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EFFECT OF ROCURONIUM ON MEASURED EXPIRATORY TIDAL VOLUME BEFORE AND AFTER CHECKING MASK VENTILATION IN PATIENTS WITH NORMAL AIRWAYS; A RANDOMIZED DOUBLE BLIND INTERVENTIONAL STUDY

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Abstract:

Background: Facemask ventilation is one of the fundamental skills required during induction of anaesthesia. Especially in cases of difficult tracheal intubation, it is an important alternative to ensure adequate oxygenation until the patient's airway can be secured.

Objective: To determine the difference in the average of mask V_TS (measured expiratory tidal volumes) at 10, 20, 30, 40, 50, 60 seconds after the onset of apnoea in both groups.

Methods: 72 patients of age 18-50 years of either sex, ASA grade I and II and Body mass index <35kg/m2 scheduled for elective lower abdominal surgeries under general anaesthesia. Patients were randomly divided into two groups. After 5 min of premedication with inj. Glycopyrrolate 0.004 mg/kg, midazolam 0.02 mg/kg; fentanyl 1 µg./kg, propofol 2mg/kg iv and study drug was given according to study protocol.

Results: There were no statistically significant ($P > 0.05$) differences in the demographic parameters such as age, sex, ASA Grade and Mallampatti class among the study groups. There was no significant difference in haemodynamic variants at differenttime intervals between the groups. There was no significant difference in Laryngoscopic time, Attempt of intubation, Cormack-Lehane Grading, Ease of laryngoscopy and Minute volume (L/min) between the groups. The difference inexpiratorytidal volume (mL/breath) at 10 sec, 20 sec, 30 sec, 40 sec, 50 sec and 60 sec between both groups was significant ($P = 0.012$). Minor complications were comparable in both groups which were managed easily.

Conclusion: Expiratory tidal volume and ease of intubation was greater during mask ventilation in the early rocuronium group than in the late rocuronium group.

Keywords: ASA Grade and Mallampatti class, Expiratory tidal volume, Minute volume, Mask Ventilation

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INTRODUCTION

Mask ventilation is the period between induction and intubation, has traditionallybeen used to confirm the ability to ventilate the patient while awaiting the onset of adequate neuromuscular blockade. By utilizing rapid and deep neuromuscular blockade to bypass mask ventilation, anesthesia providers can avoid an airway manoeuvre that is associated with risk of perioperative aspiration events, while also minimizing the risk of other airway emergencies after induction.

There are three approaches to check the face mask ventilation .Firstly induction of anaesthesia followed byfacemask ventilation, which if difficult or impossible leads to wake-up and return of spontaneous respiration. The latter part of this approach does not appear to be used and does not appear to work. Secondly a hybrid approach in which facemask ventilation is checked after induction of anaesthesia and if this is easy, along-acting NBD is administered but if ventilation is difficult, a short-acting NBD is administered. This appears to be logical, but is dependent on the return of spontaneous respiration before serious hypoxaemia occurs. It is not inconceivable that a patient with extremely difficult or impossible facemask ventilation, who has been given a short-acting NBD, becomes seriously hypoxic before spontaneous respiration has resumed.

Rocuronium, an amino steroid non-depolarising muscle relaxant structurally related to vecuronium, has emerged as a frontrunnerasith as the fastest onset of action of all the nondepolarizing NMB agents, close to that of succinylcholine. At a dose of 0.6mg/kg, its onset is 60-90 seconds. It is also available as a solution, unlike the other nondepolarizing agents, so drug preparation is reduced. The search for the so-called ideal muscle relaxant in the last years was focused on a non-depolarising compound that could replace succinylcholine for rapid intubation[1]

Therefore, well established combinations such as rocuronium-sugam madex are popular in clinical practice to offer quick paralysis for intubation and to optimize surgical conditions, while providing a fast neuromuscular recovery at the end of surgery.

Because of this, mask ventilation may now be viewed as completely optional for the majority of patients with reassuring airway exams. Since higher doses of rocuronium provide rapid and deep paralysis that could allow anaesthesiologists to quickly transition to a secure airway during induction, avoid the harmful effects of deep anaesthesia during maintenance, improve surgical operating conditions, and decrease postoperative pain, anaesthesia providers should now consider lowering their threshold for avoiding mask ventilation.

We thus designed this randomized, double-blinded trial to compare the early and late administration of rocuronium before and after checking mask ventilation undersimilar anaesthetic depth to find out whether early administration of rocuronium improves the efficiency of mask ventilation and shortens the time to tracheal intubation compared to late administration.

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MATERIAL AND METHODS

This Hospital based randomized, interventional study was conducted among patients undergoing surgery under general anaesthesia in the Department of Anaesthesiology at S.M.S. Medical College, Jaipur. Due permission from institutional ethics committee and research review board were obtained.After approval of the plan from the research reviewboard, untilthedesirednumberof cases were complete.

Sampling Technique:

Simple random technique through the sealed envelope method.

Sample Size:

Sample size was calculated to be 36 subjects for each of the 2 groups at 95% confidence and Power 80% assuming minimal detectable difference of 159 +/-165mL in mean average tidal volume in both before and after induction in both the study groups (based on a previous study[1]) So for the study purpose 36 cases were taken in each group.

Study Groups:

The studywas conducted in the followingtwo groups of patients. Each group consists of 36 patients (n =36/group).

(Group A): Patients had received 0.6mg/kgInj. rocuronium madeupto5ml by adding normal saline before checking mask ventilation (n=36) followed by 5ml normal saline after checking mask ventilation

(Group B): Patients had received 5ml normal saline before checking mask ventilation followed by 0.6 mg /kg Inj. rocuronium made up to 5ml by adding normal saline after checking mask ventilation.(n=36)

INCLUSION CRITERIA:-

- ASA grade I-III
- Age group 18-50years
- Patients of either sex
- Body mass index <35kg/m2
- Undergoing lower abdominal surgeries

EXCLUSION CRITERIA:-

- Patients not willing to participate in the study
- Cases with the risk of pulmonary aspiration

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- ❖ Patient allergic to drugs used for the study
- ❖ Neuromuscular disorders
- ❖ Predictors of difficult airways like BMI >35kg/m2,mass or radiation changes in the neck, limitations in mouth opening, neck extension, jaw

Informed written consent was obtained after explaining the detailed study protocol and the procedure.

PROCEDURE

Patients were randomised into 2 groups to receive IV rocuronium either before (early rocuronium group) or after (late rocuronium group) checking mask ventilation. An assistant unrelated to the study randomly assigned the groups in a 1:1 ratio and concealed allocation sequence in sealed opaque envelopes. All investigators and patients were blinded to the group assignment.

An anaesthesiologist not involved in the study prepared rocuronium 0.6 mg/kg and the same volume of normal saline in identical syringes. The syringe containing rocuronium was labelled as" the first drug" and the syringe with salinewas labelled as "second drug" in the early rocuronium group and vice versa in the late rocuronium group. The anaesthesia work station with pressure gauge and spirometer was checked and calibrated beforehand.

The patient was taken to the OT after confirming fasting status. The patient was monitored with pulseoximetry, non-invasive blood pressure, electrocardiography, and Bispectral index. Neuromuscular monitoring was done by using TOF watch Baseline HR, SBP, DBP, MAP, SpO2, ECG was recorded. A good IV line was secured with 18G cannula.

The patients were preoxygenated with 100% oxygen using a transparent facemask at the rate of 10L/min for 3 minutes. Inj. Ringer‟s solution was administered at 20ml/min. The patient was given inj. fentanyl 1mcg/kg, propofol 2mg/kg and the first drugwas injected sequentially.

When the patient stopped responding to verbal commands and eyelash reflex, their nose and mouth were sealed using a facemask. A good seal was made to prevent any leak. The anaesthetic machinewas set to deliver pressure-controlled ventilation withpeak inspiratory pressure of 15cm H2O, a positive end-expiratory pressure of 5cm H2O, a respiratory rate of 12 breaths/minute and an inspiratory -expiratory ratio of 1:2.Sevoflurane was supplied at 4-6% with 100% oxygen at a rate of 6 litres/min. End-tidal carbon dioxide was measured with a side stream.

At a TOF count of 0 the patient was intubated by performing direct laryngoscopy using the appropriate sized Macintosh blade. Tracheal intubation was verified bychest movements and a square wave Capnogram. The tracheal cuff was inflated.

If mask ventilation or tracheal intubation was not possible, the patients were managed according to the guidelines for unanticipated difficult airway.

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OUTCOME VARIABLES

1. Mean V_TS(measured expiratory tidal volume)[mL/breath]
2. Minute volume (L/min)
3. Grade of mask ventilation (easy/moderate)
4. Laryngoscopic time(s)
5. Time from apnoea to intubation(s)
6. Cormack–Lehane grade(1/2)
7. Intubation conditions(excellent/good)
8. Ease of laryngoscopy(excellent/good)
9. Movement and position of vocal cords (excellent or good)
10. Limb movement (excellent/good)
11. Coughing(excellent/good)
12. Heart rate and mean arterial pressure before and after intubation

STATISTICAL ANALYSIS

Statistical Analysis was performed with the SPSS, version 21 for windows statistical software packages (SPSS Inc, Chicago, IL, USA). The categorical data was presented as numbers (percent) and were compared among groups using chi-square test. The quantitative data was presented as Mean and standard deviation and were comparedby students t-test. Probability was considered to be significant if less than 0.05.

RESULTS

Group A had 22 patients between the age of 19-35yrs (61.1%) and 14 patients between 36-58 yrs (38.89) Mean ±SD=33.42±9.64

Group B had 24 patients between19-35yrs (66.67) and 12 patients between 36-58 yrs (33.33) Mean ±SD =34.22±6.74

There was no statistically significant differences among these two groups. (p=0.806)
Group A had 17 (47.22%) male patients and 19(52.78%) female patients Group B had 20(55.56%) male patients and 16(44.44%) female patients
There was no statistically significant differences among the two groups (p=0.637)

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TABLE 1: AS A GRADE WISE DISTRIBUTION

	Group A		Group B	
	No.	**%**	**No.**	**%**
Grade1	28	77.78	21	58.33
Grade2	8	22.22	15	41.67
Total	36	100.00	36	100.00
Result (P value)	0.129 (NS)			

Group A had 28 patients of ASA Grade I (77.78%) and 8 patients of ASA Grade II (22.22%)

Group B had 21 patients of ASA Grade I (58.33%) and 15 patients of ASA Grade II (41.67%)

There was no statistically significant differences among the two groups. (p=0.129)

TABLE 2: MALLAM PATTI CLASS

	Group A		Group B	
	No.	**%**	**No.**	**%**
Grade1	21	58.33	14	38.89
Grade2	15	41.67	21	58.33
Grade3	0	0.00	1	2.78
Total	36	100.00	36	100.00
Result(P value)	0.183(NS)			

Group A had 21 patients Grade 1(58.33%) and 15 patients of Grade 2(41.67%).

Group B had 14 patients of Grade I (38.89%) and 21 patients of Grade 2 (58.33%) and 1 patient of Grade 3(2.78%)

There was no statistically significant differences among two.
Group A had expiratory tidal volume (mL/breath) at 10 sec was 478.53±85.86 ml and Group B had 429.81± 74.09 ml. The difference in expiratory tidal volume (mL/breath) at 10 sec between both groups was significant (P = 0.012).

Group A had Expiratory tidal volume (mL/breath) at 20 sec was 466.53± 95.68 mland Group B had 424.53± 88.50 ml. The difference in expiratory tidal volume (mL/breath) at 20 sec between both groups was significant (P = 0.074).

Group A had Expiratory tidal volume (mL/breath) at 30 sec was 455.83± 8 90.72 ml and Group B had 413.47± 78.61 ml. The difference in expiratory tidal volume (mL/breath) at 30 sec between both groups was significant (P = 0.037).

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Group A had Expiratory tidal volume (mL/breath) at 40 sec was 449.69± 70.00 mlandGroup B had 390.56± 82.84 ml. The difference in expiratory tidal volume (mL/breath) at 40 sec between both groups was significant (P = 0.001).

Group A had Expiratory tidal volume (mL/breath) at 50 sec was 456.69± 68.57 mland Group B had 400.50± 72.90ml in Group B. The difference in expiratory tidal volume (mL/breath) at 50 sec between both groups was significant (P = 0.001).

Group A had Expiratory tidal volume (mL/breath) at 60 sec was 444.22± 63.22 mland Group B had 402.50± 78.97. The difference in expiratory tidal volume (mL/breath) at 60 sec between both groups was significant (P = 0.015).

FIGURE 1: TREND OF MEASURED EXPIRATORY TIDAL VOLUME (ML/BREATH)

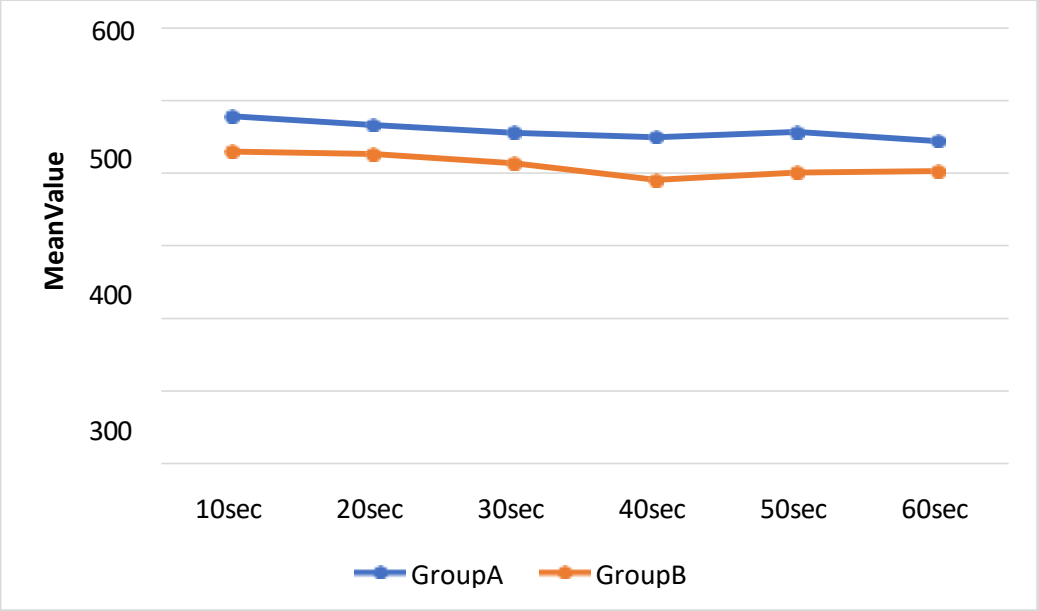

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TABLE 3: GRADE OF MASK VENTILATION

	Group A		Group B	
	No.	**%**	**No.**	**%**
Grade1	30	83.33	29	80.56
Grade2	4	11.11	6	16.67
Grade3	2	5.55	1	2.78
	36	100.00	36	100.00
Result (P value)	0.687(NS)			

Group A had 30 patients of Grade I (83.33%) and 4 patients of Grade II (11.11%) and 2 patients of Grade III (5.55%)

GroupB had 29 patients of Grade I (80.56%) and 6 patients of Grade II (16.67%) and1 patient of Grade III (2.78%).

The differences were compared and final observations were statistically not significant (p=0.687)

TABLE 4: TREND OF EASE OF LARYNGOSCOPY

	Group A		Group B	
	No.	**%**	**No.**	**%**
1	22	61.11	20	55.56
2	13	36.11	11	30.56
3	1	2.77	5	13.89
	36	100.00	36	100.00
Result (P value)	0.231(NS)			

Group A had Grade 1 in 22(61.11%) patients and group B had 20(55.56%);

Group A had Grade 2 in 13(36.11%) patients and group B had 11(30.56%)

Group Grade A had 3 in 1(2.77%) patient and group B had 5(13.89%) The difference in Ease of laryngoscopy between both groups was significant (P = 0.231).

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TABLE 5: CORMACK-LEHANE GRADE

CMLgrade	GroupA		GroupB	
	No.	%	No.	%
1	17	47.22	16	44.44
2	12	33.33	14	38.89
3	7	19.44	5	13.89
4	0	0.00	1	2.78
	36	100.00	36	100.00
Result (P value)	0.928(NS)			

Group A had Grade 1 in 17(47.22%) patients and group B had 16(44.44%) Group A had Grade 2 in 12 (33.33%) patients in group B had 14 (38.89%)
Group A had Grade 3 in 7(19.44%) patients in group B had 5(13.89%).

Group A had Grade 4 in 0(0%) patients and group B had 1(2.78%) in Group B.

The difference in Cormack-Lehane Grading between both groups was non-significant (P = 0.928).
Group A had 35(97.22%) patients intubated in one attempt, 1(2.77%) intubated in second attempt

Group B had 33(91.67%) patients intubated in one attempt, 3(8.33%) intubated in second attempt.

The difference in Attempt of intubation between both groups was non-significant (P=0.607).
Group A had Grade 1 in 0(0%) patients and Group B had 7 (19.44%). Group A had Grade 2 in 12 (33.33%) patients and Group B had 10 (27.78%)

Group A had Grade 3 in 24(66.66%) patients and Group B had 19(52.78%).

The difference in Jaw relaxation between both groups was significant (P =0.021).

Group A had 15.39±4.39 patients and 16.44±4.22 in Group B.
The difference in Laryngoscopic time between both groups was non-significant (P=0.301).
Group A had 5.46±0.63 patients and 5.50±0.61in Group B. The difference in Minute volume (L/min) between both groups was non-significant (P= 0.759).

Group A had 31 patients fully open cords (86.11%) and group B had 29 patients (80.55)

Group A had 5 patients partially open vocal cords (13.88%) and group B had 7 patients (19.44) There were no statistically significant differences among the two groups.
GROUP A had 4 patients Bucking (11.11%) and group B had 5 patients (13.88%)
Group A had 32 patients No Bucking (88.88%) And group B had 31 patients No Bucking (86.11%) There were no statistically significant differences among the two groups. (p=1.00)

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Group A had 56.14±7.20 mean ±SD with median range of 55(40-70) and Group B had 55.39±6.90 mean ±SD with median range of 54(40-70)

There were no statistically significant differences among the two groups. (p=0.635)

FIGURE 2: COMPARISON OF HEART RATE AMONG GROUPS

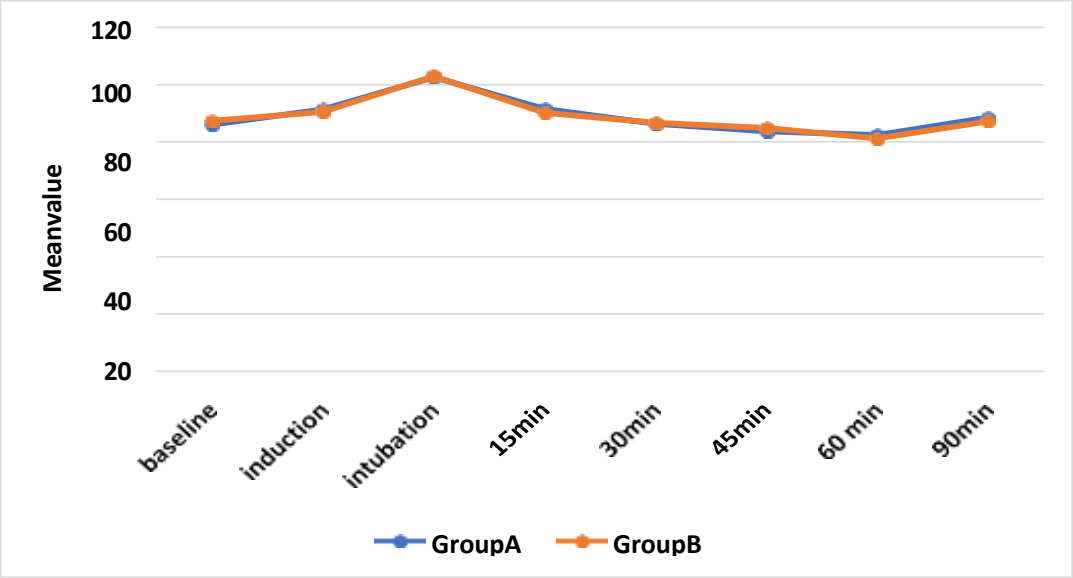

FIGURE 3: TREND OF DIASTOLIC BLOOD PRESSURE

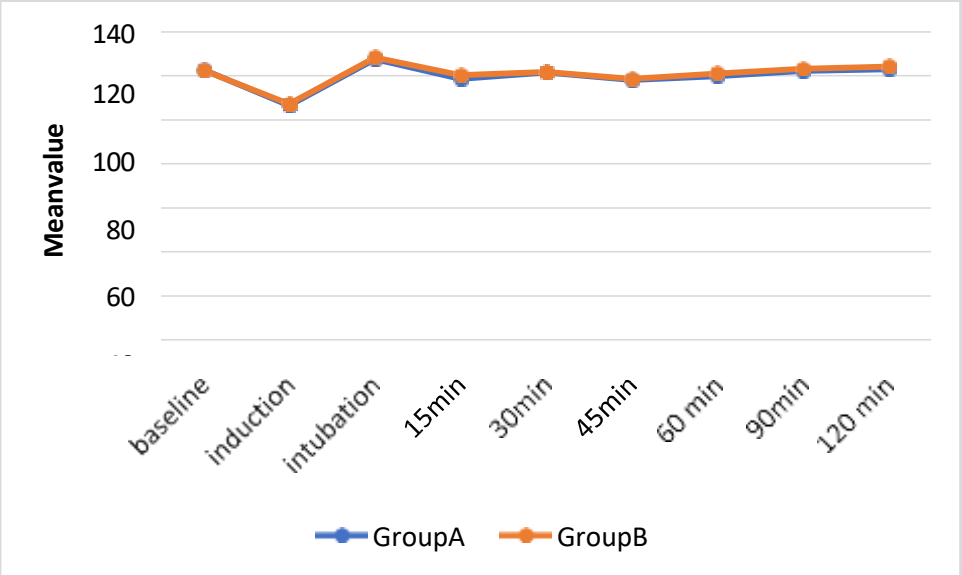

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FIGURE 4: TREND OF DIASTOLIC BLOOD PRESSURE

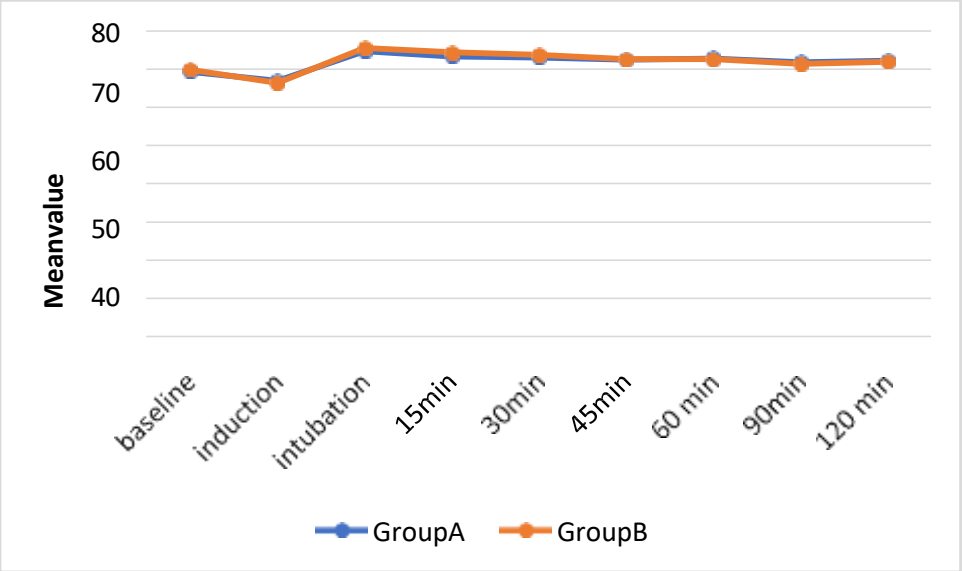
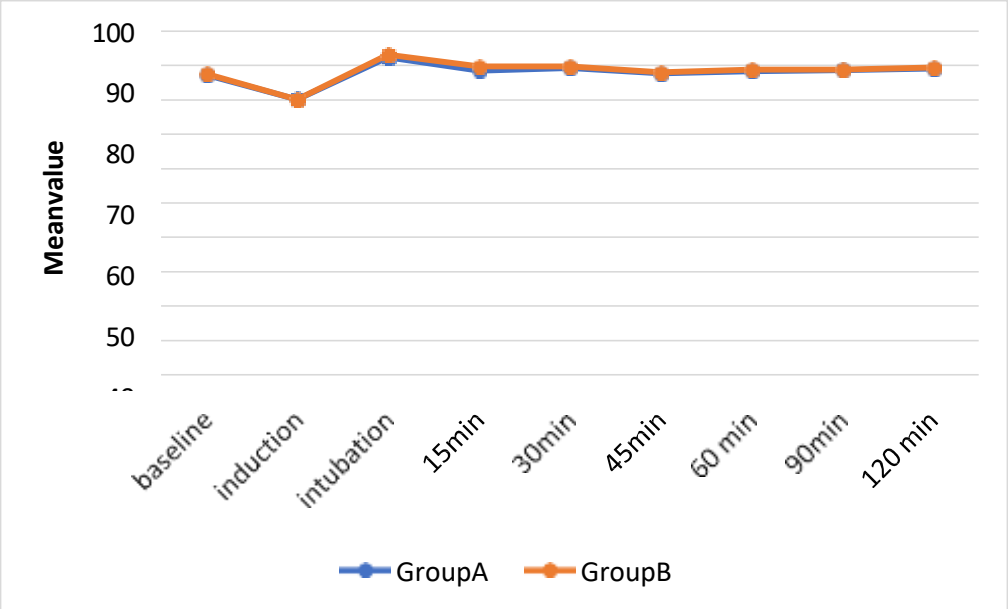


FIGURE 5: TREND OF MEAN ARTERIAL BLOOD PRESSURE



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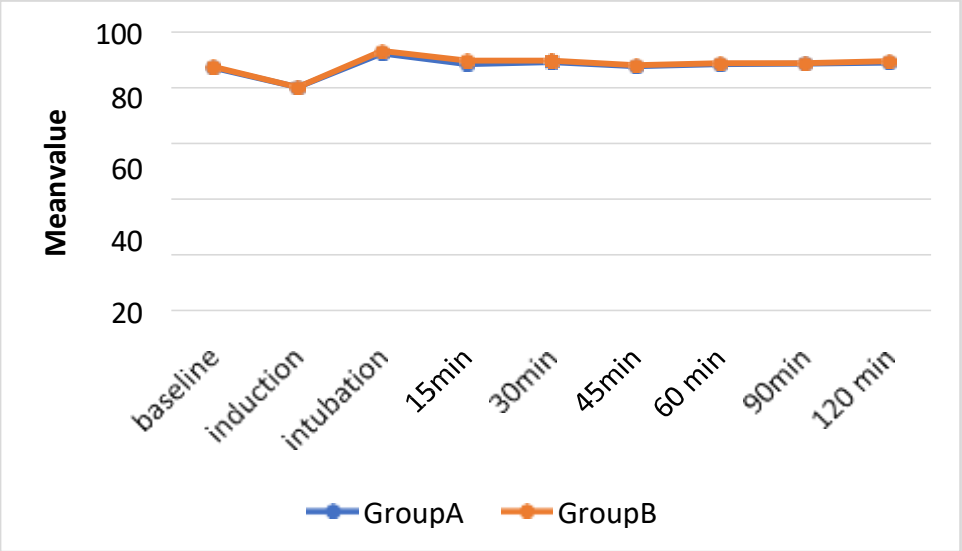
The difference in SBP, DBP, MAP, heart rate and Etco2 at different time intervals between both groups was non-significant (P>0.05).

FIGURE 6: TREND OF ET CO2

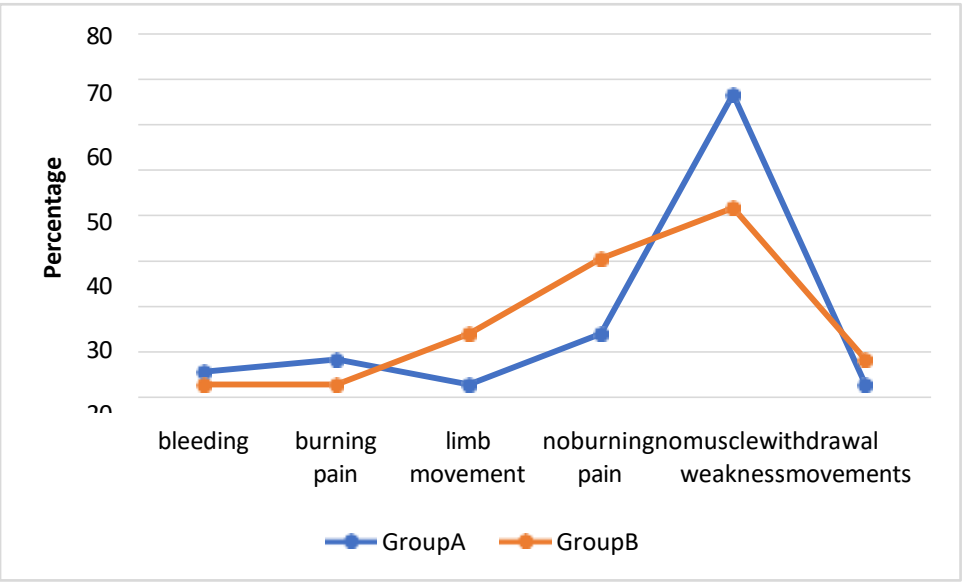


Group A had bleeding in 2 (5.56%) patients and Group B had 1 (2.78%) Group A had burning pain in 3 (8.33%) patients and Group B had and 1 (2.78%)

