◇ This Month in

ANESTHESIOLOGY

■ Managing Post–Dural Puncture Headache with Lumbar Epidural Blood Patch: Is It Effective? Safa-Tisseront *et al.* (page 334)

Between December 1988 and October 2000, Safa-Tisseront *et al.* included in an observational study all patients treated at their institution with lumbar epidural blood patch (EBP) for incapacitating post–dural puncture headache. Their aim was to assess the effectiveness of EBP as a treatment and to determine what factors, if any, were predictive of treatment failure.

During the 12-yr study period, 527 patients were included in the study; 504 were included in the final analysis. Diagnosis criteria for severe post–dural puncture headache included inability to perform daily activities and necessity to stay in bed for part of the day. In patients included in the study, dural puncture had occurred during anesthesia (both spinal and epidural), diagnostic lumbar puncture, or therapeutic lumbar puncture. Their symptoms included headache in 97% of cases, neck pain in 87%, nausea and vomiting in 60%, cochlear symptoms in 36%, and ocular symptoms in 36%. EBP was performed after a median delay of 4 days after dural puncture. The mean volume of blood injected was 23 ± 5 ml.

Complete relief of symptoms occurred in 377 cases, and incomplete relief occurred in 93 cases; the treatment failed in 34 cases. The authors analyzed patient characteristics, circumstances of dural puncture, delay between dural puncture and EBP, and volume of blood injected for EBP. They determined that only the diameter of the needle (< 20 gauge) and a delay of treatment of more than 4 days were independently predictive of treatment failure.

■ Residents' Acquisition of Fiberoptic Orotracheal Intubation Skills. Naik *et al.* (page 343)

According to Naik *et al.*, fiscal restraints have put pressure on hospitals to increase operating room turnover, resulting in less available time for attending staff to teach resident anesthesiologists the skills for performing fiberoptic orotracheal intubation (FOI), an advanced airway skill. Therefore, the researchers designed a randomized study to compare two methods of teaching FOI skills. First-year anesthesiology residents and first-and second-year internal medicine residents were randomized to either a didactic-teaching-only group (n = 12) or a model-training group (n = 12). All study participants first received a 10-min instrument orientation conducted by three expert bronchoscopists, during which time they familiarized themselves with the fiberoptic bronchoscope. In a pretest, they were all required to manipulate the fiberoptic bronchoscope through a series of syringe barrels contained in a covered wooden model under fiberoptic vision. Observers blinded to group assignment scored the performance of participants on this task.

Residents in the didactic-teaching group then received a 45-min lecture by an expert bronchoscopist who emphasized proper handling and usage of the bronchoscope for FOI. The model-training group spent 45 min practicing FOI skills with the guidance of experts on the "choose-the-hole" model with different syringe barrel combinations. Both groups were then posttested on their skills, and within 10 days of their training, all subjects were tested in the operating room on their ability to perform FOI in an anesthetized and paralyzed patient.

All patients were healthy females scheduled for elective surgery. Three anesthesiologists were present for all studies. The study anesthesiologist intervened if the patient's blood pressure or heart rate was not maintained within 20% of baseline measurements, if pulse oximetry decreased below 94%, or if a maximum of 210 s passed before intubation occurred. Two of the anesthesiologists present scored each resident on their performance. Pass ratings were given if the evaluators thought the subject could perform a second FOI without additional training. Subjects in the model-training group completed FOI significantly faster than did those in the didactic-teaching group and also received higher global rating assessment scores. Seventy-five percent of those in the model training group passed, whereas only 33% in the didactic teaching group passed. Incorporating simple models into training of FOI outside the operating room may help to reduce the time and pressures that accompany teaching this skill in the operating room for the first time and result in cost-effective use of resources.

■ Effects of Epidural Bupivacaine on Pain Intensity in Infant Rats. Howard *et al.* (page 421)

To examine the influence of postnatal age and presence of inflammation on efficacy of epidural bupivacaine at low doses, Howard *et al.* conducted a series of experiments using infant rats aged 3, 10, and 21 days. After determination of hind limb flexion withdrawal thresholds to mechanical stimulation, researchers induced inflammatory reactions in the right hind paw of each rat by local injection of 2% solution of carrageenan. Three hours after carrageenan injection, the rats were briefly anesthetized with halothane, and then epidural bupivacaine or saline was administered to the rats in dose ranges and volumes according to their postnatal age. All solutions contained 10% Evans Blue dye as a marker. Laminectomies were performed after the animals were killed to confirm intact dura and spinal cords free from staining.

After full recovery from anesthesia and 15 min after injection of bupivacaine, sensory thresholds were again determined in both hind limbs at 15-min intervals for 90 min. Pain sensitivity thresholds increased slightly throughout the experiment in animals to which saline and systemic bupivacaine were administered. Inflammatory hypersensitivity (the difference in threshold between the inflamed and noninflamed sides) was selectively attenuated by very low doses of bupivacaine (concentration range, 0.004–0.0625%), which did not affect the sensory threshold in the contralateral uninflamed limb. The effects of epidural bupivacaine were age related: In 21-day-old rats, the inflammatory hypersensitivity was only reversed by 0.0625% bupivacaine, whereas in 3- and 10-day-old rats, the concentrations required to reverse hypersensitivity were lower. The investigation suggests that very young patients may be more sensitive to the therapeutic effects of epidural local anesthetics.

■ Illuminating Sources of Opioid Peptide Production and Degree of Endogenous Pain Inhibition. Rittner *et al.* (page 500)

Tissue injuries trigger recruitment of granulocytes and monocytes, which help to limit the extent of tissue destruction and simultaneously induce endogenous analgesia. To characterize and quantify subpopulations of opioid peptide–expressing immune cells at different stages of paw inflammation, Rittner *et al.* used Freund complete adjuvant–induced hind paw inflammation in male Wistar rats and then harvested tissue samples at 2, 6, and 96 h after injection of Freund complete adjuvant. The harvested cells were characterized by flow cytometry using a monoclonal pan-opioid antibody (3E7) and antibodies against cell surface antigens and by immunohistochemistry using a polyclonal antibody to β-endorphin. After magnetic cell sorting, the researchers used radioimmunoassay to quantify β-endorphin content.

During the early stages of inflammation (2 and 6 h after Freund complete adjuvant inoculation), 66% of opioid peptide–producing ($3E7^+$) leukocytes were $HIS48^+$ granulocytes. At 96 h after inoculation, the majority of $3E7^+$ immune cells were $ED1^+$ monocytes and macrophages (73%). The total number of $3E7^+$ cells increased 5.6-fold in the 4 days after Freund complete adjuvant inoculation. During the same time period, the β-endorphin content multiplied 3.9-fold. Parallel experiments using cold water swim stress showed a 160% increase in analgesia. Understanding which distinct leukocyte lineages contribute to the expression of opioid peptides at different stages of inflammation may be important for understanding pain in patients with pain in immunosuppressive diseases, such as cancer, diabetes, or acquired immunodeficiency syndrome. It might also aid in the development of novel pain management strategies.

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