



## COMPARISON BETWEEN ROCURONIUM BROMIDE & SUCCHINYLCHOLINE IN INTUBATING CONDITION

**Dr. Sukriti Atram**

Associate Professor. Department of Anaesthesiology J.J.Hospital Grants Medical College Mumbai

**Dr Urmila Kesari**

Associatet Professor Department of Anaesthesiology, Gandhi Medical College & Hamidia Hospital, Bhopal . Corresponding author

### ABSTRACT

**Aims and Objectives:** To evaluate the quality of intubation of conditions.To evaluate the onset and duration of action . To evaluate heamodynamic changes and to assess the side effects and complication, if any of intubating doses

**Material & methods:** The present study was carried out on fifty patients who were randomly allocated into two groups. Group I Those receiving Rocuronium bromide for intubation, in a dose of 0.6 mg/kg. Group II Those receiving Succinylcholine for intubation, in a dose of 1.5 mg/kg.

**Results :** Intubation time did not differ between suxamethonium (9.8±2.2 s) (mean±SD) and rocuronium (10.5±2.9 s), respectively. Intubating conditions were clinically acceptable (good or excellent) in all patients given suxamethonium and in 96% of the patients given rocuronium. However, the condition of the vocal cords was better (P<0.05) and diaphragmatic response to intubation was less pronounced with suxamethonium (P<0.05). Changes in heart rate and arterial blood pressure were similar in both groups. (P<0.05)

**Conclusion :**Rocuronium bromide at a dose of 0.6 mg/kg provides intubating conditions similar to succinylcholine 1.5 mg/kg at 1 minute. Therefore rocuronium is a suitable alternative to suxamethonium for intubation in elective, otherwise healthy patients with less side effects.

### KEYWORDS :

#### INTRODUCTION

Practice of intubation though born long ago, started gaining popularity and with it came the need for muscle relaxation.Today the prime concern and duty of the attending anaesthesiologist is protection of the airway, thus making tracheal intubation most essential procedure. To Prevent the hazard of intubation muscle relaxant play a decision role in facilitating a smooth intubation first muscle relaxants curare in (1596).1949 Suxamethonium a depolarising neuromuscular blocking agent of rapid onset and brief duration of action.The next step was the search for a non depolariser with a quick onset of action.

Patients requiring emergent endotracheal intubation often require a rapid sequence induction intubation (RSI) technique to protect against gastric aspiration, to facilitate intubation, or to protect against increased intracranial pressure. Succinylcholine is the most common muscle relaxant used because it has a fast onset and a short duration. Unfortunately it can have serious side effects as a result of it's membrane depolarizing effect and release of potassium. Rocuronium has been suggested to create intubating conditions similar to succinylcholine.

Rocuronium bromide originally product org 9426, has a rapid onset time, intermediate duration of action, rapid recovery, no cumulation even on repeated administration cardiovascular stability, virtually no histamine release any other side effect.[1]

#### MATERIAL & METHODS

"The proposed study entitled "Comparison between Rocuronium Bromide & Succinylcholine Chloride in intubating conditions" was carried out in Department of Anaesthesiology, Gandhi Medical College & Hamidia Hospital, Bhopal (M.P).

50 patients of either sex, aged between 18-60 yrs of ASA grade I/II, scheduled to undergo various surgical procedures were chosen as subjects of this study with informed consent. The sample size was calculated with the help of statistics on basis of study carried out. aOnset time (Apnea time), intubating condition, duration of action, haemodynamic changes at each point and adverse effect.

Patients with potential airway problem, hepatic and renal

dysfunction those receiving medication which can interfere with neuromascular function and haemodynamic like beta block, anticoagulent were excluded from study.

Grouping was done into two lots of 25 each and randomly allocated Group I — Rocuronium bromide 0.6 mg/kg. Group II — Succinylcholine 1.5 mg/kg. Onset Time : The time between the end of injection of the muscle relaxant and onset of apnea time was noted intubation attempt was made after 60 secs. Intubating Conditions : The intubating conditions were evaluated and scoring was done according to vocal cord relaxation proposed by Cooper et al.[2]

#### SCORING OF INTUBATING CONDITION

Scoring	Jaw relaxation	Vocal Cards	Response to Intubation
0	Poor	Closed	Severe coughing or bucking
1	Minimal	Closed	Mild coughing
2	Moderate	Moving	Slight diaphragmatic
3	Good	Open	None

**Total Score** 8 – 9 Excellent, 6-7 Good, 3-5 Fair, 0-2 Poor

The Parameters recorded were heart rate, systolic blood pressure and diastolic blood pressure. These were measured pre operative for baseline value subsequently after induction, after intubation, 2 & 5 minutes thereafter. Adverse effect were observed during intubation and thereafter.

