Critical Review Form
Therapy

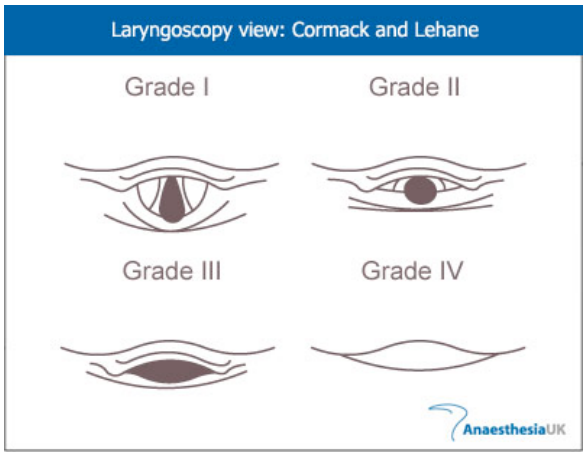
Comparison of succinylcholine and rocuronium for first-attempt intubation success in the emergency department. *Acad Emerg Med.*

Objectives: "To determine the effect of paralytic type and dose on first-attempt intubation success in the ED." (p. 12)

Methods: This was a retrospective evaluation of data collected prospectively from July 1, 2007 to October 31, 2008 in an academic tertiary care center designated as a Level I trauma center, associated with an emergency medicine residency. Subjects included consecutive patients intubated in the ED during the study period. Exclusion criteria were:

1) **Age < 18 years**
2) **Patients not receiving RSI**
3) **Patients receiving medications other than etomidate for sedation**
4) **Patients receiving medications other than succinylcholine or rocuronium for paralysis**
5) **Patients with missing documentation in the database or medical record.**

Data collected prospectively by the provider performing the intubation included age, sex, reason for intubation, medications used for RSI, presence of difficult airway predictors, device used, EP experience, and laryngeal view using the Cormack-Lehane (CL) classification system. Data collected retrospectively by medical record review included height, weight, and drug doses. Appropriate methods of retrospective data collection were used (Gilbert 1996 and Worster 2004).



Cormack and Lehane Classification	
Grade I	**Complete glottis visible**
Grade II	**Anterior glottis not seen**
Grade III	**Epiglottis seen, but not glottis**
Grade IV	**Epiglottis not seen**

The primary outcome measure was first-attempt intubation success, based on paralytic type and dose. Additional outcomes included overall success of intubation attempt and number of attempts required. The effect of patient age, sex, body mass

index, physician experience, presence of difficult airway predictors, device used, and laryngeal view were also evaluated.

Of 621 patients intubated during the study period, 327 met inclusion criteria and were included in the final analysis; 113 (35%) received succinylcholine and 214 (65%) received rocuronium. These groups were similar with respect to reason for intubation, difficult airway predictors, laryngeal view, intubating device, and physician experience (see Table 1).

Table 1
Demographic and Intubation Data (n = 327)

	Succinylcholine (*n* = 113)	Rocuronium (*n* = 214)
Patient demographics		
Age, yr (mean ± SD)	47.4 ± 20.6	46.7 ± 21
Weight, kg (mean ± sd)	82.5 ± 24.3	78.5 ± 19
Body mass index (mean ± SD)	27.4 ± 8.1	26.2 ± 5.9
Trauma patient, *n* (%)	60 (53)	118 (55)
Intubation data		
Reason for intubation, *n* (%)		
Airway protection	79 (70)	158 (73.8)
Patient control	8 (7.1)	24 (11.2)
Respiratory failure	23 (20.4)	28 (13.1)
Hypoxia	2 (1.8)	3 (1.4)
Cardiac arrest	1 (0.9)	1 (0.4)
Laryngeal view,* *n* (%)		
Grade 1	58 (51.3)	139 (65)
Grade 2	34 (30.1)	45 (21)
Grade 3	13 (11.5)	21 (9.8)
Grade 4	8 (7.1)	5 (2.3)
Difficult airway predictors,† *n* (%)		
≥1 present	81 (71.7)	153 (71.5)
Device, *n* (%)		
Direct laryngoscopy	72 (63.7)	121 (56.5)
GlideScope	37 (32.7)	76 (35.5)
Other	4 (3.5)	17 (7.9)
Physician experience, *n* (%)		
First-year resident	18 (15.9)	36 (16.8)
Second-year resident	41 (36.3)	84 (39.3)
Third-year resident or attending	51 (45.1)	88 (41.1)
Number of intubation attempts, *n* (%)		
1	82 (72.6)	156 (72.9)
2	25 (22.1)	37 (17.3)
≥3	6 (5.3)	21 (9.8)

*Cormack-Lehane classification.
†Blood in airway, vomit in airway, facial trauma, cervical immobility, obesity, airway edema, small mandible, short neck, large tongue, other.

