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Does Atraucan cause more postdural puncture backache?

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Background/aim: Postdural puncture backache (PDPB) is the most frequent complaint after spinal anesthesia. In the literature its importance is generally overshadowed by postdural puncture headache. We studied two different kinds of spinal anesthesia needles to compare their technical handling capacities and incidences of PDPB.

Materials and methods: Data of 256 pregnant female patients undergoing cesarean delivery under spinal anesthesia were collected for the study. Patients were divided into two groups as Group A (n = 109) and Group Q (n = 147) according to the spinal needle used for spinal anesthesia (i.e. 26-gauge atraumatic and 26-gauge Quincke needles, respectively). Backache incidences during a 1-week period postoperatively and handling characteristics of the needles were noted.

Results: Spinal anesthesia was successfully performed at one attempt in 92.7% and 86.4% of patients in Groups A and Q, respectively. PDPB was encountered in 62.4% and 44.2% of patients in Groups A and Q, respectively, and the difference was statistically significant (P = 0.037).

Conclusion: Both 26-gauge Atraucan and Quincke needles have excellent handling characteristics. PDPB seems to be less common with the 26-gauge Quincke needle than with the Atraucan needle.

Key words: Postdural puncture backache, spinal anesthesia complications, postspinal backache, cesarean section, Atraucan, 26 gauge

1. Introduction

Postdural puncture backache (PDPB) is the most common complaint after spinal anesthesia (1,2). The incidence ranges from 2% to 29% in adults (3,4). The incidence has been reported to be up to 40% in children (5).

It is defined as continuous pain that is localized around the site of spinal puncture without any irradiation (6,7). The pathophysiology of PDPB includes muscular relaxation with stretching of spinal ligaments and/or localized tissue trauma (1,2,8,9).

Risk factors for PDPB include length of postoperative immobilization, position of the patient during spinal anesthesia procedure, and time spent on the operating table (10). On the other hand, Dahl et al. reported similar incidence of backache with general and spinal anesthesia (1).

We commonly use one of two methods in spinal anesthesia. The first is the needle directly puncturing the skin and going through to reach the subarachnoid space. The second is the needle passing through an introducer inserted to the skin prior to that. Use of an introducer helps the spinal needle bypass the skin and subcutaneous tissue, thus preventing the needle from bending, but it may cause more tissue trauma and inflammation, resulting in backache (6).

PDPB is a frequent cause of morbidity after spinal anesthesia, but it is generally eclipsed by postdural puncture headache. There are few papers about PDPB in the literature. The purpose of our study was to evaluate the incidence of backache with 26-gauge Quincke and Atraucan spinal needles and to demonstrate the needles' handling characteristics.

2. Materials and methods

Data of 256 pregnant female patients who underwent cesarean delivery under spinal anesthesia at the Adıyaman University Research Hospital between July and August

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2013 were collected for the study. Patients were divided into two groups as Group A (n = 109) and Group Q (n = 147) according to the spinal needle used for spinal anesthesia. Patients who received spinal anesthesia via a 26-G atraumatic spinal needle (Atraucan, B.Braun Melsunger, Germany) formed Group A, whereas those having spinal puncture via a 26-G Quincke spinal needle (Spinocan, B.Braun Melsunger, Germany) formed Group Q. All the spinal anesthesia procedures were done by two experienced anesthesia specialists. The patients recruited were term nonlaboring pregnant female patients aged 18 to 45 years old of ASA physical status I and II undergoing elective cesarean section under spinal anesthesia. Multiple or complicated gestations were not included.

All the patients were prehydrated with 1000 mL of physiologic saline solution prior to the procedure. No premedication was used. Routine intraoperative monitors included continuous electrocardiography, pulse oximetry, and noninvasive arterial blood pressure monitoring. Lumbar puncture was performed through one of the L2-3, L3-4, or L4-5 intervertebral interspaces with the patient in the sitting position. No local anesthetic solution was used for skin anesthesia prior to the spinal needle insertion. The Atraucan needle was introduced with a 20-gauge introducer, whereas the Quincke needle was introduced without it. All patients received standard doses of drugs consisting of 10–12 mg hyperbaric bupivacaine in 8.25% dextrose and 15 μg fentanyl. T4–6 sensory dermatome level was obtained before surgical incision. The age, ASA status, height, and weight of the patients were noted, as well as the number of puncture attempts, time for the procedure, and complications from the patient follow-up papers. Number of puncture attempts was grouped as 1, 2, 3, or more attempts. Time required for the procedure was grouped as <1 min, 1–3 min, 3–5 min, and ≥5 min. Unsuccessful anesthesia was defined as pain sensation under the T4–6 dermatome levels and patients received either sedation with propofol (20 mg in increments) or general anesthesia with propofol (2.5 mg/kg), rocuronium bromide (1.2 mg/kg), and endotracheal intubation. Extraordinary reactions and complications were also recorded.