#### OBSERVATIONS

**Table 1 : Incidence of grade of intubating condition**

Grade	Score	Group I (Rocuronium bromide)		Group II (Succinylcholine)	
		No. of Patients	%	No. of Patients	%
Excellent	8-9	25	100	25	100
Good	6-7	-	-	-	-
Fair	3-5	-	-	-	-
Poor	0-2	-	-	-	-

Table shows that both rocuronium as well as succinylcholine provide excellent intubating conditions with scores between 8-9

**Table 2: Pharmacodynamic aspects of neuromuscular block**

Intubating Dose of drug (mg/kg)	Group I Rocuronium bromide (0.6 mg/kg)	Group II Succinylcholine (1.5 mg/kg)
Onset time (sec) (mean+SD)	83.4+17.47	61.32+8.81
Duration of action (min.) (mean+SD)	38.68+1.91	10.32+1.53

Our duration of action of rocuronium (0.6 mg/kg) was 38.68 ± 1.91 mins. and that of succinylcholine (1.5 mg/kg) was 10.32 ± 1.53 min.

**Table 3: Mean Pulse Rate + SD**

Pulse Rate (beats/min)	Group I Rocuronium bromide (0.6 mg/kg)	Group II Succinylcholine (1.5 mg/kg)
Pre-operative	89.36+14.31	86.16+10.35
After induction	83.36+11.89	91.84+15.12
After intubation	102.16+10.98	106.96+9.19
After 2 min	98.88+12.03	106.48+10.02
After 5 min.	96.32+13.144	103.60+10.20
Post operative	88.40+12.52	92.48+11.89

We found that increase in heart rate was observed after intubation and 5 minutes thereafter in group I, where rocuronium bromide 0.6 mg/kg was used. This was found to be statistically significant (p value < 0.05), both after intubation and 5 minutes thereafter. Increase in heart rate was observed after intubation and 5 minutes in group II, where succinylcholine 1.5 mg/kg was used. This was found to be statistically significant (p value 0.05), both after intubation and 5 minutes thereafter.

**Table 5: Mean Arterial Blood Pressure (mean+SD)**

Pulse Rate (beats/min)	Group I Rocuronium bromide (0.6 mg/kg)	Group II Succinylcholine (1.5 mg/kg)
Pre-operative	99.28+10.85	97.25+7.99
After induction	97.47+10.61	100.83+8.98
After intubation	107.97+13.35	109.59+10.86
After 2 min	101.81+12.37	107.97+11.32
After 5 min.	99.12+12.15	101.63+9.83
Post operative	102.32+9.51	101.73+12.09

We found that there was an increase in mean arterial blood pressure after intubation in group I patients, where rocuronium bromide 0.6 mg/kg was used and this was found to be statistically significant (p values < 0.05). In this group mean arterial blood pressure returned to the baseline values 5 minutes after intubation. We found that there was increase in mean arterial blood pressure after intubation in group II patients where succinylcholine 1.5 mg/kg was used. This was found to be statistically significant (p value < 0.05). In this group, there was increase in mean arterial blood pressure even 5 minutes after intubation. This was found to be statistically significant (p value < 0.05).

**Table 6: Incidence of Adverse effects of intubation**

Pulse Rate (beats/min)	Group I Rocuronium bromide (0.6 mg/kg)	Group II Succinylcholine (1.5 mg/kg)
Bradycardia	0	3
Hypotension	0	1

We found that there was no incidence of adverse effects in group I, where rocuronium bromide 0.6 mg/kg was used. But with succinylcholine 1.5 mg/kg, there were 3 cases of bradycardia and 1 case of hypotension.

**STATISTICAL ANALYSIS:**

Statistical analysis was done by using SPSS software version 16. The data collected in the present study were presented in the form of tables . The data were analyzed statistically by calculating the descriptive statistics viz., Mean, SD, percentage and 95% confidence interval for all continuous variables. The difference in mean is tested

using independent sample student's 't' test and the measures of association between the qualitative variables are assessed using chi square tests. The inference is considered statistically significant if p<0.05.

