Egyptian Journal of Anaesthesia (2015) **31**, 291–295

HOSTED BY

ELSEVIER

Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

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

Research Article

Oral nifedipine as a premedication for induced hypotension in functional endoscopic sinus surgery (FESS)

Ahmed Hassanein [a,*], **Moustafa Talaat** [b]

[a] *Department of Anesthesiology, Al-Minia University, Egypt*
[b] *Department of Otolaryngology, Al-Minia University, Egypt*

Received 17 December 2014; revised 3 June 2015; accepted 15 June 2015
Available online 8 August 2015

KEYWORDS

Induced hypotensive anesthesia;
Oral nifedipine;
Nitroglycerin;
Functional endoscopic sinus surgery

Abstract *Objective:* To evaluate the effects of oral nifedipine as pretreatment, quality of surgical field and amount of hypotensive agent during functional endoscopic sinus surgery (FESS) under general anesthesia.

Methods: Sixty patients ASA I or II scheduled for FESS were randomly allocated into two equal groups. Oral nifedipine 20 mg was given one hour before induction of anesthesia (nifedipine) group and placebo. In the other group (control), all the patients received standard anesthesia and monitoring. Nitroglycerin (GTN) was administrated in a dose of 2 μg/kg/min after induction of anesthesia till it achieved a target mean arterial blood pressure (MAP) of 50–60 mmHg, followed by a continuous i.v. infusion (1 μg/kg/min) intraoperative when needed. Hemodynamic variables were recorded at baseline preoperatively, intraoperatively and till the end of operation. The surgical field score was assessed by average category scale (ACS) and intraoperative blood loss and amount of GTN was estimated. Emergence time and total recovery from anesthesia (Aldrete score $\geqslant 9$) were recorded.

Results: There were no statistically significant differences between two groups with respect to the amount of blood loss and scores for a bloodless surgical field. Emergence time and time needed to achieve 9 of modified Aldrete score were significantly shorter in Control group than nifedipine group (4.46 ± 1.25 min and 7.46 ± 2 min versus 8 ± 1.62 min and 9.5 ± 2.41 min, respectively) ($P < 0.01$). MAP during hypotensive period showed no statistically significant difference ($p > 0.05$) but at 5 and 10 min after stoppage of hypotensive anesthesia, at the end of surgery and after recovery, MAP was significantly lower in nifedipine group than Control group ($p < 0.01$). Heart rate (HR) during hypotensive period showed no statistically significant difference ($p > 0.05$). At 5 and 10 min after stoppage of hypotensive anesthesia, at end of surgery and after recovery, HR was significantly lower in nifedipine group than Control group ($p < 0.001$). The amount of GTN used in nifedipine group was significantly lower than Control group ($p < 0.001$).

* Corresponding author.
Peer review under responsibility of Egyptian Society of Anesthesiologists.

http://dx.doi.org/10.1016/j.egja.2015.06.005

Conclusion: Administration of a single preoperative dose of nifedipine (20 mg) can significantly reduce the blood loss during FESS and improves the visualization of the operative field and it also lowers the amount of GTN needed to achieve target hypotension.

1. Introduction

The introduction of functional endoscopic sinus surgery (FESS) associated with improved surgical dissection due to enhanced illumination and visualization of surgical field, but impaired visibility due to excessive bleeding may present a major complication has been reported for FESS under general anesthesia [1]. Controlled hypotension is defined as a reduction in mean arterial blood pressure to 50–60 mmHg in normotensive subject [2]. Many advantages in controlled hypotension for FESS include reduction in blood loss and improved quality of surgical field. Multiple agents have been used to achieve controlled hypotension e.g., magnesium sulfate, vasodilators (sodium nitroprusside), nitroglycerine, high doses of potent inhaled anesthetics, and beta adrenergic antagonist [3–5]. Although there are numerous approaches to provide controlled hypotension, isoflurane has been an integral part of many reports, and isoflurane lends itself particularly well to the technique of controlled hypotension because of its favorable effects on the systemic and cerebral circulation [6–8]. Nitroglycerin is an organic nitrate that acts principally on venous capacitance vessels to produce peripheral pooling of blood and decrease cardiac ventricular wall tension. As the dose of nitroglycerin is increased, there is relaxation of the arterial vascular smooth muscle. The most common clinical use of nitroglycerin is either sublingual or intravenous administration for the treatment of angina pectoris due to either atherosclerosis of coronary arteries or intermittent vasospasm of these vessels, and also to achieve hypotension by infusion [5]. Nifedipine is a potent vasodilator, which relaxes vascular smooth muscle probably by its inhibitory effect on the transmembrane influx of calcium, and it is very effective in the treatment of severe hypertension and hypertensive emergency. When the conventional form of nifedipine (soft capsule containing 10 mg of dissolved nifedipine) was administered orally, there was a rapid hypotensive effect occurring maximally at 1 h after administration and disappearing within 7 h [9]. The rationale behind using oral nifedipine as an agent for inducing hypotension in our study is to induce gradual smooth hypotension without rapid swing in BP by IV hypotensive agents The current study was designed to evaluate the effect of oral nifedipine on the hemodynamic changes, the quality of the operative field, blood loss and the amount of nitroglycerine used in patients undergoing FESS under general anesthesia.

