

Comparing the Incidence of Postoperative Sore Throat and Hoarseness on Rapid Sequence Intubation with Rocuronium and Succinylcholine – A Randomised Control Trial

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ABSTRACT

Introduction: Sore throat (ST) and Postoperative hoarseness (PH) is among the most common complaint of the patient in the postoperative period after endotracheal intubation. Use of neuromuscular blockade facilitates endotracheal intubation. In the current study we aim to compare the incidence and severity of ST and PH after using Succinylcholine (SCH) or Rocuronium (ROC) for rapid sequence intubation (RSI) in postoperative period up to 24 hours

Material and Methods: A total of one hundred twenty five patients were enrolled and randomly allocated into two groups SCH group (GS, n=62) and ROC group (GR, n= 63). During induction patients in GS and GR received SCH 1mg/kg and ROC 0.6 mg/kg, respectively after giving fentanyl (2mics/kg) and propofol (2m/kg). Ease of endotracheal intubation was assessed and patients were followed at 0, 2, 4, 8, 12 and 24 hours in postoperative period for incidence and severity of ST and PH.

Results: The incidence of easy and fair laryngoscopy was 82% (102/125) and 18% (23/125), respectively. Both GS and GR were comparable with respect to ease of laryngoscopy (p=0.795). In between GS and GR, higher grades for CL grading were observed in GR but was not significant (p=0.454). The overall incidence ST and PH was 42% and 57% respectively. The incidence and severity of ST was higher in GS, with significant difference only at 2 and 4 hours (p≤0.05). Similarly, for PH it was higher for GS in comparison to GR, with significant difference seen at 2,4,8,12 and 24 hours.

Conclusions: During RSI use of both ROC and SCH are associated with comparable intubating conditions. But the overall incidence and severity of ST and PH was higher for SCH.

Keywords: Postoperative, Sore Throat, Hoarseness, Succinylcholine, Rocuronium

Factors such as Succinylcholine (SCH) administration also contribute to occurrence of ST⁶ The current indication of SCH is in rapid sequence induction (RSI), specifically in nations where availability of sugammadex is still rare. The other alternative of SCH is Rocuronium (ROC), which has similar onset time. ROC at a dose of 0.6mg/kg when used with propofol and fentanyl for induction provides intubating condition comparable to SCH 1.0mg/kg at 60 seconds⁷

Intubating condition influence the incidence and severity of laryngeal morbidity, with excellent intubating condition producing less frequent ST, PH and vocal cord injury compared with good or poor conditions.⁸ We in the current study intended to investigate the incidence and severity of postoperative ST and PH between ROC and SCH for RSI.

MATERIAL AND METHODS

The current study was carried between December 2015 and November 2017, in the Department of Anaesthesiology, MGM Medical College and M.Y. Hospital, Indore following approval from the Institutional Ethics Committee. Patients posted for laparoscopy routine surgery were enrolled. Written informed consent from the eligible patients were taken, after explaining them the study. Patient in age group of 18 to 60 years, ASA physical status I–II, surgery in supine position under general anaesthesia and duration of anaesthesia not extending beyond 2 hours were included. Patients with history of preoperative sore throat or recent upper airway infection, oral surgeries, bronchial asthma, chronic obstructive pulmonary disease, head and neck surgeries, pregnant women, difficult airway, known allergies to study

INTRODUCTION

The incidence of sore throat (ST) and postoperative hoarseness (PH) following tracheal intubation is found to be 62%. Younger age, female gender, duration of anaesthesia and high tracheal tube pressure are commonly associated with increased incidence of ST and PH. The use neuromuscular blockade for tracheal intubation results in lesser incidence of ST.¹ The symptoms of ST are self limiting and usually resolve within 12–24 hours of extubation.² Several technique and agents have been tried till date to lower the incidence of ST and PH, with no single measure being totally effective.^{1,3,4} Among the causative factors airway management has the strongest influence on the incidence of sore throat⁵

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drug, patient on chronic medication (NSAID, Steroids), those who required more than one attempt and time of intubation >15 seconds, known smoker, and subjects who repeatedly cough or bucked before extubation were excluded from the studies. A total of 130 patients were assessed for eligibility, and out of which 125 were randomized into group GS(n=62) and GR(n=63) (Figure 1).