**DISCUSSION**

In 1880, blind intubation of the trachea was done by Mac Even's : In 1914, Magill & Rawbathan designed the endotracheal tube. Direct laryngoscopy was described by Chevalier, Jackson's. Then came the entry of curare, and later suxamethonium was introduced in operating theatre with increasing popularity. In order to meet the increasing demands of perfection, newer neuromuscular blocking agents are being synthesized with a view of specificity of profile and elimination of side-effect (Vecuronium for cardiovascular stability, Atracurium for hepatic and renal impairment, Mivacurium — the short acting non- depolarizer, eliminated by pseudocholinesterase and the latest, Rocuronium for rapid intubation in situations where succinylcholine is disadvantageous).

The newer muscle relaxants compare very favorably with the profile of an ideal neuromuscular agent. Non depolarizing mechanism of action. Rapid onset of action. Short duration of action. Rapid recovery. Non-cumulative No cardiovascular side effect. No histamine release Reversible by cholinesterase inhibitor.High potency, Pharmacologically inactive metabolites.

Our study entitled "Comparison between Rocuronium Bromide & Succinylcholine Chloride in intubating conditions" was carried out in Department of Anaesthesiology, Gandhi Medical College & Hamidia Hospital, Bhopal (M.P.). We took 50 patients of either sex, aged between 18-60 yrs of ASA grade I/II, scheduled to undergo various surgical procedures were chosen as subjects of this study with informed consent. The sample size was calculated with the help of statistics on basis of study carried out. Onset time (Apnea time), intubating condition, duration of action, haemodynamic changes at each point and adverse effect. The speed of onset, intubating conditions, duration of action, haemodynamic alteration during intubation was observed with these drugs and adverse effects.

Intubation conditions were evaluated using the Cooper scale based of on ease laryngoscopy, Jaw relaxation, and vocal cords conditions. Intubating conditions : Patients in group I, were intubated using rocuronium 0.6 mg/kg 60 secs, In group II, suxamethonium was used as intubating agent all cases could be intubated in 60 secs (Cooper score excellent in 100% cases).[2]

Similar study was done by Weiss JH, Gratz I et al who did a double-blind comparison of two doses of rocuronium and succinylcholine for rapid-sequence intubation They compared the pharmacodynamics of two commonly recommended doses of rocuronium bromide (0.7 mg/kg and 0.9 mg/kg) and succinylcholine (1.5 mg/kg) Intubation was performed 60 seconds after the administration of muscle relaxant. The ease of intubation was scored using a scale of 1 to 4. Blood pressure and heart rate were measured beginning one minute before induction of anesthesia up to 5 minutes after intubation. Intubation scores were similar in groups 2 and 3 and were noted as good or excellent in all patients. They concluded that rocuronium bromide at a dose of 0.9 mg/kg provides intubating conditions similar to succinylcholine 1.5 mg/kg at 1 minute. [3]

J Perry, J Lee, G Wells et al studied Rocuronium versus succinylcholine for rapid sequence induction intubation To determine if rocuronium creates comparable intubating conditions to succinylcholine during RSI intubation. Comparisons were made with succinylcholine based on the dose of rocuronium, use of a narcotic, emergent versus elective intubation, age group and the induction agent used. The primary outcome was excellent intubation conditions.

Succinylcholine created superior intubation conditions to rocuronium when comparing excellent intubation conditions.

Using the less stringent outcome, clinically acceptable intubation conditions, the two agents were not statistically different. Intubation conditions were not statistically different between succinylcholine and rocuronium when propofol was used.[4,5]

In another such study Rapid sequence induction and intubation with 1 mg/kg rocuronium bromide in cesarean section, comparison with suxamethonium was done by *Sami A. Abu-Halaweh, Islam M. Massad et al.* Their aim was to demonstrate that Rocuronium Bromide can be used for rapid sequence induction in emergency conditions. They studied the efficacy and intubating conditions after administration of Rocuronium Bromide 1 mg/kg at 60 second in group of 60 pregnant women undergoing elective or emergency cesarean section and compared the results with those obtained after giving Suxamethonium 1 mg/kg at 60 seconds in a group of patients similar to the Rocuronium group. Intubating conditions after 1 mg /kg of Rocuronium Bromide were found to be acceptable (good and excellent) in 95% of patients and were similar to the Suxamethonium group (97%). The endotracheal tube could be passed through the vocal cords of all patients enrolled in the study. So they concluded that Rocuronium Bromide 1 mg/kg can be safely used for rapid sequence induction in cesarean section and the intubating conditions are similar to those of Suxamethonium[6].

