Original Research Article

A clinical comparative study between Rocuronium and Suxamethonium for endotracheal intubation

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Abstract

Background: This is a prospective randomized study done to compare the two drugs namely Rocuronium bromide and suxamethonium for tracheal intubation and further to evaluate whether Rocuronium bromide can be an acceptable alternative to suxamethonium. **Objective:** To compare the effect of Rocuronium bromide and suxamethonium. **Methods:A** prospective time bound study was designed in which 100 patients of ASA I& II undergoing elective surgeries under general anaesthesia who are to be intubatedwere randomly allocated into two groups of 50 each. Group — I, n=50; who received Rocuronium bromide 0.6 mg/kg iv. Group — II, n=50; who received Suxamethonium 1.5 mg/kg iv. The parameters observed were, intubating conditions, duration of action; pulserate, systolic BP, diastolic BP, MAP, side effects. **Results:** Rocuronium in a dose of 0.6 mg/kg is a suitable alternative to suxamethonium in a dose of 1.5 mg/kg. **Conclusions:** This study concludes that rocuronium in a dose of 0.6 mg/kg is a suitable alternative to suxamethonium in a dose of 1.5 mg/kg.

Keywords:*Intubation, Rocuronium 0.6mg/kg, Suxamethonium 1.5mg/kg*

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INTRODUCTION

The prime role of anaesthesiologistis to secure and maintain a patent airway. Suxamethonium, a depolarizingmuscle relaxant is most commonly used for tracheal intuabation. The popularity of suxamethonium is questioned due to its many side effects. One of the main reasons for the popularity of suxamethonium is its propensity to create good intubating conditions rapidly. With the advent of newer, non-depolarizing muscle relaxants, anaesthesiologists have the luxury of other options where suxamethonium is contraindicated.Rocuronium bromide has been shown to produce intubating conditions similar to those produced by suxamethonium

MATERIAL AND METHODS

The Study was conducted at Raichur Institute of medical science.A total of 100 patients were recruited for this study after obtaining an informed consent. These 100 patients were divided into two groups, the first group received Rocuronium (R) and the second group received Suxamethonium (S).

Inclusion Criteria:

- ASA grade I or II
- Scheduled for elective surgeries under general anaesthesia who are to be intubated.

Exclusion criteria:

- ASA grade III or IV
- On medications which are known to interfere with the action of neuromuscular blocking agents
- Cardiac, respiratory, hepatic, renal, metabolic or neuromuscular disease

All patients underwent through pre-anaesthetic check-up on the day before surgery. Patients were advised to be nil

orally from 10 pm onwards, the night before surgery.On the morning of surgery an intra-venous line was secured with appropriate size IV canula. Baseline heart rate, systolic blood. Pressure, diastolic blood pressure and mean arterial pressure were measured, recorded and designated as 'resting values'. all patients were premedicated with Inj. Midazolam 0.07-0.08mg/kg iv and Inj. Pentazocine 0.5 mg/kg iv prior to surgery.

All patients were pre-oxygenated with 100% oxygen for 3 to 5 minutes. Anaesthesia was induced with inj.propofol 2mg/kgiv,inj.glycopyrolate 0.2mg iv .Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure were recorded and designated as values 'after induction'. The group I or Rocuronium (R) received Inj. Rocuronium Bromide 0.6 mg/kg iv as muscle relaxant. The group II or Suxamethonium (S) group received Inj. Suxamethonium 1.5 mg/kg iv as the muscle relaxant. Patient were ventilated with 100% O_2 for 60 seconds. At the end of 60 seconds, laryngoscopywas performed Intubating condition were assessed using Cooper's intubating scoringsystem.

Score	Jaw Relaxation	Vocal Cords	Response to intubation
0	Poor	Closed	Severe coughing/bucking
1	Nominal	Closing	Mild cough
2	Moderate	Moving	Slight Diaphragmatic Movement
3	Good	Open	None

A total score of8-9 excellent, 6-7 good, 3-5 Fair and 0-2 is rated as poor intubating conditions.Good and excellent intubationg conditions were taken to be" clinically acceptable" by cooper et al.The changes in Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Mean Arterial Pressure were measured and recorded at 1,3 and5min after intubation.Any untoward side effects like skin flush, erythema, itching were recorded.

RESULTS

The chisquare test was also used to determine significant differences in the various conditions betweenthe groups.Significance for all statistical test were predetermined at a probability value(p-value) of 0.05 or less. Only those values which are significant have been mentioned.In Group I, there were 26 male and 24 female patients with a mean age of 27.3 ± 11.5 years. The average weight of patients in this group was 49.3± 10.5 kg.In Group II, there were 28 male patients and 22 female patients. The mean age was 28.6 ± 10.1 years. The mean weight of patients in this group was 52.0 ± 8.9 kg.Since laryngoscopy was performed at the end of 60 sec. after injection of the muscle relaxant. The onset of action for the two group was considered to be 60 seconds.Rocuronium produced "excellent" intubating conditions in 28 patients (56%), "satisfactory" intubating conditions in 16 patients (32%) and "fair" intubating conditions in 6 patients (12%).Suxamethonium produced "excellent" intubatng conditions in 32 patients (64%), 'satisfactory" intubating conditions in 18 patients (36%).The mean resting heart rate was 86.4 ± 12.9 beats per minute in Group I and 83.3± 9.9 beats per minute in Group II. There was an increase in heart rate from resting values in the two groups following laryngoscopy and intubation. The increase was maximum at 1 minute after intubation. The heart rate gradually decreased thereafter towards resting values in the two groups.

