Fig. 1. (A) Equilibrium fluorescence intensity of Dns-C₆-Chol under conditions of energy transfer from nAChR tryptophan residues in the presence of nonanesthetics. The excitation wavelength was 290 nm, and emission was recorded above 560 nm. The predicted EC₅₀ for 1.2-dichlorohexafluorocyclobutane and 2.3-dichlorooctafluorobutane were 16 µM and 4.5 µM, respectively. Data are the means (± SD) of at least three determinations. (B) Stern–Volmer plots for nAChR-rich membrane intrinsic fluorescence quenching by halothane. Data are the means (± SD) of at least three determinations.

avoiding compounds that seemed to offer the greatest probability of quenching.

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Enoxaparin and Epidural Analgesia

To the Editor—Enoxaparin sodium (Lovenox), a low molecular weight heparin (LMWH) manufactured by Rhone-Poulenc Rorer Pharmaceuticals, has a new warning included in its recently changed package insert. This change can have significant implications for anesthesiologists. It states, “Lovenox injection, like other anticoagulants, should be used with extreme caution in conditions with increased risk of hemorrhage, such as in patients with indwelling intrathecal or epidural catheters.” Because of this warning, some orthopedic surgeons at our institution have decided against the use of an epidural catheter for postoperative pain management in patients receiving Lovenox for deep venous thrombosis (DVT) prophylaxis after total hip and knee replacement surgery.

Lovenox was released for use in Europe in 1987 and in the United States in 1993. Bergqvist et al. reported that more than one million patients receiving LMWH, there was one case of a spinal hematoma. In other controlled studies of at least 10,000 patients who received epidural/spinal anesthesia or analgesia during LMWH prophylaxis, this combination of treatments did not produce any catheter-related complications. A similar safety record was observed in three other studies of 1,792 patients. In contrast, during post-market clinical use in the United States since 1993, Rhone-Poulenc Rorer Pharmaceuticals reports that there have been seven cases of epidural hematoma formation after epidural anesthesia/analgesia in association with Lovenox use. All but two cases were associated with an epidural catheter that was inserted or removed, either before the patient was started on Lovenox. Because of this new development, the drug manufacturer recently changed the package insert to reflect the perceived increased risk of epidural hematoma formation in patients with an epidural catheter during Lovenox prophylaxis.

Epidural hematoma formation in patients receiving anticoagulation therapy is a known but rare complication irrespective of central neuraxial blockade. Is the risk of spontaneous or catheter-related spinal
hematoma greater with Lovenox than with other effective forms of anticoagulant DVT prophylaxis? Is it safe to leave an indwelling epidural catheter for postoperative analgesia or to remove it during Lovenox therapy? Although we are now aware of the seven cases of epidural hematoma reported by Rhone-Poulec Rorer in the past 2 y, we cannot estimate the incidence of epidural hematoma formation in patients receiving Lovenox and have an epidural catheter, because the number of patients receiving intraoperative and/or postoperative epidural anesthesia and/or analgesia is unknown. The perceived “high” incidence of epidural hematoma formation in patients receiving Lovenox may be explained by the increased use of epidural analgesia after total joint replacement surgery. Therefore, it may appear that specifically having a catheter in place increases the risk of epidural hematoma formation.

We must identify whether the risk of epidural hematoma formation is related to the timing of epidural catheter insertion or catheter removal, or related to the duration of catheter indwelling, whether there is a relation between the administered dose of Lovenox and epidural hematoma formation. Information regarding the circumstances under which epidural hematoma occurred in the reported cases is lacking or incomplete. A cause-effect relation cannot be established at this time. A prospective determination of the incidence of epidural hematoma formation in patients with epidural catheters removed at the end of surgery and in patients whose catheter is left in place for postoperative analgesia is needed. There is no evidence in the literature that removal of an epidural catheter portends greater risk of epidural hematoma formation than does epidural catheter insertion.

Finally, further studies are needed to delineate the role and effectiveness of epidural analgesia and analgesia in improving outcome. Postoperative epidural analgesia is an excellent method for providing postoperative pain control, particularly in patients undergoing total hip and knee joint replacement. It would be unfortunate to abandon this form of postoperative pain management without further elucidation of the risk-benefit profile for Lovenox and epidural anesthesia and analgesia.

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