ABSTRACT

INTRODUCTION:
Intubation is one of the means of securing airway. Muscle relaxants are useful in providing adequate muscle relaxation to enable laryngoscopy and intubation. The aim of this study was to compare the time of onset of Vecuronium bromide with Rocuronium bromide for endotracheal intubation.

METHOD:
A total of 50 patients of ASA G1 and II selected for elective surgery are divided into two groups according to randomization plan. One group (Rocuronium group) of 25 patients received Rocuronium 0.6 mg/kg body weight and the other group (Vecuronium group) of 25 patients received Vecuronium 0.1 mg/kg body weight. Parameters observed are Time of onset which is obtained by monitoring for the time from the end of the injection of muscle relaxant until maximum blockade of the first twitch response (T1) of the TOF and Haemodynamic changes which are monitored at 5 settings i.e. 0 min (Base line), 1, 3, 5 and 10 mins.

RESULT:
The mean value of onset of action for Rocuronium is 73.6 ± 14.11 and for Vecuronium is 119.2 ± 19.13. In Rocuronium group there is increase in HR from base line which showed a peak at 5 min and decreased at 10 min, but in Vecuronium group there is decrease in HR from base line through out. There was no significant difference of SBP, DBP and MAP at baseline between the mean values of the two groups. This statistical insignificance has continued at 1, 3, 5 and 10 min after giving relaxants.

CONCLUSION:
Both the drugs are found to be equally good for maintaining hemodynamic stability in patients undergoing various surgeries. Rocuronium bromide can therefore be advocated as drug of choice where rapid intubation will be beneficial without compromise of haemodynamic stability.

INCLUSION CRITERIA:
1. ASA Grade I and II.
2. Age between 15 and 60 years.
3. Mallampati grade I or II airway anatomy.
4. Patients not suffering from neuromuscular disease.
5. Patients not receiving any medication known to interact with neuromuscular blocking drugs, for example-aminoglycoside antibiotics.

EXCLUSION CRITERIA:
1. ASA grade III and IV.
2. Age less than 15 years and more than 60 years.
3. Uncontrolled hypertensives.
4. Patients with potential airway problems and anticipated difficult intubations, (other than Mallampati grade I or II airway anatomy).

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a peripheral nerve stimulator and stimulating the ulnar nerve at the wrist via surface electrodes placed along the course of the nerve. Supra maximal square wave impulses of 0.2 mSec duration in a train-of-four sequence (2 Hz) were delivered. Baseline evoked mechanical response of the adductor pollicis muscle was assessed visually/manually. The evoked response to ulnar nerve TOF stimulation every 10 seconds was recorded. Time of onset is monitored by time gap between injecting vecuronium or rocuronium and complete abolition of first twitch response (T₁) of TOF response.

All the patients were ventilated with nitrous oxide-oxygen using closed circuit in the ratio 50:50%. Anaesthesia being maintained with 0.2-0.4% of isoflurane and repeat doses of 1/4 the original dose of muscle relaxants are given in both the groups. Heart rate and SBP, DBP and MAP are recorded one minute after administration of the drug and every five minutes till the end of the surgery. ECG is monitored throughout surgery.

Residual paralysis at the end of surgery is reversed with 0.05 mg/kg of neostigmine and 0.01 mg/kg of glycopyrolate. After clearing the throat, extubation was done at the onset of adequate respiration and good limb movements.

Parameters observed:
1. Time of onset is obtained by monitoring for the time from the end of the injection of muscle relaxant until maximum blockade of the first twitch response (T₁) of the TOF.
2. Haemodynamic changes are monitored at 5 settings i.e. 0 min (Base line), 1, 3, 5 and 10 mins
a. Heart rate recorded by ECG at regular intervals
b. Systolic blood pressure, Diastolic blood pressure and Mean arterial pressure recorded at regular intervals using a NIBP monitor.
c. ECG

RESULTS:
Demographic data like Age, Weight, Sex and ASA Grade were similar in both groups.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Onset of action</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocuronium</td>
<td>73.8 ± 14.11</td>
<td>&lt; 0.0001 (HS)</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>118.2 ± 19.13</td>
<td></td>
</tr>
</tbody>
</table>

The mean value of onset of action for Rocuronium is 73.8 ± 14.11 and for Vecuronium is 118.2 ± 19.13.Student unpaired t-test was applied and found that there was high significant difference between two groups. (p = < 0.0001)

<table>
<thead>
<tr>
<th>p value</th>
<th>Rocuronium</th>
<th>Vecuronium</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0007</td>
<td></td>
<td></td>
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</tbody>
</table>

Comparison of HR between Rocuronium and Vecuronium groups:

<table>
<thead>
<tr>
<th>Heart rate</th>
<th>Rocuronium</th>
<th>Vecuronium</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 min</td>
<td>82.72 ± 10.84</td>
<td>73.28 ± 7.55</td>
<td>0.0007 (S)</td>
</tr>
<tr>
<td>1 min</td>
<td>83.62 ± 10.52</td>
<td>72.72 ± 6.95</td>
<td>&lt; 0.0001 (HS)</td>
</tr>
<tr>
<td>3 min</td>
<td>85.82 ± 10.08</td>
<td>71.64 ± 6.43</td>
<td>&lt; 0.0001 (HS)</td>
</tr>
<tr>
<td>5 min</td>
<td>88.72 ± 10.06</td>
<td>65.66 ± 6.185</td>
<td>&lt; 0.0001 (HS)</td>
</tr>
<tr>
<td>10 min</td>
<td>87.76 ± 10.1</td>
<td>64.24 ± 5.78</td>
<td>&lt; 0.0001 (HS)</td>
</tr>
</tbody>
</table>

in HR between two groups has continued at 1, 3, 5 and 10 mins i.e. p < 0.0001 respectively.

How ever in Rocuronium group there is increase in HR from base line which showed a peak at 5 min and decreased at 10 min, but in Vecuronium group there is decrease in HR from base line through out.
An ideal muscle relaxant should have non-depolarizing mechanism of action, rapid onset and short duration of action, rapid recovery, non-cumulative, no histamine release, no cardiovascular side effects, high potency, and prompt reversibility by cholinesterase inhibitors and pharmacologically inactive metabolites. Haemodynamic stability is an integral and essential goal of any anaesthetic management plan. Rocuronium and Vecuronium come closer to the characteristics of ideal muscle relaxant in maintaining haemodynamics. Intravenous Vecuronium bromide, is considered as the “gold standard” among muscle relaxants for its cardiovascular stability. It also has a large margin of safety between neuromuscular and vagal blocking effects. Intravenous Vecuronium though being cardioactive has a slow onset and causes bradycardia when used with narcotics. Intravenous Rocuronium bromide is a relatively new steroidal intermediate acting non-depolarising neuromuscular blocking agent with a faster onset of action. It has proved to have minimal cardiovascular side effects in animal studies. Some human studies have shown that Rocuronium has minimal effects on heart rate and arterial pressures with the dose of 0.5 to 2 ED95. Thus we undertook this study to evaluate the comparative properties of Rocuronium bromide with routinely used Vecuronium bromide for an agent with shorter onset of action and good haemodynamic stability.

In our study the mean onset of action of Rocuronium (73.6 ± 14.11) is shorter when compared to vecuronium (119.2 ± 19.13) which was highly significant (p < 0.0005). This finding is similar to studies done by Booth MG et al. in 1992, Mayer M et al. in 1992, Magorian T, Flannery KB, Miller RD in 1993, and Malhotra P, Saxena N, Kiran U and Choudhary M in 2002. With regard to haemodynamics in our study we observed a significant change in HR in each of the two groups during 5 settings. A significant increase in HR by 7.47% at 5 min (88.72 ± 10.06) after giving rocuronium from base line (82.72 ± 10.64) was observed. Similarly we noticed a significant increase in HR by 12.11% at 10 min (94.24 ± 5.76) after giving vecuronium from base line (73.28 ± 7.55). The probable reason for the increase in HR in Rocuronium group is attributed to vagolytic or perhaps, sympathomimetic effect of rocuronium. Vecuronium per se do not have any tendency to cause bradycardia (e.g., fentanyl). In the Rocuronium group we observed no significant changes in SBP at any of the 5 settings but the maximum decrease in SBP was found at 5 mins by 2.48% when compared to base line. Similarly in Vecuronium group we observed no significant changes in SBP at any of the 5 settings but the maximum decrease in SBP was found at 5 mins by 5.43% when compared to base line. Thus the decrease in SBP was statistically insignificant when comparing different settings within the same group. In the Rocuronium group we observed no significant changes in DBP at any of the 5 settings but the maximum decrease in DBP was found at 5 mins by 3.35% when compared to base line. Similarly in Vecuronium group we observed no significant changes in DBP at any of the 5 settings but the maximum decrease in DBP was found at 5 mins by 4.11% when compared to base line. Thus the decrease in DBP was statistically insignificant when comparing different settings within the same group. In our study we did not find any statistically significant difference in the SBP, DBP and MAP between Rocuronium and Vecuronium at any of the 5 settings.

Our findings are similar to findings studied by Robertson EN et al. (1994) who compared cardiovascular effects with 3X ED50 of rocuronium and vecuronium, he found that there were statistically significant increases from baseline in one or more (heart rate, BP) hemodynamic parameters in the Rocuronium group when compared to Vecuronium group.

CONCLUSION: Rocuronium is devoid of any significant cardiovascular changes causing haemodynamic instability when compared with Vecuronium. Both the drugs are found to be equally good for maintaining hemodynamic stability in patients undergoing various surgeries. Rocuronium bromide can therefore be advocated as drug of choice where rapid intubation will be beneficial without compromise of haemodynamic stability.

REFERENCES: