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Selective Block of the Nerves of the Brachial Plexus

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To the Editor:—I read with interest the article by Partridge *et al.*[1] and the accompanying editorial[2] concerning axillary block.

Unfortunately, the article describing the anatomy of the brachial plexus in 18 cadavers does not mention the musculocutaneous nerve. Clinicians are aware that blockade of this nerve is frequently missed in single injection techniques. One way to make certain of anesthetizing the musculocutaneous nerve or any other nerve in the axilla is to selectively stimulate that nerve.[3]* Although the editorial mentions the possibility of lesions to the nerves with paresthetic techniques,[2] we have used peripheral nerve stimulation with insulated pin-type point needles for many years,† and this may be an answer to this problem.

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* Martin R, Lena P, Lamarche Y: Axillary brachial plexus block: A method to improve its success rate (abstract). Regional Anesth 10:19A, 1985

† Galindo AN, Galindo AL: Special needle for nerve blocks. Regional Anesth 5:12–13, 1980

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In Reply:—We appreciate Dr. Martin's interest in our study.[1] Dr. Martin is, of course, correct in noting that we did not include the musculocutaneous nerve in our study. As he points out, the musculocutaneous nerve exits the neurovascular bundle prior to the point at which the brachial plexus sheath enters the axilla, so its distribution is not relevant to the questions of whether there are functional septa within the sheath, or whether single injections within the sheath contact all the nerves lying within it.

Efforts to anesthetize the musculocutaneous nerve have included separate injections outside the axillary sheath, into the coracobrachialis muscle,[2] and techniques to extend proximal flow of drug injected into the axillary sheath.[3–5] As we discussed in our article, we were not certain that proximal flow would be the same in cadavers as in living patients, and so did not examine this. In addition, as Dr. Martin suggests, a number of authors have previously suggested using nerve stimulators to locate nerves for peripheral nerve blocks.[6,7]† As far as we are aware, however, no published study has demonstrated that success rates for axillary blocks are higher with this technique than with the others we discussed. We still believe that individual experience with a particular technique is probably the most important indicator of success with brachial plexus anesthesia.

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† Raj PP: Ancillary measures to assure success. Regional Anesth 5:9–12, 1980

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Does Halothane Protect Against Hypoxia?

To the Editor:—Hershenson *et al.*[1] confirmed a previous investigation[2] that halothane significantly reduces cardiac output and oxygen consumption in normoxic and hypoxic newborn lambs when compared to paralyzed, ventilated controls. They conclude that halothane reduces oxygen consumption and delivery, and may be protective in hypoxemic patients. One must exercise caution in interpreting these results because of two serious design flaws in this study. Hershenson *et al.*[1] used paralyzed newborn lambs that were anesthetized with fentanyl (30 $\mu g \cdot kg^{-1} \cdot hr^{-1}$) as their control animals. Fentanyl may not be an "anesthetic" in newborn lambs at ten to 100 times this dose.[3] Indeed, the ability of fentanyl to anesthetize other species at this dose has been questioned as well.[4] We wonder how this may have affected the author's conclusions. Were the decreases seen in oxygen consumption and delivery the result of halothane *per se,* or secondary to the reduction of an artificially elevated oxygen consumption and delivery caused by pain or immobilization stress?[5] Perhaps any anesthetic agent would produce the same results.

Secondly, all animals were exposed to progressively lower levels of inspired oxygen (100%, 21%, 15%, 10%) in this study without either an intervening return to normoxia or randomization of the sequence of exposure. Were the decreases in oxygen consumption and delivery at the 10% FI_{O_2} level unduly influenced or exaggerated by the immediately preceding hypoxic exposure?

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In Reply:—We welcome and appreciate Dr. Yaster's comments concerning experimental design. With regards to the use of fentanyl, we agree that fentanyl alone may not provide surgical anesthesia in the newborn lamb. We have found that unparalyzed animals given fentanyl alone at 30 $\mu g \cdot kg^{-1} \cdot hr^{-1}$, while able to lie on the operating table without restraint and appearing to have a blunted response to stimulation, continued

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