

## Comparison of Intubating Condition between Injection Rocuronium Bromide and Injection Suxamethonium Chloride

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### Abstract

**Objective:** Endotracheal intubation is an integral part of administration of anesthesia during surgical procedure. The time interval from suppression of protective reflexes by induction, to accomplishment of intubation is a critical period, during which regurgitation and aspiration of acid gastric contents can occur. Rapid sequence intubation is proved to be the technique of choice in these situations. **Method:** We studied 100 patients of either sex aged 18-70 years of ASA grade-1 and 2, with mallampati grade 1-2 undergoing elective surgery. They were randomly allocated in two groups – 50 each to compare the intubating condition of inj. Rocuronium 0.9mg/kg in Group 1 to inj. Suxamethonium 2mg/kg in Group 2. Anaesthesia was induced with fentanyl 2 µg/kg and Propofol 2 mg/kg and intubating conditions were assessed 60s after the administration of the neuromuscular blocking drug. Intubating conditions were graded on a three-point scale as excellent, good or poor, the first two being considered clinically acceptable. **Result:** All patients were successfully intubated in both groups. Overall intubating conditions in group 1 & 2 were excellent in 94% and 100% patients while good in 06% and

00% patients respectively with not quite statistically significant difference ( $p>0.05$ ). **Conclusion:** It is concluded that rocuronium 0.9 mg/kg can be used as an alternative to suxamethonium 2.0 mg/kg as part of a rapid sequence induction provided there is no anticipated difficulty in intubation.

**Keywords:** Intubating Condition; Rocuronium; Suxamethonium; Rapid Sequence Induction.

### Introduction

Endotracheal intubation is an integral part of administration of anesthesia during surgical procedure [1]. Intubation is one of the common procedures performed during general anaesthesia. Neuromuscular blocking agents are used to achieve muscle relaxation to facilitate endotracheal intubation and to provide surgical relaxation [2]. Rapid sequence induction (RSI) is a technique used to facilitate endotracheal intubation in patients at high risk of aspiration and for those who require rapid securing of the airway [3].

The ideal neuro-muscular blocking agent for rapid sequence intubation should have a fast onset, brief duration of action, provide profound relaxation and free from hemodynamic changes.

Suxamethonium (succinylcholine) - depolarizing neuromuscular blocker (NMB) with its rapid onset and short duration of action is still relaxant of choice to facilitate tracheal intubation [4]. In addition to fasciculation it has got many side effects such as bradycardia and other dysrhythmias [5], rise in serum potassium [6], post operative myalgia, rise in intraocular, intragastric and intracranial pressure [7], incidences of prolonged recovery in patients with pseudo-cholinesterase deficiency and triggering of malignant hyperthermia.

Because most of the side effects of Suxamethonium reflect its depolarizing mechanism of action therefore search for ideal neuromuscular blocking agent focused on nondepolarizing type of relaxants which has rapid onset time and offers good to excellent intubating condition, as rapidly as Suxamethonium and which lacks the above mentioned adverse effects.

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Rocuronium bromide, a newer amino-steroidal compound, is a derivative of vecuronium; Rocuronium has a rapid onset time, an intermediate duration of action and rapid recovery with cardiovascular stability [8]. Dose : 0.6 -1.2 mg/kg This study was undertaken to evaluate, whether Rocuronium onset time was sufficiently short to permit its use for rapid sequence induction of anesthesia and whether intubating conditions achieved by Rocuronium were similar to those achieved by Suxamethonium.

### Materials and Methods

100 patients ranging from 18-70 years of age and from both sex having mallampati grade 1&2 undergoing elective surgery. Patients were assessed pre operatively through history and clinical examination. Investigations were carried out and analysed. Only patients belonging to ASA 1 and 2 were selected for the study. We exclude the patients having following features. (1)Neuromuscular disease (2)H/O or anticipated difficult airway (3)Medications that influence neuromuscular function (4)Allergic to study drugs (5)Pregnancy. After obtaining institutional board approval, written informed consent was obtained from 100 patients and were randomly placed in two different groups (50 in each group)

Group 1: Receives IV inj. Rocuronium 0.9 mg/kg

Group 2: Receives IV inj. Suxamethonium 2 mg/kg

Patients were kept NBM for 6 hours. On arrival of patient in the operative room, patient's baseline heart rate, blood pressure and oxygen saturation was recorded. After securing venous access inj. Glycopyrrolate 0.004mg/kg and inj. Midazolam 0.05 mg/kg was given IV slowly over 1-2 minutes in both groups. Intravenous fentanyl 2 µg/kg was given to

all patients at the start of preoxygenation with O<sub>2</sub> for 3 min. Anesthesia was induced with intravenous propofol 2 mg/kg this was followed by IV Rocuronium 0.9 mg/kg in group 1, while IV Suxamethonium 2 mg/kg in group 2. Laryngoscopy was performed at 60s after administration of the neuromuscular blocker and intubation done with proper sized endotracheal tube. The duration of laryngoscopy and intubation was restricted to 30s. If diaphragmatic or limb movement occurred at the time of endotracheal intubation, then this was recorded and propofol administered as a rescue drug in a dose of 1 mg/kg body weight.

Neuromuscular monitoring, end-tidal carbon dioxide (ETCO<sub>2</sub>) and anesthetic agent monitoring was established following induction of anesthesia. Surface electrodes of a peripheral nerve stimulator were placed over the ulnar nerve at the wrist on the hand with the intravenous access. The NIBP cuff was applied over the other arm. Heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure, and pulse oximetric saturation were recorded for the first 10 min after intubation. Neuromuscular monitoring was done using a peripheral nerve stimulator to stimulate the ulnar nerve at the wrist using surface electrodes placed along the course of the nerve. Anesthesia was maintained with 50% oxygen, 50% N<sub>2</sub>O and sevoflurane with controlled ventilation. In Group 1 maintenance dose of Rocuronium was used while in Group 2 Inj. Atracurium was used for maintenance of muscle relaxation. After completion of surgery, reversal of muscle relaxant was achieved with inj. Neostigmine 0.05 mg/kg and inj. Glycopyrrolate 0.008 mg/kg iv. After satisfactory recovery, patients were extubated.

Intubating condition was assessed using scoring system of Sluga et al [9].

	Score 3	Score 2	Score 1
<b>Laryngoscopy</b>			
Mandibular muscle relaxation	Relaxed	Acceptable relaxation	Poor relaxation
Resistance to blade insertion	None	Slight resistance	Active resistance
<b>Vocal cords</b>			
Position	Abducted	Intermediate	Closed
Movement	None	Moving	Closing
<b>Intubation response</b>			
Limb movement	None	Slight	Vigorous
Coughing	None	Diaphragmatic	Sever coughing

#### Intubation Condition Defined as Follows

Excellent – All three factors were rated 3

Good – All three factors were rated 3 or 2

Poor – Presence of one score of 1

Excellent and good intubating condition taken to be "clinically acceptable".

The onset time from the time of administration of muscle relaxant to the complete abolition of all four twitches on train-of-four (TOF) stimulation was noted. The assessment of neuromuscular blockade was done by the appearance of first twitch in the TOF response in the rocuronium groups (nondepolarizing blockers). In the case of succinylcholine group, the return of all twitches with the lowest amplitude (depolarizing blocker). A repeat TOF stimulation was used once every 12s to follow the time course of neuromuscular blockade.

### Observation and Results

Data calculation and p value calculation is done by unpaired t-test using SPSS software. The present study includes 100 patients belonging to ASA group 1 and 2 undergoing elective surgery. They were randomly assigned into two groups of 50 each. All the patients were given the drug according to methodology of our study.

**Table 1:** Demographic Data: age, sex and weight distribution

Group	Age(Years) Mean± S.D.	Weight(Kg) Mean ± S.D.	Sex F:M
<b>GROUP 1</b> (n=50)	46.52±12.004	55.54±9.389	27:23
<b>GROUP 2</b> (n=50)	47.06±10.436	53.64±6.548	29:21

Table 1 shows the two groups were comparable with regard to the demographic data.

**Table 2:** Comparison of Intubating Condition in both groups

Intubating Condition	Group 1 (n=50)	Group 2 (n=50)
<b>Excellent</b>	94%	100%
<b>Good</b>	06%	00%
<b>Poor</b>	00%	00%

**Table 3:** Comparison of Intubating Score in both groups

	Intubating Score (at 60 sec.)MEAN± S.D.
Group 1 (n=50)	8.94±0.239
Group 2 (n=50)	9.00±0.000

There is not quite statistically significant difference in the intubation score at 60 sec. in both groups

### Discussion

We used rocuronium in dose of 0.9 mg/kg in this study. The extra anaesthetic depth needed, coupled with these laryngeal movements are two drawbacks that cannot make the low dose rocuronium as a desirable technique for rapid sequence intubation. Use of higher dose of rocuronium to improve intubating conditions during rapid sequence intubation and to cut short the onset time below 60 secs has been advocated by various workers [10,11,12,13] but doses larger than 0.6 mg/kg would be associated with a long duration of action which may be inappropriate in many situations.

