In Response
Drs. Schulz-Stübner1 and Schummer2 are correct in that we did not mention electrocardiogram positioning as a tool to verify correct positioning of a central venous catheter (CVC). However, our goal3 was to increase awareness of how to prevent CVC-induced cardiac tamponade by positioning the CVC tip outside the pericardial reflection. Electrocardiogram-guided CVC positioning places the CVC tip at the sinoatrial node, near the cava-atrial junction.

Personally, after reading the report by Kim et al.,5 I position the tip of any right-sided CVC at 11 to 12 cm depth and left-sided CVC at 12 to 13 cm. Proper positioning outside pericardial reflection was proved by chest radiographs in all cases. This approach spares unnecessary use of expensive equipment with the same patient benefit.

Micha Y. Shamir, MD
Department of Anesthesiology
Hadassah-Hebrew University Medical Center
Jerusalem, Israel
shamir61@gmail.com

REFERENCES
DOI: 10.1213/ANE.0b013e3182330db0

The Confounding Effects of Pharmacokinetics and Pharmacodynamics of Sedatives and Opioids on Time to Death After Terminal Withdrawal of Life-Support in the Intensive Care Unit

To the Editor
W

First, the small sample size could not exclude a type II error in the statistical interpretation of results. A large epidemiological survey suggested a positive association between prescribed dosages of opioids and related death in the United States.2

Second, large cumulative quantities and dosages of opioids and sedatives were given to patients3 with no documentation of the type, frequency, or severity of distressing symptoms being treated. If practice dictated titrating medications to preemptively induce unconsciousness and respiratory depression before MV/VS withdrawal in all patients, the association between the dose and the time to death might be difficult to discern. These end points would be proximate surrogates of early death within 60 minutes. Other reports suggest that opioids, sedatives, and neuromuscular blocking agents may be administered to alleviate the distress experienced by families and care providers from the dying process after terminal withdrawal of MV.3,4

Finally, if extreme severity of illness alone explained the rapid death after MV/VS withdrawal,1 patients would be most likely moribund or imminently dying of multi-organ failure. The number of acutely failing organs predicted a short time to death.5 The metabolic derangement of multiple-organ failure alters pharmacokinetics and pharmacodynamics of opioids and sedatives.6 Impaired hepatic and renal clearance can result in cumulative buildup of plasma concentrations of opioids and sedatives administered either intermittently or by a continuous infusion. Acute metabolic encephalopathy can potentiate the actions of opioids and sedatives on the central nervous system and precipitate or accelerate terminal respiratory and circulatory arrest.7 Pharmacologic potentiation of opioids and sedative effects on respiration and circulation can shorten the time to death. Drug kinetics and pharmacologic responses are critical factors for administering opioids and sedatives in proportional doses to control distressing symptoms and minimize the risk of causing death by disproportional dosing. The variability of pharmacokinetics and pharmacodynamics of opioids and sedatives in dying patients must be taken into account when determining the association between medication dosages and the time to death.

Mohamed Y. Rady, MD, PhD, FCCM
Department of Critical Care Medicine
Mayo Clinic
Phoenix, Arizona

Joseph L. Verheijde, PhD, MBA, PT
Department of Physical Medicine and Rehabilitation
Mayo Clinic
Phoenix, Arizona

Super Glue—Stuck on You

To the Editor

Gurnaney et al.1 describe great success using Derma-pond (2-octyl cyanoacrylate glue) to decrease peri-catheter leakage associated with continuous local anesthetic infusion. We note that the patients were discharged from the hospital with the catheter in situ and did not encounter any problems relating to removal of the catheter.2 We report our difficulties in 3 patients.

We are a tertiary pediatric center and routinely use continuous perineural infusions for perioperative analgesia. We too have had problems with premature displacement or removal of the catheter in our population, especially in the upper limb. In response, we tried various combinations of suturing/subcutaneous tunneling/tissue glue in an attempt to prolong catheter survival. Combining tunneling with tissue glue seemed to be the most mechanically stable. We used n-butyl-2-cyanoacrylate monomer (Indermil Tissue Adhesive; Henkel Ltd., Dublin, Ireland) to secure the catheter to the skin.

We have encountered difficulty in the removal of the catheter in 3 children in whom Indermil was used in combination with tunneling. A reasonable (moderate) amount of force was required to remove the catheters resulting in considerable distress to the patients in 2 cases, while the third required general anesthesia for catheter removal. We did not encounter a similar problem when catheters were tunneled and sutured before our introduction of Indermil glue.

Suggestions have been made in the literature regarding the use of warm soapy water,2,3 acetone,2,3 or petroleum

References