

Clinical Comparative Study for Comparison of Intubating Conditions with Rocuronium Bromide & Suxamethonium Chloride in Children Aged 5 to 10 Years



Medical Science

KEYWORDS : Rocuronium , Suxamethonium , Intubating condition

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ABSTRACT

The aim of the present study is to compare intubating conditions and hemodynamic changes associated with use of rocuronium bromide and suxamethonium chloride. An open comparative study was performed on 80 children aged 5 to 10 years of ASA grade I & II. Group R received Inj. Rocuronium (0.6 mg/kg iv) and Group S received Inj. Suxamethonium (2 mg/kg iv). At 60 sec and 90 sec intubating conditions were observed. After intubation, hemodynamic changes were noted in both the groups. Excellent intubating conditions were observed in 100% cases receiving suxamethonium at 60 sec & 90 sec while in 80% and 95% cases receiving Rocuronium at 60 sec & 90 sec respectively. Hemodynamic changes were not found clinically significant between two groups. Rocuronium at 90 seconds is comparable to Suxamethonium for intubating conditions.

INTRODUCTION

Ideal muscle relaxants should provide ideal intubating conditions in ultra short duration with minimal side effects. Succinylcholine, a depolarizing muscle relaxant, which has rapid onset and short duration of action, is relaxant of choice for rapid endotracheal intubation. But it has many unwanted actions especially in children like bradycardia, intractable cardiac arrest, hyperkalemia, masseter spasm, malignant hyperthermia, rhabdomyolysis, acidosis and death. So, Malignant Hyperthermia Association strongly advises its discontinuation in paediatric patients. Besides, it has other side effects like cardiac arrhythmias increased intraocular, intragastric and intracranial pressures, dual block, muscle pains etc.

Non-depolarizing neuromuscular blocking agents like Vecuronium, Atracurium are also used for endotracheal intubation. But they have relatively slower onset time and time required for satisfactory intubating conditions is more at the expense of longer duration of action. Methods such as large doses and 'priming' technique have been tried in an attempt to reduce the onset time of non-depolarizing muscle relaxants. These have either been proved unsuccessful or hazardous to the patients.

Rocuronium bromide a non depolarizing neuromuscular blocking agent was introduced in 1988 at 9th world Conference of Anesthesiologists in Washington. It has rapid onset and offers good to excellent intubating conditions. It is devoid of adverse effects which is associated with Succinylcholine. The present study was undertaken to compare intubating conditions of Succinylcholine and Rocuronium for endotracheal intubation at 60 & 90 seconds in paediatric patients aged 5 to 10 years.

Aim of Study

1. To evaluate & compare the tracheal intubating conditions with Rocuronium and Suxamethonium in children aged 5-10 years.
2. To compare the haemodynamic changes after intubation with Rocuronium and Suxamethonium.
3. To think about Rocuronium as an alternative to Suxamethonium for endotracheal intubation.

Material and Method

The present study was conducted in 80 patients who were scheduled for elective surgery to compare intubating conditions (at 60 seconds and 90 seconds) and time course of action of Rocuronium bromide and succinylcholine patients were divided into four groups.

Group I: Intubation with succinylcholine (2mg/kg) at 60 sec-

onds.

Group II: Intubation with succinylcholine (2mg/kg) at 90 seconds.

Group III: Intubation with rocuronium (0.6mg/kg) at 60 seconds.

Group IV: Intubation with rocuronium (0.6mg/kg) at 90 seconds.

Selection of patients:

5-10 years of age group

-ASA grade I and II

-Patients between

-Patients of either sex

Preoperative assessment:

After taking informed consent from parents, a day before operation all the patients were thoroughly assessed for any past or present medical and surgical illness, any history of previous anaesthetic exposure, drug treatment or drug allergy. Patients' parents were thoroughly asked about detailed birth history or any congenital anomalies. Then patients were examined. Airway was graded according to modified Mallampati classification and patients with Mallampati grade I & II was selected.

Investigations like Hb, Blood sugar and chest x-ray were routinely done. RFT, LFT, S-electrolytes and ECG were done where indicated.

Patients were kept nil by mouth for 6-hours pre-operatively. Clear fluids were allowed up till 2 hours pre-operatively.

Monitoring:

In operation theatre, i.v. line was secured. Non invasive blood pressure, ECG and pulse oximeter were attached.

Premedication:

Inj. Glycopyrrolate 0.004 mg/kg i.v. +

Inj. Fentanyl 1 µg/kg i.v.

Induction:

Patients were pre-oxygenated with 100% O₂ by face mask for 3 min. Anaesthesia was induced with inj. Thiopentone Sodium (2.5%) 5mg/kg i.v. slowly, followed by

In Group I & II inj. Succinylcholine 2 mg/kg i.v.

