NEUROMUSCULAR TRANSMISSION I

A829

Title: FACILITATION OF RAPID ENDOTRACHEAL INTUBATION WITH ATRACURIUM

Authors: H. Nagashima, M.D., H.D. Nguyen, M.D., S. Lee, M.D., R. Kaplan, M.D., D. Duncaif, M.D., F.F. Foldes, M.D.

Affiliation: Departments of Anesthesiology, Montefiore Medical Center and Albert Einstein College of Medicine, Bronx, New York 10467

Introduction: Administration of a subeffective dose of a non-depolarising muscle relaxant (MR) augments the neuromuscular (NM) effects of a subsequent dose of the same or another MR in vitro and in vivo. The present study investigated the influence of a subclinical dose of atracurium (ATR) on the time to develop suitable intubating conditions after a second dose of ATR.

Methods: After approval by our Institutional Review Board, informed consents were obtained from 70 ASA Class I and II adult surgical patients of both sexes. After premedication with diphendydramine and meperidine, balanced anesthesia was induced with droperidol, thiopental and fentanyl, and maintained with N2O, O2 and increments of fentanyl. After induction of anesthesia, the isometric twitch tension (P) of the adductor pollicis muscle elicited by supramaximal impulses of 0.2 msec duration at 0.1 Hz was continuously recorded. In group I, 75 μg/kg of ATR was injected intravenously (iv), followed by 250 μg/kg six min later. In groups II and III, doses of 400 or 500 μg/kg ATR were injected. Tracheal intubation (EI) was performed when P decreased to about 20% of control. The time from administering the intubating dose of ATR until EI, intubation score (3 = excellent; 2 = satisfactory; 1 = poor and 0 = impossible), maximal effect of the intubating dose, onset time (time to the development of maximal effect) and clinical duration (time from start of injection to recovery of P to 25% of control) were also observed. All patients were intubated when P decreased to 20% of control. To maintain surgical relaxation, 100 μg/kg of ATR was given whenever P returned to 25% of control. After the last dose of ATR, the time of recovery of P from 25 to 75% (recovery time) was noted. The NM effects of ATR administered in divided doses (group I) were compared with those of the single dose (groups II and III).

Results: The priming dose of 75 μg/kg ATR had no significant effect on P and decreased T4/T1 from 0.95±0.01 to 0.92±0.03. The data in the table indicate that at 1.4 min after the administration of the 250 μg/kg of ATR intubating conditions compared favorably with those obtained 2 min after the injection of 400 or 500 μg/kg of ATR. Maximal NM block was about the same in the three groups, but developed more rapidly after 325 μg/kg ATR was administered in divided doses than after single doses of 400 or 500 μg/kg. The clinical duration was significantly shorter in group I (p < 0.001) than in groups II or III. The clinical duration of the first maintenance dose of 100 μg/kg ATR was about the same in the three groups. Subsequent maintenance dose (up to 6) did not show cumulative effect in any group. Surprisingly, the recovery rate was more rapid in group I (13.1±1.0 min) than in groups II and III (19.1±1.1 min, p<0.001). In 12 patients in group I, P returned spontaneously to 100% of control in 41.3±2.8 min after the last dose and T4/T1 was 0.58±0.03. In 8 of these 12 patients T4/T1 ratio increased to 0.82±0.01 in 8.4±1.4 min without an antagonist. In the remaining 4, the T4/T1 ratio increased to 0.97±0.01 two min after the administration of 10 μg/kg atropine followed by 0.5 mg/kg of d-tubocurarine. In the remaining 8 patients the residual NM block was antagonised when P was 61.6±10.1% of control. In these patients, T4/T1 was 0.35±0.05 before and 0.86±0.03, 0.91±0.02 and 0.92±0.01 at 2, 5 and 8 min respectively after d-tubocurarine.

Group I (n=20) II (n=30) III (n=20)

Priming Dose 75 0 0
Intubating Dose 250 250 250 400, 500
Time to Intubation 1.4±0.1 2.0±0.5 2.0±0.5
Intubation Score 2.5±0.1 2.3±0.1 2.5±0.1
Maximal Block (%) 98.9±4.9 97.3±9.0 98.9±0.8
Onset Time 4.7±0.4 7.8±0.4 5.7±0.7
Clinical Duration 30.7±1.6 39.1±1.6 43.6±2.2

1. All doses in μg/kg. 2. Time interval between of priming and intubating dose was 6 min. 3. All times in min. 4. Mean ± SEM. 5. All patients were intubated at 2 min after start of injection of ATR. 6. See text for explanation. 7. Indicates significant difference from Group I (p < 0.001; Student's t test).

Discussion: Intubating conditions following a smaller total dose of ATR, administered in divided doses, were equal to and more rapid in onset than after the injection of a single larger dose. Gergis et al used larger priming and intubating doses of ATR and experienced good intubating conditions; however, the time to intubation was slower. This difference may relate to the shorter interval (3 min) between the administration of the priming and intubating doses in their study. In the present study, the clinical duration of the intubating dose was significantly decreased when ATR was administered in divided doses. Hypotension or bronchoconstriction due to histamine release, occasionally encountered with ATR are less likely to occur with the described method of ATR administration.

References: