Egyptian Journal of Anaesthesia (2016) 32, 1–6

HOSTED BY

Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

www.elsevier.com/locate/egja
www.sciencedirect.com

Research Article

A comparative study between dexmedetomidine and propofol in combination with fentanyl for conscious sedation during extracorporeal shock wave lithotripsy

Raafat A. Salem [a], **Abbady A. Mohamed** [c,*], **Hazem E.L. Moghazy** [b], **Gamal A. Alsagheer** [d]

[a] *Department of Anesthesiology, Sohag Faculty of Medicine, Sohag University, Naser City, Egypt*
[b] *Department of Urology, Sohag Faculty of Medicine, Sohag University, Naser City, Egypt*
[c] *Department of Anesthesiology, Qena Faculty of Medicine, South Valley University, Qena, Egypt*
[d] *Department of Urology, Qena Faculty of Medicine, South Valley University, Qena, Egypt*

Received 1 June 2015; accepted 23 July 2015
Available online 12 September 2015

KEYWORDS

Extra-corporeal shock wave lithotripsy;
Dexmedetomidine;
Fentanyl;
Propofol;
Sedation

Abstract *Background:* Extra-corporeal shock wave lithotripsy (ESWL) is a painful procedure. Sufficient analgesia is mandatory to achieve good treatment results, as well as patient compliance and comfort. Dexmedetomidine, owing to its sedative and its analgesic effects, may be suitable for conscious sedation during ESWL. The aim of this study was to evaluate the use of dexmedetomidine compared with propofol for its safety and efficacy during ESWL.

Patients and methods: Fifty-two patients were randomly divided into 2 groups that received either dexmedetomidine or propofol for elective ESWL. A dose of 1.5 μg/kg of fentanyl was given intravenously (IV) to all patients 10 min before the ESWL procedure. In the dexmedetomidine group, patient received an initial loading dose of 1 μg/kg of dexmedetomidine infused IV over 10 min, followed by an infusion rate of 0.3 μg/kg/h. In the propofol group, the initial loading dose of 1 mg/kg of propofol was infused IV over 10 min, followed by an infusion rate of 3 mg/kg/h. The Observer's Assessment of Alertness/Sedation (OOA/S) scores, visual analog scale (VAS), and hemodynamic and respiratory variables were recorded regularly at 5-min interval during ESWL. Hospital discharge time was determined according to Kortilla's criteria for outpatient surgeries.

Results: The OOA/S scores in the dexmedetomidine group at the 25- to 45-min assessments were significantly lower than those seen in the propofol group ($P < 0.05$). The VAS scores for the

* Corresponding author at: Departments of Anesthesiology, Qena Faculty of Medicine, South Valley University, Qena, Egypt. Tel.: +20 96536064.
E-mail address: Abbady_66@yahoo.com (A.A. Mohamed).
Peer review under responsibility of Egyptian Society of Anesthesiologists.

http://dx.doi.org/10.1016/j.egja.2015.07.004

dexmedetomidine group were significantly lower than those in the propofol group, but only at the 30- to 45-min assessments ($P < 0.05$). During sedation, the respiratory rate with dexmedetomidine was significantly slower ($P < 0.05$). Other clinical variables, adverse effects, and hospital discharge times were comparable in both groups ($P > 0.05$).

Conclusion: Dexmedetomidine with fentanyl can be used safely and effectively, and it may be a valuable alternative to propofol with fentanyl for conscious sedation during ESWL.

1. Introduction

Even with new-generation lithotripters, extra-corporeal shock wave lithotripsy (ESWL) is a painful procedure, and sufficient analgesia is mandatory to achieve good treatment results, patient compliance and comfort [1]. A combination of a sedative hypnotic and an opioid analgesic is commonly used to produce patient analgesia and sedation [2,3]. Fentanyl (Fentanyl–Hameln, 0.1 mg/2 ml) is a potent synthetic narcotic, has a rapid onset and a short duration of action. It is a strong agonist at the μ-opioid receptors and provides an acceptable analgesia condition during ESWL but it has a marked respiratory depressive effect [4]. Propofol (Propofol-Lipuro, 10 mg/ml) is a frequently used sedative hypnotic with minimal analgesic properties, but it may cause respiratory depression; an effect that may be potentiated by the presence of opioids [5,6]. The combination of fentanyl and propofol has shown to be even more potent analgesic in ESWL with mitigating side effects such as respiratory depression, decreasing oxygen saturation, nausea, vomiting, drowsiness, and hypersensitivity reactions [7,8]. Dexmedetomidine (Precedex, 100 μg/ml) is a highly selective α-2 adrenergic receptor agonist that has both analgesic and sedative properties, with minimal effect on ventilation, and thus may be a valuable drug for use during outpatient procedures that cause minimal to mild pain, such as ESWL [9].

