



Original Article

Double-Blind Randomized Study of Rocuronium Bromide 0.9 mg/kg and Succinylcholine Chloride 1.0 mg/kg Body Weight in Rapid Sequence Induction

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Abstract

The prospective randomized comparative study was done to compare succinyl choline and rocuronium bromide during rapid sequence induction, following various Surgeries under General Anaesthesia, study is randomized case control clinical trial with double blind method carried out in Ramkrishna CARE hospital Raipur (CG) India

Keywords: *Succinyl choline, Rocuronium, Rapid Sequence Induction, General Anaesthesia.*

Introduction

The presentation of neuromuscular blocking drugs upset the act of anesthesia. Prior to the appearance of muscle relaxants, anesthesia was instigated and kept up by intravenous or inward breath specialists. Tracheal intubation was phenomenal, and muscle unwinding if necessary was anchored by profound inward breath anesthesia with its chaperon dangers of respiratory or heart sadness. After the presentation of muscle relaxants, anesthesia experienced a reasonable change. Anesthesia was re-imagined as a group of three of narcosis, absence of pain and muscle unwinding, explicit medications being utilized to deliver every one of these impacts.

Muscle relaxants are comprehensively partitioned into two gatherings, the depolarizers and the nondepolarizers. Depolarizers impersonate the impact of acetylcholine at the neuromuscular intersection, first causing muscle withdrawals (fasciculation) and afterward incapacitating. Suxamethonium, the main depolarizer being used, has the benefit of acting inside 60 seconds. Muscle unwinding goes on for less than 5 minutes. It isn't switched by anticholinesterases, for example, Neostigmine yet plasma cholinesterase makes the impact wear off rapidly. Undesirable impacts incorporate harmful hyperpyrexia, expanded intraocular weight and hazardous hyperkalaemia. A few passings owing

to hyperkalaemic heart failure have happened following the utilization of Suxamethonium in youngsters with undiscovered strong dystrophies. There is a clinical requirement for a more secure medication that works similarly rapidly. Nondepolarizers have slower beginning (2-3 minutes) and are along these lines unsatisfactory for fast control of the aviation route. They work by focused bar of the neuromuscular intersection and are switched with anticholinesterases, for example, Neostigmine. There is no underlying muscle fasciculation.

With the presentation of endotracheal anesthesia amid World War I and adjusted anesthesia in 1926, a look started for a medication which could cause jaw unwinding to encourage endotracheal intubation. The majority of the intubations were finished with inhalational system which was related with issues like laryngospasm, bronchospasm. Further there was a need to take the patient adequately profound before intubation which prompts hemodynamic unsettling influences.

The primary skeletal muscle relaxant d-tubocurarine which was Non-depolarizing in nature was acquainted in 1942 with satisfy the requirement for Jaw unwinding. In spite of the fact that this medication gave amazing muscle unwinding, it had extra ganglion blocking properties causing tachycardia, hypotension even in clinical dosages. Further it had a deferred beginning, making it unacceptable for use amid fast grouping intubation in crisis cases. Subsequently a look started for a relaxant which had a quick beginning and brief span of activity.

In 1951, Burns and Paton credited the neuromuscular blocking impacts of decamethonium to depolarization of the engine endplate^[1]. It was understood that cumbersome particles, the pachycurares, caused nondepolarizing square and leptocurares, the thin atoms, caused depolarizing square. Three autonomous gatherings, from Italy, England and the United States, dealt with less complex

quaternary salts. Suxamethonium, two atoms of acetylcholine organized consecutive, was the outcome. Bovet, who had moved to Italy, distributed his work on Suxamethonium in 1949. For his commitment to pharmacology, he was granted the Nobel Prize for Medicine in 1957. Before the finish of the 1950s, d-tubocurarine and Gallamine (the two nondepolarizers) and Suxamethonium (the depolarizer) were accessible. Succinylcholine Chloride, presented in 1951, was an engineered depolarizing muscle relaxant. It satisfied both of the above prerequisites, and before long turned into the medication of decision for endotracheal intubation particularly in quick grouping intubation in crisis cases.

Be that as it may, all did not go well for Succinylcholine Chloride when its unfriendly impacts began surfacing particularly hyperkalemia, ascend in intragastric, intraocular, intracranial weights and cardiovascular impacts. Hence the mission started for a more secure substitute for Succinylcholine Chloride.

The point of research on neuromuscular medications was to have non depolarizing muscle relaxant, which resembles Succinylcholine Chloride without its reactions. Despite the fact that numerous NDMR drugs like Atracurium besylate, Vecuronium bromide and Mivacurium chloride were presented, none of them could test Succinylcholine Chloride regarding its beginning.

The following real development in the advancement of neuromuscular blockers originated from crafted by Bowman, who in 1988 set up that with the aminosteroidals the speed of beginning is identified with the power, with less strong medications having a quicker beginning of activity^[2]. Rocuronium is a desacetoxy simple of Vecuronium. With Vecuronium as the system, substitutions on the single quaternary gathering created a considerably less powerful however quicker acting particle. Rocuronium, in suitable portions, has a speed of beginning just barely slower than that of Suxamethonium. It has a halfway length of activity and relies upon the

kidney and liver for end. Rapacuronium ,a later developed simple of Vecuronium with a rate of beginning that approaches that of Suxamethonium [3]. After its presentation into clinical practice a few occurrences of serious bronchospasm were accounted for and the medication has now been pulled back.

The new NDMR Rocuronium Bromide presented in 1994 turned into the main rival for Succinylcholine Chloride. Rocuronium Bromide when given in a few times the ED95 portion is said to deliver superb to great intubating conditions in 60 seconds. Further Rocuronium Bromide is said to be without the antagonistic impacts that are seen with Succinylcholine Chloride.

Subsequently, the present investigation was embraced to assess the intubating conditions with Rocuronium Bromide 0.9 mg/kg body weight and to contrast the intubating conditions and that of Succinylcholine Chloride 1 mg/kg body weight, for use amid fast arrangement intubation of anesthesia in grown-up patients.

Methodology

Study territory Ramkrishna care Hospital, pachpedi naaka, Raipur with study populace of grown-up patients (male/female) (urban/provincial) posted for different elective medical procedures in a similar establishment.

It was randomized relative clinical preliminary with double blinding; Sample size estimation: current examination dependent on contrast in mean and standard deviation we got it from before comparative standard reference (8) What's more, it is determined that distinction of 60 s so as to unconstrained ventilation was considered clinically noteworthy. In view of SD, it was determined that in each gathering we will take 30 patients for our examination with accuracy of 10 % than no one but we can dismiss invalid speculation (subsequent to considering 10 % drop out)

The examination populace was randomly isolated into two gatherings with 30 patients in each gathering so add up to 60 patients enlisted.

Group I comprised of 30 patients to get Succinylcholine Chloride 1 mg/kg body weight and intubation endeavored at 60 seconds.

Group II comprised of 30 patients to get Rocuronium Bromide 0.9 mg/kg body weight and intubation endeavored at 60 seconds.

An intensive preanaesthetic assessment was completed multi day before medical procedure and all the vital examinations were done to preclude any fundamental malady. Tab Alprazolam 0.5 mg and tab Pantoprazole 40 mg were managed to all patients on the prior night medical procedure. Patients were kept up nil per oral for term of 6 hours before surgery. patient were moved to the operation theatre, an intravenous line was anchored with a proper estimated intravenous cannula and the patient were associated with multichannel screen comprising of heartbeat oximeter, electrocardiogram, pulse, blood pressure, and capnography. The pulse, oxygen saturation and electrocardiogram, systolic, diastolic, mean blood pressure was recorded. Inj.ondensatron 4 mg, inj Glycopyrrolate 0.004 mg/kg, inj.fentanyl 100 mcg/kg were given to all patients 3 minutes preceding induction. All patients were preoxygenated with 100% oxygen through a face mask for 5 minutes,. They were initiated with injection propofol 2 mg/kg body weight intravenously.

In group I, Succinylcholine Chloride 1 mg/kg body weight was given intravenously.

Thus in group II and Rocuronium Bromide 0.9 mg/kg was given intravenously.

In both the groups of patients, oral endotracheal intubation was endeavored at 60 seconds following the organization of muscle relaxant and intubating conditions were evaluated utilizing the score received by Magorian T^[4].

Excellent = Jaw relaxed, vocal cords apart and immobile, no diaphragmatic movements.

Good= Jaw relaxed, vocal cords apart and immobile, some diaphragmatic movements.

Poor= Jaw relaxed, vocal cords moving and bucking.

Inadequate= Jaw not relaxed, vocal cords closed.

Incorporation criteria of study were ASA grade I and II patients, Patients posted for different elective medical procedures under general anesthesia, Patients in the age gathering of 18-60 years, Patients with aggregate body weight between scopes of 50-90 kilograms, Patient excluded in avoidance criteria.

