Succinylcholine *vs* rocuronium for intubation in the intensive care unit

Rapid sequence induction (RSI) of anaesthesia followed by tracheal intubation is the gold standard technique for securing the airway during emergency care. This was originally developed for the operating theatre, but has been used successfully in the emergency department and intensive care unit (ICU). Succinylcholine has been the muscle relaxant of choice owing to its rapid onset and short duration of action, but side effects have led to suggestions that its use in the ICU is now obsolete (Reynolds and Heffner, 2005). This article examines the evidence for this and compares it with the main alternative, rocuronium.

The degree of physiological derangement and co-morbidity in critically ill patients means that RSI can be risky, and any delays in establishing the airway may be poorly tolerated. A prospective evaluation of emergency tracheal intubation in critically ill patients found a significant frequency of major complications including difficult intubation (8%), oesophageal intubation (8%) and aspiration pneumonia (4%) (Schwartz et al, 1995). Bedside tests to assess the airway have not been validated for use in the ICU, and are impractical in many ICU patients. Adequate pre-oxygenation may not be possible, and hypoxaemia can occur rapidly after onset of anaesthesia. Rapidly securing the airway is the key to minimizing complications and for this, rapid onset of neuromuscular blockade is required.

Succinylcholine

Succinylcholine causes depolarization of the motor end-plate, and provides intubating conditions within 40–60 seconds. The most problematic adverse effect in the ICU setting is hyperkalaemia leading to cardiac arrhythmias; fatalities have been reported. Common conditions within the ICU, e.g. burns, sepsis, neuromuscular disease, prolonged immobility and spinal cord injuries, can lead to a more pronounced and unpredictable hyperkalaemic response.

One study looked at this exaggerated hyperkalaemia in 23 ICU patients, none of whom had polytrauma, burns or neuromuscular disorders (Castillo et al, 1996). Potassium levels were measured before, and 5 and 30 minutes after succinylcholine 1.5 mg/kg was given, and analysed against number of days in ICU. There was a mean increase in serum potassium at 5 minutes of 0.5 mEq/litre in patients whose ICU stay was <10 days, of 1.8 mEq/litre in those staying 10–30 days, and of 1.4 mEq/litre in those staying >30 days. In patients whose stay was <30 days, the percentage increase in potassium correlated directly with ICU length of stay (r=0.7, P<0.001). No malignant arrhythmias were observed, but the sample may have been too small to determine the incidence of this complication.

Rocuronium

Rocuronium is an aminosteroid, non-depolarizing muscle relaxant. Its onset of action is 1–2 minutes and duration of action is 45–70 minutes. It has relatively few adverse effects, except anaphylaxis, which has a similar incidence to other drugs in this class. A systematic review has compared relative outcomes of succinylcholine and rocuronium for intubation (Perry et al, 2003). The trials included looked at intubation in the operating room, not the ICU, and most were of elective patients. Succinylcholine 1 mg/kg was better at achieving 'excellent' intubating conditions than rocuronium 0.6 mg/kg (relative risk = 0.87; 95% confidence interval = 0.81–0.94, n=1606). However, when comparing the efficacy of the two drugs at achieving 'adequate' intubating conditions, no statistically significant difference was found. Similarly, there was no difference between the two drugs if propofol was used as an induction agent, or with rocuronium 1.0 mg/kg.

These data should be cautiously extrapolated to critical care. Conditions in ICU are rarely as optimal as in the operating room. The greater incidence of difficult tracheal intubation in ICU patients suggests that a drug which provides an adequate view at laryngoscopy under routine conditions may provide a poor view in difficult conditions.

Conclusions

When choosing a muscle relaxant, the anaesthetist needs to be aware of the potential for the exaggerated hyperkalaemic response to succinylcholine, and of the increased incidence of difficult tracheal intubation and associated complications in ICU patients. Further data are required on the efficacy of rocuronium in this setting before succinylcholine can be declared obsolete from the ICU. **BJHM**

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