2. Methods

A prospective, randomized, single blinded study was done in Minia University Hospital, during the period from October 2012 to November 2013. After obtaining the informed consent from patients and approval of the local ethical committee, sixty ASA physical status I or II patients aging 18–55 years were scheduled for elective FESS. All patients had bilateral nasal polyposis with opacity of most paranasal sinuses. We exclude patients with recurrent sinus surgery, history of hypertension, coronary artery diseases, patients with coagulopathies or receiving drugs influencing blood coagulation, renal, hepatic or cerebral insufficiency, morbid obese patients, patients with neuromuscular diseases, pregnancy, and patients with prior treatment with calcium channel blockers or beta blockers. All surgical procedures were done by the same surgeon, and he was blinded to the hypotensive agent used. The patients were examined clinically and investigated by ECG, chest X-ray and laboratory tests.

Sample size calculation was based on our primary endpoint of keeping the mean arterial pressure (MAP) between 50 and 60 mmHg, while the normal MAP ranged between 70 and 105 mmHg. For this purpose, a difference of 20 mmHg in MAP between study and control groups was deemed clinically relevant. The calculation determined that 60 patients (30 in each group) would be required for a study with a power of 1 and an alpha of 0.05 set for significance. The study design was parallel grouping; each patient was randomly assigned to either receive oral nifedipine 20 mg (Epilat 10 mg capsules, Eipico Pharmaceuticals, EGYPT) ($n = 30$) or Placebo ($n = 30$), receiving placebo one hour before induction of anesthesia by sips of water, the placebo was identical to nifedipine capsules and prepared by the pharmacy to maintain double blind study, and an appropriate code number was assigned to each patient, with an allocation ratio of 1:1. Patients were randomized in block size of 4 to either receive oral nifedipine 20 mg or placebo. Patients were assigned to the next sequence at the time of surgery. It was impractical to blind the anesthesiologists.

In the operating room 500 ml lactated Ringer's solution i.v. infusion was started in all patients and an intra-arterial line was inserted under local anesthesia in the radial artery for direct measurement of arterial blood pressure. One hour preoperative in the recovery room the patient connected to continuous routine monitoring included ECG, pulse oximetry and invasive blood pressure were measured using (Spacelabs; model 90364, USA). All patients were premedicated with IV midazolam 0.05 mg/kg and fentanyl 1 μg/kg. Patients received standard anesthetic technique with propofol 2 mg/kg, and intubation was facilitated with atracurium 0.5 mg/kg with suitable sized cuffed tube. Anesthesia was maintained with isoflurane 1–3% and neuromascular blocker was atracurium with incremental dose 0.15 mg/kg every 25 min IV, respiration was controlled with tidal volume 6–9 ml/kg and respiratory rate 12–15 cycle/min, and the tidal volume used was mostly guided by the end tidal CO_2 (between 33 and 36 mmHg) (Drager medical AG/COKGaA; model 23542, Germany). Patients were placed in a 15° reverse Trendlenburg position to improve venous drainage, and cottonoids soaked with epinephrine in a concentration of 1:100.000 were inserted into the nasal cavity and in between the polyps to reduce blood loss. Nitroglycerin (GTN) (Nitronal aqueous, Global Napi