The first postoperative week's records of the patients were evaluated and backache incidences were noted. Backache was evaluated by visual analog scale (VAS) and numerical rating scale (NRS) on the first postoperative day and on the 8th day by phone, respectively, and all records were meticulously kept in the patients' dossiers. Backache was separated into three groups according to VAS and NRS scores as mild (VAS/NRS 1–3), moderate (VAS/NRS 4–7), and severe (VAS/NRS 8–10). Duration of backaches was also noted.

Data analysis was performed using SPSS 15 (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. At the time that we designed our study, we had found a PDPB rate of 22% for Atraucan and 11% for Quincke spinal needles from previous reports. Making power analysis, as calculated by PASS software (http://www.ncss.com/software/pass/), a sample size of 100 patients per group was necessary with the alpha error level set at 0.05 and power of 80%. A two-sided value of $P < 0.05$ was considered significant for all analyses.

3. Results

Data of 256 patients were collected for the study. An Atraucan needle was used for 109 patients, whereas a Quincke was used for 147 of them. The demographic data of the patients are demonstrated in Table 1. No differences were found with regard to age, height and weight, or ASA physical status of the patients between the two groups.

Spinal puncture attempts and procedure durations are shown in Table 2. Success rates after the first attempt were 92.7% and 86.4% for Groups A and Q, respectively. The spinal puncture procedure was performed in under 1 min in 85.3% and 74.8% of patients in Groups A and Q, respectively. No statistical difference was found between the two groups with respect to these variables. No unsuccessful spinal punctures were recorded.

One hundred patients (91.7%) in Group A and 135 patients (91.8%) in Group Q had sufficient anesthesia for the surgery. Others required sedation or transition to general anesthesia with endotracheal intubation. No statistical difference was found between the groups with this respect.

One patient in Group A suffered from sinus arrest for 6 s and responded successfully to atropine (1 mg) without further complications. One patient in Group Q suffered a small intracranial epidural hematoma, which was revealed on postoperative day 2 by brain MR imaging requested by a neurology consultant because of the intractable unilateral headache of the patient. Retrospective evaluation and painstaking anamnesis revealed minor head trauma 3 days before the operation. The patient recovered without any complications or need for surgery.

Table 3 shows backache incidence, severity, and duration. Backache incidence in Group A was higher than that in Group Q, and the difference was statistically significant ($P = 0.037$).

Table 1. Demographic data of the patients.

		Group A	Group Q	P
Age (years)		29.2 ± 4.8	30.2 ± 5.5	0.131
Height (cm)		160.9 ± 5.4	161.7 ± 5.5	0.232
Weight (kg)		76.0 ± 12.1	75.9 ± 10.1	0.961
ASA	I (n = 156)	59 (54.1)	97 (66.0)	0.055
	II (n = 100)	50 (45.9)	50 (34.0)	

Note: Data are given as SD ± mean. Numbers in the parentheses represent percentage values.

Table 2. Spinal puncture attempts and procedure duration.

	Group A (n = 109)	Group Q (n = 147)
Puncture attempts		
1	101 (92.7)	127 (86.4)
2	7 (6.4)	17 (11.6)
≥3	1 (0.9)	3 (2.0)
Procedure duration		
<1 min	93 (85.3)	110 (74.8)
1–3 min	14 (12.8)	35 (23.8)
4–5 min	2 (1.8)	2 (1.4)

Note: Numbers in the parentheses represent percentage values.

Table 3. Backache incidence, severity, and duration.

	Group A (n = 109)	Group Q (n = 147)	P
Backache			
Absent	41 (37.6)	82 (55.8)	0.037*
Present	68 (62.4)	65 (44.2)	
Intensity			
Mild	37 (54.4)	33 (50.8)	
Moderate	22 (32.4)	23 (35.4)	0.912
Severe	9 (13.2)	9 (13.8)	
Duration (days)	3.6 ± 2.2	4.1 ± 2.0	0.141

Note: Numbers in the parentheses represent percentage values. *P < 0.05.