Intravenous (IV) midazolam (0.02mg/kg) as premedication, 30mins prior to induction of anaesthesia was given. The intraoperative monitoring included ASA standard monitoring comprising of continuous electrocardiography, non-invasive blood pressure, pulse oximetry (SpO₂), end-tidal CO₂ (EtCO₂), and train of four (ToF) monitoring to stimulate ulnar nerve at wrist. After preoxygenation with 100% oxygen for 3 minutes, IV fentanyl (2.0µg/kg) and IV Lidocaine (1mg/kg) was injected; followed by IV propofol (2.0mg/kg), till loss of verbal response. Cricoid pressure was applied by an trained anaesthetist. On confirming able to ventilate on the mask, IV SCH (1mg/kg) or IV ROC (0.6mg/kg) given over 5 seconds in both group GS and GR, respectively, followed by intubation at 60 seconds. Laryngoscopy was done using Macintosh laryngoscope blade size 3 or 4 (as per patient). Tube size was decided by the intubating anaesthetist, who was constant for all cases enrolled. The tracheal tube cuff inflation was done until no air leakage could be heard with a stethoscope at a peak airway pressure of 20 cm of H₂O.

Heart rate (HR) and Blood pressure mean (MAP) were recorded before and just after induction and 5 minutes later. GA was maintained with oxygen 50% in nitrous oxide and isoflurane 1.2 MAC and atracurium 0.5mg/kg loading (in GS) and maintenance

0.1mg/kg (in both GS and GR), based on ToF readings. IV ondansetron 4 mg and IV dexamethasone 8mg was administered 15 min prior to end of surgery and then 8 h in the postoperative period. At the completion of the surgery, with the patient adequately anesthetized, special care was taken when suctioning the posterior pharynx using only a blunt suction catheter. Inspiratory oxygen concentration was increased to 100%. The neuromuscular block will be reversed with IV neostigmine (50 µg/kg) and glycopyrrolate (10 µg/kg) on recording ToF of 0.7 while awaiting the return of spontaneous ventilation. Extubation done on the return of spontaneous ventilation, the patient following commands and recording ToF of 0.9. For post-operative analgesia IV paracetamol 1gm 8hourly and IV tramadol 50 mg infusion over half-hour was given if the patient complained of pain at the operative site.

Sore throat (ST) and Postoperative hoarseness (PH) monitoring and grading was done at 0, 2, 4, 8, 12, and 24 hours post-extubation by an anaesthetist not present intraoperatively and unaware of the group of patients.

For ST the grading was based on 4-point scale [0–3]⁹, where Grade 0 = no sore throat;

Grade I = mild sore throat (complaints of sore throat only on asking);

Grade II = moderate sore throat (complaints of sore throat on his/her own); and

Grade III = severe sore throat (change of voice or hoarseness, associated with throat pain)

For PH the grading was based on 4-point scale [0–3]¹⁰, where If on asking do you have hoarseness the answer is no, PH will be graded 0 = no hoarseness;

If the answer is yes, PH will be graded I-III as follows:

I = noticed by patient,

II = obvious to observer,

III = aphonia.

Intubating anaesthetist assessed for intubating condition based on Ease of Laryngoscopy¹¹ and modified Cormack Lehane grading¹²

Ease of Laryngoscopy¹¹

Easy- Jaw relaxed, no resistance to blade insertion

Fair- Jaw not fully relaxed, slight resistance to blade insertion.

Difficult- Poor jaw relaxation, active resistance of the patient to laryngoscopy.

Modified Cormack Lehane(CL) grading¹²

Grade I = full view of glottis;

Grade II = partial view of glottis or arytenoids or posterior part of vocal cord just visible;

Grade III = only epiglottis visible; and

Grade IV = neither glottis nor epiglottis visible.

Sample Size Calculation

The sample size was calculated based on previous study³, comparing the incidence of sore throat between ROC and SCH. For an 80% power and $\alpha = 0.05$, 118 patients (59 in each group) were needed. To compensate for possible dropouts, we enrolled 130 patients (65 for each group)

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS ver20.0. Quantitative data shall be expressed as mean+/-standard deviation. Normality of demographic parameters was assessed using Shapiro Wilks test. Intergroup comparison of mean was done using independent t test. Association of categorical variables was analysed using Fischer's exact test or chi square test. Result was considered statistically significant when $p < 0.05$.

