Clinical Pearl 86
Paralytics in Rapid Sequence Intubation (RSI)

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Case: A 35-year-old woman presents after an opiate and alcohol overdose refractory to naloxone. You quickly make the decision that this patient needs to be intubated. You are deciding which medicine to give the patient. You decide ketamine and succinylcholine... Wait, ketamine and rocuronium…" Which one is better?

There has been much debate over which type of neuromuscular blockade should be used to paralyze patients during rapid sequence intubation (RSI). RSI is widely considered the safest and preferred method to intubate a critical patient who is at increased risk for pulmonary aspiration or airway compromise in order to increase the chance of first pass success and visualize the vocal cords. In general, RSI is performed by first administering a sedative, followed rapidly by a paralytic, before an attempt is made to intubate. Many providers choose their preferred paralytic based on side effect profile, length of action, and experience, but let's delve into the evidence about which medication is superior for patient safety and success of intubation.

Succinylcholine has been traditionally used as a first line paralytic due to its quick onset of action and short half-life. Succinylcholine's duration of action is 10-15 minutes, whereas the half-life of rocuronium is anywhere from 30-90 minutes, depending on dose. However, succinylcholine has major side effects, including hyperkalemia, malignant hyperthermia, fasciculations, and bradycardia. These effects are seen most significantly in patients with prior stroke, baseline neuromuscular disease, and recent burn victims. Rocuronium has a much more limited side effect profile, limited to hepatotoxicity.

Tran *et al* performed a Cochrane review in 2015 evaluating whether rocuronium could provide similar intubating conditions to succinylcholine for RSI. The review included results of a total of 50 trials, totaling >4000 patients. In general, succinylcholine was found to be superior to rocuronium when succinylcholine was dosed 1 mg/kg and rocuronium was dosed 0.6 mg/lg. When higher doses of rocuronium (1.2 mg/kg) were compared with succinylcholine, there was no difference between the two drugs. So maybe we just need to be increasing our doses of rocuronium?

Life in The Fast Lane discusses this topic further in May of 2016, where they address the belief that succinylcholine has a faster onset of action than rocuronium. Traditionally, succinylcholine is dosed 1-1.5 mg/kg and rocuronium is dosed 0.6-1.2 mg/kg. Succinylcholine generally takes 45-60 seconds for onset of laryngeal paralysis. When rocuronium is dosed at the lower end of this range, it's onset of action is longer than the 45-60 seconds required for succinylcholine. However, if it is dosed at the higher end of this range, at least 1.2 mg/kg, rocuronium's onset of action is 45-60 seconds, just like succinylcholine. Finally, rocuronium has a 40 second longer safe apnea time when compared to succinylcholine. Safe apnea time is defined as the time required for a patient to clinically desaturate, with an Sp02 <88%, after paralysis. The proposed mechanisms for rocuronium's increased safe apnea time may be the increased oxygen consumption from the fasciculations induced by succinylcholine.

Take home points:

- Rocuronium is equivalent to succinylcholine in achieving intubating conditions and onset of action when dosed appropriately
- When using rocuronium, give big doses of at least 1.2 mg/kg
- Succinylcholine has a more extensive side effect profile than rocuronium, including significant hyperkalemia which could lead to deadly arrythmias
- Rocuronium has a much longer duration of action than succinylcholine, approximately 90 minutes, so be sure to properly sedate your patients until the paralytics wear off

References:

1. El-Orbany M, Connolly LA. Rapid sequence induction and intubation: current controversy. Anesth Analg. 2010 May 1;110(5):1318-25. Epub 2010 Mar 17. Review.
2. Mallon WK, Keim SM, Shoenberger JM, Walls RM. Rocuronium vs. succinylcholine in the emergency department: a critical appraisal. J Emerg Med. 2009 Aug;37(2):183-8. Epub 2008 Dec 20. Review.
3. Perry JJ, Lee JS, Sillberg VA, Wells GA. Rocuronium versus succinylcholine for rapid sequence induction intubation. Cochrane Database Syst Rev. 2008 Apr 16;(2):CD002788. Review.
4. Life in the Fast Lane. Does Roc rock? Does Sux suck?
5. Tran, D. T., Newton, E. K., Mount, V. A., Lee, J. S., Mansour, C. , Wells, G. A. and Perry, J. J. (2017), Rocuronium vs. succinylcholine for rapid sequence intubation: a Cochrane systematic review. Anaesthesia, 72: 765-777. doi:10.1111/anae.13903