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In Reply:—We appreciate Dr. Stevens's interest in our recent papers^{1,2} and the comments made. In our opinion, the statement that "sympathetic efferents were largely, if not completely eliminated by high epidural anesthesia" in these experiments appears to be entirely appropriate.

Certainly, none of the mentioned criteria (e.g., plasma catecholamines and paralysis of the nictitating membrane) represents a direct quantitative measure of efferent sympathetic drive. The only suitable method and gold standard in this regard is a direct recording of spike traffic from multiple sympathetic efferents, the neurophysiologic correlate of sympathetic tone. For obvious reasons, these measurements cannot and could not be performed during the same experiments in these conscious unanesthetized dogs.

However, there is further, albeit indirect evidence for sympathetic blockade in our dogs, be it partial or complete. In a previous study,³ we measured an increase in both fore- and hindlimb skin temperatures with epidural anesthesia in these dogs using similar dosages of bupivacaine 0.5%. In addition, we noted that the usual reflex blood pressure and heart rate increase induced by bilateral clamping of the carotid loop arteries is either completely abolished or markedly (>80%) attenuated during epidural anesthesia. This indeed argues for a partial, if not complete sympathetic block.

Finally, whether sympathetic blockade was complete or only partial does not appear to be particularly relevant with regard to our conclusions. In fact, if sympathetic blockade were only partial, our results would even underestimate the impact of the experimental findings.

Accordingly, our main conclusions,^{1,2} i.e., that blood pressure is sup-

ported by endogenous vasopressin during epidural anesthesia and that sympathetic blockade by epidural anesthesia blunts the cardiovascular response to hypoxemia, appear well supported by the presented data, and stand.

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Inadvertent Intraarterial Placement of a Sheath Introducer while Using the Raulerson Syringe

To the Editor:—Percutaneous central venous placement of a sheath introducer has always been a task requiring a considerable degree of skill. The recently introduced Raulerson syringe by Arrow International (Reading, PA) in which the spring wire guide is threaded directly through the syringe and needle as a one-step modification of the Seldinger technique, promises to facilitate this procedure, with less risk of contamination, trauma, wire guide misplacement,¹ and air embolism.

We report here a case of inadvertent intraarterial placement of the sheath introducer with use of the Raulerson syringe.

A 65-yr-old woman was brought to the operating room for urgent coronary artery bypass grafting. Because the patient was very anxious despite intravenous sedation (morphine 0.15 mg/kg and scopolamine 0.3 mg), general anesthesia was induced prior to insertion of a pulmonary artery catheter. After satisfactory induction and uneventful

tracheal intubation, we attempted right internal jugular percutaneous placement of a sheath-introducer using the technique of English *et al.*² with the Raulerson syringe. Blood was aspirated and did not appear to be arterial. The wire guide was advanced and the introducer was inserted. Blood then was noted to be flowing through the side port in a pulsatile manner, and when transduced, demonstrated an arterial waveform. The sheath introducer was immediately withdrawn, and despite application of direct pressure, an expanding hematoma was noted.

In light of both left main coronary artery stenosis and unstable angina in this already anesthetized patient, it was decided to surgically explore the neck. Exploration of the right neck was performed *via* an anterior incision, which was an extension of the median sternotomy. The hematoma was found to originate from the thyrocervical trunk. There

was no injury to the innominate, subclavian, or carotid arteries. The thyrocervical trunk and its branches were ligated; satisfactory hemostasis was achieved; and the planned coronary artery bypass surgery proceeded.

In retrospect, arterial puncture with the Raulerson syringe was not recognized because of the inability to detect pulsatile flow through it. The color of aspirated blood is not always a reliable indicator of venous access.³ We recommend that upon entry of the blood vessel, a pressure waveform should be transduced before proceeding further. This can be done with the Arrow pressure transduction probe, which is used with the Raulerson syringe. The probe is attached to a pressure transduction system, flushed, and then inserted into the back of the Raulerson syringe plunger upon entry into the blood vessel. Once the waveform is observed to confirm venous location, the probe is removed, and the spring wire guide is inserted.

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Standard Dose of Conduction Anesthetic Is Excessive for the Patient with Uremia

To the Editor:—Lucas and Tsueda¹ describe cardiovascular depression following brachial plexus block in which 45 and 40 ml of local anesthetic were used. For this clinical challenge, a preferred strategy would be to use the *minimum* volume (and dosage) of local anesthetic, such as 20 ml, which suffices to completely block the brachial plexus *via* the parascalene approach.²

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In Reply:—We concur with Dr. Gould that the standard dosage of local anesthetics used for regional block may be excessive in uremic patients. The use of minimum effective dosages may be particularly pertinent in diabetic patients in the late stages of the disease complicated by renal failure.

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Reversal of Blood Flow in the Internal Jugular Vein

To the Editor:—We recently encountered unusual retrograde flow in the left internal jugular vein (IJV) in a patient who underwent accidental ligation of the left innominate vein during open heart surgery.

A 46-yr-old, 163-cm, 68-kg man was scheduled for coronary artery bypass grafting surgery (CABG) because of frequent attacks of angina pectoris. Following cannulation of the left basilic vein the left radial artery, anesthesia was induced with 50 $\mu\text{g}/\text{kg}$ fentanyl, 8 mg pancuronium, and oxygen. An 8-Fr Swan-Ganz[®] catheter (Edward) was inserted into the right IJV under ultrasonic guidance.¹ Both trinitrogly-

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cerin and diltiazem were administered at a rate of 1.0 $\mu\text{g} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$ throughout the operation. After sternotomy, the left innominate vein was unintentionally injured by surgical manipulation. The vein was ligated because the bleeding exceeded 1,000 ml and surgical anastomosis was considered too difficult. Blood was transfused through the right atrial port of the pulmonary artery catheter, and CABG was successfully performed.

Two days after surgery the right IJV was examined with a duplex ultrasound to determine if catheter-induced venous thrombosis had