Succinylcholine is still KING!

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KEY POINTS

- Succinylcholine produces better intubation conditions than Rocuronium
- Succinylcholine improve your ability to mask ventilate
- Recovery from Succinylcholine is realistically as quick as Rocuronium followed by megadose Suggamadex

Special Thank You! and acknowledgement to Dr. Albert J. Varon for providing his lecture slides, question results and references from the 2016 Annual Meeting for the Trauma Anesthesiology Society

"A drug capable of generating so many controversies, surviving so many crises, so uniquely short acting and rapid in onset, and inexpensive, will not just die."

-Dr. Chingmuh Lee, 1984

This was quoted over 3 decades ago and still holds true today. As you can see in **Figure 1**, it was preferred at our annual meeting this past year. With its low cost, fast onset, and reliable end point, Succinylcholine is still widely used for neuromuscular blockade, but why is it a particularly good drug in trauma? Below we present 5 more reasons why we feel Succinylcholine is superior to Rocuronium.

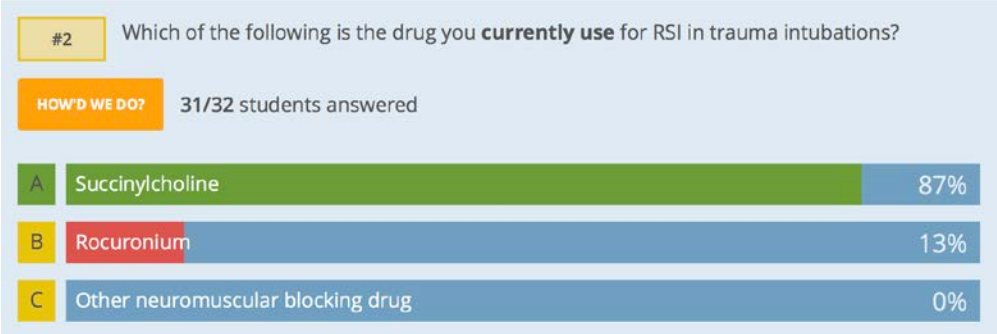

Fig 1. Response from the TAS annual meeting 2016 to what medication is given for RSIs

First, Succinylcholine produces better intubation conditions than Rocuronium. A Cochrane review looked at a comparison of Rocuronium vs Succinylcholine for Rapid Sequence Induction (RSI). This included 50 trials and 4,151 patients. Intubating conditions were scored based on ease of laryngoscopy, vocal cord opening, and intubation response. The primary outcome of the study was excellent intubating conditions versus other intubating conditions and Succinylcholine was found to be superior to Rocuronium for achieving excellent conditions (defined as easy laryngoscopy, open vocal cords, and no intubation response). The secondary outcome compared acceptable versus suboptimal intubating conditions, and again, Succinylcholine proved superior. The conclusion of the Cochrane study was, "Succinylcholine creates excellent intubation conditions more reliably than Rocuronium and should still be used as a first-line muscle relaxant for rapid sequence induction endotracheal intubations."[1]