RESULTS

The two groups GS and GR were comparable based on gender distribution, age and duration of anaesthesia (Table 1). All patients were intubated in single attempt. There was no patient with difficult laryngoscopy in both the groups, GS and GR. In GS and GR, majority 84% (52/62) and 80% (50/63), respectively had easy laryngoscopy. In GR, 20% (13/63) had fair laryngoscopy which was higher as compared to 16% (10/62) in GS, but was not significant ($p=0.795$). In both GS and GR, none of the patient had grade III or IV of CL grading. In GS, 84% (52/62) had grade I and 16% (10/62) had grade II, whereas in GR, 76%(48/63) had grade I and 24%(15/63) had grade II of CL grading. In between GS and GR, higher grades for CL grading were observed in GR but was not significant ($p=0.454$)

The overall incidence of ST was 42% (53/100), with 32% (20/63) in GR and 52% (32/62) in GS, but was comparable

Parameter	GS (n=62)	GR (n=63)	P value
Gender	Male =56.5% (35/62) Female= 43.5% (27/62)	Male=58.7% (37/63) Female=41.3% (26/63)	0.839
Age (years)	37.50±5.548	36.26±5.283	0.255
Duration of anaesthesia (minutes)	68.10±8.915	70.60±8.430	0.153

GS: group succinylcholine, GR: group rocuronium, $p \leq 0.05$ = significant

Table-1: Comparison of demographic data and duration of anaesthesia

ST at (hours)	Grade	GS (n=62)	GR (n=63)	P value
0	I	11	9	0.599
	II	0	0	
2	I	22	13	0.048*
	II	2	0	
4	I	16	13	0.035*
	II/III	10	1	
8	I	4	8	0.483
	II/III	14	5	
12	I	5	6	0.094
	II	12	3	
24	I	7	5	0.094
	II	5	0	

ST: Sore throat, GS: group succinylcholine, GR: group rocuronium, * $p \leq 0.05$ = significant

Table-2: Incidence and severity of Sore Throat

PH at (hours)	Grade	GS (n=62)	GR (n=63)	P value
0	I	3	0	0.495
	II	0	0	
2	I	34	13	0.001*
	II	0	0	
4	I	38	25	0.015*
	II/III	3	0	
8	I	28	35	0.007*
	II/III	11	0	
12	I	21	19	0.015*
	II	9	0	
24	I	24	11	0.043*
	II	1	0	

PH: Postoperative hoarseness, GS: group succinylcholine, GR: group rocuronium, * $p \leq 0.05$ = significant

