



## COMPARISON OF INTUBATING CONDITIONS WITH SUCCNYLCHOLINE AND ROCURONIUM

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### ABSTRACT

**Aims and Objectives-** To compare the Intubating conditions achieved with Succinylcholine and Rocuronium.

**Materials & Methods-** The study was conducted in 50 ASA I & II patients randomly allotted into two groups. Group I patients received succinylcholine 1.5 mg/kg and Intubating conditions were assessed at 60 seconds. Group II patients received Rocuronium 0.9 mg/kg and Intubating conditions were assessed at 60 seconds.

**Results-** All patients could be intubated within 60 seconds of administration of muscle relaxant according to group allocation. Rocuronium 0.9 mg/kg provided clinically acceptable (good to excellent) Intubating conditions in 92% of the cases. Succinylcholine provided good to excellent Intubating conditions in all cases. In Group I 88% of the cases had excellent and 12% of the cases had good Intubating conditions. In group II 40% of the cases had excellent and 52% of the cases had good Intubating conditions whereas 8% of the cases had poor intubation scores.

**Conclusion-** Rocuronium can be used in elective cases with MP I & MP II grade where there are relative contraindications to the use of succinylcholine.

**KEYWORDS :** Succinylcholine, Rocuronium, intubation, Mallampatti grade.

### Introduction

Maintenance of a patent airway by endotracheal intubation is the basic component of anaesthesia. The degree of muscle relaxation and the depth of anaesthesia are the two factors which determine the ease of endotracheal intubation. The ideal neuromuscular blocking agent should have a fast onset, brief duration of action, provide profound relaxation and should have a favorable adverse effect profile. Despite having many undesirable side effects like bradycardia, dysrhythmias, rise in serum potassium level (Ronald D Miller) post operative myalgia, rise in intracranial pressure (Michael D Minton 1986) incidence of prolonged recovery in patients with pseudocholinesterase deficiency and triggering of malignant hyperthermia succinylcholine is still preferred in clinical situations over most non depolarizing neuromuscular blocking agents to produce muscle relaxation prior to endotracheal intubation.

Rocuronium a non depolarizing muscle relaxant is 2 Morpholino, 3 Desacetyl, 16 Allyl Pyrrolidino derivative of vecuronium differing from it at 3 position of the steroid nucleus (Frances F Foldes). It is expected to have an onset time possibly as rapid as of succinylcholine. Unlike succinylcholine, rocuronium has a favorable side effect profile.

### Materials and Methods

This study for the comparison of Intubating conditions with succinylcholine and rocuronium was conducted at Government Medical College Patiala, Punjab. A total of 50 patients of ASA grade I and II of either sex aged between 18-50 and scheduled for elective surgery under general anaesthesia with intubation were randomly selected with informed consent.

Patients with potential airway problems and suspected difficult intubation (other than MP I & MP II anatomy, patients suffering from neuromuscular diseases or medications known to interact with neuromuscular blocking agents received in the past 24 hours were excluded. Pregnant females, cachexic or debilitated patients, obese, those with known hypersensitivity to neuromuscular blocking agents or patients with pulmonary hypertension and valvular heart disease were excluded. Patients were divided into two groups of 25 each with random allocation.

Group I patients received IV succinylcholine 1.5 mg/kg and Intubating conditions were assessed at 60 seconds. Group II patients received IV Rocuronium and Intubating conditions were assessed at 60 seconds. The Intubating conditions were assessed using Cooper et al. scoring system. The intubations were performed by an experienced anaesthetist who was blinded to the group allocation and drugs administered.

Score	Jaw Relaxation	Vocal Cord	Response to Intubation
0	Poor	Closed	Severe Coughing/Bucking
1	Nominal	Closing	Mild Cough
2	Moderate	Moving	Slight Diaphragmatic Movement
3	Good	Open	None

0-2 Bad  
3-5 Poor  
6-7 Good  
8-9 Excellent

Hemodynamic parameters including pulse rate, systolic BP, diastolic BP and mean arterial blood pressure were noted at 1, 3, 5 and 10 minutes of laryngoscopy.

### Observations-

**Table 1: Distribution of cases according to age**

Age In Years	Group I	Group II
< 21	3	2
21-30	7	4
31- 40	6	8
41-50	9	11
Total	25	25
Mean & SD	35.44 ± 11.94	37.20 ± 10.79

t value- 0.54  
p value > 0.05  
Not significant

**Table 2: Distribution Of Cases According To Gender**

Sex	Group I	Group II
Male	11 (44%)	7 (28%)
Female	14 (56%)	18 (72%)
Total	25	25

The majority of patients in both groups were females; being 56% in group I and 72% in group II. The groups were statically comparable.