Table 1: Comparison of Systolic Blood Pressure between two groups

Time of Monitoring		Group I Mean ±SD	Group II Mean ±SD
Resting		117.0 ±6.5	114.6 ±7.3
After Induction		117.1 ±7.2	117.4 ±8.3
	1'	130.7 ± 7.8	138.9 ± 7.7
	3'	122.2 ± 7.6	125.6 ± 7.9
After intubation	5'	118.7 ± 6.6	121.5 ± 8.7
	10'	118.2 ± 5.6	118.5 ± 8.9

There was an increase in systolic blood pressure from resting values inthe two groups following Laryngoscopy and intubation. The systolic blood pressure gradually decreased thereafter towards resting values in the two groups.

Table 2: Comparison of Diastolic Blood Pressure between two groups

Time of Monitoring		Group 1 Mean ±SD	Group II Mean ±SD
Resting		81:4 ±8.1	80.4 ±7.8
After Induction		81.2 ±7.7	81.4 ±7.8
	1'	90.5 ± 7.4	94.8 ± 7.4
	3'	87.0 ± 6.8	86.0 ± 7.8
After intubation	5'	83.2 ± 5.9	84.1 ± 6.7
	10'	84.0 ± 5.7	83.6 ± 6.9

There was an increase in Diastolic Blood Pressure from resting values in the two groups following laryngoscopy and intubation. The increase was maximum at 1 minute following intubation. The diastolic blood pressure graduallydecreased thereafter towards resting values in the two groups. There wasan increase in mean arterialpressure fromrestingvalues in the two groups following laryngoscopy and intubation. The increase was maximumat 1 minute following intubation. The mean arterial pressure gradually decreased thereafter towards resting values in the two groups.

DISCUSSION

In our study, duration of action of Rocuronium was 28.7 ± 3.9 minutes where as that of suxamethonium was 8.5 ± 3.1 minutes.The p value was < 0.001 which is highly significant. The student t-test was used to determine the significance in duration of action of rocuronium and

suxamethonium in Group I and Group II respectively.This coincides with the studies conducted by Cooper R.A.et al[2], Mirakhur R.K.et al[3] and Maddineni V.R and Puhringer F.K et al[1].Cooper R. et al.,[2] used the same does as Puhriger F.K. et al.,[1] and found that intubating conditions after rocuronium were clinically acceptable in 95% of patients at 60 seconds and in all patients at 90 seconds and in all patients at both times after suxamethonium.This goes in correlation with other studies by Huizinga A.C. et al[4]., Puhringer F.K. et.al.,[1] and Cooper R. et. al.,[2] who found that rocuronium produced clinically acceptable intubating coditions within 60 to 90 seconds after administration of the drug.In our study, we have used the rating scale by cooper[39] to assess the intubating conditions.In the rocuronium group,' excellent' intubating conditions were seen in 56% of patients, "satisfactory" in 32% and 'fair" intubating conditions were seen in 12% of patients.In the suxamethonium group. "excellent intubating conditions were seen in 64% of patients, satisfactory" intubating conditions in 36% of patients.Clinically acceptable intubating conditions were seen in 88% and 100 % of patients administered rocuronium and suxamethonium respectively.The pooled data of various studies by MirkhurR.K et al[8], Cooper A.R.et al[2], Huizinga A.C. et. al.,[4]Magorian T et al.,[5] showed " excellent" in 78% and 87% "good" in 20% and 10% "poor" intubating conditions in 2% and 3% patients after rocuronium and suxamethonium respectively. Clinically acceptable intubating conditions were seen in 98% and 97% of patients receiving rocuronium and suxamethonium respectively.No untoward side effects were noted in the two group.There are very little reports about the side effects of rocuronium. Abouleish E Cr at.[6] observed cutaneous reactions in two patients in their study group. These reaction however were transient, localized and mild. In our study the heart rate variation between two groups I and II after intubation and at 1 min were 98.2 ± 13.5(group I),94.0 ± 10.7(group II) and 107.9 ± 12.6(group I), 108.5± 9.8(group II) respectively.In our study we found that variations in haemodynamic parameters i.e heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure after intubation, at 1 min, 3min, 5min etc to be insignificant between two groups respectively.Francies F. Folds et al.,[7] studied the neuromuscular effects of rocuronium in patients receiving balanced anaesthesia. They found that there were no significant changes in heart rate, systolic blood pressure or diastolic blood pressure, measured at 1 minute intervals, from the start of injection of 0.5 or 0.6 mg/kg rocuronium to the development of its maximal neuromuscular effect. It appears to have no circulatory side effects.

CONCLUSION

Rocuronium bromide in a dose of 0.6mg/kgcan be used as an alternative to suxamethoniumprovide the airway has been carefully assessed and no difficulty is anticipated. Rocuronium is a rapidly acting nondepolarizing relaxant with an onset of action which approaches that of suxamethonium and is a suitable replacement wherever the latter is contraindicated.

To conclude, rocuronium in a dose of 0.6mg/kg is a suitable alternative to suxamethonium in a dose of 1.5 mg/kg in premedicated and anasethetized patients scheduled for elective surgeries.

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