Table-3: Incidence and severity of Postoperative hoarseness

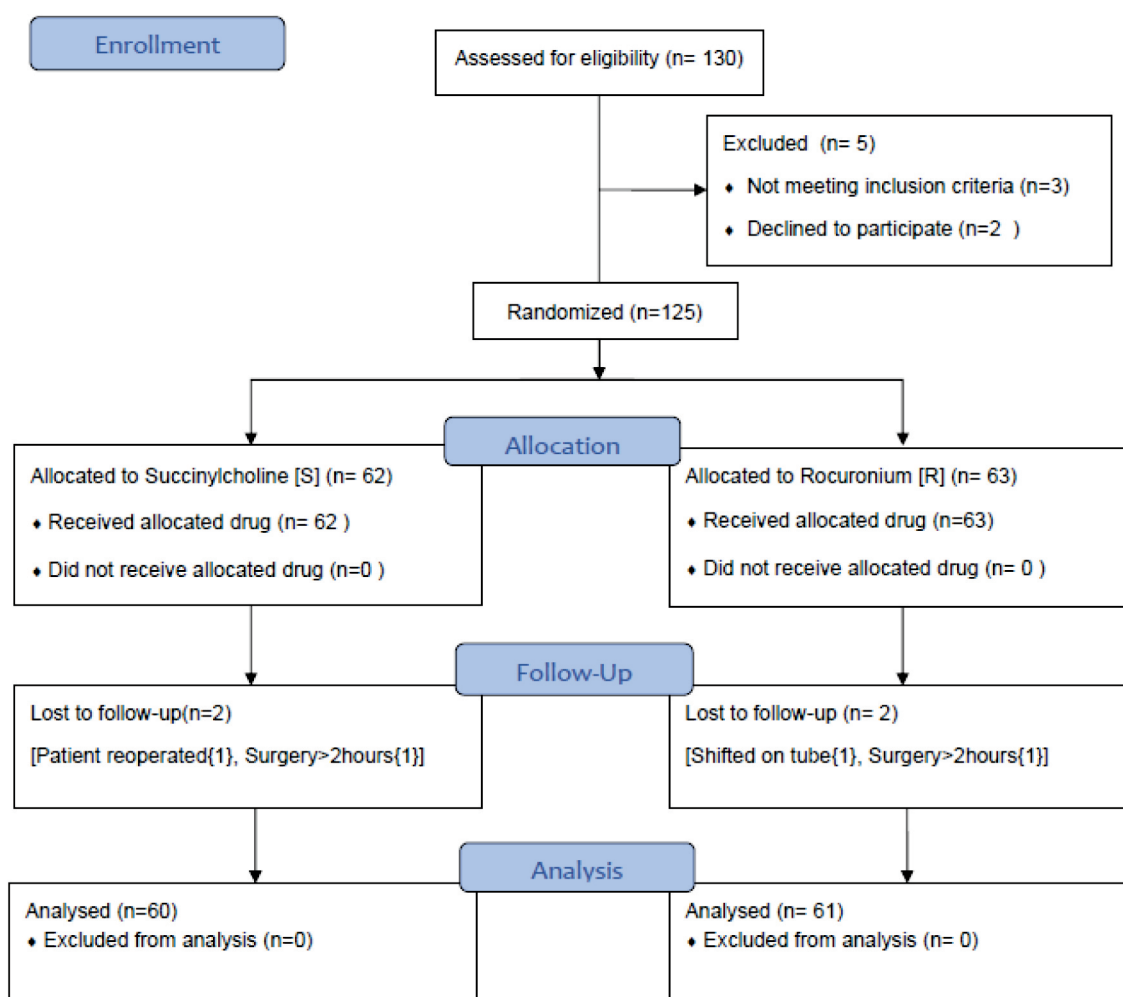


Figure-1: CONSORT flowchart

($p=0.067$). In GR and GS both, incidence of ST was highest at 4hrs (14/63) and (26/62), respectively. The overall severity of ST was also higher in GS as compared to GR, postoperative 24 hours. (Table 2)

The overall incidence of PH was 57% (71/125), with 66% (41/62) in GS and 48% (30/63) in GR, but was comparable ($p=0.106$). The overall severity of PH was also higher in GS as compared to GR. No patient in both GS and GR developed grade III PH. (Table 3)

DISCUSSION

In this study, we found that the intubating condition was similar between SCH and ROC at 60 seconds when used for RSI at the dose of 1mg/kg and 0.6 mg/kg respectively. The results were in concordance with the study conducted by Lam A et al¹³ and Venkateshwaran et al⁷ at same doses of ROC (0.6mg/kg) and SCH (1.0mg/kg) at 60 seconds when used with propofol and fentanyl. Previous studies have clearly proved the role of good intubating condition on incidence of ST, PH and vocal cord injury.⁸ With the similar intubating conditions in the two groups the incidence and severity of ST and PH was found to be on higher side with SCH. The difference was significant ($p\leq 0.05$) at 4 hours of postoperative period for ST and significant ($p\leq 0.05$) at all observed hours for PH, except at 0 hours.

The overall incidence of PH was 57% (71/125), which was similar to that reported by Mencke et al.⁸ In the current study, the incidence of PH with ROC was 48% (30/63), which was similar to the other studies conducted at same dose.^{8,14} The incidence of PH with SCH was 66% in our study which is comparatively higher than that reported by Mencke et al⁸, where it was 50%.

ST occurs in 62% of patients receiving GA with tracheal intubation.¹ Among the causative factors airway management has the strongest influence on the incidence of ST.² Factors such as SCH administration also contribute to occurrence of ST even when ordinary face mask was used⁶; others have found no effect.^{8,15} In a recent study, by Wang et al³ the incidence of ST was higher with SCH in comparison to ROC, we obtained similar trend in our results. In the current literature SCH has lost its ground, and is used in countries where ROC and sugammadex availability is limited. indications of SCH. And with the advent of Gantacurium an ultra-short acting non-depolarizing neuromuscular blocking drug with a rapid onset and a wide safety margin the use of SCH will get even more restricted.¹⁶

Multiple studies have reported increased incidence of ST with SCH but the cause of it has not been evaluated.^{3,6,17} The authors propose fasciculations of pharyngeal muscle could be one of the reason of increased ST with SCH. The incidence and severity was higher in the current study with SCH but a significant difference could be seen only at 4 hours of postoperative period. A study with larger sample size might be able to find a significant difference between the two agents.

CONCLUSION

In conclusion, for RSI a lower dose of ROC at 0.6mg/kg

provides comparable intubation condition in comparison to SCH used at 1mg/kg. The lower incidence of ST and PH with ROC at this dose is an additional merit and clears the choice of drug for RSI.

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