

## Is it not the time to stop the use of Scoline<sup>®</sup> (suxamethonium chloride) for rapid sequence intubation?

أما آن الأوان لوقف استخدام السكولين في التنبيب السريع؟

Sir,

In 1992, the USA Food and Drug Administration (FDA) issued a warning in the Scoline<sup>®</sup> (suxamethonium chloride, GlaxoSmithKline, USA) package insert after receiving reports of intractable cardiac arrests.<sup>1</sup> It stated: "Since there may be no signs or symptoms to alert the practitioner as to which patients are at risk, it is recommended that the use of succinylcholine in children should be reserved for emergency intubation or instances where immediate securing of the airway is necessary, e.g. laryngospasm, difficult airway, full stomach or intramuscular (IM) use when a suitable vein is inaccessible."

Scoline<sup>®</sup> has been used for rapid sequence tracheal intubation since its introduction into clinical practice in Europe in 1951 and in the USA in 1952.<sup>2</sup> It gained popularity for its quick onset (less than 60 seconds) and ultrashort duration of action. Scoline<sup>®</sup> came to rule the practice of anaesthesia and continues to do so even today. It is the gold standard against which the other muscle relaxants are compared;<sup>3</sup> however, a number of clinical case reports have shown clearly that the use of scoline has been associated with a number of serious adverse effects<sup>4,5</sup> and its use has declined since 1992.

In our hospital, there have been cases (unpublished reports) of prolonged apnoea and trismus following scoline use. Since it is not possible to predict at the outset which patient will have prolonged apnoea unless a family history is available, is it prudent to use scoline in cases of anticipated difficult intubation? Cardiac arrests after Scoline<sup>®</sup> use have been reported in Japan in pregnant patients who had been immobilised due to concern about preterm labour.<sup>6</sup> A couple of reports even mention that the use of Scoline<sup>®</sup> led to a 'can't ventilate and can't intubate' situation due to severe trismus in an emergency,<sup>7,8</sup> and even following attempts at routine intubation.<sup>9</sup> Are these adverse effects acceptable in current day practice of medicine and anaesthesia?

For the quick onset of relaxation of vocal cords, rocuronium bromide, a non-depolarising muscle relaxant, is available (Esmeron<sup>®</sup> N.V. Organon, Oss, Netherlands). It was introduced in clinical practice in 1994 and has been used in many countries for the last 17 years. It belongs to the aminosteroid group and studies show that it achieves rapid onset of good intubating conditions within 60 seconds if a dose of 1.2 mg/kg is given intravenously.<sup>10-13</sup> In patients for whom intravenous access is not available it can even be administered intramuscularly.<sup>14</sup> It has been safely administered in the paediatric age group from 1–24 months of age.<sup>15</sup>

When comparing the intubating conditions between rocuronium and Scoline<sup>®</sup>, the Cochrane database meta-analysis found that rocuronium is less effective than succinylcholine for creating excellent intubation conditions and recommended that rocuronium should therefore only be used as an alternative to succinylcholine when it is known that succinylcholine should not be used.<sup>16</sup> However, in an emergency situation it is not known and cannot be predicted which patient will have an adverse reaction to Scoline<sup>®</sup>.<sup>6-8</sup>

On reviewing and comparing the overall safety and efficacy profile, rocuronium has not shown any of the serious adverse reactions seen with scoline. It is even used safely in asthmatic patients.<sup>17</sup> The only adverse reaction is hypersensitivity, but the overall incidence is not more than Scoline<sup>®</sup>, or other non-depolarising muscle relaxants. The main concern with rocuronium has been the long duration of action.<sup>18</sup> The possibility of awakening the patients in case of an inability to ventilate was the main reason preventing the use of this drug for rapid sequence intubation.

With the availability of sugammadex sodium (Bridion<sup>®</sup>, Schering-Plough Merck, USA) this should no longer be a barrier to using rocuronium. It has been recommended to the cardiac anaesthesiologist for clinical use for high risk patients at appropriate doses.<sup>21</sup> Sugammadex is a cyclodextrin derivative which seems to

provide a faster onset-offset profile than that seen with 1.0 mg/kg succinylcholine.<sup>20</sup> This drug has even been used as an antidote to the muscle relaxant in case of a hypersensitivity reaction.<sup>19</sup> It was approved for clinical use by the European Medicines Agency in 2008.<sup>22</sup> It awaits FDA approval in the USA due to concerns about its hypersensitivity, but there is no concern about its efficacy.<sup>21</sup>

Nowadays, we have intubating laryngeal mask airway (iLMA), proseal airway and gum elastic bougie for securing the airway in case intubation is difficult. We would not like any patient to develop severe trismus and make the possibility of ventilating difficult or even impossible in an emergency situation.

Therefore the time has now come to reconsider the recommendations and indeed to discontinue the use of Scoline<sup>®</sup> for rapid sequence intubation.

#### CONFLICT OF INTEREST

The author has declared no conflict of interest and is in no way influenced by the manufacturers of any drug mentioned in this letter.

