◇ This Month in

ANESTHESIOLOGY

■ "Walking" Epidural Anesthesia: Are Test Doses Necessary? Cohen *et al.* (page 387)

Although the actual benefits of walking during labor are unproven, many women express the desire to walk during labor. Combined spinal-epidural analgesia performed with intrathecal opioids has gained acceptance in this application because it causes minimal motor block. Cohen *et al.* designed a randomized, double-blind study to evaluate analgesic effectiveness and ability to walk after receiving a bolus of either 0.0625% bupivacaine or 0.125% bupivacaine (with sufentanil), with or without previous administration of the traditional lidocaine-epinephrine test dose.

Sixty healthy women in active labor, all of whom requested epidural analgesia and who expressed a desire to walk during labor, participated in the study. Visual analog pain scores were 3 or more, and cervical dilation was between 1 and 6 cm for participants. All subjects received a 3-ml epidural injection (a 1.5% lidocaine-epinephrine test dose or bupivacaine) and 3 min later, 12 ml bupivacaine with 10 μg sufentanil injected in two increments 3 min apart. Maternal blood pressure and visual analog pain scores were recorded before study drug administration and after completion of the bolus injections at 5, 10, 15, 20, 30, and 60 min, and then hourly for 4 h until delivery. Data relating to ambulation, balance, proprioception, and motor block were collected at baseline, 30 min, 1 h, and then hourly until delivery. Ability to walk with little or minimal assistance across the room was rated as either "yes" or "no." Women who walked spent approximately 5–10 min out of bed and usually attempted to void, and then were reassessed for balance, among others.

A high percentage of women in all groups (75–93%) walked at some stage during labor. The group receiving the bolus of 0.125% bupivacaine with sufentanil, without a previous test dose, experienced the best analgesia and walked earlier than women in all other groups. Fewer women walked within 1 h of block placement when they received a test dose before 0.125% bupivacaine. With or without a test dose, 0.0625% bupivacaine with sufentanil provided inadequate analgesia. Women in the two latter groups required additional bupivacaine, which in turn impaired their ability to walk. The authors suggest that, based on these results, walking during the early postblock period would be possible by omitting the lidocaine-epinephrine test dose and using 0.125% bupivacaine for the initial bolus.

■ Determining Critical Level of Oxygen Delivery in Humans. Lieberman *et al.* (page 407)

The threshold of oxygen delivery (the level below which evidence of hypoxia is produced), also defined as the "critical" DO_2, has been determined in anesthetized dogs, rats, and pigs. In an attempt to define the critical DO_2 in conscious, healthy adults, Lieberman *et al.* recruited eight paid volunteers, aged 19–25 yr, and reduced oxygen delivery from 14.0 ± 2.9 ml $O_2 \cdot kg^{-1} \cdot min^{-1}$ to 7.3 ± 1.4 ml $O_2 \cdot kg^{-1} \cdot min^{-1}$ by acute hemodilution followed by β-blockade.

As blood was removed, isovolemia was maintained by infusion of 5% human serum albumin and the subjects' platelet-rich plasma. Cardiovascular measurements were made 30 min after insertion of invasive cannulae and before removal of blood; after hemodilution to a hemoglobin concentration of 5 g/dl (which reduced oxygen delivery to 9.9 ± ml $O_2 \cdot kg^{-1} \cdot min^{-1}$); and again after a further reduction in oxygen delivery to 7.3 ml $O_2 \cdot kg^{-1} \cdot min^{-1}$, achieved by the infusion of esmolol. Arterial and mixed venous blood was also sampled for measurement of pH, oxygen content, oxyhemoglobin saturation, and arterial plasma lactate concentration. At the conclusion of the experiment, all erythrocytes were transfused and subjects were thoroughly examined by a physician before discharge.

