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Comparison of Intubation Conditions of Alfentanil and Propofol With Atracurium in Short Procedures of Children

Ahmet Can ŞENEL
Erdem Nail DUMAN
Mevlüt YURTSEVEN
Gönül AKTÜRK

Department of Anaesthesia, Farabi Hospital, Faculty of Medicine, Karadeniz Technical University, 61080, Trabzon-Turkey

Abstract: We have assessed tracheal intubating conditions in 45 ASA I-II children, aged 4-14 years undergoing elective ear, nose and throat surgery. After the induction dose of propofol 2.5 mg kg⁻¹, group I received alfentanil 10 µg kg⁻¹, group II received alfentanil 20 µg kg⁻¹ and group III received atracurium 0.5 mg kg⁻¹ for tracheal intubation.

The mean arterial pressure (MAP), heart rate (HR), arterial oxygen saturation (SaO₂), end tidal carbondioxide (ETCO₂) and intubation conditions were investigated. The quality of tracheal intubation was graded according to the ease of laryngoscopy, position of the vocal cords, coughing and jaw relaxation.

There were no significant differences in the overall assessment of intubating conditions between three groups. Intubations were accomplished in 94% of the patients in group I and II, and 100% of the patients in group III.

We conclude that, the combination of propofol and alfentanil improve the adequate conditions for tracheal intubation in children and attenuate the hemodynamic responses to laryngoscopy and tracheal intubation.

Key Words: Anaesthesia; pediatric. Anaesthetics iv; propofol. Analgesics; alfentanil. Intubation; tracheal. Neuromuscular relaxants; atracurium.

Introduction

Pediatric ear, nose and throat surgery cases are short procedures that we meet every day. Suxamethonium is widely used to facilitate tracheal intubation in anaesthesia of these patients. But it has several disadvantages; such as bradycardia, an increase in serum potassium concentration, myalgia and to trigger malignant hiperprexia while the use of atracurium and vecuronium for short procedures delay recovery from anaesthesia. An alternative approach to the use of neuromuscular blockers for tracheal intubation is the use of propofol and alfentanil, to improve intubation conditions (1, 2). This study was designed to compare the intubation conditions and hemodynamic changes in children, with varying doses of alfentanil and atracurium after induction dose of propofol (3, 4, 5).

Materials and Methods

We have investigated 45 ASA I-II children aged between 4-14 years and weighing less than 45 kg, undergoing elective ear, nose and throat surgery. Hospital ethics committee approval and presents informed consent were obtained. All patients were unpremedicated. On arrival in the anaesthetic room, a 22 gauge cannula was inserted into a large forearm vein and electrocardiogram (Hawlett-Packard) and pulse oximeter (Ohmeda 4700 Oxicap) were attached. Measurements of mean arterial pressure (MAP), heart rate (HR), arterial oxygen saturation (SaO₂), end tidal carbondioxide (ETCO₂) and intubation conditions were investigated. The quality of tracheal intubation was graded according to the ease of laryngoscopy, position of the vocal cords, coughing and jaw relaxation.
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The quality of intubation was graded by the consultant using the scoring system devised by Helbo-Hansen, Raulo and Trap-Anderson (Table 1). Ease of laryngoscopy, vocal cord position, coughing and jaw relaxation were allocated a score of 1-4. Intubation conditions were judged acceptable when each individual category score was 2 or less. Any assessment score greater than 2 was taken as indicative of unacceptable conditions. Because of difficult intubation in the position of the larynx, one patient was excluded from the study. Comparison of the three groups was made by the Kruskal-Wallis variance analysis. P<0.001 was regarded as significant.

Results

In this study, we investigated 45 children aged between 4-14 years. Groups comprised 15 patients were comparable in age and weight (Table II). The analysis of differences between three groups showed no statistical significance for each variable assessed (p>0.001).

Overall, intubation was accomplished in 94% of the patients in group I and II and there was no statistical significance between two groups (p>0.001). Group III, in which intubation was accomplished in 100% of the patients, was not statistically significant from group I and II (p>0.001) (Table III).

In group I and II there was a small increase in hemodynamic values; MAP and HR but there was not any statistical difference between group I and II (p>0.001) (Figure 1-2).

Changes in SaO₂ and ETCO₂ in patients showed no statistical difference in all groups (p>0.001) (Figure 3-4).

---

<table>
<thead>
<tr>
<th>Score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laryngoscopy</td>
<td>Easy</td>
<td>Fair</td>
<td>Difficult</td>
<td>Impossible</td>
</tr>
<tr>
<td>Vocal cords</td>
<td>Open</td>
<td>Moving</td>
<td>Closing</td>
<td>Closed</td>
</tr>
<tr>
<td>Coughing</td>
<td>None</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>Jaw relaxation</td>
<td>Complete</td>
<td>Slight</td>
<td>Stiff</td>
<td>Rigid</td>
</tr>
</tbody>
</table>

### Table 1. Intubating condition score.

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(yr)</td>
<td>7.8(2.45)</td>
<td>9.6(2.97)</td>
<td>8.53(2.97)</td>
</tr>
<tr>
<td>Weight(kg)</td>
<td>25.4(5.32)</td>
<td>28.47(7.18)</td>
<td>23.6(6.62)</td>
</tr>
<tr>
<td>Dose of propofol(mg)</td>
<td>64.74(26.6)</td>
<td>72.67(18.96)</td>
<td>61.0(16.5)</td>
</tr>
</tbody>
</table>

### Table 2. Patient data table (mean (SD))

<table>
<thead>
<tr>
<th>Group</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>III</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table 3. Number of patients given each scoring first attempt at intubation.
Discussion

In this study we have investigated the potential for tracheal intubation using propofol with alfentanil or atracurium. Atracurium, although of shorter duration than other non depolarizing neuromuscular blockers in clinical use, may delay recovery from anaesthesia after short procedures. On the other hand suxamethonium has well-known side effects. More recent studies in adults have attempted to improve conditions further by the addition of adjuvant agent such as alfentanil (6, 7).

Coghlan et al. showed that conditions for nasotracheal intubation were significantly better when propofol augmented with alfentanil 20 µg/kg\(^{-1}\). Jaw relaxation improved, vocal cord movement was reduced and cords were abducted. Pressor response to intubation was attenuated (8).

Alcock et al. also studied alfentanil and propofol as an alternative to suxamethonium in facilitating tracheal intubation. Its use was associated with a significant decrease in postoperative myalgia without an increase in the frequency of other side effects (9).

In another study, McConaghy and Bunting have used alfentanil in doses of 5 µg/kg\(^{-1}\), 10 µg/kg\(^{-1}\), 15 µg/kg\(^{-1}\) before the induction dose of propofol. The dose of propofol required to induce anaesthesia decreased significantly with increasing doses of alfentanil. They have shown that adequate conditions for laryngoscopy and intubation were produced in children after induction of anaesthesia with alfentanil 10 µg/kg\(^{-1}\), followed by propofol (10). Conditions for intubation were significantly better than those obtained with propofol and alfentanil 5 µg/kg\(^{-1}\) while no additional benefits were
produced by increasing the dose of alfentanil 15µgkg⁻¹.

Alfentanil, with its rapid onset and short duration of action, may be a logical choice of agent for augmenting propofol for short procedures. It effectively prevents the hemodynamic response to intubation.

In summary, we have shown that in short procedures of children, combination of propofol and alfentanil may be an alternative to neuromuscular agents in improving adequate conditions for tracheal intubation. As the results of group I and II showed no statistical difference, we can prefer the dose of alfentanil 10 µgkg⁻¹ as an adjuvan to propofol in the absence of neuromuscular ajents.

References


