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Propofol vs isoflurane anesthesia-incidence of PONV in patients at maxillofacial surgery

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ABSTRACT

Purpose: Prophylaxis of PONV (postoperative nausea and vomiting) is important for maxillofacial surgery. Vomiting is particularly unpleasant for the patient and undesirable as it may be detrimental to the operative area. The aim of this study is to compare the incidence of PONV after propofol with that after isoflurane anesthesia.

Materials and Methods: 84 patients age 15-50, ASA I-II, undergoing maxillofacial surgery were randomly allocated in two groups. Group P n=42 –using TIVA (Total Intravenous Anesthesia) with propofol and Group I n=42- using isoflurane anesthesia. The incidence and severity of PONV was evaluated for 24 hours postoperatively based on scoring system: 0=no emetic symptoms, 1=nausea, 2=vomiting. Whereas the severity of nausea was assessed using a four-point Likert scale, with 0=none, 1=mild, 2=moderate, 3=severe.

Results: There were no significant differences between the groups with respect to demographic data and duration of anesthesia. The incidence of nausea (2-3 Likert scale) in the propofol group was 11.9% compared to the isoflurane group 38.1% during early post-operative period (0-6 hrs) (p=0.011), whereas during late post-operative period 7.1% in group P compared with 11.9% in group I (p=0.712).

Incidence of vomiting in early post-operative period in-group P was 4.8%, whereas in-group I 11.9% (p=0.432). In late post-operative period in-group P no patient suffered from vomiting or retching, whereas in-group I 4.8% (p=0.494).

Conclusions: TIVA with propofol reduces the postoperative incidence of nausea and vomiting after maxillofacial surgery, compared with isoflurane anesthesia, and also
reduces requirements of antiemetic medications.

Key words: PONV; propofol; isoflurane; maxillofacial surgery, nausea, vomiting

INTRODUCTION

Prevention of postoperative nausea and vomiting (PONV) is important for maxillofacial surgery. PONV is one of the most frequent side effects of general anesthesia, particularly unpleasant and undesirable for the patient and as it may be detrimental to the operative area, especially in maxillofacial surgery. Despite the achievements in the field of anesthesia the discovery of new anesthetics and antiemetic, PONV remains a "*big little problem*"[1] and challenges anesthesiologists in their work every day**.** Overall incidence of PONV ranges from approximately 20 to 30% [2], while in "high-risk" patients this incidence remains very high-around 70%[3].

PONV can cause a prolonged post anesthesia care unit (PACU) stay, patient discomfort, and can also cause serious complications such as aspiration, electrolyte imbalance, increased bleeding and wound dehiscence [4,5], therefore increasing medical costs [6]. There are many studies that confirm that total intravenous anesthesia (TIVA) with propofol results in significant reduction in PONV, compared to inhalational anesthesia [7-10].

The aim of this study was to compare the incidence and severity of PONV, antiemetic requirement and patient

satisfaction, after TIVA with propofol vs. balanced anesthesia with isoflurane, without antiemetic prophylaxis.

MATERIALS AND METHODS

After obtaining approval from our hospital ethical committee and written informed consent from all participants, 84 patients, ASA physical status I–II, age 15-50, weighing between 40-90kg, scheduled for elective maxillofacial surgery under general anesthesia that was expected to last no more than 2 hours, were enrolled in this prospective, randomized, double-blinded study. Patients were randomly allocated via computer-generated random number list in two groups: group P n=42 –using Propofol (Propofol-Fresenius™ 2%, Fresenius Kabi GmbH, Bad Homburg, Germany) and group I n=42- using Isoflurane (Forane by Abbott Laboratories Limited, United Kingdom) for maintenance of anesthesia.

Exclusion criteria were Apfel score>II, antiemetic use within 24 h before surgery, chemotherapy use within 4 or radiotherapy within 8 last weeks, allergy to any of study drugs, migraine, motion sickness, epilepsy, obesity, mental retardation, psychiatric illness postoperative opioid analgesics, women who were menstruating, pregnant or lactating. All patients received oral diazepam (Diazepam, Actavis UK Ltd) 10 mg in the evening before operation. A nasogastric tube was not inserted and no prophylactic antiemetic drugs were used.

