◇ This Month in

ANESTHESIOLOGY

■ Risk of Contaminated Percutaneous Injuries in Anesthesia Personnel Calculated. Greene *et al.* (page 1362)

Over a 2-year period, Greene *et al.* (page 000) prospectively collected data at 11 institutions to analyze the risk of contaminated percutaneous injuries (CPIs) to anesthesia personnel. At the participating institutions, attending anesthesiologists, anesthesia residents, certified registered nurse anesthetists, or student registered nurse anesthetists who sustained CPIs during the study period were advised to first follow their institution's policy for occupational exposure. After initial management of the injury, those who agreed to participate in the study anonymously completed an Injury Report Form. The data collected from the Injury Report Forms were analyzed to estimate risk of infection with human immunodeficiency virus (HIV) and hepatitis C virus.

A total of 138 CPIs were reported on the Injury Report Forms. Of those injuries, 73% occurred in the operating room, 9% occurred in the preoperative holding area, 5% occurred in the postanesthesia care unit, and 13% occurred in other areas. The majority of CPIs (74%) were caused by hollow-bore needles, and blood was the predominant contaminant. The authors also used a retrospective Reporting Rate Survey circulated anonymously to all anesthesia personnel to determine the number of CPIs sustained in the previous 12 months. The retrospective reporting rate surveys returned by 500 personnel indicated that 179 CPIs occurred in the previous 12 months and that only 45% of respondents reported CPIs to their hospital health services for injury management.

Corrected for underreporting, the team calculated the risk of CPIs at 0.27 CPIs/yr/person and at 0.42 CPIs/yr/full-time equivalent worker. The rate of CPIs/yr/full-time equivalent worker was statistically greater for residents and attending anesthesiologists compared to certified registered nurse anesthetists or student registered nurse anesthetists, with residents having the greatest relative rate. Estimated average 30-yr risks per full-time equivalent worker were 0.049% for HIV infection and 0.45% for hepatitis C infection. According to the authors, 74% of the reported CPIs were potentially preventable. Increasing the use of safety devices, including needleless or shielded needle devices and protective barriers, using a one-handed technique or a mechanical device for recapping, and following standard precautions would greatly reduce the risk of CPIs in anesthesia personnel.

■ Effects of Isoflurane and Sevoflurane on Surgical Noxious Stimulation-induced Hypertension. Segawa *et al.* (page 1407)

To study the effects of volatile anesthetics commonly administered to treat intraoperative hypertension, Segawa *et al.* recruited 40 healthy volunteers scheduled for left lobectomy of the liver for living-related transplantation. Anesthesia was induced using 4 to 5 mg/kg intravenous thiopental and tracheal intubation facilitated by 0.2 mg/kg intravenous vecuronium. The first 20 patients were assigned randomly to one of two groups receiving either 1.2% (1.0 mean alveolar concentration [MAC] isoflurane—the "low-isoflurane" group) or 2.0% (1.67 MAC isoflurane—the "high-isoflurane" group). The next 20 patients were assigned randomly to either the low-sevoflurane group (1.7%, 1.0 MAC^{12}) or the high-sevoflurane group (2.8%, 1.67 MAC).

Oxygen saturation (Sp_{O_2}) was monitored continuously and maintained between 90–100%, whereas end-tidal carbon dioxide tension was maintained between 30–35 mmHg throughout the study period. Pulse rate and arterial blood pressure were recorded automatically every 10 s during the study period (1 min before skin incision until 15 min afterward). Blood samples were drawn 1 min before skin incision and at 2.5, 5.0, 7.5, 10.0, 12.5, and 15.0 min after the start of the incision. Plasma catecholamine concentrations were determined by liquid chromatography.

Except for lower arterial blood pressure in the high-isoflurane group, there were no differences between the high- and low-dose groups in subjects receiving either sevoflurane or isoflurane for catecholamine concentrations, blood pressure, or pulse rates obtained in the study subjects at baseline. After skin incision, epinephrine and norepinephrine concentrations increased significantly at all sampling times in all groups, except for in the low-sevoflurane group, in which a significant increase did not occur until 12.5 min after start of incision. Maximum changes in pulse rate were significantly greater in the high-isoflurane than in the low-isoflurane group. Values of maximum increase and area under the concentration-*versus*-time curve of norepinephrine were greater in the high-dose

groups of both anesthetics. The effects of isoflurane and sevoflurane on the surgical noxious stimulation-induced norepinephrine response were inversely proportional to the dose, and both anesthetics augmented the plasma catecholamine response. The authors suggest that this may be caused by the suppression of responses of the vascular smooth muscle and myocardium to catecholamines.