Group A had limb movement in 1(2.78%) patient and Group B had 5(13.89%)

Group A had withdrawal movements in 1(2.78%) patients and group B and 3 (8.33%).

FIGURE 6: TREND OF COMPLICATIONS



DISCUSSION

The conventional practice of delaying neuromuscular blockade after checking mask ventilation seems to be based on the strategy to wake up the patient rapidly in unanticipated difficult mask ventilation[2]. However, this strategy may be impractical[3]because the durationofhypnoticsmaynotbe short enough to restore the patient's spontaneous breathing without the risk of hypoxemia[4]. Accordingly, the relevant rescue for impossible mask ventilation is not to wait for the return of spontaneous breathing without any action but to place a tracheal tube or supraglottic airway as soon as possible with a minimum number of attempts[5]. The rescue intervention is more successful with adequate neuromuscular blockade than without blockade[3, 6, 7]

Ina study by Ikeda A et al[8] they observed that the striate muscles contract during the process of succinyl choline-induced muscle paralysis, and upper airway patency and thoracic compliance possibly dynamically change. Therefore, succinyl choline may differently influence FMV from rocuronium because of the different pharmacological actions on the muscles.

In the present study, the difference in the mean age, sex, mallampatti class, at different time intervals among these two groups were statistically non-significant (P value>0.05), hence these two groups were comparable.

The difference inexpiratorytidal volume (mL/breath) at 10 sec, 20 sec, 30 sec, 40 sec, 50 sec and 60 sec between both groups was significant (P = 0.012).

The difference in Minute volume (L/min) between both groups was non-significant (P= 0.759)

In the study conducted by Hillman et al[53]in about 12 patients explains about the improvement in tidal volume following NBD that it could be attributed to anatomical and physiological factors, along with physical properties of gas flow. In a conscious patient, the tone of the upper airway muscles and natural reflexes provided a clear passage to airflow. It was known that following induction of general anaesthesia, the tongue falls back, and depending on the volume of the oropharynx, may rest against the hard/soft palate and posterior pharyngeal wall.

The difference in Jaw relaxation between both groups was significant (P = 0.021).

Shobhana Gupta et al[9]in 2010 also conducted a study to check the intubating conditions after Suxamethonium versus and Rocuronium. The patients were divided in to two groups, each consisting of 30 patients: group a patient's received Rocuronium bromide, 0.6 mg/kg and group B patients received Suxamethonium chloride 1.5 mg/kg. In both the groups, jaw relaxation and vocal cord relaxation were considered for atraumatic laryngoscopy at 60 seconds or, if needed, at 75 seconds and then at 90 seconds. Intubation conditions were ratedas excellent in 90% and good in 10% of the patients who received Rocuronium, and excellent in 100% of the patients who received Suxamethonium. They concluded that intubation can be performed under good to

excellent conditions at 60-90 seconds after a bolus dose of Rocuronium of 0.6 mg/kg. These aresimilar to our results.

Haemodynamic variables

The difference in SBP, DBP, MAP, heart rate and Etco2 at different time intervals between both groups was non-significant (P>0.05).

K P Rothfield et al[10]in 1998 studied the haemodynamic effects of rocuronium in adults undergoing cardiac surgery with cardiopulmonary bypass in 20 patients after anaesthetic induction, recovery from succinylcholine, and achievement of baseline haemodynamic stability, patients received 0.6 mg.kg-1 rocuronium as an initial rapid intravenous bolus. Maintenance dosing of 0.2 mg.kg-1 was continued for the remainder of the procedure. Haemodynamic measurements (heart rate, systemic arterial systolic, diastolic, and mean arterial pressure, pulmonary arterial systolic, diastolic, and mean pressure, pulmonary capillary wedge pressure, central venous pressure, and thermodilution cardiac output measurements) were obtained forthe first five minutes after rocuronium administration, and subjects were observed for histamine-related symptoms. The haemodynamic profile for a 0.6 mg.kg-1 bolus of rocuronium is acceptable for patients with cardiovascular disease was the conclusion obtained from this study.

The difference in Ease of laryngoscopy between both groups was significant (P = 0.231).