On arrival in the OR, intravenous access was obtained with an 18-gauge IV canula (Novomed Ltd Dublin-Ireland), standard monitoring (Datex -Ohmeda S/5 (™) Monitor, Helsinki, Finland) electrocardiogram (5 lead), noninvasive blood pressure, pulse oxymeter were connected, and the baseline vital parameters were noted. All patients received midazolam (Dormicum ®, F.Hoffman-La Roche Ltd Basel, Switzerland) 0.03mg/kg i/v as a premedication 10 minutes before induction and were preoxygenated with 100% O2 for 5 minutes. In the group P anesthesia was induced with propofol 1.5-2.5 mg•kg^{-1} and fentanyl (Fentanyl Renaudin, Laboratoire Renaudin Z.A.Errobi, France) 2 -3 µg•kg$^{-1,}$ rocuronium (Esmeron ® N.V., Organon, Oss, Holland) 0.5 -0.7mg•kg^{-1} was given to facilitate orotracheal intubation. Whereas patients in group I received thiopental (Thiopental Sodium, Rotexmedica, Trittau, Germany) 5 mg•kg$^{-1,}$ fentanyl 2-3 µg•kg^{-1}, rocuronium 0.5-0.7 mg•kg^{-1} to facilitate orotracheal intubation...

Depending on the group to which the patient belonged, anesthesia was maintained with propofol 5–10 mg•kg^{-1}•hr^{-1} in group P or isoflurane (0.7–1.5 MAC) in group I, adjusted by clinical needs. Intraoperative analgesia was provided by fentanyl up to 5 µg · kg^{-1} · h^{-1}. Controlled ventilation was performed with a nitrous oxide/oxygen mixture (2:1) in both groups and adjusted to maintain PETCO2 at 34–36 mmHg throughout surgery, as measured by an anesthetic/respiratory gas analyzer (Anesthesia machine -Fabius® GS premium Dräger Medical AG & Co. Lübeck, Germany)

At the end of the procedure, residual neuromuscular block was reversed with neostigmine (Neostigmin Metilsulfat, Laboratoire Renaudin, France) up to 0.04mg kg-1 and atropine (Atropine Sulfat, Sterop SA Laboratories, Brussels – Belgium) 0.02 mg kg-1 and extubated in awake state. After that, the patients were transported to the postanaesthetic care unit (PACU). In both groups, diclofenac sodium (Almiral ® Medochemie LTD Limassol-Cyprus) 75 mg IM was administered 20 minutes before the end of surgery and after that in the PACU as needed for postoperative pain. Vital signs (blood pressure, heart rate, SaO2) were recorded at 5-minute intervals throughout surgery and at 10-minute intervals in PACU until patient was fully awake.

The incidence and severity of PONV was evaluated for 24 hours postoperatively based on scoring system: 0=no emetic symptoms, 1=nausea, 2=vomiting. Nausea severity was recorded on a 4-point categorical (Likert) scale: 0 = none, 1 = mild, 2 = moderate, 3 = severe. A complete response (CR) was defined as no PONV and no need for rescue antiemetic. Rescue antiemetic-metoclopramide (Elitan, Medochemie LTD Limassol-Cyprus) 10-20mg IV was administered when the PONV score was greater than 1 or when Likert scale was 2-3 lasting >15 min.

After the patient arrived in the PACU, an investigator who was blinded to the intraoperative management recorded the number of nausea and emetic episodes and the time each one occurred, and the requirement of rescue antiemetic medication. PONV was recorded in two stages: early post-operative period (0-6 hrs) and late post-operative period (6-24 hrs).

Patients were discharged from PACU in surgical ward, when they were fully awake and oriented, had stable vital signs and minimal pain (<3 on a 0–10 VAS scale) and were not experiencing any side effects. PONV assessments were made and recorded in surgical ward by nurse on duty who was also blinded to the method used. Patients rated their satisfaction with the control of PONV by using a five-point scale (1 = very satisfied; 2 = somewhat satisfied; 3 = neither satisfied nor dissatisfied; 4 = somewhat dissatisfied; 5 = very dissatisfied) approximately 24 h after anesthesia.

For testing of all categorical data are used Fisher exact test, X^2 test, and Kruskal Walis,

Whereas for parametric data is used T test. To evaluate the correlation of Apfel score and PONV is used Spearman Correlation. P<0, 05 is considered significant.

RESULTS

There were no significant differences between the groups with respect to demographic data, ASA score and Apfel score (*Tab.1*)

Efficacy data are summarized in *Tab. 2*. There was significant difference among the groups in the incidence of moderate to severe nausea (2-3 Likert scale) in the propofol