Dexamethasone Compared with Metoclopramide in Prevention of Postoperative Nausea and Vomiting in Orthognathic Surgery

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Article ID: WMC002013
Article Type: Original Articles
Submitted on: 07-Jul-2011, 06:04:47 PM GMT   Published on: 08-Jul-2011, 05:38:10 PM GMT
Article URL: http://www.webmedcentral.com/article_view/2013
Subject Categories: ANAESTHESIA
Keywords: Nausea, Vomiting, Dexamethasone, Metoclopramide, Ason, Orthognatic Surgery

How to cite the article: Gashi A. Dexamethasone Compared with Metoclopramide in Prevention of Postoperative Nausea and Vomiting in Orthognathic Surgery. WebmedCentral ANAESTHESIA 2011;2(7):WMC002013

Source(s) of Funding:
None

Competing Interests:
None
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Abstract

Purpose: Prevention of postoperative nausea and vomiting (PONV) for orthognathic surgery is very important because of intermaxillary fixation. The aim of this study is to compare the efficiency of dexamethasone and metoclopramide in prevention of PONV.

Materials and Methods: 22 patients age 15-50, ASA I-II, undergoing orthognathic surgery were randomly allocated in two groups. Group D n=11 -using dexamethasone 8 mg IV and Group M n=11- using metoclopramide10 mg IV. 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 was significant difference among the groups in the incidence of moderate to severe nausea (2-3 Likert scale) in the dexamethasone group 9.0 % compared to the metoclopramide group 27.2%, in early post-operative period (0-6 hrs). During late post-operative period (6-24 hrs), no significant difference was found between groups.

There was significant difference among the groups in incidence of vomiting or retching (score 2) in early post-operative period (0-6 hrs), in-group D was 0% compared with 18.1% in-group M. In late post-operative period (6-24 hrs) in-group D no patient suffered from vomiting or retching, whereas in-group M 9.0% which was statistically insignificant.

Conclusions: The prophylactic administration of 8 mg of IV dexamethasone, one-minute prior induction of anesthesia, reduces the incidence of PONV during the first 24 h postoperatively, with no increase in adverse side effects or delay in PACU discharge, when compared with the intravenous metoclopramide 10 mg, in patients undergoing orthognathic surgery.

Introduction

Postoperative nausea and vomiting (PONV) is one of the most frequent side effects of general anesthesia, particularly unpleasant and undesirable for the patient. Factors, influencing PONV development include female gender, age, nonsmoking status, previous history of PONV or motion sickness, general anesthesia, type and duration of surgery, and use of intra- and postoperative opioids.[i]

PONV for years has been called and remains the “big little problem” [ii] . Despite the achievements in the field of anesthesia the discovery of new anesthetics and antiemetic Overall incidence of PONV ranges from approximately 20 to 30%[iii], while in “high-risk” patients this incidence remains very high-around 70%[iv]. The overall incidence of PONV seems to be lower in patients undergoing maxillofacial operations compared with those in other surgical disciplines.

However, swallowed blood and secretions stimulate the gag reflex and may make nausea and vomiting worse, and as it may be detrimental to the operative area. It is another risk factor for postoperative airway obstruction especially in orthognathic surgery where all patients will have intermaxillary fixation.

Since propofol is associated with, a lower incidence of PONV compared with inhalational agents [v] [vi] [vii] [viii] propofol anesthesia may be a good choice for orthognathic surgery.

PONV can cause a prolonged post anesthesia care unit (PACU) stay, patient discomfort, and can cause serious complications such as aspiration, electrolyte imbalance, increased bleeding, and wound dehiscence[ix], therefore increasing medical costs[x].

To our best knowledge, there is a lack of information about incidence of PONV in patients undergoing orthognathic surgery. This study is designated to evaluate the efficacy of dexamethasone and metoclopramide for preventing postoperative nausea and vomiting in patients undergoing orthognathic surgery, the PONV incidence in these patients and comparing emetic episodes between groups.

Methods

After obtaining approval from our Hospital Ethical Committee and written informed consent from all...
participants, 22 patients, ASA physical status I–II, age 15-50, weighing between 40-90kg, Apfel score ≤2, scheduled for elective orthognathic surgery under general anesthesia, were enrolled in this prospective, randomized, double–blinded study. Patients were randomly allocated in one of two groups: group D n=11- using IV Dexamethasone 8 mg at 1 min before the induction of anesthesia, and group M n=11–using IV Metoclopramid 10 mg approximately 10 minutes before extubation.

Exclusion criteria were Apfel score>II, antiemetic use within 24 h before surgery, chemotherapy use within 4 or radiotherapy within 8 last weeks, , obesity, migraine, motion sickness, epilepsy, 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.

On arrival in the OR, intravenous access was obtained with an 18-gauge IV canula, standard noninvasive monitoring including: electrocardiogram (5 lead), noninvasive blood pressure, pulse oxymeter were connected, and the baseline vital parameters were noted. All patients received midazolam 0.03mg/kg I/V as a premedication 10 minutes before induction and were preoxygenated with 100% O2 for 5 minutes. The anesthetic technique was identical in all patients. Anesthesia was induced with propofol 2.5-3.0 mg•kg-1, fentanyl 2-3 µg•kg and Succinylcholine 1mg•kg-1 to facilitate nasotracheal intubation.

The eyes are covered. Once the nasotracheal tube is fixed, the throat is gently packed with ribbon gauze soaked in saline. The arterial blood pressure, ECG, pulse, oxygen saturation, end tidal carbon dioxide, temperature, inspired oxygen, and fluid balance are monitored continuously and recorded intermittently- at 5-minute intervals throughout surgery. The basic fluid requirement in orthognathic surgery is around 4 ml/kg/h but the blood lost is usually replaced with three times the loss in crystalloids.

Anesthesia was maintained with propofol 5–10 mg•kg-1•hr-1 in both groups, adjusted by clinical needs. Intraoperative analgesia was provided by fentanyl up to 5 µg · kg−1 · h−1 and intermittent doses Pancuronium or Atracurium was used for muscle relaxation. Controlled ventilation was performed with a nitrous oxide/oxygen mixture (1:1) in both groups and adjusted to maintain PETCO2 at 34–36 mmHg throughout surgery, as measured by anesthetic/respiratory gas analyzer (Anesthesia machine -Fabius® GS premium Dräger Medical AG & Co. Lübeck, Germany)

At the end of the surgical intervention, the patient is placed in a head-down position, the throat pack is removed before because of intermaxillary fixation, and the nasopharynx is suctioned. The residual neuromuscular block was reversed with neostigmine up to 0.04mg kg-1 and atropine 0.02 mg kg-1. The patients were extubated after confirming the patient’s eye-opening, spontaneous breathing, obeying verbal commands, recovery of protective reflexes and recovery from muscle relaxation.

After that, the patients were transported to the postanaesthetic care unit (PACU). In both groups, diclofenac sodium · 75 mg IM was administered after surgery in the PACU as needed for postoperative pain. Vital signs (blood pressure, heart rate, SaO2) were recorded at 10-minute intervals in PACU for two hours postoperatively. Oxygen was given through a vent mask (6 lt/min) on admission and discontinued before discharge to the ward.

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. 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). A complete response (CR) was defined as no PONV and no need for rescue antiemetic. Metoclopramide 10-20mg IV was administered as rescue antiemetic in both groups postoperatively when the PONV score was greater than 1 or when Likert scale was 2-3 lasting >15 min.

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.

### Discussion

In this randomized, double-blind study, preoperative IV dexamethasone (8 mg) significantly reduced the incidence of PONV and antiemetic requirements compared with metoclopramide, after orthognathic surgery. PONV is an unpleasant, distressing, and exhausting complication for patients, it can prolong recovery time, delay patient discharge and increase hospital costs[i]. The cause of PONV is multifactorial,
these factors may be related to the patient, the surgical procedure, or the choice of anesthetic\[ii\].
The length of the surgical procedure also increases the risk of PONV. According to Sinclair et al.\[iii\], each 30 min increase in the duration of surgery increases the incidence of PONV by 60%. The operations of our patients have lasted 2-4 hours and all patients postoperatively have had intermaxillary fixation. Since the routine PONV prophylaxis has been recommended for patients at high risk for PONV \[iv\], and our patients belongs to Apfel score \(\leq 2\), we have considered that these patients are at risk for PONV and therefore we decided for PONV prophylaxis.

So many studies showed that the incidence of PONV was low after propofol anesthesia, and it was proposed that propofol possesses antiemetic effects \[v\] \[vi\] \[vii\] \[viii\]. In our previous study also, we found that TIVA with propofol is more effective in preventing nausea, but not vomiting during early post-operative period (0-6 hrs) compared to isoflurane anaesthesia\[ix\]. Apfel et al concluded that proemetogenic effect of volatile anesthetics must be considered main cause of PONV in the early postoperative period, but they have calculated as an early period the period of 0-2 hours \[15\]. Therefore, we choose propofol anesthesia for both groups.

