◇ This Month in

ANESTHESIOLOGY

■ Does Bispectral Index Monitoring Reduce Recovery Times after Surgical Anesthesia? Pavlin *et al.* (page 566)

A study conducted by Pavlin *et al.* was conducted over a 7-month period to investigate whether monitoring of the bispectral index (BIS), a parameter derived from the continuous recording of the processed electroencephalogram, might have an impact on time spent in the surgical recovery unit. After installation of BIS monitors in all 18 operating rooms at the study authors' institution, all anesthesia providers (including nurse anesthetists and residents in training) were allowed a 3-month introductory training period. Using a randomized crossover design, the investigators reassigned the 69 participating providers to one of two groups (BIS monitoring or no monitoring) at monthly intervals during the study period.

The primary outcome variable for the study was duration of stay in the postanesthesia care unit. If a patient remained in the postanesthesia care unit for longer than 50 min, this was defined as a "delayed recovery," and the reasons for delay were recorded for each case. End-tidal anesthetic gas concentrations and BIS values were also recorded at 15-min intervals. Secondary endpoints of the study included the time from end of surgery to exit from the operating room and time for the patient to achieve an Aldrete score of 9–10.

A total of 1,698 patients initially met the criteria for the study, and the majority of the analyses were performed on 1,580 of these patients. The latter group was chosen for analysis because the cases used similar types of anesthetics. Analysis of outcome data revealed that BIS monitoring did not affect the mean duration of stay in the postanesthesia care unit, either within the entire population of 1,580 patients or within subcategories, grouped by type of surgery or duration of surgical procedure. BIS monitoring also had no effect on time to achieve an Aldrete score of 9–10 or time until exit from the operating room after completion of surgery. There were differences in recovery time related to type and duration of anesthesia: thiopental induction, for instance, was associated with a 16-min-longer recovery period compared to propofol, and isoflurane with a 19-min-longer recovery time compared to sevoflurane.

■ Effects of Spinal Cord Injury on Anesthetic Requirements in Rats. Jinks *et al.* (page 624)

In the current issue, Jinks *et al.* report on a series of chronic and acute experiments conducted on 16 adult Sprague-Dawley rats (10 males and 6 females). Before and up to 28 days after a T8 spinal transection, the team determined the minimum alveolar concentration (MAC) of isoflurane necessary to block movement in response to supramaximal noxious stimulation, as well as tail-flick and hind paw withdrawal latencies. To test for the presence of spinal shock or hyperreflexia, the team also measured tail-flick and hind paw withdrawal latencies while the rats were awake. The acute experiments involved limb-force testing conducted after a reversible spinal conduction block effected by cooling the spinal cord at the T8 level.

The team found that spinal transection in the chronic injury group reduced MAC values to ≤40% three days after the procedure. Between day 3 and day 14 posttransection, MAC partially recovered to 60% of control values. Over a 28-day testing period, tail-flick and hind paw withdrawal latencies were either facilitated or unchanged, indicating that decreases in isoflurane requirement were not due to baseline motor depression such as that seen during spinal shock. All animals showed signs of spasticity by 7 days posttransection, but under isoflurane anesthesia, tail-flick and hind paw withdrawal were depressed or absent. In both groups of animals (chronic injury and acute cold-block injury) hind limb forces were reduced. The authors conclude that isoflurane MAC is determined by a spinal depressant action, and possibly counteracted by a supraspinal facilitatory action. Partial recovery of MAC at later time points suggests that neuronal plasticity after spinal cord injury influences anesthetic requirements. The authors point out that additional study is necessary before extrapolating their results to humans, in whom autonomous hypersensitive reactions to stimuli can develop months and even years after spinal cord injury.

■ Effective Doses Determined for Intrathecal Spinal–Epidural Analgesics in Labor. Camorcia *et al.* (page 646)

Enrolling 97 primiparous women in early labor (2–4 cm cervical dilation) with initial pain scores of more than 50 mm on a 100-mm visual analog scale, Camorcia *et al.* randomly assigned participants to receive one of three local anesthetics. The aim was to compare the analgesic efficacy of intrathecal ropivacaine, levobupivacaine, and bupivacaine when used alone during first-stage labor. Using the up–down sequential allocation model, the investigators administered an initial dose of 2.5 mg of each local anesthetic solution, setting the testing interval at 0.25 mg for all

three groups. The dose of drug in each group was determined by the outcome in the previous parturient: if the participant reported a visual analog pain scale score ≤ 10 mm within 30 min from intrathecal injection, this outcome would direct a decrement of 0.25 mm of the local anesthetic dose for the next parturient assigned to the same study drug group.

A score of more than 10 mm within 30 min of injection indicated an ineffective outcome and a rescue bolus of 15 ml of epidural 0.125% levobupivacaine was given. Cervical examinations were performed 30 min after injection of study drug. A total of eight women were excluded based on progression of labor (cervical dilation beyond 4 cm), leaving data from 89 of the original 97 enrollees available for final analysis. The minimum local analgesic dose was 3.64 mg for ropivacaine, 2.94 mg for levobupivacaine, and 2.37 mg for bupivacaine. The authors noted a strong trend of hierarchical potency of spinal bupivacaine > levobupivacaine > ropivacaine. Although more motor impairment (as measured by leg lifting and perineal squeezing) was observed in those receiving bupivacaine and levobupivacaine, the study was not designed to specifically investigate motor block. Further studies are needed to determine the intrathecal motor block potency of these drugs.

■ Intrathecal Ropivacaine and Levobupivacaine Compared as Analgesics in Early Labor. Sia *et al.* (page 651)

Sia *et al.* recruited 100 parturients in early labor for their randomized study comparing intrathecal ropivacaine and levobupivacaine, drugs that carry a lower risk of causing cardiotoxicity than bupivacaine. Women were assigned to receive one of five doses (1 mg, 1.5 mg, 2 mg, 2.5 mg, or 3 mg) of either intrathecal ropivacaine or levobupivacaine. This study design produced 10 different treatment groups, and no placebo group. Patients' cervical dilation status, preblock visual analog pain scores, and systolic blood pressures were recorded before treatment. All blocks were performed at the L3–L4 intervertebral level by only one operator to eliminate interoperator variability.

The team assessed patients' visual analog pain scores at 15, 30, and 45 min postblock; systolic blood pressure at 5, 10, 15, 20, 25, and 30 min postblock; highest sensory block to ice cubes at 5, 15, and 30 min postblock; motor block using the modified Bromage scale at 5, 15, and 30 min postblock; and incidence of side effects such as nausea and vomiting or shivering at 5, 15, and 30 min postblock. Fetal heart rates were monitored continuously in the first 30 min postblock. A block was considered successful if a woman reported a 10 mm lower visual analog pain score 15 min after injection and her pain was maintained at this score for 45 min. Intravenous ephedrine in 5-mg boluses was given if the systolic blood pressure was reduced by more than 20% of the baseline value.

The median effective dose of intrathecal ropivacaine was significantly greater than levobupivacaine, but this significance was reduced when the comparison was based on molar potency. There was no difference in the duration of analgesia or in occurrence of adverse effects between the two drugs at doses greater than or equal to 2.5 mg.

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