

■ Diaphragm's Resistance to Rocuronium

Characterized by short onset of paralysis, the new steroidal neuromuscular blocking agent rocuronium is particularly suitable for rapid-sequence intubation. However, its neuromuscular effects on respiratory muscles, including the laryngeal muscles and diaphragm, have not been established. Cantineau *et al.* (page 585) studied 18 ASA physical status 1 and 2 patients undergoing elective surgery for peripheral procedures under general anesthesia. In the first part of the study, cumulative dose-response curves were constructed to compare the response of the adductor pollicis with the diaphragm in six patients. The ED₅₀ was 0.14 ± 0.07 mg/kg for adductor pollicis and significantly greater, 0.26 ± 0.07 mg/kg for the diaphragm. A single intubating bolus dose of 0.06 mg/kg rocuronium, in the second part of the study, induced 100% paralysis of the adductor pollicis in all patients and of the diaphragm in 9 of 12 patients. The diaphragm started to recover from paralysis sooner than did the adductor pollicis (8 ± 4 min for the diaphragm and 17 ± 9 min for the adductor pollicis). The fast onset of rocuronium as measured at the adductor pollicis may not be a good predictor of concurrent optimal intubating conditions.

■ Computer Simulations Compare Analgesic Doses

After a review of postanesthesia care unit records, Dexter (page 610) selected cases of patients who had undergone general anesthesia for vitrectomy, laparoscopic cholecystectomy, or abdominal hysterectomy. The team used computer simulation to evaluate the accuracy of several statistical tests, as well as their ability to detect a difference in postoperative morphine given to the groups of patients. When comparing two groups, the Mann-Whitney test was as accurate as the *t*-test and chi-square tests at detecting group differences and had the greatest power to detect differences between groups' doses. When comparing more than two groups, Kruskal-Wallis was the best method—as accurate, or more accurate, than analysis of variance.

■ Less Sevoflurane Required for Laryngeal Mask Airway Insertion Than for Tracheal Intubation in Children

Sevoflurane is especially suitable for inducing anesthesia in children because of its nonpungent odor and

low blood gas partition coefficient. Taguchi *et al.* (page 628) conducted a study to determine sevoflurane concentrations required for inserting laryngeal mask airways (MAC_{LMI}) and for tracheal intubation (MAC_{EI}) in children. Forty-two ASA physical status 1 pediatric patients, aged 1–9 yr and scheduled for elective plastic or reconstructive surgery, were assigned randomly to one of two groups: MAC_{LMI} (n = 21) or MAC_{EI} (n = 21). Test concentrations of sevoflurane (starting with 2.0% and 3.0% for MAC_{LMI} and MAC_{EI}, respectively) were determined using a modification of Dixon's up-and-down method (with 0.5% as the step size). Patient's responses to LMI or EI were recorded as movement or no movement, determined by unanimity of observations by the anesthesiologist, the surgeon, and the nurse. Patients who moved were immediately administered an intravenous bolus dose of 3 mg/kg thiamylal and 1 mg/kg succinylcholine. In the children studied, MAC_{LMI} of sevoflurane was 2.00% and MAC_{EI} of sevoflurane was 2.83%. The laryngeal mask can be inserted at a lesser sevoflurane concentration than that required for tracheal intubation.

■ Nonreversible Lidocaine Injury to Frog Nerve

What is the concentration below which lidocaine can be administered safely without causing nerve toxicity? Although the range of concentrations in humans remains to be determined, animal studies may demonstrate analagous properties of nerve injury following even transient exposure to lidocaine. Bainton and Strichartz (page 657) conducted experiments on excised, desheathed frog sciatic nerves, mounting them in sucrose gap or extracellular chambers as a method to record compound action potential (CAP). After a control period of both sucrose gap and extracellular setups (30–60 min), plain frog Ringer's was removed from the test pool and replaced with solutions of varying concentrations of lidocaine (0.5–200 mM) dissolved in frog Ringer's, pH adjusted to 7.2. Lidocaine was applied for 15 min, then removed. Even transient exposure to concentrated lidocaine ablated the CAP, in a continuously graded fashion. The degradation was significant at a concentration of 40 mM (1.0%) and increased in a graded fashion. Storage of the frogs for 5 weeks at 4°C made the nerves more resistant to the effects of the lidocaine. In addition, presence of nifedipine (10^{-5} M), an L-type Ca²⁺ channel blocker, increased the nerves' resistance to lidocaine.