This study by P Zahn et al[11]in 1995 also supported our study where in the intubation conditions and time-course of action of a 0.3 mg kg-1 bolus of rocuronium were studied under alfentanil/propofol and fentanyl/Thiopentone/enflurane anaesthesia. 40 healthy patients were randomly allocated to induction of anaesthesia with either alienating 20 micrograms kg-1 and propofol 2.0-2.5 mg kg-1, or fentanyl 3 micrograms kg-1 and Thiopentone 4-6 mg kg-1. Approximately 5 min later, after calibration of mechanomyography, an IV bolus of 0.3 mg kg-1 rocuronium was administered. Laryngoscopy and tracheal intubation were attempted when maximum block occurred. Intubation was completed successfully in 39 patients. The passage of the tube was rated good or excellent in 18/20 (alfentanil/propofol group) and 18/19 patients in the other group. The times of onset were 65 s and 69 s, respectively. It is concluded that a 1 x ED90 dose of rocuronium rapidly provides good or excellent intubation conditions in the majority of cases.

The difference in Laryngoscopytime between both groups was non-significant (P=0.301).

André van Zundert et al[12] in 2009 conducted a study on intubation of the trachea within direct laryngoscopy in 450 adults with ASA I -III, for airway management with three devices. Anesthesia induction for tracheal intubation consisted of fentanyl-propofol-rocuronium. Cormack-Lehane grading system to score an initial direct laryngoscopic view using a classic metal Macintosh blade. After subsequent positive-pressure

ventilation using a face mask and an oxygen-sevoflurane mixture for 1 min, the trachea was intubated using one of the three VLSs. Following this, intubation time, number of intubation attempts, use of extra tools to facilitate intubation, and overall satisfaction score of the intubation conditions. The average intubationtime was 34 +/-20 s for the Glide Scope, 18 +/- 12 s for the V-MAC Storz, and 38 +/- 23 s for the McGrath VLS. Intubation with the Storz was faster ($P < 0.05$) than the other two VLS tested and necessitated fewer additional tools ($P < 0.01$), resulting in ahigher first-pass successful intubation rate Hence, facilitates good intubating conditions.

Attempt of intubation

The difference in Attempt of intubation between both groups was non-significant (P=0.607).

Study done by Nicholas M Levin et al[13]in 2021 also supported our study. They assessed rocuronium dose for rapid sequence intubation is 1.0 mg/kg; however, the optimal dose for emergency airway management is not clear. This study assessed the relationship between rocuronium dose and first-attempt success among emergency department (ED) patients undergoing rapid sequence intubation. It was concluded that Rocuronium dosed ≥1.4 mg/kg was associated with higher first attempt success when using direct laryngoscopy and among patients with pre-intubation hypotension withno increase in adverse events.

Cormack-Lehane Grading

The difference in Cormack-Lehane Grading between both groups was non-significant (P= 0.928).

J I Andrews et al[14]in 1999 performed this study to evaluate clinically relevant differences between the use of rocuronium and succinyl choline to secure acceptable intubating conditions during rapid-sequence induction of anaesthesia with propofol. Anaesthesia was induced using propofol 2.5 mg/kg in 349 ASA physical status grade I-IV patients who were undergoing either elective or emergency surgery. Propofol was followed immediately by either rocuronium 0.6or1 mg/kg or succinyl choline 1.0 mg/kg (randomly selected). Fifty seconds after the end of muscle relaxant injection laryngoscopy was performed and intubating conditions were graded by an experienced anaesthetist blind to the muscle relaxant allocation. Although rocuronium 1.0mg/kg provided superior intubation conditions when compared with rocuronium 0.6 mg/kg.

T Heier et al[15]in 2000 Conducted a studyto determine the dose of rocuronium that gives a high probability of achieving perfect conditions for rapid (within 60 s)tracheal intubation, by administeringa range of doses of rocuronium, some larger than used previously. Sixty adults patients were anesthetized with thiopental 4 mg/kg IV and alfentanil 10 microg/kg IV, received rocuronium 0.4 to 2.0 mg/kg IV. They estimated the doses giving 90% and 95% probability of achieving perfect intubation. Rocuronium 1.85 and 2.33 mg/kg gave, respectively, 90% and 95% probability of perfect intubation

conditions. The confidence limits (5th and 95th percentile) for these estimates were 1.15 to 2.31 and 1.23 to 3.22 mg/kg, respectively. In conclusion, it is possible to achieve perfect intubation conditions with large doses of rocuronium.

H AyoğluH Altunkaya et al[16]in 2007 studied the efficacy of dexmedetomidine compared with lidocaine in reducing the pain of propofol and rocuronium injection pain in One hundred and fifty patients were scheduled for elective surgery with general anaesthesia. The conclusion was extracted that pretreatment with dexmedetomidine is not effective in reducing injection pain of propofol, but may attenuate the hand withdrawal associated to rocuronium, as lidocaine does. In our study we used 2% lidocaine instead of dexmedetomidine and it provided good injecting condition.

CONCLUSION

Expiratory tidal volume and ease of intubation was greater during mask ventilation in the early rocuronium group than in the late rocuronium group. Therefore, the administration of rocuronium before checking mask ventilation may be a better alternative to provide larger expiratorytidal volume in comparison to late administration.

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