Rocuronium *vs* suxamethonium for rapid sequence induction

Suxamethonium has traditionally been the muscle relaxant of choice when performing rapid sequence induction for endotracheal intubation. Rocuronium is gaining in popularity as an alternative, in part because of increasing familiarity with sugammadex, which can reverse profound rocuronium-induced neuromuscular blockade. This article discusses the arguments for and against the use of suxamethonium and rocuronium for rapid sequence induction.

Suxamethonium

Suxamethonium exhibits rapid onset and offset of action and provides excellent intubating conditions (Sorensen et al, 2012). The time taken to achieve optimal intubation conditions is important as this is the period of time before a definitive airway can be established, when the patient is most at risk of aspiration. The majority of studies show that suxamethonium results in a shorter time to intubation (Wallace and McGuire, 2014).

Suxamethonium's short duration of action is a common reason for its use, in theory allowing a patient to recover spontaneous ventilation in a 'cannot intubate, cannot oxygenate' scenario. However, the return to spontaneous ventilation is longer with suxamethonium 1 mg/kg for rapid sequence induction than with rocuronium and sugammadex (Sorensen et al, 2012). This is compounded by increased oxygen consumption caused by skeletal muscle fasciculation, particularly relevant to obese patients. Suxamethonium also has well-documented undesirable side effects, such as bradycardia, hyperkalaemia, asystole and malignant hyperpyrexia (Sorensen et al, 2012).

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Rocuronium

Rocuronium is a muscle relaxant with a long duration of action of up to 122 minutes at 0.9 mg/kg (Sorensen et al, 2012), whereas suxamethonium is metabolized more rapidly. The average recovery time from suxamethonium 1 mg/kg is 8.5 minutes, during which intubating conditions deteriorate progressively. In contrast intubating conditions with rocuronium are optimal until sugammadex is given (Sorensen et al, 2012). This may be advantageous as many aspects of airway management including abolishment of laryngeal reflexes, increased chest wall compliance and facilitation of facemask ventilation are improved by ensuring adequate neuromuscular block (Frerk et al, 2015). A rescue dose of sugammadex can reverse profound neuromuscular blockade, with return of spontaneous ventilation within 3 minutes (Sorensen et al, 2012).

The Cochrane meta-analysis by Tran et al (2015) found no significant difference in intubating conditions between suxamethonium and rocuronium provided the higher dose of rocuronium (0.9–1.2 mg/kg) was given. There was no clinical or statistical difference in the number of failed intubations with either drug.

Suxamethonium has many associated side effects (Wallace and McGuire, 2014). The risks associated with high dose rocuronium and sugammadex are few by comparison, with (rare) anaphylaxis the main concern (Wallace and McGuire, 2014). Sadleir et al (2013) found rocuronium caused 56% of cases of anaphylaxis *vs* 21% caused by suxamethonium. However, the relative incidence of anaphylaxis for different muscle relaxants is hard to quantify. The forthcoming Sixth National Audit Project into perioperative anaphylaxis may further our understanding in this area.

Rapid sequence induction is often used in emergency or critical care situations. In many clinical situations, waking the patient is not a realistic option, eliminating any advantage of a drug with rapid offset. A common argument against rocuronium is the cost of sugammadex. It currently costs about £340 (Joint Formulary Committee, 2015) for immediate neuromuscular blockade reversal (based on a rescue dose of 16 mg/kg for a 70 kg adult), although only a very small proportion of patients undergoing rapid sequence induction will require its use.

Conclusions

The much reduced side-effect profile and potential for rapid reversal with sugammadex make rocuronium a valid alternative to suxamethonium for rapid sequence induction. However, it is prudent to calculate the rescue dose of sugammadex and ensure its availability before embarking on this. **BJHM**

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