Effect of transdermal hyoscine on nausea and vomiting after surgical correction of prominent ears under general anaesthesia

P. HONKAVAARA, L. SAARNIVAARA AND U.-M. KLEMOLA

Summary
In a double-blind, randomized study, we have compared the efficacy of transdermal hyoscine with placebo in the reduction of nausea and vomiting in 50 patients, ASA I–II, after surgical correction of prominent ears under general anaesthesia. In the placebo group, 28%, 4% and 48% of patients suffered nausea, retching and vomiting, respectively, during the first 24 h after anaesthesia. The corresponding values in the hyoscine group were 12%, 0% and 16% (P < 0.01). In the placebo group more patients (48%) needed droperidol as an antiemetic compared with the hyoscine group (16%; P < 0.05). There was significantly more sedation in the hyoscine group.

Key words

Surgical correction of prominent ears has been proposed to cause an auriculo-emetic reflex, which can be diminished by blocking the activity of the auriculotemporal and great auricular nerves [1]. The auriculotemporal nerve contains parasympathetic fibres and therefore postoperative nausea and vomiting (PONV) after correction of prominent ears might be associated with increased parasympathetic activity. This assumption is supported further by data indicating that PONV can be decreased significantly by avoiding the stimulation caused by dressing on the areas supplied by the auricular branch of the vagus nerve [2].

In a recent study, transdermal hyoscine was used successfully for the prevention of PONV after strabismus surgery caused possibly by the oculo-emetic reflex mediated by the parasympathetic nervous system [3]. On this basis, the present work was designed to study the occurrence of PONV after surgical correction of prominent ears and the effect of transdermal hyoscine.

Patients and methods
The study was approved by the local Ethics Committee and informed consent was obtained from patients or their parents. We studied 50 consecutive ASA I–II patients undergoing surgical correction of prominent ears using the method described by Nordzell [4]. Exclusion criteria were the use of centrally acting or antiemetic drugs within the previous week, nursing, pregnancy, sicknesses causing nausea and vomiting, obesity or other recognized contraindications to the drugs used in the study.

Patients were allocated randomly to either a placebo (n = 25) or a hyoscine (n = 25) group. The design of the study was double-blind. On the afternoon of the day before surgery, a history of motion sickness and PONV was obtained. Thereafter, on the basis of the randomization, either an inactive patch or an identical hyoscine patch (Scopoderm 0.5 mg/72 h) was applied to the skin of the postauricular area opposite the operative side for unilateral correction or on the sternum for bilateral surgery after cleansing the site with diethyl ether. Patients weighing 20–40 kg received half of the patch and the remainder a whole patch. In order to secure the patch, it was covered by an adhesive tape (Leukoplast).

Before anaesthesia patients were questioned on the presence of dry mouth, blurred vision, urinary difficulties, sedation, anxiety and other symptoms. Thereafter the placebo group received atropine 100 μg kg⁻¹ i.v. and the hyoscine group saline in identical syringes containing the same volume, each with its own code number.

Premedication comprised midazolam 0.5 mg kg⁻¹ up to 15 mg orally 30–50 min before anaesthesia. Anaesthesia was induced with thiopentone 5 mg kg⁻¹. Fentanyl 2 μg kg⁻¹ was given before thiopentone and thereafter during operation as 25- or 50-μg doses for analgesia. Alcuronium 30 μg kg⁻¹ was given for “precurarization”. Intubation was facilitated with suxamethonium 1.5 mg kg⁻¹ and anaesthesia maintained with 66% nitrous oxide and 0.5–1.5% isoflurane in oxygen. Vecuronium at an initial dose of 60 μg kg⁻¹ and subsequently as additional doses of approximately 20 μg kg⁻¹ was used to maintain neuromuscular block at 80–90%. Residual neuromuscular block was antagonized with neostigmine 40 μg kg⁻¹ and atropine 20 μg kg⁻¹.

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Arterial pressure and heart rate were maintained within 20% of preanaesthetic values and end-tidal carbon dioxide concentration at 5-5.5%. Haemoglobin oxygen saturation was monitored also.

Postoperative pain was treated with diclofenac 1 mg kg\(^{-1}\) either i.v. or per rectum, or paracetamol 10 mg kg\(^{-1}\) if patients could not tolerate diclofenac. In addition, oxycodone 50 μg kg\(^{-1}\) i.v. or 100 μg kg\(^{-1}\) i.v., s.c. or i.m. was used, if needed.

A trained nurse, who was unaware of the nature of the study drug, assessed the occurrence of nausea, retching and vomiting at 0-2, 2-6, 6-12, 12-18 and 18-24 h after the end of anaesthesia. During the first 0-2 h, patients were assessed in the recovery room and thereafter on the ward. Droperidol 10 μg kg\(^{-1}\) i.v., s.c. or i.m. was given for retching, vomiting or prolonged nausea, after a minimum time interval of 30 min.

While in the recovery room patients were assessed as either sleeping (not easily arousable), sedated (somnolent, but responds to speech or physical stimulation) or awake.

**STATISTICS**

Data were analysed using ANOVA for parametric data and chi-square test with Yates' correction and Mann–Whitney U test for non-parametric data. All calculations were made by a Macintosh II VX computer using Stat View 4.0 FPU software. \(P < 0.05\) was regarded as significant.

**Results**

There were no significant differences in patient or anaesthetic characteristics between the groups (table 1). Four children in the placebo group and five in the hyoscine group had a history of motion sickness. One patient in the placebo group had a history of PONV.

