



Research Article

Efficacy of preoperative hydrocortisone versus tramadol for attenuation of postoperative shivering after percutaneous nephrolithotripsy: A randomized controlled trial



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KEYWORDS

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Abstract *Background:* Percutaneous nephrolithotripsy is a technique used for the treatment of renal stones during which an irrigation fluid is used which may cause hypothermia and shivering if not prevented. The aim of this prospective randomized placebo controlled double blinded study was designed to evaluate the efficacy of preoperative hydrocortisone versus tramadol for attenuation of postoperative shivering after percutaneous nephrolithotripsy under general anesthesia
Method: 90 ASA I males and females patients aged 20–50 years, planned for percutaneous nephrolithotripsy under general anesthesia were randomly divided into three groups:

Group S ($n = 30$) received 10 ml normal saline IV before induction of general anesthesia

Group H ($n = 30$) received IV hydrocortisone 2 mg/kg before induction of general anesthesia

Group T ($n = 30$) received IV tramadol hydrochloride 1 mg/kg before induction of general anesthesia

The following parameters were recorded:

Core temperature, heart rate and mean arterial blood pressure before induction of anesthesia, then every 15 min after induction of anesthesia, and every 30 min in the PACU, shivering intensity in the first 2 h postoperative, the incidence of shivering, the number of patients required meperidine and side effects.

Results: The number of patients who had shivering was statistically significantly higher in S group (12) than in H group (8) and in T group (7) with no statistically significant differences between H and T groups.

Intraoperative heart rate, mean arterial blood pressure and side effects showed no statistically significant difference between the study groups.

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Conclusion: Preoperative IV hydrocortisone and tramadol were effective in attenuation of postoperative shivering compared to placebo after percutaneous nephrolithotripsy without increasing the incidence of side effects.

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1. Introduction

Body core temperature is important for the maintenance of normal physiology of the body, and intraoperative hypothermia causes postoperative shivering, coagulation disorders, and prolongation of drug duration [1].

General anesthesia facilitates redistribution of the temperature from the central tissues to the peripheral tissues [2] causing perioperative hypothermia which complicates a large percentage of surgeries [3].

Percutaneous nephrolithotripsy (PCNL) is a common technique for the treatment of renal stones [4], and the use of irrigation fluid during endoscopic surgeries at room temperature may lead to hypothermia and shivering [5].

Malhotra et al. reported that fluid absorption occurred in 78% of the PCNL, and this may lead to inadvertent intraoperative hypothermia [6] and postoperative shivering which increase oxygen consumption, blood pressure, and intracranial and intraocular pressures [7].

Many drugs such as meperidine, ondansetron and clonidine have been used for the prevention of shivering [8].

Hydrocortisone has been found to be effective in the prevention of postoperative shivering after general anesthesia [9].

Tramadol hydrochloride, a synthetic opioid, prevents shivering by inhibiting the reuptake of serotonin, dopamine and norepinephrine [10], and previous studies showed that tramadol is a potent prophylactic antishivering agent [11–13].

The aim of this prospective randomized placebo controlled double blinded study was to evaluate the efficacy of preoperative hydrocortisone versus tramadol for attenuation of postoperative shivering after percutaneous nephrolithotripsy under general anesthesia.

2. Patients and methods

After approval from the ethical committee in Faculty of medicine, Beni suef university hospital (FMBSU REC, Egypt), the study was registered at the Australian New Zealand Clinical Trials Registry (ANZCTR), the registration number is ACTRN12614000413628, and written informed consents were obtained from 90 ASA I male and female patients aged 20–50 years, who were planned for percutaneous nephrolithotripsy under general anesthesia from May 2014 to January 2015.

Patients were excluded from the study if they are ASA > I, had history of peptic ulcer, or are on prolonged steroid therapy, and those with history of use of antidepressant drugs, epilepsy, a known allergy to the study drugs, expected blood transfusion during surgery, BMI > 30 or an initial body temperature > 38 °C or < 36 °C were also excluded.

On arrival to the operating theater, 18 G intravenous cannula was inserted and IV warmed crystalloid fluid was infused.

The patients were randomly divided using closed envelope technique for randomization to one of three groups:

Group S ($n = 30$): received 10 ml normal saline IV.

Group H ($n = 30$): received IV hydrocortisone 2 mg/kg.

Group T ($n = 30$): received IV tramadol hydrochloride 1 mg/kg.

The studied drugs were diluted in 10 ml coded syringes and given as an IV bolus just before induction of general anesthesia by an anesthesiologist who is unaware of the study protocol.

With adjustment of the temperature in operating room at 22 °C – 24 °C, the monitor was attached to the patients to take preoperative readings of heart rate, non-invasive arterial blood pressure, and SpO₂.

General anesthesia was induced after preoxygenation for 3–5 min with 100% oxygen by face mask, then anesthesia was induced in all patients with the use of IV fentanyl 2 µg/kg, IV propofol 1.5–2 mg/kg, and atracurium 0.5 mg/kg and they were ventilated manually with sevoflurane 2 volume%, 100% oxygen via a face mask and then oral cuffed endotracheal tube was inserted. Muscle relaxation was guided by nerve stimulator anesthesia was maintained with oxygen 100%, sevoflurane, additional doses of atracurium, and mechanical ventilation with maintenance of end tidal carbon dioxide 35–40 mmHg.

The patients were covered with sheets and sterile surgical drapes, and all intravenous fluids and irrigation fluids were warmed.

At the end of surgery, neuromuscular blockade was reversed with IV neostigmine 0.04 mg/kg and atropine 0.02 mg/kg, the trachea was extubated when the patient responds to commands, and all patients were transferred to PACU, where they received oxygen via face mask 3–4 l/min and were monitored and covered with cotton blanket.

The following parameters were recorded by senior anesthesia resident unaware of the study protocol:

1. Patient characteristics and operation time.
2. Core temperature (°C) (tympanic membrane temperature by Rossmax® medical infrared ear thermometer, radiant innovation Inc., Taiwan) before induction of anesthesia, then every 15 min after induction of anesthesia, and every 30 min in the PACU.
3. Shivering intensity in the first 2 h postoperative was graded by using a five-point scale that was used in the study of Honarmand and Safavi [8].

(Grade 0: none; Grade 1: one or more areas of Pilo erection but without visible muscular activity; Grade 2: visible muscular activity confined to one muscle group; Grade 3: same as Grade 2 but in more than one muscle group; and Grade 4: gross muscular activity involving the entire body). If grades 3 shivering was observed the patients were treated with IV meperidine 25 mg.

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