

CORRESPONDENCE

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In Reply:—We thank Hogan and Mark for their interest in our recent case report. They raise the questions of whether (1) the extent of blocks were really unexpected especially given that these were obese pregnant patients, and (2) whether it is really possible to identify subdural injections with small volumes (4–7 ml) of water-soluble contrast media using plain film radiographs.

Although every anesthesiologist is taught the effect of weight (and pregnancy) on local anesthetic volume requirements, we have not been impressed by this relationship in everyday clinical practice. One of us (HSC), with more than 12 yr clinical experience providing obstetric anesthesia, has observed that although epidural dose requirements may, in obese patients, be more variable, most such patients require similar volumes of local anesthetic compared to non-obese parturients to achieve high thoracic blocks and satisfactory anesthesia for cesarean section. Lubenow *et al.* have proposed clinical criteria for identifying subdural injections.¹ The patients we reported all met the criteria suggested by these authors for identifying subdural injections. Although it may not be possible to distinguish between extreme spread of an epidural anesthetic and subdural injection of local anesthetic on purely clinical grounds, the patients we presented were all unusual enough to prompt us to ask for a radiographic study. Two of our patients had T2–3 level blocks with 13 ml of local anesthetic solution; one patient had a C2 sensory level and complete motor block of the upper extremities. In our experience, this is most exceptional following lumbar epidural administration of 13 ml 2% lidocaine.

Hogan and Mark point out that volumes of 8–20 ml of contrast material have been recommended to adequately outline epidural nerve root sleeves. Indeed, prior to magnetic resonance imaging, this was common practice for *diagnostic* epidurography.^{2–4} To completely outline multiple nerve root sleeves, it is necessary to completely fill the anterior epidural space, which requires a larger volume of injectate than is necessary to merely confirm needle placement. In recent reports in which patients were studied to confirm epidural catheter placement, much smaller volumes (1–5 ml) of contrast material were recommended and considered adequate for documentation of catheter placement.^{5,6} This fits well with our injected volumes of 4 and 7 ml. Despite the small volumes of contrast, all three patients showed good filling of the subdural space over an area of 5–7 vertebral levels. In case 3, which showed extravasation at the nerve root sleeves of T12, it appears that some of the contrast layered within the epidural space but with contrast clearly layering in the anterior subdural space as well. Unlike injections of small volumes into the posterior epidural space, subdural injections of even small volumes of contrast media readily layer in the anterior aspect of the theca, as was demonstrated in case 3.

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We take exception to the statement that one cannot reliably discern epidural injection from subdural contrast injection with plain radiographic films, especially when these are taken under appropriate conditions with fluoroscopic control of the injection and filming. We perform many epidurograms at our institution, usually for confirmation of epidural catheter placement in patients with severe chronic pain conditions. Our experience in confirming epidural *versus* subdural or extraspinal placement of the catheter has been very good. We believe that it is inadequate merely to state that the injection is “extra-arachnoid” and believe that the distinction is important for proper anesthetic management and patient safety. If equivocal findings are present, then the patient should be studied using cross-sectional computed tomographic imaging.

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