**Table 1** Patient and anaesthetic characteristics (mean (SD or range)). No significant differences

<table>
<thead>
<tr>
<th></th>
<th>Placebo group</th>
<th>Hyoscine group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (n)</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Child/adult</td>
<td>23/2</td>
<td>23/2</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>11/14</td>
<td>12/13</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>9.2 (6.1-25.3)</td>
<td>9.3 (5.9-24.6)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>29.5 (11.5)</td>
<td>29.4 (11.3)</td>
</tr>
<tr>
<td>Unilateral/bilateral correction</td>
<td>6/19</td>
<td>7/18</td>
</tr>
<tr>
<td>Duration of anaesthesia (min)</td>
<td>125 (35)</td>
<td>115 (33)</td>
</tr>
<tr>
<td>Duration of operation (min)</td>
<td>96 (30)</td>
<td>87 (30)</td>
</tr>
<tr>
<td>Mean inspiratory isoflurane during anaesthesia (%)</td>
<td>0.6 (0.2)</td>
<td>0.6 (0.2)</td>
</tr>
<tr>
<td>Peroperative fentanyl (μg kg(^{-1}))</td>
<td>3 (1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Lignocaine during surgery (mg)</td>
<td>23 (13)</td>
<td>22 (13)</td>
</tr>
<tr>
<td>Need for postoperative oxycodone No. of patients</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Median dose (μg kg(^{-1}))</td>
<td>100 (40-440)</td>
<td>90 (40-200)</td>
</tr>
</tbody>
</table>

During the first 24 h after anaesthesia, more patients in the placebo group suffered from nausea, retching and vomiting than in the hyoscine group (\(P < 0.01\)) (fig. 1). Not until 12 h did the number of patients suffering from nausea, retching and vomiting in both groups begin to decrease (fig. 2). At 2-6 h, the number of nauseated patients was significantly less in the hyoscine compared with the placebo group.

The total number of patients requiring droperidol was 12 in the placebo group and four in the
Transdermal hyoscine

Table 2 Sedation after anaesthesia (number of patients). One patient in the hyoscine group was omitted because of incomplete scoring of sedation. **P < 0.01 (Mann–Whitney U test)

<table>
<thead>
<tr>
<th>Time after arrival in recovery room</th>
<th>Degree of sedation (sleeping/sedated/awake)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Placebo (n = 25)</td>
</tr>
<tr>
<td></td>
<td>Hyoscine (n = 24)</td>
</tr>
<tr>
<td>0</td>
<td>17/8/0</td>
</tr>
<tr>
<td>30</td>
<td>5/12/8</td>
</tr>
<tr>
<td>60</td>
<td>3/8/14</td>
</tr>
<tr>
<td>90</td>
<td>2/7/16</td>
</tr>
<tr>
<td>120</td>
<td>0/2/23</td>
</tr>
</tbody>
</table>

The aetiology of PONV is multifactorial [7]. It might be a significant aetiological factor. Both the patient-controlled analgesia [14, 15]. Both the patients receiving opioids extradurally [12, 13] and significantly the frequency of nausea and vomiting in strabismus surgery in children [3] and after operations, a girl receiving hyoscine, aged 6 yr, vomited successfully with atropine 100 μg kg⁻¹. During operation, in the hyoscine group, heart rate decreased to 53 beat min⁻¹ in one child and to 49 beat min⁻¹ in another child, it was treated successfully with atropine 100 μg kg⁻¹ i.v. After operation, a girl receiving hyoscine, aged 6 yr, vomited several times and felt weak, dizzy and sedated for up to 28 h. Another child in the same group, aged 6 yr, woke up during the night after operation and complained of dizziness and double vision.

Discussion

We found a high incidence of PONV after surgical correction of prominent ears under general anaesthesia. Transdermal hyoscine before operation significantly reduced the frequency of these side effects.

As far as we know, there are no previous results on the use of hyoscine for PONV after surgical correction of prominent ears. There are, however, earlier reports of vomiting in 48–85% of patients [5, 6]. These data are similar to those of the present study.

The aetiology of PONV is multifactorial [7]. It is well known that age, sex, obesity, type and duration of anaesthesia and surgery, and severity of pain, have an effect [8]. On the other hand, transdermal hyoscine is an effective antiemetic in patients suffering from motion sickness [9] and PONV after outpatient ear surgery [10], after strabismus surgery in children [3] and after orthopaedic and plastic surgery [11]. Furthermore, transdermal hyoscine has been shown to reduce significantly the frequency of nausea and vomiting in patients receiving opioids extradurally [12, 13] and patient-controlled analgesia [14, 15].

In the present study, an auriculo-ematic reflex might be a significant aetiologic factor. Both the auricular branch of the vagus nerve supplying the skin of the inner and outer third of the external auditory meatus, concha and the posterior surface of the ear, and the auriculotemporal nerve supplying the anthelix, most of the helix and the external auditory meatus, contain parasympathetic fibres. Stimulation of these nerves during surgery may cause an auriculo-ematic reflex. As a parasympatholytic drug, hyoscine might prevent the initiation of this reflex. This assumption is supported by the result that PONV after strabismus surgery in children initiated by another parasympathetic reflex, the oculo-ematic reflex, has been reduced successfully with preoperative transdermal hyoscine [3]. Restlessness might increase the frequency of PONV and sedation caused by hyoscine might contribute also to its prevention.

In the present study, there were no significant differences in the frequency of side effects between the groups, although perioperative transient bradycardia occurred in two children in the hyoscine group. In addition, one child was sedated after operation for an exceptionally long time and another child complained of dizziness and double vision. Our data that hyoscine did not significantly increase the frequency of side effects are similar to those from studies in children undergoing strabismus surgery [3] and patient-controlled analgesia [15]. There are however studies which have reported increased frequency of dry mouth [11, 13, 16, 17], visual disturbances [14, 17–20] and psychosis [21, 22].

References