

ANESTHESIOLOGY

■ Tracking Risk Factors Associated with Early Onset Pneumonia in Head Trauma Patients. Bronchard *et al.* (page 234)

Bronchard *et al.* conducted a prospective observational study designed to identify risk factors for development of early onset pneumonia in head trauma patients who require tracheal intubation. During a 2-year period, 109 head trauma patients in the surgical intensive care unit at the authors' institution met the criteria for inclusion in the study. Routine care was provided according to French recommendations on initial management of head trauma patients. Those ventilated for at least 2 days were included in the study. Antibiotic prophylaxis was administered only if the patients underwent surgery or had open fractures.

The team collected data according to parameters established for their study, including the patients' Glasgow coma scores; age, sex, associated injuries, and injury severity scores; carriage of *Staphylococcus aureus*; use of barbiturates, hyperthermia; and occurrence of hypotension, intracranial hypertension, length of stay, and so forth.

The mean Glasgow coma score on admission was 7.2 ± 2.6 . Twenty of the 109 patients died within the study period. Nasal carriage of *S. aureus* was assessed by using nasal swabs on arrival in the intensive care unit, and then once a week, a routine procedure at the institution. On admission, 41 patients were carrying *S. aureus*; two of those cases were methicillin-resistant. Of the 55 cases in which patients developed ventilator-associated pneumonia, 45 were considered early onset. The authors found that nasal carriage of *S. aureus*, aspiration before intubation, and use of barbiturates were independent risk factors for development of early onset pneumonia. Because early onset pneumonia is a frequent event in head trauma patients, often leading to secondary cerebral insults, the authors believe that the results of their study could be useful in designing preventative management strategies in these high-risk patients.

■ Effects of Protective Gear on Adequate Airway Management during Mass Casualty Situations. Flaishon *et al.* (page 260) and Flaishon *et al.* (page 267)

Mass casualty situations, such as those induced by chemical or bioterrorist attacks, pose special challenges for medical personnel attempting to aid the injured. Researchers from Tel Aviv Sourasky Medical Center con-

ducted a pair of studies to assess how the wearing of antichemical protective gear would affect the ability of anesthesiologists and surgeons to effectively manage patients' airways.

In the first study, Flaishon *et al.* recruited 15 anesthesiologists with a range of 2–5 yr of residency. The prospective, randomized, crossover design called for study participants to perform tracheal intubation or insertion of a laryngeal mask on anesthetized patients while the participants wore either surgical attire or full antichemical protective gear. The protective gear consisted of butyl rubber boots and gloves, a khaki-covered nylon shirt and pants, and an antigas mask with an active filter.

A total of 60 patients were included in the study. All participants practiced on mannequins during a 30-min drill on the day before study participation. As expected, tracheal intubation took longer when anesthesiologists were wearing the protective gear. Insertion of mask airways also took longer than tracheal intubation when anesthesiologists wore the protective attire, but there were no incidents of oxygen desaturation or hemodynamic disturbances associated with the longer airway management times.

Although considered the definitive standard for airway management, tracheal intubation was a less favorable choice time-wise than laryngeal mask airway management when anesthesiologists wore the protective gear. However, the authors note that during a real mass casualty event, the situation would be much more chaotic and longer time intervals might result in hypoxia, especially for affected victims who were already physically compromised.

In the companion study, Flaishon *et al.* compared the performance of 20 anesthesiologists and 22 surgeons, wearing either surgical attire or full protective antichemical gear, when inserting laryngeal mask airways in 84 anesthetized patients. In addition, six novices also inserted masks in 57 patients, in a random order and in a crossover, prospective manner. The duration of insertion was measured from the time the device was first grasped until a normal capnography recording was obtained.

The anesthesiologists needed 39 ± 14 s to insert the masks when wearing surgical attire, and 40 ± 12 when wearing protective gear. In contrast, surgery residents required 64 ± 40 s and 102 ± 40 s, respectively, to insert the masks. Anesthesiologists were able to insert the masks with a single attempt, whereas the surgeons required up to four tries—although no hypoxia or failure

resulted from their repeat attempts. After four trials with protective gear and two trials with surgical attire, the novices' mean performance times for successful airway management matched the times of the surgeons. The improvement in learning curve in the novice group may have been influenced by the group's training in advanced cardiac life support and trauma life support, conducted by the Israeli Defense Forces' Medical Corps.

Although the laryngeal mask airway is a good alternative for those inexperienced in tracheal intubation, the longer time required to attach the mask could be problematic if multiple attempts are necessary. In the event of a real chemical attack, victims could already be suffering from acute lung injury (caused by toxic gases) or muscle paralysis, upper airway obstruction, and bronchorrhea (caused by nerve gases), and they most likely would be panicky. Periodic courses instructing physicians in the use of laryngeal masks are highly recommended. In addition to having anesthesiologists and surgeons trained in these techniques, other physician "novices" could bolster the numbers of experienced on-site caregivers needed in a mass casualty event.

■ A Link between Isoflurane–Nitrous Oxide Anesthesia and Acquisition of New Learning? Culley *et al.* (page 309)

Expanding on previous work demonstrating that spatial learning is impaired for 3 weeks after general anesthesia

in aged rats, Culley *et al.* examined acquisition of new spatial memory tasks introduced 48 h postanesthesia. Five 6-month-old and five 20-month-old male Fisher 344 rats were anesthetized for 2 h with 1.2% isoflurane, 70% nitrous oxide, and 30% oxygen. Age-matched rats in the control group received 30% oxygen and 70% nitrogen. Spatial learning was assessed daily for 21 days on a 12-arm radial maze (RAM) beginning 48 h after termination of anesthesia.

The authors measured the days it took the rats to complete a threshold criteria; number of choices the rats made before the first error; total errors; and time required to complete a test. The test results were pooled for the 21-day testing period. Each test showed that learning was impaired in rats that had previously received anesthesia, and not in the control rats. Anesthesia worsened maze performance in both age groups. In an additional experiment, the authors examined locomotion and swim speeds in six rats, three of which received anesthesia and three of which did not. The older rats swam slower, but there were no differences between the control and anesthesia groups. Thus, the persistent deficit in radial maze performance was not explained by impaired locomotion. Despite rapid clearance of both isoflurane and nitrous oxide from the brain, it appears that general anesthesia with these drugs can produce prolonged postoperative cognitive dysfunction.

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