In Group III & IV inj. Rocuronium 0.6 mg/kg i.v.

Then patients were ventilated with 100% O₂ by face mask. Laryngoscopy was done at 60 seconds in group I & III patients while at 90 seconds in group II & IV patients. Patients were intubated with a well lubricated cuffed or uncuffed endotracheal tube of appropriate size. Bilateral air entry checked for equality and ETCO₂ monitor applied after fixing the tube.

During laryngoscopy, intubating conditions were graded according to Cooper et al criteria.

Cooper et al criteria:

Score	Jaw relaxation	Vocal Cord Position	Response to Intubation
0	Poor (impossible)	Closed	Severe bucking or coughing
1	Minimal (difficult)	Closing	Mild coughing
2	Moderate (fair)	Moving	Slight diaphragmatic movement
3	Good (early)	Open	None

Total score:

8-9	Excellent	} Clinically acceptable
6-7	Good	
3-5	Poor	} Clinically unacceptable
0-2	Bad	

Heart rate, systolic blood pressure and ECG changes were recorded before induction and at 1 min ,3 min &5 min after induction.

Maintenance:

Anesthesia was maintained with oxygen, nitrous oxide, isoflurane and inj.Atracurium as per duration of surgery. Per operatively patients' heart rate, blood pressure ECG, SPO₂ & ETCO₂ were monitored. Patients were also watched for other adverse reactions like rashes, erythema etc.

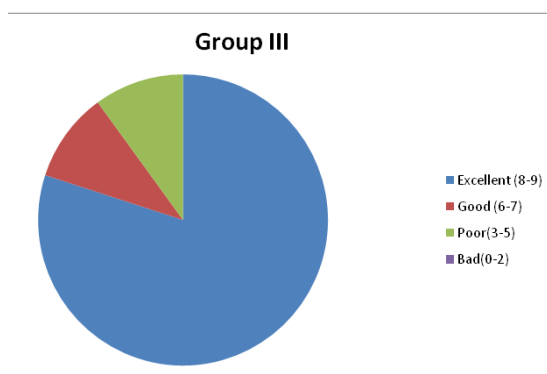
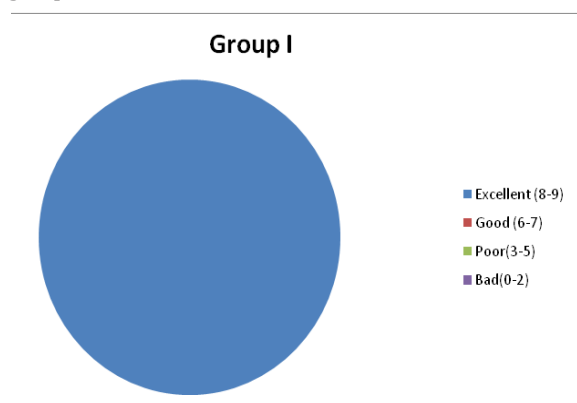
Reversal:

At the end of surgery, patients in whom only intubating dose of Succinylcholine was given were allowed to recover spontaneously and all other patients were reversed inj. Glycopyrrolate 0.01 mg/kg and inj. Neostigmine 0.05 mg/kg after recovery of spontaneous respiration with. Patients were extubated after recovery of adequate muscle power, tone and cough reflex.

OBSERVATION & RESULTS

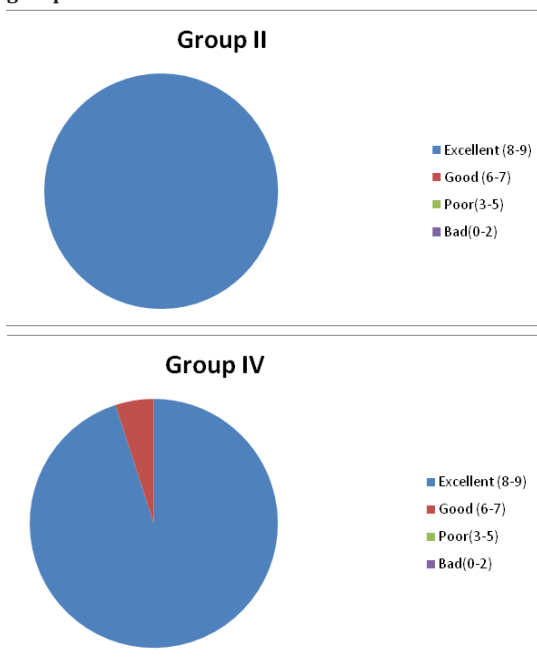
1. INTUBATING CONDITIONS

Chart 1.1: comparison of intubating condition between group I and III



All the patients in group I had excellent intubating conditions. In group III, 16 patients (80%) had excellent intubating conditions, 2 patients (10%) had good intubating conditions and another 2 patients (10%) had poor intubating conditions. Thus in group III 18 patients (90%) had clinically acceptable intubating conditions.