Patient excluded from study are patients having Diabetes mellitus, Hypertension, Ischemic coronary illness, Bronchial asthma, other supreme contraindications of succinylcholine (personal or familial history of malignant hyperthermia,)

History of dangerous hyperthermia, burn > 24 hours and in any event till year and a half of burn, raised intraocular pressure, Hyperkalemia)

Maintainance of anaesthesia was done with 50% oxygen and 50% nitrous oxide and isoflurane, on close circuit with ananesthesia workstation. Information summarization-was determined in the terms of MEAN VALUE i.e. SBP/HR.

Subsequently, the muscle relaxation was maintained with Atracurium 0.1 mg/kg body weight till the end of surgery. At the end of surgery all the patients were reversed with injection Neostigmine 0.05 mg/kg body weight and injection Glycopyrrolate 0.008 mg/kg body weight,. Proportions OF SIGNIFICANCE-P esteem from Z table and take p esteem <0.05 was considered for importance. Measurable TEST-Appropriate factual test were utilized to analyze mean estimation of SBP/HR by utilizing STATISTICAL SOFTWARE-SPSS 16.0. Correlation among the two gatherings for SBP/HR. Chi square test will be utilized to break down subjective information in all our tables.

Observation

Table-1 Age, weight & gender wise distribution of all patients both of groups.

Variables	Group I Succinylcholine Chloride 1 mg/kg(n = 30)	Group II Rocuronium Bromide 0.9 mg/kg (n = 30)
Mean age (years) ± SD	46.2±10.44	48±5.5
Mean weight (kg) ± SD	68.4±5.99	68.7±4.76
Male:Female ratio	1.5:1	1.14:1
Male: Female%	60:40	53.33:46.67

Table-2 Intubation Score of two group

Intubating conditions	Group I Succinylcholine Chloride 1 mg/kg (n = 30)	Group II Rocuronium Bromide 0.9 mg/kg (n = 30)	P value (Chi sq test)
a. Excellent	28(93.33)	27(90)	0.0001 HS
b. Good	2(6.67)	3(10)	
c. Poor	00	00	
d.Inadequate	00	00	

Table-3 Compare the duration of action among the Succinylcholine & Rocuronium Group

Clinical duration of action	Group I Succinylcholine Chloride 1 mg/kg (n = 30)	Group II Rocuronium Bromide 0.9 mg/kg (n = 30)	P value (Chi- square)
(min) ± SD	4.87±0.94	46.43±1.22	0.00001 HS

Table-4 Compression of Mean Heart rate (beats/min) at regular time interval in the groups

Mean heart rate ± SD (beats/min)	Group I Succinylcholine Chloride 1 mg/kg (n = 30)	Group II Rocuronium Bromide 0.9 mg/kg (n = 30)	P value (Chi- square)
Base line (pre induction)	76.07±5.52	73.3±7.53	0.23 NS
1 min after intubation	96.27±11.43	95±8.66	0.78 HS
3 min after intubation	86.8±8.1	84.6±7.79	0.45 HS
5 min after intubation	78.63±6.97	77.07±7.051	0.61NS

Table-5: Compression of Mean Arterial pressure among Group I & Group II at regular time interval

Mean BP± SD (mm Hg) ± SD	Group I Succinylcholine Chloride 1 mg/kg (n = 30)	Group II Rocuronium Bromide 0.9 mg kg (n = 30)	P value (Chi- square)
Base line (pre induction)	70.87±5.34	71.03±5.73	0.17 NS
1 min after intubation	86.47±13.69	82.77±9.58	0.30NS
3 min after intubation	79.43±9.42	78.17±7.31	0.33 NS
5 min after intubation	73.33±6.2	73.5±5.49	0.18 HS

Results

In the present research add up to 60 participants members has been selected and mean age for group I 46.2 ± 10.44 years and group II 48 ± 5.5 separately. According to their gender orientation proportion savvy disseminations in both of the gatherings were 1.5:1 and 1.14:1 respectively. (Table-1)

Intubation Score of two groups' it was discovered that Intubating conditions in group 1 were :28-excellent,2-great, Intubating conditions in group II were: 27 excellent,03 – great, The p esteem was 0.0001 for intubating conditions in this way dispersion of tests as indicated by intubating condition in 2 bunches was factually profoundly noteworthy. (Table-2) when Compare the span of activity among the Succinylcholine and Rocuronium Group it was for gathering 1 was 4.87 ± 0.94 mins, 46.43 ± 1.22 for gathering 2. The thing that matters was observed to be exceptionally measurably noteworthy (p value=0.00001). (Table-3)

