

Comparison of Intubating Conditions Produced by Rocuronium and Suxamethonium for Rapid Sequence Induction in Elective Caesarean

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Objective: To find out whether Rocuronium produces intubating conditions as good as Suxamethonium in rapid sequence induction (RSI) in elective caesarean section.

Design: Quasi Experimental Study.

Setting: Operative rooms of Hameed Latif Hospital Lahore.

Subjects: 50 ASA I and II parturients scheduled for elective caesarean section under general anaesthesia:

Interventions: Anaesthesia was induced with 5mg/kg Thiopentone and neuromuscular blocking agent using RSI. Group I (n=25) received Suxamethonium 1.5 mg/kg and group II received Rocuronium 1.0 mg/kg. Intubation was done 60s after the administration of muscle relaxant. Main outcome: Intubating conditions using the scoring criteria described by Cooper et al.

Results: There was no statistically significant difference in jaw relaxation, vocal cord relaxation and response to intubation in both groups. Overall intubating conditions in group I & II were excellent in 84 % and 76% patients while good in 16% and 24 % patients respectively with no statistically significant difference ($p > 0.05$).

Conclusion: Our study showed that Rocuronium 1.0 mg/kg provides equally good intubating conditions when compared to Suxamethonium 1.5mg/kg in elective caesarean section using RSI at 60s.

Key words: Neuromuscular blocking agent; Suxamethonium, Rocuronium, intubation; rapid sequence induction caesarean.

Rapid sequence intubation (RSI) is a life saving procedure, developed to secure the airway quickly and safely in life threatening situations. In emergency situations and some other conditions RSI is often chosen over other intubation techniques because simultaneous onset of deep sedation and paralysis, followed by rapid tracheal intubation, minimises the risk of aspiration of gastric contents¹. An ideal neuromuscular blocking agent, to facilitate the tracheal intubation, would provide rapid onset and short but profound effect followed by rapid spontaneous recovery of neuromuscular function².

Until recently, Suxamethonium was the only neuromuscular blocking agent used for RSI of anaesthesia. It provides a rapid onset of action and good muscle relaxation in less than 1 min³. But it has side effects which include: Muscle fasciculations causing muscle aches, raised intracranial and intraocular pressures, potential to cause malignant hyperthermia and hyperkalemia in certain patients.^{4,5} Because of the concerns regarding occasional but unpredictable risks associated with the Suxamethonium, there is demand for a muscle relaxant with similar onset but without undesired side effects.

Rocuronium, a non-depolarising neuromuscular blocking agent, is currently being used in RSI as an alternative to Suxamethonium⁵. It does not possess any of the side effects associated with Suxamethonium and has a rapid onset of action, less than 1 min for complete block with doses of 0.9-1.2 mg/kg⁶. Rocuronium has also been used for RSI in caesarean section, where it is reported to produce good intubating conditions without adverse hemodynamic effects on the mother. In addition, neither Rocuronium nor its metabolite 17-Desacetylrocuronium cross the placenta significantly and are not harmful to the foetus⁷.

Most of the previous data which showed no significant difference in intubating conditions between Rocuronium and Suxamethonium, Propofol or opioids were used for induction. As rapid sequence induction is indicated for every caesarean section under general anaesthesia while propofol and opioids influence intubating conditions that is why we selected elective caesarean sections for our study.

The aim of our study was to find out whether Rocuronium produces equally good intubating conditions when compared to Suxamethonium in RSI in elective caesarean sections.

Material and Methods

After approval from concerned institutional ethical committee and written informed consent, 50 full term pregnant patients under going elective caesarean section were included in study. Convenience sampling was done.

Inclusion criteria: Elective caesarean section and ASA I & II.

Exclusion criteria: Preterm labour, Known or anticipated difficult intubation, patients with neuromuscular disease, familial history of malignant hyperthermia, drugs known to interact with neuromuscular blocking agent and allergy to Rocuronium.

Patients were assigned into group I and II. After applying monitors, a sand bag was placed under right hip for left uterine displacement and a sand bag of 10 cm high was placed under the head of every patient to have a uniform intubating conditions. No pre medication was given. After pre oxygenation, induction was done with Thiopentone 5 mg/kg using Rapid Sequence of Induction in both groups. Group I received Suxamethonium 1.5 mg/kg while group II received Rocuronium 1.0 mg/kg to facilitate endotracheal

intubation. All injections were given in fast running infusion of 0.9% saline. At 60 seconds after the administration of the muscle relaxant, intubation was done by a senior anaesthetist using appropriate sized Macintosh laryngoscope blade. Endotracheal tube with an internal diameter of 7.0 cm was used. The intubator was not blinded to the muscle relaxant used. The intubating conditions observed by the intubator were noted on the data capture forms. Intubating conditions were assessed according to the scoring system described by Cooper et al tab-1⁸.

Table 1:

Score	Jaw relaxation	Vocal Cords	Response to intubation
0	Poor (impossible)	Closed	Severe coughing or bucking
1	Minimal (difficult)	Closing	Mild coughing
2	Moderate (fair)	Moving	Slight diaphragmatic movement
3	Good (easy)	Open	None

- Total score of 8-9= Excellent, 6-7= Good, 3-5= Fair, 0-2 = Poor

Good and excellent conditions were considered as clinically acceptable.

Sample size was calculated by using computer software winepiscore, assuming relative risk 2.5 at confidence interval (C.I) 95% and power 80%. The data was entered in computer software SPSS. After defining variables, master sheet was developed. The data was cleaned and analysed on SPSS. The null hypothesis was made and it was tested by applying Student’s t-test for mean scores and chi-square test for proportions. P value < 0.05 was considered to represent statistical significance.

Limitations of the study

Blinding was not possible due to Suxamethonium induced muscle fasciculations.

Table 2: Response to intubation.

Group	No. of Patients	Mean score	Standard Deviation	Variance
I:Suxamethonium	25	2.68	0.48	0.227
II: Rocuronium	25	2.4	0.707	0.50

T value= 1.65, p value=>0.05, 95% CI= -0.052 to 0.61

Results

The patients in both groups were similar in mean age and weight (p>0.05). There was no statistical difference in mean

scores of jaw relaxation, Vocal cord abduction (p>0.05). There was small difference in response to intubation but that was not clinically significant (p>0.05) table 2. Table 3 shows the frequency distribution of Intubating conditions between the groups. In group I & II intubating conditions were rated as excellent in 84% and 76% while good in 16% and 24% patients respectively with no statistically significant difference (p>0.05) table 3. All intubations were completed in first attempt. There was only one intubator for all intubations. Poor intubating conditions were not observed in any patient.

Table 3:

Intubating Conditions	GROUPS		Total
	I: Suxamethonium	II: Rocuronium	
	Number (%)	Number (%)	
Excellent	21 (84.0%)	1 (76.0)	40 (80.0%)
Good	4 (16.0%)	6 (24.0%)	10 (20.0%)
Total	25 (100.0%)	2 (100.0%)	50 (100%)

Chi square value=2.0, Degree of freedom=3, p value= >0.05

Table 3:

Total Score	GROUPS		Total
	I: Suxamethonium	II: Rocuronium	
	Number (%)	Number (%)	
6	2 (8.0%)	3 (12.0%)	5 (20%)
7	2 (8.0%)	3 (12.0%)	5 (20%)
8	6 (24.0%)	9 (36.0%)	15 (30.0%)
9	15 (60.0%)	10 (40.0%)	25 (50.0%)
Total	25 (100.0%)	25 (100.0%)	50 (100.0%)

Discussion

In our study we compared Rocuronium with Suxamethonium in elective caesarean section using rapid sequence induction technique and it was found that clinically acceptable intubating conditions (good and excellent) were similar with both groups. Although the rate of excellent intubating conditions was higher with Suxamethonium that was not statistically significant.

An important limitation of our study is that it was not blind study because of Suxamethonium induced fasciculations. As rapid sequence induction of anaesthesia is high risk procedure requiring the full attention of appropriately trained anaesthetist. In our setting, blind study and optimal patient safety was not feasible simultaneously that is why we abandoned blind study design. We did not use nerve

stimulator as it is not a reliable method for evaluating paralysis of the vocal cords⁹.

Mencke T et al¹⁰ found 1.0mg/kg Suxamethonium produced significantly better intubating conditions as compared to Rocuronium 0.6mg/kg while using Fentanyl along with thiopental after rapid sequence. Sluga M et al¹¹ Suxamethonium 1.0 mg/kg allows for a more rapid intubation and creates superior intubating conditions compared with Rocuronium 0.6mg/kg while induction was done with Propofol and Fentanyl for rapid sequence induction. Larsen PB et al¹² used propofol and Alfentanyl and found that Rocuronium 0.6 mg/kg produced intubating condition equal to Suxamethonium 1.0mg/kg for rapid sequence of induction. Pery J et al³ in a Cochrane Review analyzed 24 studies and concluded that Suxamethonium creates excellent intubating conditions more reliably than Rocuronium but clinically acceptable intubating conditions were not statistically different. It is also seen that there was no significant difference in intubating conditions when Propofol was used. In this Cochrane Review only 24 Of the 1606 patients were emergency cases and underwent true RSI using propofol and Rocuronium 1mg/kg. Cheng CA et al⁶ found that Rocuronium 0.9mg/kg provides similar intubating conditions to Suxamethonium 1.5 mg/kg using Alfentanyl and Thiopentone while Rocuronium 0.6 mg/kg was inadequate. Aboulish E and colleagues found that Rocuronium 0.6 mg/kg with Thiopentone 6mg/kg provides good to excellent intubating conditions at 80 seconds and found that Rocuronium is safe for mother and foetus⁷.

In this study, Thiopentone was the sole anaesthetic agent while in some studies opioids were used with Thiopentone^{4,10} or opioids and Propofol^{11, 12} or propofol alone as anaesthetic agent. Although anaesthetic agent and opioids have no influence on neuromuscular block but they may promote the development of good intubating conditions and even may be similar to Suxamethonium.

The difference between the two relaxants is small and mainly results from lower ratings in the subscore addressing the reaction to intubation i.e. coughing or bucking. As the reaction to intubation occurs after the placement of endotracheal tube, the relevance for patients' safety is marginal. Although it was not part of our study but we found that there was no difference of Apgar score in both groups. It was observed that Suxamethonium induced fasciculations finished in upper part of body after 35 seconds after injection; we there fore, surmise that intubation with Suxamethonium would have been possible earlier than with Rocuronium.

We suggest that use of muscle relaxant for RSI should be assessed on individual basis by balancing intubation conditions and duration of the intubation sequence against potential side effects. However it should not be used in patients with expected difficult intubation.

Conclusion

Our study showed that Rocuronium 1.0 mg/kg provides equally good Intubating conditions when compared with Suxamethonium 1.5 mg/kg in elective caesarean section in 60 seconds using rapid sequence of induction.

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