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## References

- Rosenberg H, Gronet GA. Intractable cardiac arrests in children given scoline. *Anesthesiology* 1992; 77:1054–6.
- Foldes FE, McNall PG, Borrego-Hinojosa JM. Succinylcholine: a new approach to muscular relaxation in anesthesiology. *New Engl J Med* 1952; 247:596–600.
- Savarese JJ, Caldwell JE. Pharmacology of muscle relaxants and their antagonists. In: Miller RD, Cuccharia RF, Miller ED, Geral Reves J, Roizen ME, Savarese JJ, Eds. 5th ed. Philadelphia, PA: Churchill Livingstone-Elsevier, 2000. Vol. 1, Pp. 419–26.
- Wang JM, Stanley TH. Duchenne muscular dystrophy and malignant hyperthermia: Two case reports. *Can Anesth Soc J* 1986; 33:492–7.
- Wu CC, Tseng CS, Shen CH, Yang TC, Chi KP, Ho WM. Succinylcholine induced cardiac arrest in children with unsuspected Beck muscular dystrophy: A case report. *Acta Anaesthesiolog Sin* 1998; 36:165–8.
- Sato K, Nishiwaki K, Kuno N, Kumagai K, Kitamura H, Yano K, et al. Unanticipated hyperkalemia following succinylcholine administration in prolonged immobilized parturients treated with magnesium and ritodrine. *Anesthesiology* 2000; 93:1539–41.
- Bauer SJ, Orio K, Adams BD. Succinylcholine induced masseter spasm during RSQI may require a surgical airway. *Emerg Med J* 2005; 22:456–8.
- Gill M, Graeme K, Guenterberg K. Masseter spasm after succinylcholine administration. *J Emerg Med* 2005; 29:167–71.
- Onyeka TCU. Masseter muscle rigidity: Atypical malignant hyperthermia presentation or isolated event? *Saudi J Anaesth* 2010; 4:205–6.
- McCourt KC, Salmela L, Mirakhor RK, Carrol M, Miakinen MT, Kansanaho M, et al. Comparison of rocuronium and suxamethonium for use during rapid sequence induction of anesthesia. *Anaesthesia* 1998; 53:867–71.
- Andrews JI, Kumar N, Van Den Brom RHG, Olkkola KT, Roest GJ, Wright PMC, et al. A large simple randomized trial of rocuronium versus succinylchoine in rapid-sequence induction of anesthesia along with propofol. *Acta Anaesthesiol Scand* 1999; 43:4–8.
- Heier T, Caldwell JE. Rapid tracheal intubation with large dose rocuronium: A probability based approach. *Anesth Analg* 2000; 90:175–9.
- Larsen PB, Hansen EG, Jacobsen LS, Wiis J, Holst P, Rottensten H, et al. Intubation conditions after rocuronium or succinylcholine for rapid sequence induction with alfentanil and propofol in the emergency patient. *Eur J Anesthesiol* 2005; 22:748–53.
- Reynolds LM, Lau M, Brown R, Luks A, Fisher DM. Intramuscular rocuronium in infants and children: Dose ranging and tracheal intubating conditions. *Anesthesiology* 1996; 85:231.

15. Devys JM, Mourissoux G, Donnette FX, Platt R, Schauvliège F, Le Bigot P, et al. Intubating conditions and adverse events during sevoflurane induction in children. *Br J Anaesthes* 2011; 106:225–9.
16. Perry JJ, Lee JS, Sillberg VAH, Wells GA. Rocuronium versus succinylcholine for rapid sequence induction intubation. *Cochrane Database Syst Rev* 2008; 2:CD002788. DOI: 10.1002/14651858.CD002788 .pub2.
17. Burburan SM, Xisto DG, Rocco PRM. Anaesthetic management in asthma. *Minerva Anesthesiol* 2007; 73:357–65.
18. Claudius C, Karacan H, Viby-Mogensen J. Prolonged residual paralysis after a single intubating dose of rocuronium. *Br J Anaesth* 2007; 99:514–7.
19. McDonnell NJ, Pavy TJG, Green LK, Platt PR. Sugammadex in the management of rocuronium-induced anaphylaxis. *Br J Anaesthes* 2011; 106:199–201.
20. Lee C, Jahr JS, Candiotti K, Warriner B, Zorrows MH. Reversal of profound NMB with sugammadex is faster than recovery from succinylcholine. *Anesthesiology* 2007; 107:A988.
21. Hemmerling TM, Zaouter C, Geldner G, Nauheimer D. Sugammadex - A short review and clinical recommendations for the cardiac anesthesiologist. *Ann Card Anaesth* 2010; 13:206–16.
22. Bridion R. Sugammadex injection - First and only selective relaxant binding agent approved in European Union. Schering-Plough Press release: 2008-07-29. From: [http://www.schering-plough.com/schering\\_plough/news/release.jsp?releaseID=1180933](http://www.schering-plough.com/schering_plough/news/release.jsp?releaseID=1180933). Accessed: Aug 2008.