This study was designed to compare the sedative, analgesic, hemodynamic, and respiratory effects of dexmedetomidine and propofol in combination with fentanyl during ESWL, as well as the time elapsed to hospital discharge.

2. Patient and methods

This prospective, randomized, double-blinded comparative clinical study was performed in the Sohag and Qena University Hospitals of the Sohag and the South Valley Universities, Egypt respectively, from June 2014 to December 2014. After approval from the institutional ethical committee of both university hospitals, written informed consent was obtained from each patient. The study sample consists of 52 patients (age range: 20–60 years).

The inclusion criteria were as follows: Patients with an American Society of Anesthesiologists (ASA) physical status of I or II, and scheduled for ESWL to treat a single renal (pelvic or upper calyceal) stone with 700–900 Hounsfield Unit (HU) and without pain.

Exclusion criteria included the following: Age younger than 20 years, a history of drug or alcohol abuse, an allergy to any of the study medications, a second- or third-degree heart block, chronic use of α2-agonist drugs, and current psychiatric or respiratory problems. Patients with urinary tract infections or obstruction, cysteine stones, coagulopathies, skeletal deformities, pregnant women and body weights more than 50% of the ideal body weight were also excluded.

Patients were randomly assigned to receive either dexmedetomidine with fentanyl or propofol with fentanyl. Randomization and enrollment were done using sequentially numbered closed envelopes. All patient assessments were performed by a physician (A.A. Tarik) blinded to the sedation analgesic technique used during the lithotripsy procedure. To reduce the selection and the pre-test biases, an anesthetist (E.I. Darweesh) prepared the study drugs and wrapped the syringe pumps and tubing with opaque covering.

We performed routine preoperative evaluations and investigations. Upon arrival in the ESWL unit, patients were allowed to position themselves on lithotripter table, and baseline measurements of mean arterial blood pressure (MAP), heart rate (HR), respiratory rate (RR), and room air oxygen saturation (SpO_2) were obtained and electrocardiographic (ECG) leads were applied for continuous ECG monitoring using a Life Scope monitor (BSM – 2353; Nihon Kohden – Japan). Supplemental O_2 (4 L/min) was administrated using an oxygen face mask and, after placement of the intravenous (IV) cannula, 1.5 μg/kg of fentanyl was given to all patients 10 min before the start of ESWL. Patients were randomly divided into 2 groups: patients in the dexmedetomidine group (D group) received a loading dose of dexmedetomidine at 1 μg/kg infused IV over 10 min, followed by a maintenance infusion of 0.3 μg/kg/h, and patients in the propofol group (P group) received a loading dose of propofol at 1 mg/kg infused IV over 10 min, followed by a maintenance infusion of 3 mg/kg/h. The maintenance infusion rate (by syringe pump, B. Braun, Melsungen AG – Germany) of either dexmedetomidine or propofol was adjusted to produce a state of moderate sedation/analgesia formerly called conscious sedation [10].

The ESWL procedure was started at the end of the IV infusion of the loading dose of dexmedetomidine or propofol. All patients received 3500–4000 shocks (60–80 per min) at 18 kV using Dornier equipment. Two to 3 min before the end of the procedure, the drug infusions were discontinued. At the end of the ESWL procedure, patients were transferred to the recovery room. Discharge from the hospital was based on Kortilla's discharge criteria for outpatient procedures [11].

3. Data collection and measurements

Baseline measurements of HR, non-invasive MAP, RR, and SpO_2 were obtained just prior to the start of the study drug