Prevention of nausea and vomiting with transdermal hyoscine in adults after middle ear surgery during general anaesthesia

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Summary

In a double-blind, randomized study, we have compared the efficacy of transdermal hyoscine in the prevention of nausea and vomiting with placebo in 60 young, ASA I–II patients after middle ear surgery during general anaesthesia. In the placebo group, 27% and 43% of patients suffered from nausea and vomiting, respectively, during the first 24 h after anaesthesia. The corresponding values for both symptoms in the hyoscine group were 10% (P < 0.001 between groups). The frequency of side effects was similar in both groups. The results suggest that transdermal hyoscine is a useful prophylaxis against nausea and vomiting after middle ear surgery. (Br. J. Anaesth. 1994; 73: 763–766)

Key words

In our previous studies we found that the most common and unpleasant side effects after middle ear operations were nausea and vomiting [1-3]. The incidence varied from 20 to 36% despite the type of anaesthesia used.

The anticholinergic agent, hyoscine, in the form of a plaster for transdermal application, has been shown to have a significant antiemetic effect in patients suffering from motion sickness [4-6] and in those treated with extradural opioids [7, 8] or patient-controlled analgesia (PCA) for postoperative pain [9-11]. It is well known that motion sickness is caused by stimulation of the vestibular apparatus. It has also been shown that morphine and synthetic opioids increase vestibular sensitivity and that vestibular stimulation increases the incidence of nausea and vomiting caused by morphine [12, 13]. Middle ear operations may also affect the function of the vestibular apparatus. Therefore we have studied the effect of transdermal hyoscine on nausea and vomiting after middle ear operations.

Patients and methods

The Ethics Committee of the Otolaryngological Hospital approved the study and informed consent was obtained from all patients. We studied 60 ASA class I–II patients, aged 15–60 yr, undergoing middle ear surgery. Exclusion criteria included the use of centrally acting or antiemetic drugs within the previous week. Patients were allocated by means of computer-generated randomization to either a placebo (n = 30) or hyoscine group (n = 30). The design of the study was double-blind. On the afternoon of the day before surgery, a history of motion sickness and postoperative nausea and vomiting, and menstrual date was obtained. Thereafter on the basis of the randomization, either an inactive patch or an identical hyoscine patch (Scopoderm) was applied to the skin of the postauricular area opposite the operative side. In order to secure the patch, it was covered by an adhesive tape (Leukoplast). Before anaesthesia the patients were questioned on the presence of dry mouth, blurred vision, urinary difficulties, sedation, anxiety or other effects. Thereafter the placebo group received glycopyrronium 0.2 mg i.v. and the hyoscine group received saline in identical syringes containing the same volume, each with its own code number.

A standard anaesthetic technique was used for all patients. Premedication comprised oxycodone 0.1 mg kg⁻¹ i.m. 40–60 min before anaesthesia. Anaesthesia was induced with thiopentone 5 mg kg⁻¹. Alcuronium 2–2.5 mg was used for "precurarization". Intubation was facilitated with suxamethonium 1.5 mg kg⁻¹. Anaesthesia was maintained with 66% nitrous oxide in oxygen and isoflurane (inspiratory concentration 0.5–1.5 vol. %, mainly 0.7 vol. %). End-tidal carbon dioxide was maintained at 5–5.5 vol. %. Fentanyl 2 μg kg⁻¹ before administration of thiopentone and thereafter during operation as 50-μg doses was used for analgesia. Arterial pressure and heart rate were kept within 20% of preanaesthetic values. Vecuronium in an initial dose of 60 μg kg⁻¹ and subsequently as additional doses of about 20 μg kg⁻¹ was used for neuromuscular block which was maintained at a level of 80–90%. Neuromuscular block was antagonized with neostigmine 2 mg and glycopyrronium 0.4 mg.

Postoperative pain was treated with diclofenac 1 mg kg⁻¹ i.v. or paracetamol 10 mg kg⁻¹ suppositories in patients who could not tolerate diclofenac. In addition, oxycodone 50 μg kg⁻¹ i.v. or 100 μg kg⁻¹ i.m. was used, if needed.

A trained nurse, who was unaware of the nature of...
the study drug, assessed the incidence of nausea, retching and vomiting during the following time intervals: 0–2, 2–6, 6–12, 12–18 and 18–24 h after the end of anaesthesia. During the first 0–6 h the patients were in the recovery room and thereafter in the ward. Droperidol 10 μg kg\(^{-1}\) i.v. or i.m. was given for prolonged nausea or retching or vomiting, at a minimum interval of 30 min. The method was based on that described by Bellville, Bross and Hawland [14].

