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Title : CAN NORCURON BE USED FOR INTUBATION?

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Introduction. Norcuron is a new non-depolarizing muscle relaxant with a structure similar to that of pancuronium. However, Norcuron is 1.5 times more potent and its duration of action is one-third that of pancuronium. Since a short-acting, non-depolarizing muscle relaxant has been sought to replace or supplement succinylcholine, we assessed the efficacy of Norcuron for endotracheal intubation.

Methods. We obtained informed consent and approval from the Committee on Human Research to study 16 ASA I or II patients scheduled for surgery. We assessed neuromuscular function by quantitating the force of thumb adduction with a Grass FT-10 force displacement transducer in response to supramaximal stimulation of the ulnar nerve at the wrist. Anesthesia was induced with thiopental, 1-2 mg/kg iv, and inhalation of 70% nitrous oxide. Patients were divided into three groups and received Norcuron in doses of 0.07, 0.14, or 0.28 mg/kg (respectively, three, six, or nine times the ED₉₀ of Norcuron, as determined in earlier studies). As soon as twitch tension was abolished, the trachea was intubated. The conditions affecting intubation were assessed and scored as follows: 0 = vocal cords abducted, good visualization, no patient movement; 1 = vocal cords abducted, good visualization, diaphragmatic movement; 2 = vocal cords slightly abducted, fair visualization, coughing on intubation; or 3 = vocal cords moderately abducted, difficult visualization, gross movement of extremities with coughing on intubation. Anesthesia was then maintained with halothane, 0.4 to 1.0%, as determined by mass spectrometry; and ventilation was controlled. Arterial carbon dioxide tension and patient temperature were kept within normal range throughout the operation. We also determined onset (time from injection to loss of muscle twitch), duration (time from injection to 90% recovery of control muscle twitch tension), and recovery time (time from 25 to 75% recovery of control muscle twitch tension). Finally, five additional patients were studied in an identical manner, except that they received halothane, 0.4 to 1.0%, for 10 min before Norcuron, 0.14 mg/kg, was given. Using a two-tailed Student *t* test, we compared the onset times for this group with data obtained in the patients previously described who had received the same dose of Norcuron.

Results. Results are summarized in Table 1. The group of patients who received halothane before receiving Norcuron, 0.14 mg/kg, had an onset time of 2.0 ± 0.3 min, which is significantly shorter than the onset time of those who received the same dose of Norcuron without halothane (*P* < 0.005).

Discussion. In doses of 0.07 to 0.14 mg/kg, Norcuron is satisfactory for endotracheal intubation. Although the onset times of Norcuron are similar to those for equivalent doses of pancuronium,^{1,2} several features of Norcuron make it a promising agent for endotracheal intubation. Although it is 1.5 times more potent than pancuronium, its duration of action is at least one-third shorter than that of pancuronium.^{1,2} Thus, prolonged neuromuscular blockade should occur less frequently after Norcuron than after pancuronium. Secondly, the onset time can be shortened by concomitant administration of halothane. Lastly, our experimental design probably prolonged the actual time necessary to achieve satisfactory conditions for intubation after administration of Norcuron. It is not necessary to wait until the twitch is completely obliterated to intubate the trachea, as was done in this study (Agoston, S: personal communication). Therefore, satisfactory conditions for intubation can be achieved approximately 2 min after administration of Norcuron (0.14 mg/kg). This fact, combined with Norcuron's shorter duration of action, its lack of cardiovascular effects,³ and easy reversibility with neostigmine, indicate that more extensive clinical trials are justified.

References

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2. Katz RL: Clinical neuromuscular pharmacology of pancuronium. *Anesthesiology* 34:550-556, 1971
3. Booij LHDJ, Edwards, R, Sohn YJ, et al: Cardiovascular and neuromuscular effects of Org NC 45, pancuronium, metocurine, and d-tubocurarine in dogs. *Anesth Analg (Cleve)* 59:26-30, 1980

Table 1.

| Norcuron (mg/kg) | Onset (min) | Duration (min) | Recovery Time (min) | Intubating Score |
|------------------|-------------|----------------|---------------------|------------------|
| 0.07 (n=6) | 4.2 ± 0.5 | 36.6 ± 2.5 | 7.9 ± 0.3 | 1.3 ± 0.4 |
| 0.14 (n=5) | 2.8 ± 0.1 | 103.7 ± 6.4 | 20.7 ± 1.2 | 0.5 ± 0.2 |
| 0.28 (n=5) | 2.1 ± 0.4 | 171.7 ± 36.1 | 37.1 ± 6.7 | 0.0 |

Data are mean ± SEM.