

Comparison of Intubating Conditions of Succinylcholine and Rocuronium

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Abstract: The aim of study on neuromuscular drugs was to have nondepolarising muscle relaxant, which is like succinylcholine without its side effects.

The new NDMR drug rocuronium became the first competitor for succinylcholine. Rocuronium introduced in 1994 is said to produce excellent to good intubating conditions in 60 seconds. Further rocuronium is said to be devoid of the adverse effects that are seen with succinylcholine

Hence, the present study was undertaken to evaluate the intubating conditions with rocuronium 0.6 mg kg⁻¹ and 0.9 mg kg⁻¹ body weight and to compare the intubating conditions with that of succinylcholine 1 mg kg⁻¹ body weight, for use during rapid sequence intubation of anaesthesia in emergency cases.

The study population consisted of 90 adult patients of ASA grade I and II

Group I consisting of 30 patients were to receive ROCURONIUM 0.6 mg kg⁻¹ body weight and intubation attempted at 60 seconds.

Group II consisting of 30 patients were to receive ROCURONIUM 0.9 mg kg⁻¹ body weight and intubation attempted at 60 seconds.

Group III consisting of 30 patients were to receive SUCCINYLCHOLINE 1 mg kg⁻¹ body weight and intubation attempted at 60 seconds.

group I patients who received rocuronium 0.6 mg kg⁻¹ body weight, 10 patient had excellent intubating conditions with jaw relaxed, vocal cords apart and immobile and no diaphragmatic movements.

In group II, 24 patients (80%) out of 30 had excellent intubating conditions, 6 (20%) patients had satisfactory intubating conditions.

In group III patients, 23 (77%) patients out of 30 had excellent intubating conditions, 7 (23%) Patients had satisfactory intubation condition. There was no case of failed intubation at 60 seconds in any of the three groups. Heart rate, systolic, diastolic and mean arterial pressure changes were comparable in all three groups.

Rocuronium is a safe alternative to Succinylcholine for rapid sequence induction in adult patients in situations where Succinylcholine is contraindicated and in whom there is no anticipated difficult way.

Keywords: Comparison of Intubating Conditions, Succinylcholine and Rocuronium, Succinylcholine and Rocuronium.

1. INTRODUCTION

Anaesthesia defined as 'a defect of sensation', first appeared in Bailey's English Dictionary in 1751. Inventions and discoveries started rolling down in the field of anaesthesia when W.T.G. Morton demonstrated the effects of diethyl ether to the world.

Succinylcholine, introduced in 1951, was a synthetic depolarizing muscle relaxant. It fulfilled both of the above requirements, and soon became the drug of choice for endotracheal intubation especially in rapid sequence intubation in emergency cases. But all did not go well for succinylcholine when its adverse effects started surfacing especially hyperkalemia, rise in intragastric, intraocular, intracranial Pressures and cardiovascular effects. Thus the quest began for a safer substitute for succinylcholine.

The aim of research on neuromuscular drugs was to have nondepolarising muscle relaxant, which is like succinylcholine without its side effects.

Though many NDMR drugs like atracuriumbesylate, vecuronium bromide and mivacurium chloride were introduced, none of them could challenge succinylcholine in terms of its onset.

The new NDMR drug rocuronium introduced in 1994 became the first competitor for succinylcholine. Rocuronium when given in two to three times the ED₉₅ dose is said to produce excellent to good intubating conditions in 60 seconds. Further rocuronium is said to be devoid of the adverse effects that are seen with succinylcholine. Hence, the present study was undertaken to evaluate the intubating conditions with rocuronium 0.6 mg kg⁻¹ and 0.9 mg kg⁻¹ body weight and to compare the intubating conditions with that of succinylcholine 1 mg kg⁻¹ body weight, for use during rapid sequence intubation of anaesthesia in emergency cases.

2. METHODOLOGY

The study population consisted of 90 adult patients of ASA grade I and II belonging to both sexes in the age group of 20 to 50 years who were posted for various emergency surgeries. Informed consent was obtained from the patients before taking up for surgery. Exclusion criteria include patient with neuromuscular disorders, ASA Grade III & IV patients, Hypertension, Diabetes, Bronchial asthma, Ischemic heart disease etc., Mallampati III & IV Grading, Pregnant women.

The study population was randomly divided into three groups with 30 patients in each group.

Group I consisting of 30 patients were to receive ROCURONIUM 0.6 mg kg⁻¹ body weight and intubation attempted at 60 seconds.

Group II consisting of 30 patients were to receive ROCURONIUM 0.9 mg kg⁻¹ body weight and intubation attempted at 60 seconds.

Group III consisting of 30 patients were to receive SUCCINYLCHOLINE 1 mg kg⁻¹ body weight and intubation attempted at 60 seconds.

The baseline heart rate, oxygen saturation and electrocardiogram, systolic, diastolic, mean arterial blood pressures were recorded. injection pentazocin 15 mg and injection midazolam 1 mg were given to all In patients 3 minutes prior to administering induction agent.

All patients were preoxygenated with 100% oxygen via a face mask for 3 minutes after administering pentazocin and midazolam. They were induced with injection thiopentone sodium 5 mg kg⁻¹ body weight intravenously.

In all patients cricoid pressure was applied after the administration of induction agent when the patients become unconscious.

In group I, Rocuronium 0.6 mg kg⁻¹ body weight was given intravenously after the loss of eyelash reflex.

Similarly in group II and group III, Rocuronium 0.9 mg kg⁻¹ and Succinylcholine 1 mg kg⁻¹ respectively was given intravenously after the loss of eyelash reflex. No mask ventilation was done in any patient after administration of relaxant.

In all the three groups of patients, oral endotracheal intubation was attempted at 60 seconds following the administration of muscle relaxant and intubating conditions were graded using the rating scale adopted by Lund and Stovneet. al (1962).

At the end of surgery all the patients were reversed with injection neostigmine 0.05 mg kg⁻¹ body weight and injection atropine 0.02 mg kg⁻¹ body weight.

3. RESULTS AND DISCUSSION

Intubation Score:

At the end of 60 sec after injection of muscle relaxant, the laryngoscopy was performed and intubating condition were graded depending upon scale adopted by LUND AND STOVNER et. al. (1962).

Table 1: Intubating condition Grading

| Intubating Condition | Excellent | Satisfactory | Fair | Impossible |
|---------------------------|-----------|--------------|------|------------|
| (ROC 0.6) Group I | 10 (33) | 20 (67) | - | - |
| (ROC 0.9) Group II | 24 (80) | 6 (20) | - | - |
| Succinylcholine Group III | 23 (77) | 7 (23) | - | - |

$$\chi^2 = 17.5 \text{ P} < 0.0001 \text{ HS}$$

As it is seen in the table 1, in group I patients who received rocuronium 0.6 mg kg⁻¹ body weight, 10 patient had excellent intubating conditions with jaw relaxed, vocal cords apart and immobile and no diaphragmatic movements.

In group II, who received rocuronium 0.9 mg kg⁻¹ body weight, 24 patients (80%) out of 30 had excellent intubating conditions, 6 (20%) patients had satisfactory intubating conditions.

In group III patients, who received Succinylcholine 1 mg kg⁻¹ body weight, 23 (77%) patients out of 30 had excellent intubating conditions, 7 (23%) Patients had satisfactory intubation condition. There was no case of failed intubation at 60 seconds in any of the three groups.

Pulse rate:

Table 2: Pulse Rate Variations

| | | ROC 0.6 Group I | | ROC 0.9 Group II | | Succinylcholine Group III | |
|--------------------|--------|--------------------|------|---------------------|------|------------------------------|------|
| Time of Assessment | | Mean | SD | Mean | SD | Mean | SD |
| Resting | | 89.8 | 12.5 | 89.8 | 12.5 | 81.4 | 10.6 |
| After Intubati on | 5 Mins | 97.4 | 9.1 | 97.4 | 9.1 | 98.5 | 10.6 |

Table 2 shows the pulse rate variation in 3 groups.

The mean resting pulse rate was 89.8 ± 12.5 beat per minute in Group I, 89.8 ± 12.5 in Group II and 81.4 ± 10.6 beat per minute in Group III

There was an increase in heart rate from resting values in 3 group following laryngoscopy and intubation.

The increase was maximum at 1 minute after intubation. The pulse rate gradually decreased thereafter toward resting value in 3 groups.

B. Systolic blood pressure:

Table 3: systolic blood pressure variation

| SBP | | ROC 0.6 Group I | | ROC 0.9 Group II | | Succinylcholine Group III | |
|--------------------|--------|--------------------|-----|---------------------|-----|------------------------------|-----|
| Time of Assessment | | Mean | SD | Mean | SD | Mean | SD |
| Resting | | 117.0 | 7.0 | 117.0 | 7.0 | 114.7 | 8.2 |
| After Intubati on | 5 Mins | 117.0 | 6.0 | 117.0 | 6.0 | 120.1 | 9.4 |

Similar results? Possible (despite changes in doses of ROCURONIUM for intubation there is no change in systolic blood pressure after 5min of intubation)

Table 3 shows systolic blood pressure variation in 3 groups.

The mean resting blood pressure was 117 ± 7 mm of Hg in group I, 117 ± 7 mm of Hg in group III, 114.7 ± 8.2 mm of Hg in group III. There was an increase in systolic blood pressure from resting value in 3 group following laryngoscopy and intubation. The increase was maximum at 1 minute after intubation. The systolic blood pressure gradually decreased thereafter toward resting values in 3 groups.

C. Diastolic blood pressure:

Table 4: Diastolic blood pressure variations

| | | ROC 0.6 | | ROC 0.9 | | Succinycholine | |
|--------------------|--------|---------|-----|---------|-----|----------------|-----|
| Time of Assessment | | Mean | SD | Mean | SD | Mean | SD |
| Resting | | 84.0 | 6.7 | 84.0 | 6.7 | 80.7 | 8.3 |
| After Intubation | 5 Mins | 83.7 | 6.1 | 83.7 | 6.1 | 83.5 | 7.6 |

Similar results? Possible (Resting blood pressure means before intubation in preoperatively)

Table 4 shows diastolic blood pressure variation in 3 groups.

The mean resting diastolic blood pressure was 84 mm of Hg in Group I, 84 mm of Hg in Group II, and 80.7 mm of Hg in Group III. There was an increase in diastolic blood pressure from resting value in 3 groups following laryngoscopy and intubation. The increase was at 1 minute following intubation. The diastolic blood pressure gradually decreased thereafter toward resting value in 3 groups.

Table No. 5: Mean Arterial Pressure variation after 5 minutes.

| Sr. No. | Group | Mean pressure | S.D. | P value |
|---------|--------------------------|---------------|------|--------------------|
| 1 | Roc 0.6 Group I | 94.70 | 5.16 | 0.79 ^{NS} |
| 2 | Rec 0.9 Group II | 94.70 | 5.16 | |
| 3 | Succinycholine Group III | 95.60 | 7.28 | |

Results similar in both groups? Possible (No change in Mean arterial pressure variation despite drug dose consideration for rocuronium)

Mean arterial pressure variation between groups after 5 minutes was nonsignificant. However, it was low in Group I and Group II. No side effect were noted in all the 3 groups.

4. CONCLUSION

Rocuronium is a safe alternative to Succinycholine for rapid sequence induction in adult patients in situations where Succinycholine is contraindicated and in whom there is no anticipated difficult way. There is no changes in vital parameter with change in dose of Rocuronium , intubating condition is excellent with dose of 0.9mg/kg as compare to 0.6 mg/kg of Rocuronium.

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