Research Article

Comparison of the effect of two different doses of rocuronium on intubating conditions

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ABSTRACT

Background: Tracheal intubation with use of muscle relaxant is one of the best methods of securing and maintaining airway. Rocuronium bromide is a newer non depolarizing muscle relaxant being used for tracheal intubation. The aim of our study was to investigate the intubating conditions with two different doses of rocuronium 0.6 and 0.9 mg/kg at 90 seconds and evaluate whether reducing the dose provide clinically acceptable intubating conditions.

Methods: Prospective, randomized, single blind trial in which 84 patients admitted for surgery were included. The patients were allocated into 2 groups. Group I received the drug Rocuronium of dose 0.9mg/kg and group II received the drug rocuronium of dose 0.6 mg/kg. Intubating conditions were assessed at 90 seconds based on the scale adopted by cooper et al.

Results: 84 patients completed the study protocol. The two groups were similar with respect to demographic characteristics. Rocuronium bromide 0.6 mg kg\(^{-1}\) body weight produced excellent intubating conditions in of 69% patients but produced good intubating conditions in 28.6% of patients. Rocuronium bromide 0.9 mg kg\(^{-1}\) body weight produced 88.1% excellent intubating conditions and good intubating conditions in 11.9% of patients. Duration of action of dose 0.6mg/kg is 37.9±6.1 minutes and that of 0.9mg/kg is 49.3±8.7 minutes.

Conclusions: Rocuronium in dose 0.6 mg/kg give clinically acceptable intubating conditions at 90 seconds. Increasing the dose of rocuronium bromide increased the number of excellent intubating conditions but at the cost of increased duration of action.

Keywords: Rocuronium, Tracheal intubation, Intubating conditions

INTRODUCTION

Muscle relaxants provide conditions necessary for easy intubation. Use of low doses of muscle relaxants shortens the time for recovery from neuromuscular block and reduces the requirement for anticholinesterase drugs. But this may compromise the intubating conditions.\(^1\) This study investigates whether acceptable intubating conditions can be obtained with lower dose of rocuronium a steroideal myorelaxant, with low potency, intermediate duration of action and rapid onset time.

METHODS

After obtaining institutional review board approval a prospective randomized single blind study was conducted for a period of six months. The study population included 84 American Society of Anesthesiologists Physical Status (ASAPS) I and II patients in the age group 18-65 years scheduled for elective surgery under general anesthesia. Patients were allotted into groups I and II using a computer generated random number table. Statistical analysis was performed with G* power software which gave a sample size of 42 in each group assuming sensitivity of 80% , alpha error of 5% and a study power...
of 0.80. Group I received rocuronium 0.9 mg/kg and Group II received 0.6 mg/kg.

Patients with ASAPS grade more than II, potential airway problems, modified mallampati 3 or 4, neuromuscular, liver or kidney diseases, those for rapid sequence intubation, head and neck surgery, and those taking medications interfering neuromuscular function were excluded.

After obtaining informed consent patients were kept fasting for six hours and premedicated with oral pantoprazole 40 mg, domperidone 10 mg and alprazolam 0.5 mg the night before surgery and at 6 am day of surgery.

Baseline vitals were recorded and surface electrodes to asses Train of Four (TOF) responses were placed over the ulnar nerve at the wrist. All patients were given intravenous midazolam 1 mg.

After preoxygenation general anesthesia was induced with injection thiopentone sodium 4 mg/kg. Fentanyl 2 microgram/kg and 2% lignocaine 1.5 mg/kg were given intravenously for stress response attenuation. The adequacy of mask ventilation was confirmed and rocuronium 0.9 mg/kg was given to group I and 0.6 mg/kg to group II.

Direct laryngoscopy with appropriate sized Macintosh blade was carried out at 90 seconds after rocuronium by an anesthesiologist with considerable experience. Intubating condition was graded using score adopted by Cooper et al and oral intubation was done with an appropriate sized cuffed endotracheal tube. Jaw relaxation (ease of laryngoscopy), vocal cords position and movement and response to intubation were assessed.