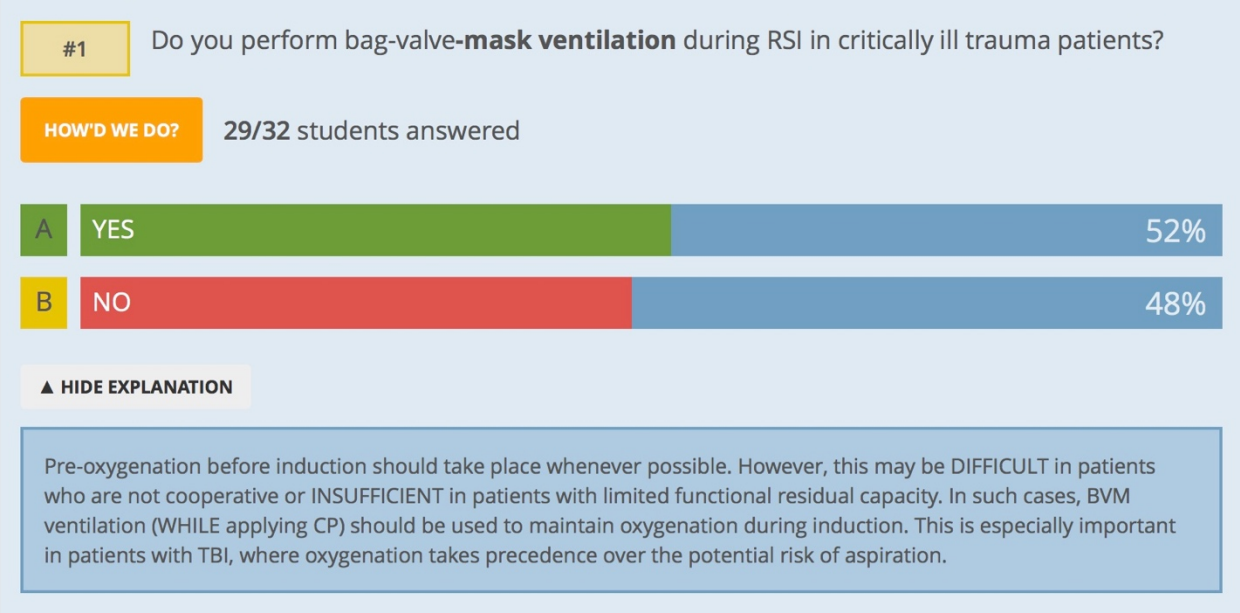

Fig 2. Response from the TAS annual meeting 2016 about bag mask ventilating prior to intubation

Second, Succinylcholine improves face mask ventilation during RSI. Although face mask ventilation may cause some anesthesiologists to cringe, the use of cricoid pressure can prevent gastric insufflation during face mask ventilation.[2] Many providers of anesthesia bag mask ventilate for certain patients (see **Figure 2**).[3] Several studies have failed to show insufflation of the stomach with up to 50 cmH_2O pressure during mask ventilation when cricoid pressure is used.[3] Furthermore, there is a Grade B recommendation that bag mask ventilation should not be avoided during RSI.[4]

Ikeda A, et al. looked at the effects of muscle relaxants on mask ventilation in anesthetized persons with normal upper airway.[5] They studied 42 patients undergoing elective surgery and measured tidal volume during face mask ventilation before and after Rocuronium and Succinylcholine. Succinylcholine proved superior to Rocuronium in increasing tidal volume.[5] In addition, the investigators reported reported dilation of the airway space during sux-induced paharyngeal fasciculations. Thus, in the advent of an unanticipated difficult intubation, Succinylcholine not only improves intubation conditions compared to Rocuronium, but it may less likely result in a "Can't intubate, Can't ventilate" scenario. The ability to mask ventilate, even a little bit, would allow additional time for help or equipment to arrive to the anesthetizing location.

The third reason succinylcholine is superior, is that Rocuronium "rescue" reversal in "Cannot intubate, cannot ventilate" is a myth. The utility of Sugammadex as a rescue measure in a "Cannot intubate, cannot ventilate" (CICV) situation has been debated and opinions are divided. Although case reports exist showing success,[6,7] as well as, failure.[8,9] In this regard, it is the opinion of the authors that factors such as availability of the drug, time to administration, and time to achieve acceptable "train of four (TOF)" limit the viability of Sugammadex as a rescue measure. A study using simulation by Bisschops et al.,[10] looked at the average total time it took to accomplish the above goals. They found that the average time taken to obtain Sugammadex, draw up a reversal dose (16 mg/kg), and administer it was 6.7 minutes. The time to achieve a TOF of 0.9 was 2.2 minutes for a total time to reversal of 8.9 minutes! (The same time for 50% of patients to recover from 1 mg/kg of Succinylcholine)[11] Even in a properly pre-oxygenated patient (which would not likely be the case in an emergency) this lag time is detrimental and potentially catastrophic. Using simulation, Naguib et al. explored how rapid reversal of neuromuscular blockade with Sugammadex improves return of spontaneous ventilation. They also concluded that reversal in CICV situations does not guarantee a patent airway or effective gas exchange which is especially true in the obese population.[12]