■ Can Tenoxicam Reduce Low Back Pain after Lumbar Epidural Anesthesia? Wang *et al.* (page 1414)

To assess the local effects of tenoxicam, a newer-generation nonsteroidal antiinflammatory drug on postepidural backache after nonobstetric surgery, Wang *et al.* included 1,000 unpremedicated ASA status I or II patients scheduled for hemorrhoidectomy from May 1994 to September 1997 in their prospective, randomized, double-blind study. The solution for local skin and subcutaneous anesthesia was prepared with or without 10 mg tenoxicam injected into a vial of 20 ml lidocaine, 1%. The anesthesiologist who performed the epidural anesthesia and the investigator who evaluated patients' pre- and postoperative pain scores were blinded to drug-group assignment.

Epidural blocks were performed with the patients lying in the left lateral knee-chest position and were administered by the same anesthesiologist through needles at the L4-5 or L5-S1 interspace. Patients in the control group received 25 ml lidocaine, 2%, with epinephrine 1:200,000 epidurally and 4 ml lidocaine, 1%, for local skin infiltration. Patients in the tenoxicam group received 25 ml lidocaine, 2%, with epinephrine 1:200,000 epidurally and 4 ml lidocaine, 1%, with tenoxicam 1:2,000 for local skin infiltration. After surgery, patients received intramuscular pethidine for surgical pain and warm sitz baths on the first postoperative morning. Using the standard 10-cm visual analog scale, patients were asked to rate their pain (0 = no backache; 10 = most intensive backache imaginable) before surgery and at 24, 48, and 72 h postoperatively. For purposes of the study, a patient was recorded as having postepidural backache if the postoperative visual analog scale score was higher than the preoperative score.

In the control group, 22.8% of patients experienced postepidural backache 24 h after surgery, 17.4% experienced it at 48 h after surgery, and 9.2% experienced it at 72 h after surgery. Patients in the tenoxicam group had a 6.8% incidence of backache at 24 h, a 4.0% incidence at 48 h, and a 1.2% incidence at 72 h after surgery. In the control group, low back pain developed in 14 patients after an initial painless interview result at 24 h.

Local supplementation with tenoxicam decreased the incidence and severity of postepidural backache and also shortened its duration. In addition, the complications seen with systemic tenoxicam administration, such as gastric bleeding, renal impairment, or increased bleeding because of inhibition of platelet activity, were not seen with the local administration of this low dose of the drug. There was a significant association between postepidural backache and multiple attempts to place the epidural needle in the control group patients.

■ Discharge Criteria following Regional Block Evaluated in Obstetric Post-anesthesia Care Unit. Cohen *et al.* (page 1559)

In a 6-month observational study, Cohen *et al.* collected data for 358 patients who underwent cesarean section (n = 327) or tubal ligation (n = 33) and recovered in the obstetric post-anesthesia care unit (PACU). Patient demographic data, type of anesthesia used, duration of anesthesia, and incidence of side effects were documented. The PACU nurse monitored patient vital signs and documented the presence and treatment of side effects at 30-min intervals until the patient was discharged from the PACU. During the monitoring period, patients were asked to rank their pain on a 10-point verbal pain score (0 = no pain; 10 = worst pain imaginable). The nurse also assessed the patient's degree of mobility of the lower extremities. (0 = no mobility; 1 = ability to move feet; 2 = ability to flex knees; and 3 = ability to lift hips.)

During the study period, the discharge criteria at the authors' institution included a 1-h minimum stay in the obstetric PACU, presence of normal consciousness level, stable vital signs, adequate analgesia (verbal pain score of 3 or less), and ability to flex the knees (mobility score of 2). "Needed to stay" events included bleeding, cardiorespiratory problems, sedation, dizziness, and pain. "Safe to leave" PACU events included pruritus, nausea, and residual neural blockade.

Patients were seen the next day, and their charts were reviewed to determine whether any complications, such as hemorrhage, hypotension, or persistent neurologic deficit, occurred in the first few hours after

discharge from the obstetric PACU. Patients also rated satisfaction with their anesthesia, pain control, and PACU stay.

Regional anesthesia was used in 94% of the patients, and PACU stay was shorter in duration in the epidural than in either the spinal or the general anesthesia groups. Residual block accounted for the majority of stays considered unnecessary. Pruritus and nausea were the next most common reasons for unnecessary stays in the PACU. Of 11 patients who had prolonged stays (3–6 h), three had severe hypertension (systolic blood pressure over 160 mmHg), six had hemorrhage, and two had prolonged anesthetic block. In all, the authors calculated that 429 h of PACU time could have been saved using revised criteria (stable vital signs, able to flex knees). Complications did not develop in any of the women rated as "safe to leave." Although cost savings were relatively modest ($20,292), shorter-duration PACU stays could yield greater flexibility and more efficient use of nursing personnel.

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