4. Discussion

Both spinal needles used had good handling characteristics. Spinal puncture at first attempt was successfully performed in 92.7% and 86.4% of the patients in the Atraucan and Quincke groups, respectively; at two attempts the success rate was increased to 99.1% and 98.0%, respectively. In 85.3% of the patients in Group A and 74.8% in Group Q the duration of spinal anesthesia procedure was less than 1

min from the start of puncturing. Sharma et al. displayed an 80% success rate at first puncture attempt for Atraucan (11). They speculated that the greater success rate at first spinal puncture attempt was related to the design of the Atraucan needle (11). Atraucan is an atraumatic spinal anesthetic needle available since 1993 (12). It is used with a 20-gauge introducer. Scott et al. suggested that it is associated with easy insertion through the spinal ligaments and minimal trauma to the dural fibers (12). De Andrés et al. also demonstrated good technical handling for Atraucan needles (6). Pan et al. displayed 62% success with one attempt (7). Our success rate for the Atraucan needle is the highest in the literature. We think that the success rate is also dependent on the experience of the specialist.

The rate of backache was 62.4% and 44.2% in Groups A and Q, respectively. Sharma et al. (11) reported 22% PDPB, Pan et al. (7) 9.6%, and De Andrés et al. (6) 22.8% with the Atraucan needle. Sharma et al. (11) and Pan et al. (7) enrolled obstetric patients, while De Andrés et al. (6) recruited patients having orthopedic surgery. Despite this, De Andrés et al. (6) displayed the highest rate of PDPB among these, which is surprising if you think that the obstetric population often encounters backaches because of the anatomic changes of the lumbar vertebrae during the physiologic process of pregnancy. De Andrés et al. also linked PDPB to the young age of the patients and routine use of the 20-gauge introducer with the spinal needle (6). Even with the Quincke needle we have encountered a high incidence of backache. Some authors showed less PDPB with thicker Quincke spinal needles. Kokki et al. (13) and Imarengiaye and Edomwonyi (14) found back pain rates of 27% and 13.3%, respectively, with the 22-gauge Quincke needle. We think that the recorded backaches in both groups were not all spinal puncture-related, i.e. PDPB. It is probable that most of them were not related to spinal puncture; however, the apparent difference between the groups as regards backache is obvious. If we propose that backaches not related to spinal puncture are equal in each group, the difference seems to be related to the spinal needle used.

Two hypotheses may be suggested for this issue. The first is that the thicker spinal needle you use, the more PDPB you encounter. Thicker needles cause greater trauma and more inflammation in the tissue, resulting in more PDPB (15). However, some studies have shown no difference in PDPB related to the needle size and shape (7,11). The second hypothesis is that repeated spinal puncture attempts cause PDPB (16). However, some studies revealed this to be untrue. Brooks et al. (15) found no difference in PDPB related to the number of redirections of the spinal needle. Pan et al. (7) found no difference in PDPB related to the number of attempts of spinal puncture. The Atraucan spinal needle is used with an introducer that is quite thicker than the subarachnoid needle itself. It may cause more PDPB than needles without introducers (10). However, introducers have the advantage of keeping the needle straight and thus preventing it from bending (15). Brooks et al. (15) proposed that omission of introducer needles may decrease tissue damage and lessen PDPB incidence. They used a 24-gauge Sprotte needle with and without an 18-gauge introducer; the result was no difference regarding PDPB, but higher incidence of redirections in the group without introducer. They concluded that the addition of an introducer to the spinal needle decreased the number of redirections and did not increase PDPB (16). Our findings are in accordance with these facts and we think that adding an introducer may stabilize the subarachnoid needle itself, decreasing redirections and thus resulting in less PDPB; for all that, it can cause more PDPB as a result of being thicker than the subarachnoid needle itself and causing more trauma to the tissue.

The limitation of our study was that we were unable to obtain information about the patients' preoperative backache history. The patients having backache symptoms prior to the operation may have tended to complain about backache after the operation and the etiology of this pain might not be related to spinal puncture. Moreover, nearly half of the patients suffering from backache (54.4% and 50.8% in the groups with Atraucan and Quincke needles, respectively) had mild symptoms; we think that this might have made the discrimination between spinal puncture-related and nonrelated back pain more complicated, i.e. patients with mild backache preoperatively tended to report backache postoperatively, not necessarily of PDPB in origin. It was not feasible to demonstrate the origin of the backache of the patients recorded in the dossiers. Prospective studies with homogeneous groups are necessary, with meticulous history of the patients' backaches recorded prior to operations, to establish this difference clearly.

In conclusion, we think that PDPB may be encountered less in patients receiving spinal anesthesia via 26-gauge Quincke spinal needles than via Atraucan. A painstaking anamnesis should be taken from the patients regarding their history of backache before recruitment in these kinds of studies.

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