



Aminophylline does not Prevent Postdural Puncture Headache in Caesarean Section

Ismail Sirit¹, Ibrahim Ozturk^{2*}, Dilek Yazıcıoglu²

¹Department of Anesthesiology, Maternity And Children Hospital, Turkey

²Department of Anesthesiology, Dışkapı Yıldırım Beyazıt Education and Research Hospital, Turkey

***Corresponding author:** Ibrahim Ozturk, Department of Anesthesiology, Dışkapı Yıldırım Beyazıt Education and Research Hospital, İrfan Bastug Street, Altınlı, Ankara, Turkey, Tel: +9005333120185, E-mail: drozturk28@gmail.com

Abstract

Background: We aimed to investigate that whether intraoperative intravenous aminophylline is effective for prevention of postdural puncture headache after caesarean section or not.

Materials and method: Records of patients who underwent caesarean section between January, 2013 and November, 2013 with spinal anesthesia were examined retrospectively. Patients older than 18 were included in the study. Failed and conversion to general anesthesia was the exclusion criteria. Demographic data of patients (age, weight, height and physical status), comorbid diseases, intraoperative intravenous aminophylline uses the number of spinal puncture attempts and existing of postdural puncture headache were recorded.

Results: Total 149 records of patients who met the inclusion criteria were analyzed (aminophylline group n=80 and control group n=69). Postdural puncture headache developed 15% (n=12) in the aminophylline group and 13% (n=9) in control group. There was no difference between groups in terms of age, weight, height, American Society of Anesthesiologists physical status, comorbid diseases, attempt numbers and frequency of postdural puncture headache ($p>0.05$). There was no correlation between postdural puncture headache occurrence and use of intraoperative intravenous aminophylline during spinal anesthesia performance ($p>0.05$).

Conclusion: We conclude that administration of intraoperative intravenous aminophylline during spinal anesthesia does not affect postdural puncture headache incidence in caesarean section.

Keywords

Aminophylline, Postdural puncture headache, Spinal anesthesia

Introduction

Postdural puncture headache (PDPH) is a substantial complication that has been seen varying rates as 0-36% after spinal anesthesia and can critically affect patient's daily life [1]. The first presentation of PDPH due to spinal anesthesia has reported by August Bier who was the first practitioner of spinal anesthesia, as well [2].

The loss of cerebrospinal fluid (CSF) from entrance point of spinal needle and the decrease in CSF pressure related to this loss

causes PDPH [1]. These two situations underlie explanation of two possible mechanisms. First of all, tension in intracranial structures related to decrease in CSF pressure causes headache. Secondly, decrease in CSF volume can be compensate with increase in blood volume and this composed venodilation causes headache [3].

In a current meta analysis released by Basurto Ona et al. [4], they analyzed the medications used for preventing PDPH. They have concluded that practice of intravenous aminophylline has decreased frequency of PDPH. However, this result is based on a single research published by Sadeghi et al. in 2012 [5]. We think that pharmacological effect of aminophylline may be transient for preventing PDPH. Therefore it can not affect incidence of PDPH development. For this reason, we aimed to investigate that whether intravenous aminophylline, which is one of the pharmacological methods applied time to time in the current anesthesia practice, is effective in prophylaxis of PDPH or not.

Materials and Methods

After ethics committee approval (Dışkapı Yıldırım Beyazıt Education and Research Hospital Ethic Committee:11.11.2013-11/14, ClinicalTrials.gov ID: NCT02150304), patient files who had caesarean operation, records of intraoperative anaesthesia and hospital automation system in Siirt Maternity and Children Hospital were scanned retrospectively. Informed consent was taken from the patients who would be included in the research during the control examinations. Records of patients who were older than 18 and had caesarean section with spinal anaesthesia were included in the research. Records of patients who were applied to deep sedation or general anaesthesia procedure during the any phase of operation after the practice of spinal anaesthesia, who were obese (body mass index ≥ 30) that may complicate the use of spinal anaesthesia, who had all of the types headache history, who often consumed analgesic or who had a medication history like aminophylline and so forth were not included in the evaluation. In addition, patients were not included in the evaluation who were applied combined spinal-epidural anaesthesia. PDPH was diagnosed accordingly to diagnosis criteria guide of Headache Classification Committee of the International Headache Society [6].

It was recorded that the number of spinal needle from the written or electronic data, frequency of application: age, height, weight

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Table 1: Characteristics of Patients, Attempt Number of Spinal Anesthesia, Frequency of Postdural Puncture Headache

	Aminophylline group n=80	Control group n=69	p
Age (Year)	30.1 ± 8.5	27.9 ± 5.7	0.3
Weight (kg)	69.2 ± 5.4	70.7 ± 4.7	0.05
Height (cm)	163.0 ± 4.1	163.7 ± 4.1	0.4
ASA	I 67 (87%)	59 (81%)	0.3
	II 10 (13%)	13 (18%)	
Comorbidity*	No 63 (81.8%)	61 (84.7%)	0.6
	Yes 37 (18.2%)	39 (15.3%)	
Attempt No	1 53 (68.8%)	45 (62.5%)	0.5
	2 19 (24.7%)	22 (30.6%)	
	3 5 (6.5%)	5 (6.9%)	
PDPH	12/80	9/69	0.6

Mean ± standard deviation, PDPH: Postdural Puncture Headache

*co-existing systematic disease.

