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In Reply:—I thank Drs. Bromage, Launcelott, and Visser for taking the time to raise issues about this case that we were unable to include in our original letter because of word limitations. First, both are correct that the concentration of hydromorphone in the epidural infusate was 6 *micrograms* per milliliter and not milligrams as erroneously published. The size of the Tuohy needle in the Arrow epidural kit is 17 gauge.

Drs. Bromage and Launcelott assert that it is possible that all, or at least a significant fraction, of the epidural infusate (1.25 mg bupivacaine and 6 μg hydromorphone per ml and given at a rate of 14 ml/h) passed through the dural rent created during placement one vertebral interspace below the final epidural insertion at T10–11. I could not refute that notion without assaying cerebral spinal fluid. However, on clinical grounds, one would expect to see a significant and persistent cephalad migration of paralysis or at least noticeable paresis. Serial evaluations by the Anesthesia Pain Service and the nursing staff failed to reveal any extraordinary abnormalities in this patient who was ambulatory and receiving chest physiotherapy. Specifically, her neurologic examination at 5:00 PM the first postoperative day (30 h post-insertion) revealed a decreased sensation to cold but intact crude touch from T4 to L1 and intact motor. Reportedly, the patient was able to feed herself dinner without difficulty. After the incident, the patient's husband offered his impression that perhaps later that evening she appeared more somnolent and weaker, however, not sufficiently to be alarming. We had no other documentation of her condition before her nurse's discovery at 2:00 AM the next morning. I am compelled to assume that the epidural catheter was functioning as expected until sometime later that evening when there was a relatively abrupt transition to a subarachnoid block, with a dense motor block of lower and upper extremities with a sensorium responsive only to intense stimulation.

Despite her dismal diagnosis of mesothelioma, the patient was relatively robust and should have been capable of normal absorption and metabolism of bupivacaine and hydromorphone. Accumulation of drug can occur and must be monitored clinically, which is the purpose of APS rounds and vigilant observation as per our nursing protocol. Nonetheless, I do not believe that it is an appropriate comparison to equate the effects of 2.35–2.73 mg of hydromorphone given as an infusion over approximately 30 h with Dr. Bromage's experience with a single 1-mg epidural bolus. Finally, if a large portion of an epidural infusate or the migration of a catheter can occur through a previous accidental dural puncture, then perhaps we ought to reconsider the wisdom of the widespread practice of placing epidural catheters a level of two above such sites.

With regards to Dr. Launcelott's concerns regarding the quality of our care for this patient, I would like to state that our APS system provides the close and responsive service that he recommends. Our APS rounds *bis in die* include the completion of a standard daily progress note, which details drug dose and technique, catheter site assessment, patient sensory and motor levels, side effects, and patient satisfaction with the therapy. The nurses are instructed to contact the APS liberally for consultation (available 24 h) regarding changes in the patient's state or comfort level, and standing orders exist for the cessation of epidural infusions and the administration of naloxone should events such as the one we present occur. These steps were followed as our case illustrates. In addition, I echo the concerns of Dr. Launcelott regarding the monitoring of patients using epidural analgesia outside the operating suite. With the present economic pressures to explore new avenues by which to ply our trade outside of the operating room, anesthesiologists are finding themselves using drugs and techniques under conditions that are frequently suboptimal as compared with those in a conventional OR. It is neither feasible to place all patients in intensive care units for the sole purpose of postoperative pain management nor is it possible for the anesthesiologist to remain continuously at the bedside. Attempts at using pulse oximetry on a large scale on the wards often lead to non-compliance because of restriction to patient movement, frequent false alarms, and inattentiveness by nursing staff because of current workloads. Because I suspect that the patient may ultimately be our best "monitor," more time spent educating the patient and family as to the need for continuous self-assessment and recognition of early warning signs of undesired levels of weakness or sedation before the placement of epidural catheters could prove useful.

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