraumatic Spinal Needle, Egemen Ltd., Izmir, Turkey) formed Group A, via a 25-G Quincke spinal needle (25-G Quincke Spinal Needle, Egemen Ltd., Izmir, Turkey) formed Group Q and whereas those having spinal puncture via 1 25-G pencil-point needle (25-G Pencilpoint Spinal Needle, Egemen Ltd., Izmir, Turkey) formed Group P. All the spinal anesthesia procedures were performed by one experienced anesthesia specialist. The procedure was explained to all patients during their preoperative visits.

Exclusion criteria were the patient's refusal of spinal anesthesia, acquired or congenital coagulation disorders, systemic or localized infection at the puncture site, contraindications to spinal anesthesia, neurological diseases, and a history of headache.

No premedication was used. All patients prehydrated with 10 ml kg<sup>-1</sup> of 0.9% sodium chloride solution over 30-40 minutes before the block was performed. Routine intraoperative monitors

included continuous electrocardiography, pulse oximetry, and noninvasive arterial blood pressure monitoring. Lumbar puncture was performed under strict aseptic precautions through one of the L3-4 or L4-5 intervertebral interspaces with the patient in the sitting position leaning forward, feet on a stool and shoulders maintained by an assistant. No local anesthetic agent was used for skin anesthesia prior to the spinal needle insertion.

After demonstrating free flow of CSF, all patients received standard doses of drugs consisting of 12.5 mg hyperbaric bupivacaine (0.5% Spinal Heavy, Bupivacain HCl 20 mg/4mL, BUSTESİN, VEM) was injected over a period of 30 seconds with the needle's bevel facing upwards. When spinal anesthesia was considered to be sufficient, the operation was allowed to start. The age, ASA status, height, and weight of the patients were noted, as well as the complications and type of surgery from the patient follow-up papers. Once the surgical procedure had been completed, patients were shifted to the postanaesthesia care unit.

Postoperatively, all patients were visited to evaluate successively for two days by a anesthesia specialist, who was unaware of the type of needle used, to inquire about headache. On the 5th day, if the patient was discharged from the hospital evaluation was made by phone call. PDPH was defined as an occipital

or frontal headache brought on by erect position and relieved when the supine position was assumed. Also severity of headache was questioned and was judged as 0: no headache, I: Mild, not limit the daily activity, may be treated with oral or intravenous fluids, II: Moderate, limits daily activities, which can be treated with oral hydration therapy + analgesia, III: Severe, unresponsive to treatment and require further evaluation and treatment. Extraordinary reactions and complications were also recorded. The headache was initially treated conservatively with bed rest and hydration. If the severity of headache was evaluated as II<sup>nd</sup> degree, then oral analgesic (paracetamol 250 mg + propyphenazone 150 mg + 50 mg caffeine) was given. When a patient complained of an occipital or frontal headache, she was monitored daily until she was discharged from the hospital. Patients with severe headache unresponsive to treatment were assessed for further evaluation and treatment.

Statistical analysis was performed using SPSS (Statistical Package for Social Sciences for Windows, Ver. 18.0; SPSS Inc., Chicago, IL, USA). Continuous variables were presented as mean and standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. Differences between categorical variables were evaluated with the chi-square test. The Kolmogorov–Smirnov test was used for normality distribution. Continuous variables were compared by Student's t-test or Mann–Whitney U test for two independent groups, as appropriate. Statistical significance was interpreted when p values were below 0.05.

## Results

Data of 81 patients were collected for the study and patients were randomly assigned to the Group A (n = 27), Group Q (n = 27), or Group P (n = 27). The demographic data of the patients are demonstrated in Table 1. No differences were found with regard to age, gender, height and weight, or ASA physical status of the patients between the three groups.

