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Title: RAPID TRACHEAL INTUBATION WITH VECURONIUM: THE PRIMING PRINCIPLE.

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Introduction. Tracheal intubation can be performed within about 1 min after the i.v. injection of succinylcholine (SCh). Sch, however, frequently has side effects and many cause may cause serious complications. With reasonable doses of nondepolarizing muscle relaxants (MR), suitable conditions for tracheal intubation can not be achieved in less than 2 to 3 min. Furthermore, with the exception of vecuronium, intubating doses of nondepolarizing MR may also have unwanted side effects. In exploring various possibilities for facilitation of rapid tracheal intubation it occurred that this may be accomplished by the administration of a nondepolarizing MR in divided doses. It was assumed that it would be feasible to select a "priming" dose of MR that would be just large enough to cause moderate inhibition of neuromuscular (NM) transmission, indicating greater than 75% occupancy of cholinoreceptors[1], without causing unpleasant symptoms in wake patients[2]. Tracheal intubation then could be performed rapidly after the injection of a second larger dose, that would increase receptor occupancy to about 90% necessary for profound NM block. The present study was undertaken to test the validity of this assumption.

Methods. This investigation, approved by the Institutional Review Boards, was carried out on 63 adult ASA classification 1 and 2 surgical patients of both sexes who signed informed consents In 19 patients (group I) after conventional premedication balanced anesthesia was induced with 1 µg/kg fentanyl, 75 µg/kg droperidol; sleeping doses of thiopental and maintained with N_2O-O_2 and incremental doses of fentanyl. After induction of anesthesia, the isometric twitch tension (P) of the adductor pollicis muscle, elicited by supramaximal square wave impulses of 0.2 msec duration, applied to the ulnar nerve at the wrist at 0.1 Hz was quantitated by a force displacement transducer and continuously recorded. When P became stable 15 µg/kg vecuronium was injected i v. and the T4/T1 ratio was recorded at 2 and 5 min. At about 5.5 min 50 to 100 µg of fentanyl followed at 6 min by 50 µg/kg vecuronium was injected i.v. rapidly. When P decreased to about 80% of control the trachea was intubated and the quality of intubating conditions was assessed. Subsequently the time of development of the maximal NM block (onset time) and the time between the start of injection of the intubating dose and the recovery of P to 25% of control (clinical duration) was noted. In 15 (group II) and 29 (group III) other similarly anesthetized patients tracheal intubation was performed when P decreased to about 80% of control following a single 100 µg/kg vecuronium or 0.6mg/kg succinylcholine.

Results. At 5 min after the administration of the priming dose P was 84.7 + 2.1 of control and the T4/T1 ratio was 0.77 + 0.03 indicating only minimal impairment of NM transmission. The observations summarized in the table indicate that satisfactory conditions for tracheal intubation and complete NM block developed more rapidly ($p < 0.002$; Student's t test) after the injection of 65 µg/kg vecuronium in divided doses (group I) or a single 0.6mg/kg SCh (group II) than after a single 100 µg/kg dose of vecuronium (group III). Clinical duration of the NM block in group I was shorter ($p < 0.001$) than in group II, but longer ($p < 0.001$) than in group III.

Discussion. Vecuronium administered in two, 15 and 50 µg/kg increments, 6 min apart provided equally satisfactory conditions for tracheal intubation, just as rapidly, as single 0.6mg/kg dose of SCh, and more quickly than a single 100 µg/kg dose of vecuronium. Because of the smaller total dose the clinical duration of the intubating dose was shortened when vecuronium was administered in divided doses. This may be of advantage in short lasting surgical procedures. An additional advantage of the described technique is that the reaction to the priming dose may reveal any undiagnosed pathological or idiopathic hypersensitivity[3] to MR. An other group of 10 patients not included in this report received the 15 µg/kg priming dose of vecuronium before induction of anesthesia. None of these patients complained of any unpleasant sensations during the 3 to 4 min between the injection of the priming dose of vecuronium and the administration of thiopental. These patients received the 50µg/kg intubating dose of vecuronium about 6 to 7 min after the priming dose and were intubated within 1.5 min.

References. 1.Paton WDM, Waud DR: The margin of safety of neuromuscular transmission. J Physiol 191: 59-90, 1967.

2. Foldes FF, Monte AP, Brunn HM, Wolfson B: Studies with muscle relaxants in unanesthetized subjects. Anesthesiology 22:230-236, 1961.

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Group	I(n=19)	II(n=15)	III(n=29)
Muscle Relaxant[1]	Vecuronium 15 + 50[2]	Vecuronium 100	Succinylchol. 600
Intubation Time[3]	1.1 ± 0.05[4]	2.6 ± 0.20[6]	1.1 ± 0.010
Intubation Score[5]	3 in 84 2 in 16	3 in 60 2 in 40	3 in 69 2 in 31
Onset Time	1.5 ± 0.12	5.9 ± 1.00[6]	1.6 ± 0.10
Clinical Duration	21 ± 1	36 ± 2[6]	6.3 ± 0.1

[1] g/kg; [2]Injected 6 min apart; [3]All times in min; [4]Mean + SEM; [5]In % of patients; [6]Different from groups I and III ($p < 0.001$; Student's t test).