Despite increased heart rate and increased stroke volume and cardiac indices, there was no evidence of inadequate systemic oxygenation in any of the subjects. Oxygen consumption and plasma lactate concentrations increased slightly. In addition, one woman subject had a single transient ST-segment change during the study period. However, the incident was not symptomatic and resolved despite a further reduction in DO_2. The researchers were not able to determine the critical level of systemic DO_2, which appears to be less than the value achieved in this study.

■ Is Surgery with Anesthesia an Independent Risk Factor for Stroke? Wong *et al.* (page 425)

Although certain surgeries, such as cardiac, neurologic, and vascular procedures, and risk factors such as cigarette smoking, male gender, and history of transient ischemic attacks have been established as associated with increased incidence of perioperative stroke, no one

has evaluated surgery and anesthesia alone as a possible independent risk factor for development of stroke.

Using a medical record linkage system to the Rochester Epidemiology Project, Wong *et al.* retrieved records of 1,455 people who had an incident (first-time) of ischemic stroke from 1960 to 1984. An equal number of age-and gender-matched controls were identified from the same database. With the additional usage of the Mayo Surgical Information Retrieval System, the team then identified all stroke cases in which surgery with either general anesthesia or central neuroaxis blockade had been performed within 1 yr before the stroke date.

A conditional logistic regression model was used to estimate the odds of stroke after surgery and general anesthesia. The team identified 59 patients and 17 controls who underwent surgery within 30 days before their stroke or index date. After adjusting for previously identified risk factors (male gender, cigarette smoking, history of transient ischemic attacks, among others) the team found that undergoing surgery 30 days before the index date was an independent risk factor for stroke. The risk of perioperative ischemic stroke was increased even after general, non-high-risk surgeries. The mechanisms underlying this increased risk, of course, require further investigation.

■ Development of Ulnar Neuropathy Not Limited to Perioperative Setting. Warner *et al.* (page 613)

In an attempt to determine the underlying causes of ulnar neuropathy, Warner *et al.* previously described 7 of 1502 prospectively studied surgical patients who reported onset of symptoms 2-7 days after their procedures. In the current issue, the team describes two patients from a prospective study of ulnar neuropathy in patients admitted to the hospital for nonsurgical conditions. *Ulnar neuropathy* was defined as current symptoms of paresthesia in the ulnar distribution, signs of abnormal two-point discrimination in the volar surface of the distal fifth digit, or weakness of the first dorsal interosseous and abductor digiti minimi muscles. Patients with current symptoms or preexisting ulnar neuropathy were excluded from the study.

A specially trained research assistant performed a standardized daily baseline neurologic assessment of the upper extremities in all study participants while they were in the hospital. Those discharged before 7 days were interviewed by phone using a standardized questionnaire. Two of the study's 986 patients had ulnar neuropathy. Patient 1 was a 55-yr-old man with a 6-month history of recurrent disseminated aspergillosis who was admitted for intravenous antifungal therapy, who experienced intermittent tingling in the fourth and fifth digits of his right hand on the third hospital day. By the fifth day, tingling had become constant and was accompanied by a burning dysesthesia when his elbow was flexed greater than 90°. His symptoms improved gradually and completely resolved over the next 6 months. Patient 2 was a 67-yr-old man with severe bronchiectasis admitted for treatment of recurrent *Pseudomonas pneumonia* with intravenous antibiotics and respiratory therapy, in whom developed tingling and aching in the fourth and fifth digits of his left hand on the fourth hospital day. By the sixth day, he also had symptoms in his right hand, which resolved within 2 weeks. Symptoms in his left hand, however, persisted for 8 months.

The authors posit that factors common to medical and postoperative patients may contribute to the development of ulnar neuropathy. Specifically, male gender and prolonged periods of bed rest in the supine position seem to increase risk. When lying in a hospital bed, patients tend to bend their elbows and rest their hands on the upper abdomen or chest, thus increasing pressure on the ulnar nerve. Anatomic differences at the elbow, *i.e.*, larger tubercle of the coronoid process and less fatty tissue over the medial aspect, may explain why this condition is more likely to develop in men than in women.

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