Guide		Comments
I.	**Are the results valid?**	
A.	**Did experimental and control groups begin the study with a similar prognosis (answer the questions posed below)?**	
1.	Were patients randomized?	No. This was a retrospective study on prospectively collected data; the choice of using succinylcholine vs. rocuronium was at the discretion of the treating physician. This could potentially lead to selection bias.
2.	Was randomization concealed (blinded)?	No. The patients were not randomized, and group allocation was not concealed.
3.	Were patients analyzed in the groups to which they were randomized?	Yes. Patients were analyzed according to which paralytic they received, and there was no crossover noted. There were 93 patients excluded due to missing documentation, and we do not know how many of these patients were in each of the groups.
4.	Were patients in the treatment and control groups similar with respect to known prognostic factors?	Yes. The authors indicate that the groups were similar with respect to age, weight, BMI, presence of difficult airway predictors, laryngeal view, intubating device, and physician experience (Table 1). However, the proportion of patients in the succinylcholine and rocuronium groups with Grade 1 (51.3% vs. 65%, p = 0.017) and Grade 4 (7.1% vs. 2.3%, p = 0.037) laryngeal views differ. Additionally, the lack of randomization could have resulted in prognostic imbalance with respect to unknown confounders.
B.	**Did experimental and control groups retain a similar prognosis after the study started (answer the questions posed below)?**	
1.	Were patients aware of group allocation?	Yes and no. While blinding of participants is generally recommended when feasible, these were patients being sedated and paralyzed for intubation and were unlikely to be aware of group allocation. They were unlikely to be subject to performance bias.
2.	Were clinicians aware of group allocation?	Yes. Paralytic choice was at the discretion of the treating physicians. Performance bias could therefore be introduced.
3.	Were outcome assessors aware of group allocation?	Uncertain (likely yes). There is no explicit mention of outcome assessors being blinded, and as the paralytic choice would be in the

		medical records, it is unlikely that blinding occurred.
4.	Was follow-up complete?	No. 93 patients were excluded from analysis due to missing or incomplete documentation. The number of excluded patients in each group is not provided, and it is possible that attrition bias was introduced.
II.	**What are the results (answer the questions posed below)?**	
1.	How large was the treatment effect? Table 2 Factors Predictive of First-attempt Intubation Success (Univariate Logistic Regression) OR / 95% CI / p-value Age, yr 1 0.99–1.02 0.54 Body mass index 1 0.96–1.04 1 Male* 0.6 0.35–1.04 0.07 Rocuronium† 1.02 0.61–1.7 0.95 Paralytic dose Succinylcholine 0.58 0.29–1.13 0.11 Rocuronium 1.1 0.51–2.4 0.81 Laryngeal view‡ 55.18 18.87–161.39 <0.001 Difficult airway predictor§ 0.55 0.31–0.99 0.05 Device‖ 0.57 0.34–0.96 0.03 Physician experience¶ Second-year resident 1.15 0.58–2.26 0.7 Third-year resident or attending 1.74 0.87–3.48 0.12 *Likelihood due to male. †Likelihood due to rocuronium. ‡Likelihood due to Grade 1 or 2 Cormack-Lehane classification. §Blood in airway, vomit in airway, facial trauma, cervical immobility, obesity, airway edema, small mandible, short neck, large tongue, other. ‖Likelihood due to direct laryngoscopy compared to GlideScope or other devices. ¶Compared to first-year residents.	• All patients were successfully intubated. • First-attempt intubation success was similar between the succinylcholine and rocuronium groups: 72.6% vs. 72.9% (p = 1.00), for a RR of 1.0 (95% CI 0.87-1.15). • Median number of intubation attempts was similar between the succinylcholine and rocuronium groups: 1, interquartile range (IQR) 1-2 and 1, IQR 1-2. • Median doses for succinylcholine and rocuronium were 1.65 mg/kg (IQR 1.26-1.95 mg/kg) and 1.19 mg/kg (IQR 1-1.45 mg/kg). • Unadjusted odds ratios for various predictors of intubation success are shown in Table 2. The only factor predictive of first-attempt intubation success was laryngeal view (OR 55.18), while the presence of 1 or more difficult airway predictors and direct laryngoscopy (compared to use of Glidescope or another difficulty airway device) were associated with decreased success rates (OR 0.55 and 0.57 respectively). The use of unadjusted odds ratios does not take into account differences in confounding variables (such as CL laryngoscopy view) (Szumilas 2010).
2.	How precise was the estimate of the treatment effect?	See above.
III.	**How can I apply the results to patient care (answer the questions posed below)?**	
1.	Were the study patients similar to my patient?	Yes. These were emergency department patients in a large, level I, tertiary care, academic institution.

2.	Were all clinically important outcomes considered?	No. The outcomes included first-attempt intubation success, overall success, and number of attempts. More patient-important outcomes could have been considered, including mortality, neurologic status, complication rates (such as aspiration), hospital length-of-stay, and cost.
3.	Are the likely treatment benefits worth the potential harm and costs?	Yes. Based on the results of this study, intubation success is similar with succinylcholine and rocuronium, and the use of either agent is reasonable.

Limitations:

1) **Retrospective study design with no randomization.**

2) **The rocuronium group had more patients with Grade 1 and less patients with Grade 4 laryngeal views. This prognostic imbalance favors the rocuronium group.**

3) **The clinical significance of first attempt intubation success is unclear. More patient-important outcomes should be considered.**

4) **The authors should include the proportion of patients from each group not included due to incomplete documentation.**

Bottom Line:

This non-randomized, retrospective observation trial conducted in ED patients compared succinylcholine and rocuronium in RSI. No difference was observed in the primary outcome, first-intubation success. Laryngeal view was shown to be a significant predictor of first-intubation success, however the two groups differed with respect to the view obtained, with more Grade 1 views and fewer Grade 4 views in the rocuronium group. It is unclear if this difference could be attributed to the drug (i.e. rocuronium provides better paralysis and hence better laryngeal views) or to a difference in the populations that could bias the results.