End-tidal carbon dioxide and anesthetic agent monitoring was established. Neuromuscular monitoring was done using TOF at the time of tracheal intubation and every 10 minutes thereafter. The anesthesiologist who performed the tracheal intubation was blinded to the dose of rocuronium and TOF response at intubation. Anesthesia was maintained using isoflurane (1 MAC) in 35% oxygen in nitrous oxide.

Heart rate (HR) and Mean Arterial Blood Pressure (MAP) were recorded before and after induction and after rocuronium for every two minutes up to 10 minutes.

The duration of action (time from injection of rocuronium until return of one tactile TOF response) and failed intubation attempts were noted.

Incremental doses of rocuronium were given so as to suppress at least three TOF responses. After surgery neuromuscular block was reversed with intravenous neostigmine 0.05 mg/kg and glycopyrolate 0.01 mg/kg before extubation.

Statistical package for social sciences (SPSS) version 11 was used for statistical calculations. Statistical analysis was performed using Students unpaired t-test and Chi Square test. P <0.05 was considered statistically significant.

RESULTS

Both groups were comparable in age, sex and ASA distribution. Table 1 shows comparison of intubating conditions. Acceptable intubating conditions were obtained in 100% in group I and 97.6% in group II with no statistically significant difference (Figure 1).

### Table 1: Comparison of intubating conditions.

<table>
<thead>
<tr>
<th>Jaw relaxation</th>
<th>0.9 mg/kg</th>
<th>0.6 mg/kg</th>
<th>( \chi^2 )</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
<td>Percent</td>
</tr>
<tr>
<td>Minimal</td>
<td>1</td>
<td>2.4</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Moderate</td>
<td>12</td>
<td>28.6</td>
<td>20</td>
<td>47.6</td>
</tr>
<tr>
<td>Good</td>
<td>29</td>
<td>69.0</td>
<td>21</td>
<td>50.0</td>
</tr>
<tr>
<td>Vocal cords</td>
<td>0.9 mg/kg</td>
<td>0.6 mg/kg</td>
<td>( \chi^2 )</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
<td>Percent</td>
</tr>
<tr>
<td>Closing</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Moving</td>
<td>5</td>
<td>11.9</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>Open</td>
<td>37</td>
<td>88.1</td>
<td>32</td>
<td>76.2</td>
</tr>
<tr>
<td>Response to intubation</td>
<td>0.9 mg/kg</td>
<td>0.6 mg/kg</td>
<td>( \chi^2 )</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Percent</td>
<td>Count</td>
<td>Percent</td>
</tr>
<tr>
<td>Mild coughing</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Slight diaphragmatic movement</td>
<td>10</td>
<td>23.8</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>None</td>
<td>32</td>
<td>76.2</td>
<td>31</td>
<td>73.8</td>
</tr>
</tbody>
</table>
Six patients in group I and seven in group II were intubated in the 2nd attempt and required use of bougie in spite of having good intubating conditions. The duration of action was 49.3 minutes in group I and 37.9 minutes in group II which shows significant difference (Table 2). MAP and HR changes in both groups showed no statistically significant difference.

A dose dependent effect of rocuronium on both onset and duration of neuromuscular block has been demonstrated earlier.\(^7\) Our study shows comparable intubating conditions and shorter duration of action with 0.6 mg kg\(^{-1}\) of rocuronium.

There was a fall in MAP in both the groups following induction which was not statistically significant. MAP increased following intubation and was then maintained in both the groups. The studies conducted by Wierda JM KH et al and Levy et al S. V. Kale et al show similar cardiovascular effects. So rocuronium can be used in cardiac/haemodynamically unstable patients.\(^5,10\)

**CONCLUSION**

Rocuronium in dose 0.6 mg/kg give clinically acceptable intubating conditions at 90 seconds. Increasing the dose of rocuronium bromide increased the number of excellent intubating conditions but at the cost of increased duration of action.

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