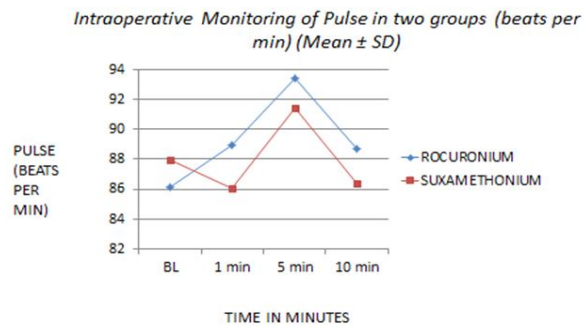
Table 1 shows comparable demographic data among two groups. The endotracheal intubation was commenced at 60 seconds and intubating conditions noted. Similar clinically acceptable (excellent or good) intubating conditions were found in both Rocuronium 0.9 mg/kg and Suxamethonium 2 mg/kg groups. After Rocuronium administration, the response of diaphragm to intubation was more pronounced than

that after administration of Suxamethonium. But the overall intubating conditions were similar to those after Suxamethonium administration. Intubation conditions were rated as excellent in 94% and good in 06% of the patients who received Rocuronium, and excellent in 100% of the patients who received Suxmethonium [Table 2]. In our study, intubation score at 60 sec. in both groups shows not quite statistically significant difference[Table 3].

Bhardwaj et al. [14], in his study concluded that clinically acceptable intubation conditions were obtained in all patients after rocuronium 0.9 mg/kg and succinylcholine 1.5 mg/kg as compared to only 37% in rocuronium 0.6 mg/kg group (p<0.0001). Jaw relaxation was significantly better in rocuronium 0.9 mg/kg and succinylcholine 1.5 mg/kg. The intubation time was significantly longer in rocuronium 0.6 mg/kg. They concluded, rocuronium in a dose of 0.9 mg/kg may be a valuable alternative to succinylcholine for rapid tracheal intubation in emergency situations where succinylcholine is contraindicated and surgery if of intermediate duration.

Similar results about onset time and intubating conditions were found in other studies of Dubois *et al* [15] and Huizinga *et al* [16] in these studies, no difference was observed in the frequency distribution of clinically acceptable intubating conditions at 60 and 90 seconds after the administration of Suxamethonium or Rocuronium.

The study of Maria *et al.*, aimed at comparing intubation conditions after 0.6 mg/kg rocuronium at 60 seconds in children, adults and elderly patients



There is no significant difference in the intra operative pulse in both groups as shown in the graph.

Fig. 1:

### Conclusion

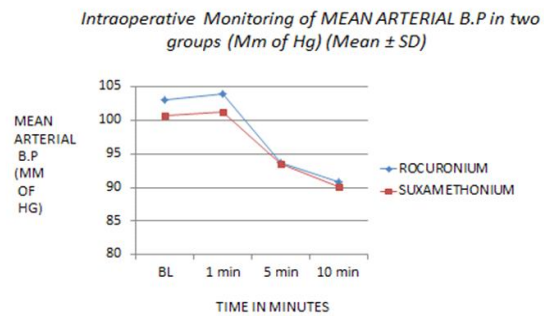
It is concluded from this study that Rocuronium 0.9 mg/kg can be used as an alternative to Suxamethonium 2 mg/kg as part of rapid sequence induction at 60 sec., provided there is no anticipated difficulty in intubation.

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and concluded that 0.6 mg/kg rocuronium was sufficient for tracheal intubation in 60 seconds in adult and elderly patients. It was however, insufficient for clinically acceptable tracheal intubation conditions in 60 seconds in 100% of children [17].

The heart rate and mean arterial blood pressure changes upto 10 minutes after intubation in both the groups were statistically non-significant ( $P > 0.0001$ ), [Figure 1&2]



There is no significant difference in the post operative mean arterial B.P. in both groups as shown in the graph.

Fig. 2:

rhythms following intravenous succinylcholine with and without intramuscular atropine preanaesthetic medication. Anesth Analg. 1975; 54: 705-9.

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