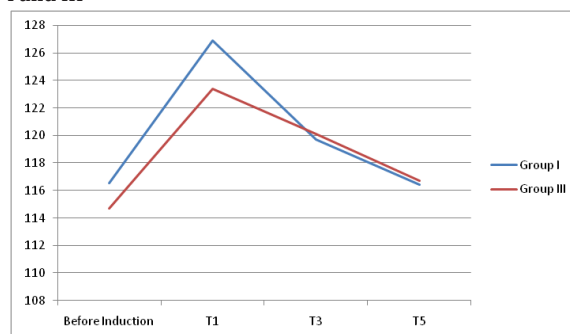
Chart 1.2: comparison of intubating condition between group II and IV



Intubating condition was excellent in all the patients of group II. In group IV 19 patients (95%) had excellent and 1 patient (5%) had good intubating condition. Thus all the patients in both the groups had clinically acceptable intubating conditions.

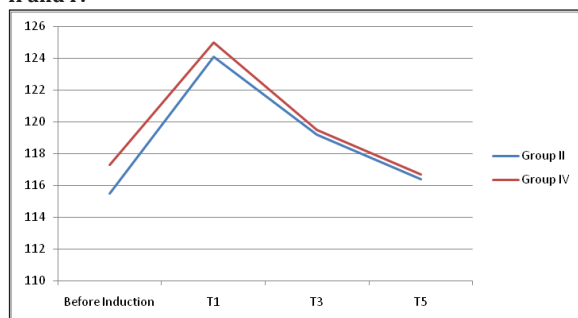
2. HEART RATE VARIATION

Graph 2.1: comparison of mean heart rate between group I and III



Maximum rise in heart rate was at 1 min. after intubation (8.97% in group I and 7.63% in group III). But this rise in heart rate was not clinically significant ($P>0.05$).

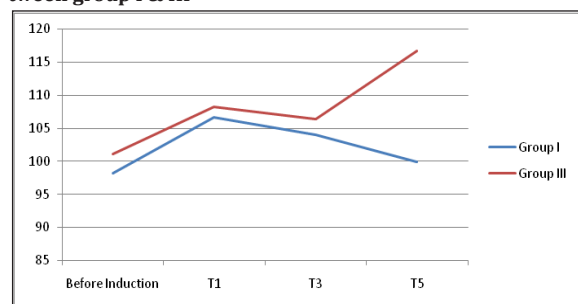
Graph 2.2: comparison of mean heart rate between group II and IV



Maximum rise in heart rate was at 1 min after intubation (7.40% in group II and 6.56% in group IV). But this rise in heart rate was not clinically significant ($P>0.05$).