**STATISTICS**

The ANOVA and contingency table analysis, if appropriate, were used for the data with the aid of a Macintosh II VX computer using Stat View II, v.1.03 software. \( P < 0.05 \) was regarded as statistically significant.

| Table 1 Mean (SD or range) characteristics of patients treated with either a transdermal placebo or hyoscine patch and the main features of anaesthesia for middle ear surgery |
|----------------------------------|-----------|-----------|-----------|-----------|
| **Placebo**                      | **Hyoscine** |
| Patients (n)                     | 30        | 30        |
| Sex (M/F)                        | 17/13     | 14/16     |
| Age (yr)                         | 43 (15–60) | 39 (15–56) |
| Weight (kg)                      | 71 (11)   | 71 (12)   |
| Duration of anaesthesia (min)    | 236 (77)  | 255 (84)  |
| Duration of operation (min)      | 194 (76)  | 212 (84)  |
| Mean isoflurane during anaesthesia (%) | 0.7 (0.2) | 0.7 (0.2) |
| Peroperative fentanyl (μg)       | 5 (2)     | 5 (2)     |
| Lignocaine during surgery (mg)   | 35 (14)   | 37 (12)   |
| Need for postoperative oxycodone | 13        | 16        |
| Median dose (range) (μg kg\(^{-1}\)) | 100 (40–270) | 100 (40–480) |

**Results**

Patient data and details of anaesthesia are shown in table 1. There were no statistically significant differences between the groups. The number of menstruating patients was nine in the placebo group and 11 in the hyoscine group. The distribution of patients between the different phases of the menstrual cycle was similar in both groups.

In the placebo group, 27%, 10% and 43% of patients suffered from nausea, retching and vomiting, respectively, during the first 24 h after anaesthesia. The corresponding values in the hyoscine group were 10%. The frequency of symptoms was significantly less \( (P < 0.001) \) in the hyoscine than in the placebo group (fig. 1). In both groups all symptoms occurred up to 24 h after anaesthesia but their frequency decreased with time. There was a significant difference between the groups during the first 2-h interval (fig. 2). The need for droperidol was significantly less in the hyoscine than in the placebo group (fig. 3).

A history of motion sickness was obtained from 11 patients. Vomiting occurred in 80% of these patients treated with placebo and in 33% treated with hyoscine. The corresponding values in the 49 patients without a history of motion sickness were 36% and 3%. Because of the small number of patients with a history of motion sickness, the groups were not comparable.
Transdermal hyoscine, emetic symptoms and ear surgery

Figure 3  Percentage distribution of patients receiving none (□), one (○), two (□□), three (□□□) or four (■) injections of droperidol 10 μg kg⁻¹ in the two treatment groups over the 24 h after anaesthesia (n = 30 in each group). P < 0.05 between groups.

Table 2  Frequency (%) of side effects immediately before the start of anaesthesia in oxycodone-premedicated patients treated with either a transdermal placebo or hyoscine patch

<table>
<thead>
<tr>
<th>Side effect</th>
<th>Placebo (n = 30)</th>
<th>Hyoscine (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry mouth</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>Restlessness</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Dizziness</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Sedation</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

The most common side effect immediately before the start of anaesthesia was dry mouth, the frequency of which was 23% in the placebo group and 27% in the hyoscine group. The frequencies of restlessness, blurred vision and dizziness in the placebo group were 23%, 3% and 10%, respectively. The corresponding values for these side effects in the hyoscine group were 10%, 3% and 7% (table 2).

Discussion

We have found that preoperative administration of transdermal hyoscine decreased the frequency of nausea, retching and vomiting after middle ear operations without increasing the frequency of side effects compared with a placebo group.

As far as we know there are no previous studies on the use of transdermal hyoscine for nausea and vomiting after middle ear operations. However, our data were in agreement with earlier studies showing that transdermal hyoscine is an effective antiemetic in patients suffering from motion sickness [4–6] and in those treated with opioids extradurally [7, 8] or via PCA [9–11]. Both motion sickness and part of the emetic effect of opioids are caused by stimulation of the vestibular apparatus [12, 13]. This supports the assumption that nausea and vomiting after middle ear operations may also have a vestibular component.

Other studies on the efficacy of transdermal hyoscine are contradictory. It has been shown that transdermal hyoscine reduces postoperative emesis after orthopaedic and plastic surgery [15], after outpatient laparoscopy [16] and after paediatric strabismus surgery [17], whereas in two other studies [18, 19] transdermal hyoscine had no effect on postoperative emesis. A recent review article described marked variations in the rate of postoperative vomiting in different hospitals. There were many different aetiological factors for postoperative nausea and vomiting and the circumstances in the different hospitals were not comparable [20]. For example, menstruation had a different effect on the risk of nausea and vomiting after gynaecological laparoscopy [21, 22]. The studies on hyoscine also differed in design; the interval between application of the hyoscine patch and the postoperative period varied between studies. For example, in a study where hyoscine was unsuccessful, the patch was applied only 50 min before surgery [18]. In the light of the recommendation that transdermal hyoscine should be applied several hours before surgery in order to provide a therapeutic plasma concentration of hyoscine [23], the failure of hyoscine in the previous study [18] was not surprising.

In the present study, patients with a history of motion sickness tended to have a higher frequency of nausea and vomiting than those without motion sickness, confirming data from an earlier study [24].

In our patients the frequency of side effects after hyoscine did not differ significantly from that after placebo. This is in agreement with a recent study in hyoscine-treated children in respect of dry mouth on the first postoperative day and visual disturbances during the postoperative period [11]. It should be remembered, however, that there are studies which have reported increased frequency of dry mouth [8, 9, 15, 19], visual disturbances [5, 10, 16, 18, 19] and psychosis [25, 26] after treatment with hyoscine.

References

8. Kotelko DM, Rottman RL, Wright WC, Stone JJ, Yamashiro AY, Rosenblatt RM. Transdermal scopolamine decreases...