According to many studies, dexamethasone is effective in preventing PONV associated with surgical procedures \[x\] \[xi\] \[xii\] \[xiii\] \[xiv\]. The optimal timing of dexamethasone administration is immediately before the induction of anesthesia, provided an effective antiemetic effect throughout the first 24 hours of the postoperative period\[xv\]. Therefore, we administered dexamethasone 1 minute before the induction of anesthesia. The dose of 8- to 10-mg dexamethasone was most frequently used as effective dose 20 21 22 23 24. Although the minimum effective dose of dexamethasone for the prevention of PONV was suggested to be 2.5 mg\[xvi\], we used an 8-mg dose of dexamethasone.

In previous studies, the onset time of dexamethasone’s antiemetic effect may be approximately two hours 38 and duration of antiemetic effect at least 24 h in patients undergoing clinical surgical procedures 20 21 22 23 24. These results match with our data, because patients in dexamethasone group were in advantage in prevention of PONV in early and in late postoperative period, compared with those in metoclopramide group. In orthognathic surgery, the most common nerve affected is the trigeminal nerve, the stimulation of which results in activating the sympathetics in the medulla, which in turn stimulate the cardiac sympathetics, giving rise to tachycardia but all our patients were hemodynamically stable. Metoclopramide is known to induce extrapyramidal side effects, especially when used for chemotherapy-induced emesis\[xvii\], but there were no adverse effects in neither group, even when we used as rescue antiemetic postoperatively. Therefore, we suggest that even lower risk patient’s populations (Apfel score \(\leq 2\)) may benefit from PONV prophylaxis in orthognathic surgery.

In conclusion, the prophylactic administration of 8 mg of IV dexamethasone, one minute prior induction of anesthesia, reduces the incidence of PONV during the first 24 h postoperatively, with no increase in adverse side effects or delay in PACU discharge, when compared with the intravenous metoclopramide 10 mg, in patients undergoing orthognathic surgery.
Illustrations

Illustration 1

Results

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

Table 1. Demographic and Baseline Characteristics of patients.

<table>
<thead>
<tr>
<th>Demographic data</th>
<th>Gr. P</th>
<th>Gr. I</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Age (Mean ± SD)</td>
<td>20.2 ± 4.1</td>
<td>21.0 ± 3.2</td>
</tr>
<tr>
<td>Weight (Mean ± SD)</td>
<td>56.3 ± 11.1</td>
<td>55.9 ± 12.3</td>
</tr>
<tr>
<td>Height (Mean ± SD)</td>
<td>165.0 ± 7.5</td>
<td>167 ± 8.3</td>
</tr>
<tr>
<td>Sex M:F</td>
<td>2/9</td>
<td>4/7</td>
</tr>
<tr>
<td>Apfel score 0/1/2</td>
<td>3/5/3</td>
<td>5/4/2</td>
</tr>
<tr>
<td>ASA score I/II</td>
<td>9/2</td>
<td>10/1</td>
</tr>
</tbody>
</table>

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 dexamethason group 9.0% compared to the metoclopramide group 27.2%, in early post-operative period (0-6 hrs).
Table 2. Incidence of postoperative nausea and vomiting between groups.

<table>
<thead>
<tr>
<th></th>
<th>Gr. D</th>
<th>Gr. M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate to severe nausea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likert scale 2-3 (n, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-6h interval</td>
<td>1 (9.0)</td>
<td>3 (27.2)</td>
</tr>
<tr>
<td>6-24h interval</td>
<td>0</td>
<td>1 (9.0)</td>
</tr>
<tr>
<td>Vomiting or retching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score 2 (n, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-6h interval</td>
<td>0</td>
<td>2 (18.1)</td>
</tr>
<tr>
<td>6-24h interval</td>
<td>0</td>
<td>1 (9.0)</td>
</tr>
</tbody>
</table>

During late post-operative period (6-24 hrs), no significant difference was found between groups.

There was significant difference among the groups in incidence of vomiting or retching (score 2) in early post-operative period (0-6 hrs), in-group D was 0% compared with 18.1% in-group M. In late post-operative period (6-24 hrs) in-group D no patient suffered from vomiting or retching, whereas in-group M 9.0% which was statistically insignificant.
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