This Month in

ANESTHESIOLOGY

Patient Recall of Intraoperative Messages

Midlatency auditory evoked potentials (MLAEP) were used recently to assess intraoperative awareness. Schwender *et al.* (page 493) investigated implicit and explicit memory in cardiac surgery patients, a group for whom a high degree of intraoperative awareness has been reported. All 45 patients received a benzodiazepene (1–2 mg flunitrazepam orally) before anesthesia. Anesthesia was induced in group 1 patients with flunitrazepam/fentanyl (0.01/0.01 mg/kg) and in groups 2 and 3 with etomidate/fentanyl. Anesthesia was maintained in all patients with high-dose opioid analgesia (1.2 mg/h fentanyl). In addition, group 1 received flunitrazepam, group 2 isoflurane, and group 3 propofol. After sternotomy but before cardiopulmonary bypass, patients in groups 1–3 were presented a 10-min audiotape containing an implicit memory task. Their memories were then assessed in a 30-min postoperative interview. Although none of the patients recalled explicit memories of intraoperative events, five patients from group 1, one patient from group 2, and one patient from group 3 retained implicit memory for the intraoperative tape message (to associate the code word "Friday" with "Robinson Crusoe"). The authors conclude that MLAEP reflect the level of auditory processing during anesthesia and suggest that auditory modality may be the most receptive sensory channel for perception during general anesthesia.

Tracking Impaired Lung Function after Cardiac Surgery

Impaired lung function is a major complication following cardiac surgery with extracorporeal circulation (ECC). Blood gas analysis does not yield sufficient information regarding underlying mechanisms. Hachenberg *et al.* (page 509) used the multiple inert gas elimination technique to evaluate ventilation-perfusion ($\dot{V}_A/\dot{Q}$) distribution in the awake state, after induction of anesthesia, before and after cardiopulmonary bypass, and postoperatively. Nine patients (aged 65–75 yr) scheduled for coronary artery bypass graft were studied. Shunt (10 ± 9%) was observed in eight of nine patients after induction of anesthesia. Sternotomy induced small fluctuations in shunt, but separation from ECC caused a marked increase of $\dot{Q}_S/\dot{Q}_T$ to 22 ± 8% ($P < 0.01$). Four hours after surgery, oxygenation still was impaired but to a lesser degree than shortly after ECC. The main cause of gas exchange impairment in patients undergoing cardiac surgery appears to be intrapulmonary shunt, and ECC significantly aggravates this. In the postoperative period, contributors to impaired gas exchange may be the altered chest mechanics, perfusion of "low" $\dot{V}_A/\dot{Q}$ regions, and decreased mixed venous P_{O_2}.

Timing of Prothrombin Activation

A key regulatory step in hemostasis and thrombosis, prothrombin activation appears to play a pivotal role in postsurgical ischemic and thrombolytic events. Slaughter *et al.* (page 520) measured prothrombin activation during the perioperative period in 19 adult patients undergoing coronary artery bypass. Blood samples were obtained preoperatively, at 30-min intervals during cardiopulmonary bypass (CPB) and at 1, 3, and 20 h postoperatively. Prothrombin activity increased into the postoperative period following heparin neutralization. The peak period of thrombin formation and activity correlated with the period during which the highest incidence of myocardial ischemia has been reported after coronary artery bypass graft surgery. Current approaches to anticoagulation with heparin during CPB do not ensure that prothrombinase activity will be inhibited. The authors urge further investigation to define the site of thrombotic activation during the postoperative period.

Preventing Mask Leaks

Although already in wide use, the laryngeal mask airway (LMA) is relatively new, first described by Brain in 1983. Devitt *et al.* (page 550) assessed the effectiveness of positive pressure ventilation when the LMA is used to maintain airway patency. After induction of anesthesia and paralysis, 48 patients (ASA physical status 1 or 2) who had no pulmonary disease and who were undergoing elective surgery were studied. Four peak pressure settings (15, 20, 25, and 30 cmH_2O) were used for each patient. The orders of ventilator pressure settings were assigned from a randomized block schedule. Satisfactory ventilation of all patients' lungs using the LMA was achieved. Leaks occurred at each ventilation pressure, including 15 cmH_2O, and were directly proportional to the airway pressure. Incidence of leak at the neck, as assessed with a stetho-

scope, depended on ventilation pressure. The LMA can be used for intermittent positive pressure ventilation in patients with normal airway resistance who do not require high inflation pressure to produce normal tidal volumes. However, monitoring for gastroesophageal insufflation should accompany the procedure.

Motor Response Inhibition in Rats

In a laboratory study, Rampil (page 606) assessed the relative roles of the brainstem and spinal cord as sites of anesthetic action in blocking somatic responsiveness in the rat. Anesthesia was induced in seven male Sprague-Dawley rats by inhalation of isoflurane. Minimum alveolar concentration (MAC) for each rat was calculated as the midpoint between the lowest isoflurane concentration blocking motor response and the highest concentration permitting movement. Movement response was assessed using tail clamping and hind and fore toe pinching, with the latter intended as a control measurement for detecting spinal shock. After transection and freezing of a segment of the spinal cord, the mean MAC value was not statistically different (1.03 ± 0.40, $P = 0.133$). There was no evidence for sensory or motor communications across the lesion in six of seven animals without spinal shock. Despite acute loss of descending cortical and bulbar controls, somatic motor responsiveness appeared to be unaltered. The site of anesthetic inhibition of motor response may be in the spinal cord.

Propofol as a Nonhypnotic: Clinical Applications

Propofol has been available since 1982, but all of its properties have yet to be discovered. Borgeat *et al.* (page 642) described propofol's nonhypnotic properties and suggested clinical applications for each. Propofol significantly decreases postoperative nausea and vomiting, particularly if not of vagal origin. As an adjuvant to cancer chemotherapy, propofol has been successful in treating previously refractory vomiting in chemotherapy patients, thus significantly improving their quality of life. Subhypnotic doses of propofol are useful in relieving neuraxial opioid-induced pruritus, as well as pruritus associated with liver disease. Whether its action is as a proconvulsant or an anticonvulsant, propofol also has been found useful for induction of coma therapy for controlling refractory epilepsy.

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