■ Effects of Clonidine on Spontaneous and Somatosympathetic Reflexes

To compare effects of clonidine on spontaneous sympathetic outflow and afferent A- and C-fiber-mediated somatosympathetic reflexes, Wang *et al.* (page 710) administered clonidine both intrathecally and intravenously to 10 greyhounds. After induction with 15 mg/kg methohexital intravenously, anesthesia was maintained with 1% alpha-chloralose and with 10 mg succinylcholine hydrochloride intravenously every 20–30 min. Supramaximal electrical stimuli were applied to the radial nerve in the left foreleg and the tibial nerve in the right hindleg, which had been exposed, desheathed, cut distally, and placed across silver-silver chloride electrodes in warm mineral oil. Clonidine was administered intrathecally in incremental doses of 50, 100, and 150 μ g, in volumes of 0.5, 1.0, and 1.0 ml, respectively, at 15-min intervals. Clonidine also was administered intravenously in incremental doses of 50, 100, 150, and 300 μ g at 15-min intervals. Whether administered intrathecally or intravenously, clonidine depressed spontaneous sympathetic outflow and evoked nociceptive reflexes. However, intrathecal clonidine had little effect on reflexes evoked *via* descending efferent pathways.

■ Sensitivity of Infant Versus Adult Hearts to Halothane and Isoflurane

To determine direct myocardial effects of inhalation agents, Palmisano *et al.* (page 718) administered halothane and isoflurane to 37 infant and 36 adult rabbit hearts. Hearts were excised, suspended in, and perfused with warm solution (37°C) maintained at constant temperature with a circulating heated water system. Three doses of each anesthetic agent were administered in alternating order to define a dose-response pattern: low = 0.2 mm halothane and 0.22 mm isoflurane; medium = 0.41 mm halothane and 0.44 mm isoflurane;

and high = 0.6 mm halothane and 0.66 mm isoflurane. Heart rate and rhythm, AV conduction time, LV function (peak systolic, diastolic, and developed pressures) (+) and (–) dP/dt_{MAX} and τ , as well as coronary flow, oxygen consumption, and fractional extraction, were measured and compared between age and anesthetic groups. Halothane was a more potent depressant of cardiac function than was isoflurane. Developmental differences accounted for greater prolongation of AV conduction time and LV τ by halothane in the infant hearts compared to adult hearts. In addition, the infant hearts were more sensitive to depression of LV developed pressure and $+dP/dt_{MAX}$ and to elevation of diastolic pressure by halothane.

■ Camera Catches Emergency Intubation Errors

By suspending miniature cameras and microphones from the ceiling, Mackenzie *et al.* (page 763) videotaped resuscitation events of two different anesthesiology teams at the University of Maryland R Adams Cowley Shock Trauma Center. Key physiologic data (heart rate, arterial blood pressure, or pulmonary arterial or central venous blood pressures, end-tidal carbon dioxide (ET_{CO_2}), arterial oxygen saturation (Sp_{O_2}), and temperature) were synchronized with and overlaid on the videotapes, which then were reviewed by a nonparticipant subject matter expert, an experienced trauma anesthesiologist. Repeat viewing and analysis of case 1 identified inadequate use of ET_{CO_2} and Sp_{O_2} monitoring, as well as inadequate communication between the supervising attending anesthesiologist and the emergency medicine physician regarding chest auscultation. In both cases, videotape review identified important procedural and communication breaches, underscoring the advantages of real-time monitoring as a training tool.

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