◇ This Month in

ANESTHESIOLOGY

■ Does Oxygen Therapy after Surgery Alter Frequency of Sleep Disturbances? Drummond *et al.* (page 817)

Episodes of upper airway obstruction after major abdominal surgery, caused by side effects from opioid analgesia, resemble similar episodes in sleep apnea–hypoapnea syndromes (SAHS). Drummond *et al.* hypothesized that nasal constant airway pressure (nCPAP), used to treat SAHS, might also benefit patients after abdominal surgery by reducing the frequency of postoperative sleep disturbances caused by the airway obstruction and intermittent hypoxemia.

The team enrolled 40 patients scheduled for major abdominal surgery; data from 34 of those patients were analyzed for this study. Patients were randomized to either nCPAP or to conventional therapy with an oxygen mask. Air and 35% oxygen were administered in alternating 90-min periods to both groups of patients, so that patients received two periods of each during the night. The 90-min interval was chosen because this is the approximate time period of a normal sleep cycle. The investigators used a portable polysomnographic monitoring system to record periods of sleeping and waking. If pulse oximeter readings fell below 90%, a continuous supply of oxygen was given and the patient was terminated from the study.

Overall, the pattern of sleep for all patients in the study was very poor: patients slept only 34% of the 6-h study period, and stage 3 sleep was achieved only 3.6% of the time. The median frequency of arousals in the nCPAP group was 125/h, and 116/h for patients in the control group breathing only oxygen. Patients receiving nCPAP spent 69% of the study period with SpO_2 values between 91% and 95%, while patients in the control group spent 62% at those values. The frequency of oxygen desaturation was greater when patients were classified as awake.

The investigators noted that their study was technically difficult. Because of nasogastric tubes, IV lines, and other apparati, it was awkward to fit the nasal masks snugly. Postoperative nausea, vomiting, and pruritus also impeded continuous monitoring efforts. Oxygen therapy was more effective than nCPAP in preventing hypoxemia, although there was no strong relation between hypoxemia and sleep patterns found in this study.

■ Use of Mixed Venous Pulmonary Artery Catheters during VA Cardiac Surgeries. London *et al.* (page 860)

In this issue, London *et al.* present results of an observational study comprising part of the larger Department of Veterans Affairs 4.5 yr study investigating outcomes and processes of care for cardiac surgery within the VA system. Culling data from 3,265 cardiac surgery patients at 14 VA medical centers, the authors recorded the use of standard pulmonary artery catheterization (PAC) *versus* continuous monitoring of mixed venous oxygen saturation by reflectance spectrophotometry (SVO_2-PAC), and related these data to clinical outcomes.

Standard PAC was used in 51%, and SVO_2-PAC in 49%, of the cases reviewed. The authors constructed logistic and Cox regression models to evaluate the association of SVO_2-PAC with 30-day mortality; postoperative complications; cardiac complications; time to extubation; and duration of hospital stay. In the total group of patients treated between 1992 and 1996, 81.7% had undergone myocardial revascularization and 18.3% had valve replacement or repair. There was no association found between SVO_2-PAC and outcomes, except for a small but statistically significant reduction in the number of arterial blood gasses and thermodilution cardiac output. Despite its higher cost, SVO_2-PAC was used frequently in the 14 hospitals submitting data. The authors did note their study was limited by its dependence on coding for postoperative complications, which was nonspecific and open to interpretation. The implications of the study are not clear. Although the use of PAC has already increased in clinical practice, its effectiveness and appropriateness should be studied further.

■ A New Rat Model to Study Time Course of Action of Neuromuscular Blocking Agents. De Haes *et al.* (page 963)

De Haes *et al.* have developed an *in situ* isolated, antegrade, perfused nerve-muscle preparation in the rat, which is described in this month's issue. The authors describe their model, dubbed APPAT (Antegrade Perfused Peroneal nerve-Anterior Tibial muscle), as well as results of their first experiments investigating the influence of EC_{90} (intrinsic potency) and flow on time course of action of pancuronium and rocuronium in the intact rat. In male Wistar rats, the team isolated the anterior tibial muscle and cannulated the anterior tibial artery and

vein, providing an avenue for single-pass perfusion with blood from donor rats. They connected a force transducer to the tibialis anterior muscle and a stimulator to the tibial nerve. Blood from the donor rats flowed into a reservoir, and was then warmed, filtered, and pumped with a pulsatile flow into the cannulated rat. The model was tested for viability without use of neuromuscular blocking agents (NMBAs) for 4 h, a period that included measurement of twitch height in recipient rats, and donor blood homeostasis.

After the team determined the rate of NMDA infusion needed to produce a stable 90% block, measurement recordings began. Six rats were studied with rocuronium and six with pancuronium. Doubling the muscle blood flow resulted in a significantly faster onset and offset for both NMDAs. At a flow of 200 μg/min the mean offset index for rocuronium in this model was 63 s, while the offset index for pancuronium was 54 s. Tripling EC_{90} was not associated with any significant changes in the time course of the agents' action. This new rat model eliminates variations in cardiac output and circulation time by controlling blood flow to the tibialis anterior muscle. The authors have shown that the model can be used to determine the time course of action of NMBAs under stable conditions for at least a 4-h period.

■ Effects of Halothane and Thiopental on Brain and Spinal Cord Examined in Goats. Antognini *et al.* (page 980)

Antognini *et al.* set out to test whether halothane and thiopental would have receptor actions similar to those of other anesthetics, such as isoflurane, which has been shown to act on the spinal cord to suppress movement without commensurate action in the brain. Ten female goats were anesthetized and prepared for either halothane (n = 5) or thiopental (n = 5) anesthetic delivery. In the halothane group of animals, the investigators used noxious stimulation applied to a dew-claw on a hind limb as the indicator of purposeful movement. They determined control MAC as the midpoint between two bracketed concentrations of the agent (one permitting movement and the other preventing movement). After that determination, they diverted cranial venous blood into the oxygenator and reinfused it to accomplish a bypass circuit to the brain. Halothane delivery to the torso was discontinued. The team increased or decreased halothane to the head area depending upon the animal's response to the dew-claw clamp. Similar experiments were also conducted with thiopental infusion.

The investigators found that control, or whole-body, halothane requirement to prevent motion was 0.9 ± 0.2%; requirement to the head during differential delivery was 3.4 ± 1%. The electroencephalogram was greatly depressed or isoelectric during selective halothane delivery, even though the animals moved in response to the dew-claw clamp stimulation. When thiopental was selectively delivered to the head, the electroencephalogram was active in all five animals and cranial thiopental requirement was 42 ± 6 μg/ml. The whole body requirement for thiopental, on the other hand, was 20 ± 10 μg/ml. These data suggest that the two anesthetics act in the spinal cord to suppress movement that occurs as a result of noxious stimulation. As shown by the electroencephalogram data, halothane appears to be less potent than thiopental in the brain, suggesting that its action in the spinal cord is more significant than that of thiopental.

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