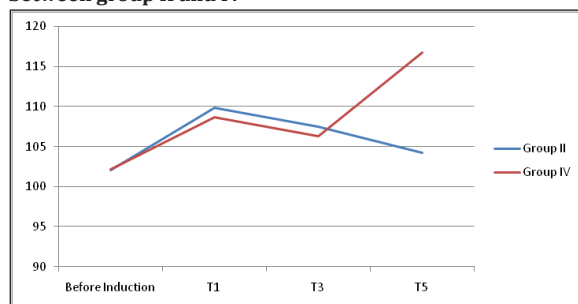
3. SYSTOLIC BLOOD PRESSURE VARIATION

Graph 3.1: comparison of mean systolic blood pressure between group I & III



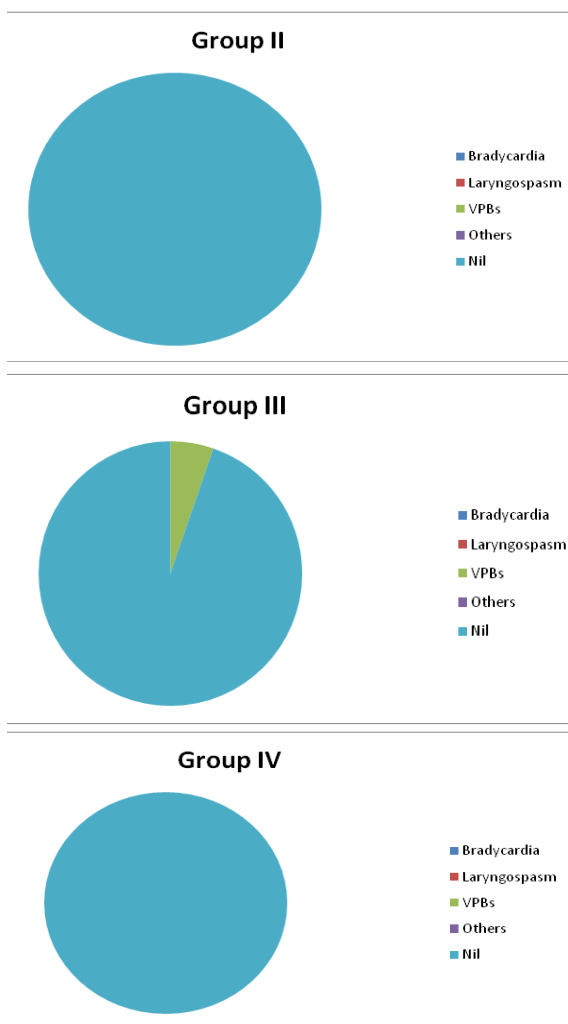
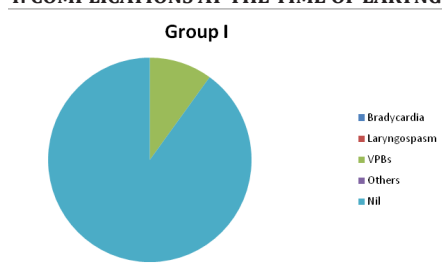
Maximum rise in systolic blood pressure was at 1 min after intubation (8.71% in group I and 7.12% in group III). But this rise in systolic blood pressure was not clinically significant ($P>0.05$).

Graph 3.2: comparison of systolic blood pressure variation between group II and IV



Maximum rise in systolic blood pressure was at 1 min after intubation (7.59% in group II and 6.31% in group IV). But this rise in systolic blood pressure was not clinically significant ($P>0.05$).

4. COMPLICATIONS AT THE TIME OF LARYNGOSCOPY



* Ventricular Premature Beats: This table shows that only 2 patients (10%) in group I and only 1 patient (5%) in group III had ventricular premature beats during laryngoscopy.

Discussion

Muscle relaxant is used to facilitate endotracheal intubation and to provide surgical relaxation. There are maximum chances of hypoxia, regurgitation and aspiration after induction of anesthesia and before intubation. So the ideal neuromuscular blocking agent should facilitate early intubation to decrease chance of aspiration. It should also provide good relaxation and should be free from side effects.

Succinylcholine is ultra short acting muscle relaxant with rapid onset within 60 seconds. But unfortunately it has many side effects such as:

- Muscelfasciculation
- Hyperkalemia
- Bradycardia
- Cardiac arrhythmias
- Malignant hyperthermia
- Post operative muscle pain

Also it is contraindicated in many situations such as:

- Patient having recent history of burns
- Patients with denervating injuries.

Nondepolarizing muscle relaxants such as Atracurim and Vecuronium have slow onset and are not suitable when rapid endotracheal intubation is required. **Rocuronium** which is a nondepolarizing muscle relaxant has emerged as an alternative.

It has rapid onset (60 to 90 seconds), good to excellent intubating conditions similar to Succinylcholine and is free from side effects related to Succinylcholine.

Summary

The present study was conducted to compare intubating conditions between Succinylcholine (2mg/kg) and **Rocuronium** (0.6 mg/kg) in ASA grade I & II patients aged 5-10 years.

Patients were divided into four groups.

Group I: Intubation with succinylcholine (2mg/kg) at 60 seconds.

Group II: Intubation with succinylcholine (2mg/kg) at 90 seconds.

Group III: Intubation with rocuronium (0.6mg/kg) at 60 seconds.

Group IV: Intubation with rocuronium (0.6mg/kg) at 90 seconds.

Results are compared between group I & III and group II & IV. Intubating conditions were clinically acceptable in all the patients receiving Succinylcholine and in 90% of patients in group III & in 95% of patients in group IV. Haemodynamic changes were noted in all the groups but these changes were not clinically significant between group I & III and group II & IV.

Conclusion

From observation and results we conclude that **Rocuronium**, a new non depolarizing muscle relaxant with a brief onset of action, but devoid of the adverse effects of Succinylcholine may be a suitable alternative to Succinylcholine for tracheal intubation in paediatric age group. However 90 seconds are required with **Rocuronium** 0.6 mg/kg to achieve intubating conditions similarly to Succinylcholine.

Hence, Rocuronium in dose of 0.6 mg/kg conditions at 90 seconds which is comparable to Succinylcholine for intubating conditions and can be given either in normal children or in conditions where use of Succinylcholine is contraindicated or hazardous.

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