**Table 1.** Demographic data of the patients.

	Group A (n = 27)	Group Q (n = 27)	Group P (n = 27)
Age (years) (mean±SD)	29.7±7.3	29.2±8.5	33.3±8.9
Height (cm) (mean±SD)	172.6±8.5	175.8±7.7	172.6±6.8
Weight (kg) (mean±SD)	78.7±14.5	79.0±12.9	76.8±13.6
Gender (Female/Male)	6/21	5/22	4/23
ASA I/II	23/4	24/3	22/5

The overall incidence of PDPH in this young adult population was 13.6% (11 patients of 81). PDPH incidence in Group Q was lower than that in other two groups but no statistical difference was found between the three groups (Table 2). Severe headache was not observed in any patient at any time. No differences were found with regard to extraordinary reactions (nausea-vomiting) between the three groups.

**Table 2.** Headache incidence of groups.

		Group A (n = 27)	Group Q (n = 27)	Group P (n = 27)	p
Headache	Absent	23 (85.2 %)	24 (88.9 %)	23 (85.2 %)	0.901
	Present	4 (14.8 %)	3 (11.1%)	4 (14.8 %)	

Table 3 shows PDPH incidence of patients according to assessment day. Headache rates were found to be similar on 1<sup>th</sup> day and 2<sup>nd</sup> day assessment between three groups. But headache incidence on postoperative 5<sup>th</sup> day assessment in Group A was higher than that in Group Q and Group P, and the difference was statistically significant (p=0.044).

**Table 3.** Headache incidence of groups according to assessment (visit) day.

	Group A (n = 27)	Group Q (n = 27)	Group P (n = 27)	p
1 <sup>th</sup> day (n, %)	1 (%3.7)	2 (%7.4)	1 (%3.7)	0.769
2 <sup>nd</sup> day (n, %)	4 (%14.8)	3 (%11.1)	3 (%11.1)	0.892
5 <sup>th</sup> day (n, %)	3 (%11.1)	0	0	<b>0.044</b>

## Discussion

Post-dural puncture headache (PDPH) is one of the most common complications of spinal anesthesia (11). The risk of occurrence of post-spinal headache depends on different factors and the incidence may vary depending on the population carried out and types of used needles. The needle diameter and tip shape are the most important factors involved in the formation of this headache (12).

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Our results show that all spinal needles used in our study have the potential to lead to PDPH in young patients undergoing spinal anesthesia for lower abdominal surgery. And the overall PDPH incidence in the whole population of patients was 13.6%. The literature concerning incidence of PDPH confirms our data (4, 7). The reported PDPH rates vary considerably, for instance, PDPH rates for the 25 gauge Quincke needle range from 3% to 37.2% (4, 13). In previous published studies, Buettner et al., Evans et al. and Schmittner et al. have reported PDPH incidence with 25G Quincke needles, respectively, 8.5%, 13% and 16.9% (10, 14-16). In our study, the rate of headache was 11.1% in Group Q.

On the other hand, it was believed that the use of fine gauge pencil-point needles and atraumatic needles lead to a greater reduction in the incidence of post-dural puncture headache (4). In contrast, in this study PDPH incidence in Group Q was found to be similar with that in other two groups (pencil-point and atraumatic groups). Moreover, on postoperative 5<sup>th</sup> day evaluation, headache incidence was higher in Group A than that in Group Q and Group P, and the difference was statistically significant. It has been shown that, in vitro, the Atraucan spinal needle lead to less cerebral spinal fluid (CSF) leakage than Quincke and pencil-point spinal needles (17-18). Therefore, it is expected that PDPH also should be lower in atraumatic needles. However, Vallejo *et al.* reported a higher incidence of epidural blood patch and PDPH associated with 26-gauge atraumatic spinal needles compared to 25-gauge pencil-point needles (19). Andres et al. (20) and Sharma *et al.* (21) reported that the PDPH incidences were similar in 26- gauge atraumatic spinal needles and 25-gauge or 27-gauge pencil-point needles. Additionally, in another study it was reported that the 26-gauge atraumatic and 25-gauge pencil-point spinal needles were associated with a similar incidence of PDPH (22).

In conclusion, we think that PDPH may be encountered in all types of spinal needles used in our study. Based on the results of our study we did not see any obvious advantage of our current practice of using 25G Atraumatic spinal needle in young patients. The choice between these three types of needles should then be based on the availability and cost of the needles.

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