**Table 3: Distribution of Cases According To Weight in All Age Groups**

Weight in kg	Group I	Group II
41-50	2	5
51-60	20	17
61-70	23	3
Total	25	25
Range	50-62	50-68
Mean & Std. deviation	56.80 ± 3.56	58.20 ± 6.61

t value 0.93  
 p value > 0.05  
 Not significant

**Table 4: Comparison of Intubating Conditions In Both Groups**

Intubating Conditions	Group I (Sch 60)	Group II (R 60)
Excellent	22 (88%)	10 (40%)
Good	3 (12%)	13 (52%)
Poor	-	2 (8%)

**Table 5: Showing Pulse Rate at Different Time Intervals of Group I**

S.No.	Time Interval	Range (per minute)	Mean±SD	't' value	'p' value	Sig.
1	Base Line	60-104	79.44±10.46	-	-	-
2	On Admission	64-102	78.08±8.86	0.49	>0.05	NS
3	1 Minute	74-130	93.84±14.14	4.09	<0.01	HS
4	3 Minutes	72-130	91.52±12.89	3.63	<0.01	HS
5	5 Minutes	66-110	84.64±10.81	1.72	<0.05	S
6	10 Minutes	66-120	79.44±11.44	0	1	NS

**Table 6: Showing Pulse Rate at Different Time Intervals of Group II**

S.No.	Time Interval	Range (per minute)	Mean±SD	't' value	'p' value	Sig.
1	Base Line	69-78	80.56±7.99	-	-	-
2	On Admission	70-88	79.60±4.69	0.51	>0.05	NS
3	1 Minute	78-110	100.96±11.05	7.48	<0.01	HS
4	3 Minutes	80-112	97.28±8.94	6.97	<0.01	HS
5	5 Minutes	74-102	90.56±7.61	4.53	<0.05	HS
6	10 Minutes	68-90	80.64±6.42	0.03	>0.05	NS

There was a statistically significant increase in pulse rate in both groups at the time of laryngoscopy and intubation. Maximum increase in pulse rate occurred at 1 minute after intubation in both groups. The rise in pulse rate from baseline became statistically insignificant at 10 minutes after laryngoscopy and intubation.

**Table 7: Showing Systolic Blood Pressure At Different Time Intervals Of Group I**

S.No.	Time Interval	Range (per minute)	Mean±SD	't' value	'p' value	Sig.
1	Base Line	100-160	124.24±18.09	-	-	-
2	On Admission	110-160	127.20±15.57	0.62	>0.05	NS
3	1 Minute	126-170	143.68±12.96	4.36	<0.01	HS
4	3 Minutes	120-166	140.80±12.61	3.75	<0.01	HS
5	5 Minutes	110-166	134.24±15.97	2.07	<0.05	S
6	10 Minutes	80-160	120±18.86	0.81	>0.05	NS

**Table 8: Showing Systolic Blood Pressure At Different Time Intervals Of Group II**

S.No.	Time Interval	Range (per minute)	Mean±SD	't' value	'p' value	Sig.
1	Base Line	110-156	125.76±13.70	-	-	-
2	On Admission	100-150	124.48±14.31	0.32	>0.05	NS
3	1 Minute	130-170	153.28±10.20	8.05	<0.01	HS
4	3 Minutes	120-170	146.64±11.79	5.77	<0.01	HS
5	5 Minutes	120-170	137.20±13.39	2.98	<0.05	S
6	10 Minutes	100-160	126.24±15.42	0.11	>0.05	NS

**Table 9: Showing Diastolic Blood Pressure At Different Time Intervals Of Group I**

S.No.	Time Interval	Range (per minute)	Mean±SD	't' value	'p' value	Sig.
1	Base Line	60-100	79.52±10.60	-	-	-
2	On Admission	70-100	80.80±10.38	0.43	>0.05	NS
3	1 Minute	80-100	94.32±5.99	6.07	<0.01	HS
4	3 Minutes	80-100	91.60±5.80	4.99	<0.01	HS

5	5 Minutes	70-100	86.08±7.97	2.47	<0.05	S
6	10 Minutes	64-90	77.68±7.87	0.69	>0.05	NS

**Table 10: Showing Diastolic Blood Pressure At Different Time Intervals Of Group II**

S.No.	Time Interval	Range (per minute)	Mean±SD	't' value	'p' value	Sig.
1	Base Line	70-96	78.64±7.93	-	-	-
2	On Admission	70-90	77.92±7.06	0.33	>0.05	NS
3	1 Minute	76-110	95.68±9.46	6.9	<0.01	HS
4	3 Minutes	76-100	92.56±8.30	6.06	<0.01	HS
5	5 Minutes	70-102	85.84±8.48	3.09	<0.01	HS
6	10 Minutes	70-96	78.96±7.68	0.14	>0.05	NS

There was a statistically significant increase in blood pressure (SBP & DBP) which was maximum at 1 minute after laryngoscopy and intubation and became statistically insignificant at 10 minutes after laryngoscopy and intubation.