In continuation the Mean Heart rate (Beats/min) at various time interim in both of the groups; The p esteem for change in mean pulse amid pre acceptance period,1 minute after intubation,3 minutes after intubation, 5 minutes after intubation are >0.05 . So it was profoundly immaterial. (Table-4)

Group - I & Group - II was looked at for mean Blood Pressure at various time interim the p esteems for change in mean blood vessel pulse amid pre-enlistment stage (benchmark), 1 minute after intubation, 3 minutes after intubation and 5 minutes after intubation are >0.05 , which is factually irrelevant. (Table-5)

Discussion

Endotracheal intubation offers safe conduct of general anaesthesia. Though other methods of securing the airway are available today; nothing can match the safety of endotracheal tube in firmly securing the airway. Prior to the introduction of muscle relaxants, inhalational

agents were used for endotracheal intubation. Inhalational technique was associated with its own complications when intubation was attempted with inadequate depth. the complications noted were laryngospasm and bronchospasm. Further to achieve adequate intubating conditions, higher concentrations of these inhalational agents needed to be used which were associated with hemodynamic disturbances. To add up to these, specific inhalational agents were associated with their own adverse effects on organ systems such as sensitization of myocardium to catecholamines by halothane and hepatotoxicity of chloroform.

With the introduction of concept of 'balanced anaesthesia' by John S. Lundy in 1926, which was later modified by Rees and Gray, the search went on for a relaxant to complete the idea of narcosis, reflex suppression and relaxation. This came true in 1942 when d-tubocurarine was introduced into clinical anaesthesia. Though d-tubocurarine produced an excellent jaw relaxation to facilitate endotracheal intubation, it had its own drawbacks. The onset of action was slow, taking up to 3 minutes to produce good intubating conditions. This made the drug unsuitable for use in emergency cases and full stomach cases where rapid airway procurement is the goal. Succinylcholine Chloride introduced in 1951 was unparalleled in terms of its onset and duration of action. The type of relaxation obtained with this drug was so good that even today it is used as a gold standard and other drugs are compared with it. But with time, adverse effects of Succinylcholine Chloride like bradycardia, nodal and junctional rhythms, rise in intraocular, intracranial pressure started surfacing; quest began for better relaxants devoid of these adverse effects. Many drugs like Vecuronium, Atracurium and Mivacurium were introduced into clinical practice, but none could challenge Succinylcholine Chloride in terms of onset time. Further they were associated with side effects like Histamine releasing property of Mivacurium.

Rocuronium Bromide introduced in 1994 became the first drug to challenge the onset time of Succinylcholine Chloride, in that it produces good to excellent intubating conditions in 60 seconds. In addition to this Rocuronium Bromide is devoid of adverse effects of Succinylcholine Chloride. In view of this, the present study was undertaken to compare the intubating conditions of Rocuronium Bromide with that of Succinylcholine Chloride at 60 seconds.

Various authors have employed Succinylcholine Chloride 1 mg/kg body weight and compared its intubating conditions with Rocuronium Bromide 0.9 mg/kg body weight. The intubating conditions were judged by clinical criteria and scaled accordingly by various authors. The intubating conditions with Succinylcholine Chloride 1 mg/kg at 60 seconds by various authors with present study. It was noted that with Succinylcholine Chloride 1 mg/kg body weight *Cooper R. (1993) and Naguib M.* have obtained excellent intubating conditions in 95% and 90% of cases respectively. *McCourt KC, Salmella L, Mirakhur RK et al. in 1998* ^[5] have noted poor intubating conditions in 3% of the cases. In the present study, also Succinylcholine Chloride 1 mg/kg body weight produced excellent intubating conditions in 93% of cases, which is comparable with that of *Cooper R (1993) and Naguib M (1997)*.^[6]

Thus it was noted that the incidence of excellent intubating conditions with Rocuronium Bromide 0.9 mg/kg body weight ranged from 80% in the study of *Magorian T(1993)* to 100% in *Naguib M (1997)*.

In the present study 86.6% of patients had excellent intubating conditions with Rocuronium Bromide 0.9 mg/kg which concurs with the study of *Magorian T.(1993)* and *Naguib M (1997)*.

The present study involved comparison of Succinylcholine 1 mg/kg body weight with Rocuronium Bromide 0.9 mg/kg body weight for rapid sequence induction in adult patients. It was noted that Succinylcholine Chloride 1 mg/kg produced excellent intubating conditions in 93.3%

of the patients, well to excellent intubating conditions 6.7% of the patients.

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