Table 2: Postdural Puncture Headache and Correlation between Variables

	r	p
Age	-.05	0.47
Weight	-.05	0.5
Height	.1	0.2
ASA	-.06	0.4
Comorbidity	-.02	0.8
Attempt Number	.03	0.6
Application of Aminophylline	.1	0.2

of the patient, physical status classification of American Society of Anaesthesiologists (ASA), whether i.v aminophylline was used or not (Carena[®], Biofarma Drug Industry, Istanbul, Turkey) and whether PDPH developed or not.

Statistical analysis

Statistical Package for the Social Sciences (SPSS) 16.0 was used for the statistical analysis of data. The normality of distribution was tested with Kolmogorov-Smirnov Z test: The homogeneity of variance was tested via Levene and Welch tests. Findings were given as mean ± standard deviation, median (data range, minimum-maximum) or percentage. Parametric data that indicated whether there is difference between groups or not were evaluated with Independent sample test and nonparametric data were evaluated by Mann-Whitney U test. In order to determine the correlation between variables, Spearman's Rho correlation test was applied. P value $\alpha<0.05$ was accepted as significant.

Results

Files of 154 patients who were applied spinal anaesthesia were analyzed. Data of five patients were not included in the analysis due to skipping general anaesthesia because of the failure of spinal anaesthesia. In total 149 patients whose ages ranging 18-52 years old, weights ranging 57-88kg, heights ranging 155-173cm and $BMI<30 \text{ kg.m}^2$ were included in the analysis. It was observed that the usage of spinal anaesthesia was successful for the first attempt in most patients (n=98, 65.8%), that there were no comorbidity in 124 patients (124/149, 82.3 %), 80 patients were applied 1.5mg. kg^{-1} dose intravenous aminophylline (53.6 %), any medications as aminophylline or prophylactic were not practiced to 69 patients (46.4 %) and PDPH was developed in 21 patients (21/149, 14.1%), (in intravenous aminophylline group 15% n=12/80, n control group 13% n=9/69)

It was observed that the spinal anaesthesia was applied by the same experienced anaesthetist to all patients with 25G Quincke spinal needle from L₃₋₄ interval with 2.5mL 0.5% hyperbaric bupivacaine. There was no significant difference between patients who were applied or not applied intraoperative intravenous aminophylline in terms of age, weight, height, ASA physical status, comorbidity, attempt number and PDPH (Table 1, p>0.05).

Any correlation between the variables that belonged to patients with developing PDPH and spinal anaesthesia could not be found (Table 2, p>0.05).

Discussion

Postdural puncture headache is a common complication of spinal anaesthesia that reducing the quality of life after the operation and causing additional therapy costs. For this reason, in order to prevent PDPH in preoperative or intraoperative period, many medications were tried as prophylactic. Between these medications, there are caffeine [7,8], dexamethasone [9,10], indomethacin [11] and aminophylline [5,12,13].

Both in published research, oral caffeine was applied with three different dose: 75, 125 and 300mg [7,8]. Esmaoglu et al. [7] did not find effective the caffeine and paracetamol combination also, Strelec et al. [8] did not find caffeine effective separately. Similarly, Flacetten et al. [11], Doroudian et al. [9] and Youseshahi et al. [10]

Concluded respectively rectal indomethacin and intravenous dexamethasone were not effective for PDPH.

The mechanism of preventing headache for metilxanthine derivation was not enlightened exactly [13]. However, the possible mechanism has been that aminophylline has made cerebral vasodilation [5].

In literature, there have been studies applied aminophylline for PDPH prophylaxis [5,12,13]. Zajac et al. [12] showed in their research that when they gave 250mg intravenous aminophylline with caffeine and magnesium together, it did not affect the incidence of PDPH. In this research which applied to 182 patients who had caesarean section, the medications were given in postoperative period.

It was observed that prophylaxis of intravenous aminophylline was effective in other study with pregnant [5]. In this study, aminophylline was applied in 1mg. kg^{-1} dose as intraoperatively after the infant was born and the cord was clamped. As a result, the researchers found that aminophylline decreased the incidence of headache during the period of 24 and 48 hours. However, in our research it was seen that the headache incidence observed in the patients who practiced aminophylline was not different than the patients who were not applied aminophylline that there was no correlation between headache and prophylaxis of aminophylline.

Moreover, Naghibi et al. [13] observed that the single use of 1.5mg. kg^{-1} aminophylline (n=34) for the patients who had lower extremity surgery was more effective than the placebo group (n=35). The incidence of PDPH occurred between 5.88% and 42.85%. The researchers used 23G Quincke spinal needle. Moreover, they used aminophylline 15minutes before the ending of operation. However, in our research, spinal anaesthesia was applied with 25G Quincke spinal needle. For this reason, we observed the PDPH incidence as 14.1%. We incorporated in 149 patients to our study. Although Naghibi et al. [13] included in total 140 patients to their study, the group only applied aminophylline and placebo consisted of 69 patients. In addition to this, aminophylline was given 1.5mg. kg^{-1} dose in the intraoperative period. Our draft research was similar with the research of Sadeghi et al. [5].

The most important limitation of our research was having fewer samples. The second limitation was involving in different patient populations. The other limitation comprising only one sex due to examining the patients who had caesarean section.

Conclusion

We were of the opinion that practice of intravenous aminophylline in intraoperative period did not reduce the PDPH. However, it is needed larger randomized controlled studies containing about the subject.

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