

ANESTHESIOLOGY

■ Doses of Rapacuronium Necessary for Good Intubation Conditions in Children. Meakin *et al.* (page 1002)

In an effort to determine the doses of rapacuronium necessary to provide satisfactory conditions for rapid tracheal intubation in infants and children, Meakin *et al.* enrolled 165 pediatric patients scheduled for elective surgery in a prospective, randomized, multicenter trial. Sixty-five of the participants were infants less than 1 yr old; 51 were younger children, 1–6 yr old; and 49 were older children, 7–12 yr old.

Anesthesia was induced with 5–8 mg/kg thiopental followed by inhalation of 66% N₂O in oxygen. Neuromuscular transmission was monitored using an acceleromyograph. Researchers began train-of-four stimulation of the ulnar nerve as soon as patients were asleep; immediately after the first train-of-four response was recorded, one of five doses of rapacuronium (0.5, 1.0, 1.5, 2.0, or 2.5 mg/kg) was administered by rapid intravenous injection according to a predetermined randomization schedule. Laryngoscopy was started 45–50 s later, followed by intubation at 60 s. Intubating conditions were graded by a blinded observer.

Intubation conditions were good or excellent at 60 s in all infants after doses of 1.5 mg/kg and 2 mg/kg rapacuronium. In all younger and older children, good or excellent intubation conditions were found after doses of 2.0 mg/kg and 2.5 mg/kg. (The 2.5-mg/kg dose of rapacuronium for infants and the 0.5-mg/kg dose for younger and older children were eliminated after an interim analysis of intubation data from the first 35 patients.)

Recovery times were measured from the time of rapacuronium injection to reappearance of the third twitch of the train-of-four. Mean times to T₃ recovery were less than 10 min in infants at doses of 1.5 mg/kg or less and in younger and older children at doses of 2.0 mg/kg or less. Recovery of T₃ after 1.0 or 2.0 mg/kg rapacuronium was slower in infants compared with younger and older children. Researchers documented five adverse events, ranging from bronchospasm to tachycardia to increased salivation, all of which were related to rapacuronium administration, but none of which were serious.

The authors were able to establish that satisfactory conditions for tracheal intubation in anesthetized infants and children can be produced when giving infants doses of 1.5 mg/kg and children 2.0 mg/kg. In addition, these doses appeared to be well-tolerated and produced few adverse events.

■ Implicit and Explicit Memory during Emergency Cesarean Sections. Lubke *et al.* (page 1029)

In a study of 24 patients undergoing emergency cesarean sections, Lubke *et al.* used an electroencephalography-based bispectral index (BIS), recorded throughout the surgery, to measure hypnotic state during presentation of word lists to assess recall during “light” general anesthesia. For all patients, anesthesia consisted of a rapid-sequence induction with 4 mg/kg thiopental and 100 mg succinylcholine to facilitate intubation. After delivery of anesthesia, the nitrous oxide concentration was increased from 50 to 70%, with 0.2% isoflurane (end tidal) and 0.1–0.15 mg/kg morphine. Immediately after alterations of drug concentrations postdelivery, a program for word presentation was started. Two word lists of 16 words each in random order were played *via* headphones for each patient. Each word was repeated consecutively 12 times with a 2-s delay between repetitions.

As soon as patients began responding postoperatively, the research team conducted short, structured interviews regarding recall of pre-, intra- and postoperative events. After a short word stem exercise to demonstrate the test procedure, inclusion and exclusion parts of the word stem completion test were administered. Patients were asked to complete word stems, presented audibly and visually, with the corresponding word that had been played during anesthesia. If unable to recall the word from surgery, the patient was asked to fill in with the first word that came to mind (inclusion test). For the exclusion test, patients were asked to avoid words from surgery while completing word stems. This process dissociation procedure (PDP) allowed researchers to separate explicit memory from implicit memory.

The mean bispectral index during word presentation was 76.3. None of the patients had spontaneous recall of intraoperative events. However, patients were able to make correct inclusion-exclusion decisions (*i.e.*, patients had higher hit rates in the inclusion part of the test compared with base rate performance, and, in the exclusion part, hit rates were lower). These results indicate that explicit memory is not synonymous with conscious recall and, indeed, can occur in the absence of it.