**Discussion**

The aim of the study was to compare the Intubating conditions achieved with succinylcholine and rocuronium in adult elective surgical cases.

Succinylcholine, a depolarizing muscle relaxant, is the most common agent used in both controlled and emergent settings (Weiss 1997). Succinylcholine is the current favorite muscle relaxant because of its rapid onset of 40-60 seconds and a short duration lasting only 6-10 minutes (Coombs 1994). Succinylcholine is contraindicated in patients with major burns (beyond 48 hours), major crush injuries (beyond 48 hours), severe abdominal sepsis, denervation syndromes and major nerve and spinal cord injuries due to the risk of Hyperkalemia as a result of its depolarizing action, possibly leading to fatal cardiac arrhythmias (Coombs 1994, Sullivan 1994). It is also contraindicated in patients with malignant hyperthermia or previous allergic reaction to succinylcholine (Lebowitz 1989). The alternatives to succinylcholine may include Pancuronium, Vecuronium and Atracurium but they fail to achieve acceptable Intubating conditions as rapidly as succinylcholine (Mazurek 1998).

Rocuronium is a steroid based non depolarizing muscle relaxant which can achieve acceptable Intubating conditions similar to succinylcholine. The duration of action may be between 37 to 72 minutes with standard doses (Magorian 1993). Although care must be taken in case of patients who have myasthenia gravis or myasthenic syndrome, hepatic disease, neuromuscular disease, carcinomatosis or severe cachexia as the duration of action may be prolonged in such patients.

All patients could be intubated within 60 seconds of administration of muscle relaxant according to group allocation. Rocuronium 0.9mg/kg at 60 seconds provided clinically acceptable (good or excellent) Intubating conditions in 92% of the cases. Forty percent of the cases had excellent and 52% of the cases had good Intubating conditions. In 8% of the cases Intubating conditions were poor.

Succinylcholine provided acceptable (good or excellent) Intubating conditions in all the cases. Eighty eight percent of the cases had excellent and 12% of the cases had good Intubating conditions.

Cooper et al. (1992) compared the Intubating conditions after the administration of ORG-9426 (Rocuronium) and succinylcholine in 80 adult patients aged 18-65 years, ASA grade I & II, found Intubating conditions after ORG-9426 (0.6mg/kg) to be clinically acceptable (good or excellent) in 95 % of the patients at 60 seconds.

In 1993 Toni Mogorian et al. also compared Rocuronium with succinylcholine and Vecuronium for rapid sequence induction of anaesthesia. He concluded that there is a dose dependant decrease in the onset time with rocuronium. The onset time for the two larger doses (0.9mg/kg & 1.2 mg/kg) of rocuronium was similar to that of succinylcholine but the clinical duration of action with rocuronium

was significantly longer. So the administration of 0.9mg/kg to 1.2 mg/kg doses of rocuronium may be an acceptable alternative to succinylcholine for rapid sequence induction of anaesthesia.

Michael Dubois et al. (1994) compared rocuronium with succinylcholine for endotracheal intubation. Good to excellent Intubating conditions were achieved in both groups. They therefore concluded that rapid Intubating conditions could be obtained after both succinylcholine and rocuronium. So rocuronium can be used in conditions where succinylcholine is contraindicated or in healthy patients with no apparent difficulty in airway when procedures are expected to last more than 15 minutes.

Sparr et al. (1996) compared the Intubating conditions after rocuronium 0.6mg/kg with succinylcholine 1mg/kg following induction of anaesthesia with thiopentone 6mg/kg in 50 unpremedicated patients of ASA physical status I & II. Intubating conditions were clinically acceptable (good or excellent) in all patients given succinylcholine and in 96% of the patient given rocuronium. However the condition of the vocal cord was better and diaphragmatic response to intubation was less pronounced with succinylcholine.

### Conclusion

So rocuronium may be used as an alternative to succinylcholine in conditions where succinylcholine is contraindicated or there is a high risk of adverse events due to the unfavorable side effect profile of succinylcholine.

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