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Research Article

Caffeine, Is it effective for prevention of postdural puncture headache in young adult patients?

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Abstract *Background and objectives:* Postdural puncture headache is a relatively common complication in spinal anesthesia, so several kinds of regimens have been suggested for treatment of this problem. The aim of this study was to evaluate the efficacy and safety of prophylactic administration of intravenous caffeine sodium benzoate for prevention of postdural puncture headache (PDPH) in young adult patients received spinal anesthesia.

Methods: One hundred ASA I and II patients undergoing elective knee surgeries either arthroscopy or anterior cruciate ligament reconstruction (ACL reconstruction) were included in this study. Patients were randomized by double-blind, placebo-controlled design to receive intravenously (IV) either 10 mL normal saline as control group (group S) or 10 ml with 500 mg caffeine sodium benzoate (CSB) as caffeine group (group C) during the first 60 min after spinal anesthesia administration. The patient's electrocardiogram, noninvasive blood pressure, and pulse oximetry were monitored and recorded. The patients' headaches were evaluated by using the visual analog

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scale (VAS), and the severity of the headache was classified as follows: no headache = 0, mild headache ⩽3, moderate headache from 4 to 6 and severe headache ⩾7. Analgesic requirements were recorded.

Results: Visual analog scale scores were significantly lower in group C than in group S. The incidence of moderate and severe headache was significantly higher in group S (11 patients) when compared with group C (2 patients). Analgesic demand was significantly lower in group C than in group S.

Conclusion: It seems that the incidence of postdural puncture headache decreases in those patients who received caffeine sodium benzoate. The article can potentially help clinicians to use caffeine as an effective drug for prevention of PDPH.

1. Introduction

The incidence of postdural puncture headache (PDPH) is estimated to be between 0% and 5% following spinal anesthesia and up to 81% following accidental dural puncture during epidural catheter insertion specifically in the pregnant woman [1].

The incidence is partly dependent on the skill and experience of the person performing the lumbar puncture, but even in the best hands headache occurs despite apparently a traumatic punctures of the theca [2].

PDPH is described as severe, distributed over the frontal and occipital areas radiating to neck and shoulders. Neck stiffness may be present. Pain is exacerbated by head movement, and in upright posture, and relieved by lying down. An increase in severity of headache on standing is the hallmark of PDPH, in some patients PDPH can be debilitating and may increase the length of hospital stay [3].

The presence of certain predisposing risk factors increases the incidence of PDPH. The age group at highest risk is from 18 to 40 years, being 3–4 times that at the age of 65 years [4–6]. Also patient position during the procedure is one of the contributing factors [7,8]. There is no evidence that either bed rest or additional IV fluids reduce the likelihood of a headache developing following dural puncture.

Although Epidural Blood Patch (EBP) is one of the most effective treatment methods for PDPH [8,9], pharmacologic management is less invasive method in comparison with EBP. Epidural injection of NaCL 0.9% or dextran is used as an alternative when the EBP is unsuccessful or contraindicated so pharmacological management to prevent PDPH is an attractive option used to relief patient symptoms and to decrease the length of hospital stay [8].

Caffeine was first reported as a treatment for PDPH in 1949. Caffeine is a central nervous system stimulant and is thought to treat PDPH by inducing cerebral vasoconstriction. Doses from 75 to 500 mg have been investigated and caffeine has been administered orally, intramuscularly and intravenously [11].

Well-designed, adequately powered, randomized controlled trials showing the efficacy of caffeine in PDPH are lacking. Available studies are small and have methodological shortcomings.

This double blinded randomized controlled study was designed to evaluate the efficacy and safety of caffeine for prevention of PDPH in young adult patients received spinal anesthesia.

2. Patient and method

After approval of the ethical committee in New Jeddah Clinic hospital (Saudi Arabia), a written informed consent was obtained from 100 patients ASA physical status I–II, aged 20–30 years, who were scheduled for elective knee surgeries either arthroscopy or anterior cruciate ligament reconstruction (ACL reconstruction), were enrolled in this study.

Patients were excluded from the study if they had allergy to caffeine, a current psychiatric or neurological disorder or pre-existing hypertension, or intolerance to caffeine, or had consumed caffeinated beverages within the previous 4 h.

The patients received instructions on how to use a visual analog scale for the assessment of the degree of headache that consist of an unmarked 10 cm line, with 0 representing no headache and 10 cm representing the worst headache imaginable [12].

In pre-anesthesia room, standard noninvasive blood pressure (BP) and pulse rate were recorded and a peripheral 18-gauge i.v. cannula was inserted. All patients received 20 mL/kg of lactated Ringer's solution as a prehydration measure over 30 min. In the operative theater baseline values of heart rate (HR), mean arterial pressure (MAP), and hemoglobin oxygen saturation (SpO2) were recorded by Datex-Ohmeda; Aisys (GE healthcare) before anesthesia and every five min. during the procedure. For all cases in the study, the spinal anesthesia was performed with the patient in the sitting position at L3-4 or L4-5. Hyperbaric bupivacaine 0.5% 2–3 mL was administered after confirmation of cerebrospinal fluid through a 25-gauge Quincke spinal needle. Patients were placed immediately in supine position. After fixation of the upper sensory level which assessed at 5-min intervals, a tourniquet was applied to the thigh to give bloodless field. All operations were done by the same surgeon.

Patients were randomly allocated into two groups using a computer generated randomization chart to receive intravenously either caffeine sodium benzoate (CSB) 0.5 g, as a caffeine group (group C, $n = 50$) or normal saline as a controlled group (group S, $n = 50$). The study drug (caffeine) was diluted to a volume of 10 mL in one syringe and the other syringe contains 10 ml normal saline both of them presented as coded syringes by an anesthesiologist who was not involved in the management of the patients. For the two groups the injection was given slowly intravenously within the first 60 min after lumber puncture and then 12-hourly for 48 h.

The hemodynamic parameters and any side effects such as nausea, vomiting, rigor, discomfort or inadequate analgesia