Just in case you were still considering reversal of Rocuronium as an acceptable alternative to Succinylcholine, megadose Sugammadex reversal is expensive. The recommended dose of Sugammadex is 16 mg/kg after an RSI dose of Rocuronium (1.2 mg/kg). An 80 kg adult would require 1,280 mg for a total cost to the patient of $494.37! That's a pretty steep price if you still need a neurologic exam, see **Figure 3**. Although side effects are rare, Sugammadex does not come without side effects, especially in higher doses. The side effect profile includes anaphylaxis, bradycardia, hypotension, and cardiac arrest. Sugammadex can cause a dose dependent

prolongation of PT, PTT, INR and it binds to contraceptive drugs rendering them ineffective for a short period of time.

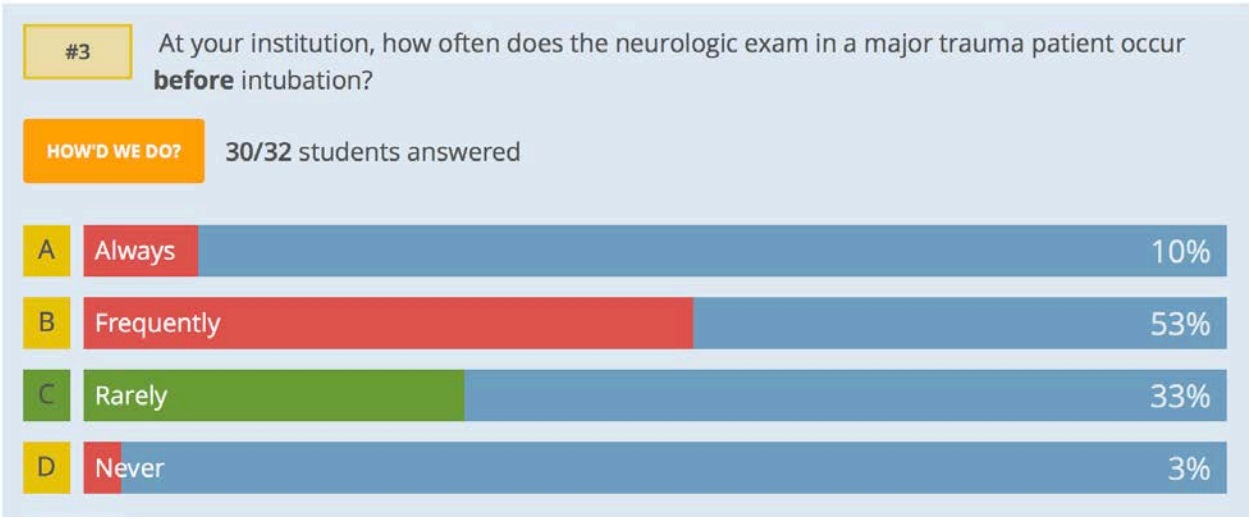

Fig 3. Response from the TAS annual meeting 2016 about performing a neurologic exam prior to intubation

Just in case you haven't been convinced yet, the final reason that you should choose Succinylcholine is, you should just join the bandwagon. The development of Sugammadex has increased the use of Rocuronium. However, Succinylcholine is still the most commonly used neuromuscular blocking drug for RSI (refer back to **Figure 1**). In a survey published in the British Journal of Anesthesia, Sajayan et al. found that the majority of respondents usually use Succinylcholine over Rocuronium for RSI.[13] Furthermore, Hung et al. informally asked colleagues from ten countries if Succinylcholine was used for RSI and 70% of respondents reported doing so.[14]

The short end of the story is that Succinylcholine will still be part of the Anesthesiologist's armamentarium for a long time. It provides faster, better, and cheaper intubating conditions. It makes the feared "can't intubate, can't ventilate" situation less likely. No wonder it is so widely popular.

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