H. J. Sparr, T. J. Luger, et al did a comparison of intubating conditions after rocuronium and suxamethonium following "rapid-sequence induction" with thiopentone in elective cases. They also compared the intubating conditions after rocuronium and suxamethonium following rapid-sequence induction of anaesthesia. Anaesthesia was induced with thiopentone 6 mg kg<sup>-1</sup> followed randomly by suxamethonium 1 mg kg<sup>-1</sup> or rocuronium 0.6 mg kg<sup>-1</sup> and, 45 s later, intubation was commenced. Muscle fasciculations, intubating conditions and intubation time, haemodynamic variables and oxygenation were assessed. Intubation time did not differ between suxamethonium (9.8±2.2 s) (mean±SD) and rocuronium (10.5±2.9 s), respectively. Intubating conditions were clinically acceptable (good or excellent) in all patients given suxamethonium and in 96% of the patients given rocuronium. However, the condition of the vocal cords was better (P<0.05) and diaphragmatic response to intubation was less pronounced with suxamethonium (P<0.05). Changes in heart rate and arterial blood pressure were similar in both groups. The authors conclude that rocuronium is a suitable alternative to suxamethonium for rapid tracheal intubation even under unsupplemented thiopentone anaesthesia, at least in elective, otherwise healthy patients.[7]

Sørensen MK, Bretlau C et al did a randomized trial on rapid sequence induction and intubation with rocuronium–sugammadex compared with succinylcholine. The aim of the trial was to assess how rapidly spontaneous ventilation could be re-established after RSII. They hypothesized that the time period from tracheal intubation to spontaneous ventilation would be shorter with rocuronium–sugammadex than with succinylcholine. The median time from tracheal intubation to spontaneous ventilation was 406 s with succinylcholine and 216 s with rocuronium–sugammadex (P = 0.002). The median time from tracheal intubation to 90% recovery of the first twitch in train-of-four (T<sub>1</sub> 90%) was 518 s with succinylcholine and 168 s with rocuronium–sugammadex (P < 0.0001). Intubation conditions and time to tracheal intubation were not significantly different.[8]

## CONCLUSION

The newer muscle relaxant ROCURONIUM compare very favorably with the profile of an ideal neuromuscular agent. It has a non depolarizing mechanism of action, rapid onset. Short duration of action, rapid recovery. It is non-cumulative with no cardiovascular side effect, no histamine release. It is reversible by cholinesterase inhibitor. It has high potency, and pharmacologically inactive metabolites. Therefore rocuronium is a suitable alternative to

suxamethonium for intubation in elective, otherwise healthy patients

## REFERENCES

1. Agoston S. Onset time and evaluation of intubating conditions- Rocuronium in perspective." a review. *Eur J Anaesth.* 1995; 12 (11): 31-37
2. Cooper R Mirakhor RK, Clarke RSJ, Boules Z. Comparison of intubating conditions after administration of Org 9426 (Rocuronium) and Succinylcholine. *Br J Anaesth.* 1992; 69: 269-273. 19
3. Weiss JH, Gratz I, Goldberg ME, Afshar M, Insinga F, Larijani G. Double-blind comparison of two doses of rocuronium and succinylcholine for rapid-sequence intubation. *Journal of clinical anesthesia.* 1997 Aug 1; 9(5):379-82.
4. Perry J, Lee J, Wells G. Rocuronium versus succinylcholine for rapid sequence induction intubation. *Cochrane Database Syst Rev.* 2003; 1(1).
5. Perry JJ, Lee JS, Sillberg VA, Wells GA. Rocuronium versus succinylcholine for rapid sequence induction intubation. *Cochrane database syst rev.* 2008 Jan 1; 2
6. Abu-Halaweh SA, Massad IM, Abu-Ali HM, Badran IZ, Barazangi BA, Ramsay MA. Rapid sequence induction and intubation with 1 mg/kg rocuronium bromide in cesarean section, comparison with suxamethonium. *Saudi medical journal.* 2007; 28(9):1393-6.
7. Sparr HJ, Luger TJ, Heidegger T, Putensen-Himmer G. Comparison of intubating conditions after rocuronium and suxamethonium following "rapid-sequence induction" with thiopentone in elective cases. *Acta anaesthesiologica scandinavica.* 1996 Apr 1; 40(4):425-30.
8. Sørensen MK, Bretlau C, Gätke MR, Sørensen AM, Rasmussen LS. Rapid sequence induction and intubation with rocuronium–sugammadex compared with succinylcholine: a randomized trial. *British journal of anaesthesia.* 2012 Feb 6; 108(4):682-9.