■ *In Vitro* Study of Nonimmunologic Mast Cell Activation. Veien *et al.* (page 1074)

Veien *et al.* used human cutaneous mast cells isolated

from neonate foreskins to investigate the mechanisms of mediator release toward the further understanding of anaphylactoid reactions and other states of mast cell activation. Skin tissue was used within 24 h of circumcision, after incubation in CMF-HBSS with collagenase, hyaluronidase, and deoxyribonuclease.

Dispersed mast cell suspensions were challenged with vancomycin, calcium ionophore A23187, morphine, and atracurium, using concentrations based on *in vitro* data and data applied to clinically relevant doses. To determine whether mast cell degranulation was calcium-dependent, cells were incubated in either a buffer containing 2.8 mM Ca^{2+} and 1.0 mM Mg^{2+} , or buffer from which Ca^{2+} and Mg^{2+} had been omitted. After three cycles of freezing and thawing to arrest the release reaction, the net histamine-tryptase release was calculated as a percent of total histamine release.

Vancomycin, calcium ionophore A23187, morphine, and atracurium, all known nonimmunologic stimulators, produced significant histamine and tryptase release in mast cells incubated in buffer containing calcium and magnesium. When calcium or magnesium was omitted from the incubation buffer, histamine release was decreased by 90% for vancomycin and almost abolished for morphine. However, calcium had no effect on the mast cell release reactions to A23187 or atracurium stimulation. Preincubation of the dispersed mast cells with the secretory PLA2 inhibitor OBAA attenuated vancomycin-induced histamine release from $19.4 \pm 8.5\%$ to $9.3 \pm 6.3\%$, whereas the A23187-induced histamine release was not affected by the preincubation. Similarly, a PLC inhibitor also abolished the vancomycin-induced histamine release, but not the calcium ionophore A23187-induced histamine release. Because tryptase is released, along with histamine during nonimmunologic mast cell activation, it may not be a specific marker for anaphylaxis.

■ Preventing Perioperative Peripheral Neuropathies: An ASA Practice Advisory. Warner *et al.* (page 1168)

In this issue, Warner *et al.* and fellow members of the American Society of Anesthesiologists' (ASA) Task Force on Prevention of Perioperative Peripheral Neuropathies, present a practice advisory generated through a five-step process. Intended as a source of guidance and not a formal set of practice guidelines, the advisory focuses on

such preventive strategies as perioperative patient positioning, use of protective padding, and avoidance of contact with hard surfaces or supports that may apply direct pressure on susceptible peripheral nerves.

The 10-member task force first conducted a review of the published literature, initially identifying 509 articles that addressed topics related to seven evidence linkages. After a review of the articles, 427 were eliminated because they did not provide direct evidence. Second, consultants who practice in various academic and private practice settings and who have particular expertise in identified subject areas were surveyed regarding their opinions of the effectiveness of positioning and protective strategies to prevent perioperative peripheral neuropathies. These consultants were also asked to comment on the task force's initial draft report. Third, the task force collected responses from 429 of 1,500 ASA members selected at random to complete surveys regarding their opinions of the advisory's elements. Fourth, the task force held an open forum at a major national anesthesia meeting to solicit additional input regarding the draft advisory. Finally, all available information was used to build consensus within the task force on the advisory.

The task force found strong agreement among surveyed consultants and ASA members that a focused preoperative physical assessment may identify patients with an increased risk of development of peripheral neuropathies during the perioperative period. Eighty-eight percent of the responding consultants and 80% of the ASA member respondents agreed with this statement. In the area of specific positioning strategies for the upper extremities, 92% of the consultant respondents and 96% of the ASA members agreed that limiting abduction of the arms in a supine patient may decrease the risk of brachial plexus neuropathy. There was some disagreement regarding the upper limits of abduction, with 93% of the consultants advising limiting abduction to 90°, and 7% indicating an upper abduction limit of 60°. Further advisories regarding preventive positioning strategies addressed ulnar neuropathies in supine patients with arms on arm boards, with arms tucked at the side, or with the elbow flexed. The task force also addressed specific positioning strategies for the lower extremities, the use of protective padding, automatic blood pressure cuffs, and shoulder braces.

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