

First, a number of patients with chronically inserted epidural catheters experience pain upon injection that is variously described as burning or pressure, or may, in some cases, have a radiating, even radicular, pattern. In most cases, reinsertion of the catheter, as in the reported patient, leads to resolution of pain with injection. It is also possible that if there was a leak from either the catheter or the epidural space and the drug was injected subcutaneously this may cause pain. The preservative in the morphine of the clinical report was phenol and formalin. Phenol has been used extensively for neurolysis and, most recently, it has been reported to have been chronically administered epidurally for cancer-related pain.<sup>2</sup> The patient in this report had pain that occurred concurrently with a change to preservative-containing drug. This is suggestive, but should not necessarily be interpreted as causal. The final concentration of phenol injected in this patient was 0.05%. It may be that local irritation and fibrosis had occurred from the implanted catheter and injection of any substance, preservative-containing or not, may have caused pain. It is unfortunate that the authors did not inject preservative-free morphine prior to catheter replacement and inject preservative-containing morphine after catheter replacement to test the "preservative" hypothesis.

Second, the authors infer that the dose of administered preservative accounted for the patient's altered state of consciousness. I think the authors have ignored the basic pharmacokinetics and pharmacodynamics of epidurally administered morphine. It has been shown that the CSF levels of morphine after epidural administration will be two to three orders of magnitude higher

than after other parenteral administration methods.<sup>3</sup> Thus it is no surprise that the patient's level of consciousness cleared when a change in route of administration of a similar dose of morphine was made.

Third, the patient experienced good pain relief after reinsertion of his epidural catheter at a different site. This may reflect closer proximity to the involved segments or better spread of the injected drug.

I think it is important to be concerned about the spinal administration of preservative-containing drugs, but it is also important to practice cost-conscious medicine. Avoidance of these products should not be based on this case report, since alternative explanations for the findings are probable.

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*In Reply:*—Dr. Oden points out many concerns regarding our case report and the conclusions drawn from that report; he offers alternative explanations for the reported observations. In general, Dr. Oden's conceptual error occurred because he attempted to apply the acute pain model to our chronic cancer pain patient.

Dr. Oden's first concern is over our conclusion that the phenol-formaldehyde preservative containing morphine caused the increased pain.<sup>1</sup> Our experience, covering several hundred temporary epidural catheters and over 225 permanent catheters, has shown us that pain on injection due to catheter position is of a dull aching or radicular pattern and epidurograms show catheter tip in the lateral epidural space close to nerve root location. In this case, the epidurogram showed no such catheter tip location or leakage of dye outside of the epidural space. The epidurogram did, however, show dye flow that was neither characteristic of a closed

space seen with epidural infections or chronic inflammatory and fibrosis, but a spread of dye four spaces above and five spaces below the catheter tip which had non-specific areas of non-filling. The concern over infection lead us to avoid the use of the catheter until the results of the culture had been returned. During the 3 days of iv therapy and further diagnostic studies, the catheter was found to be displaced from the epidural space, the reason the catheter was replaced. Although there is not absolute proof that the phenol-formaldehyde preservative mixture was the causative agent, we feel that the epidurogram results, the negative cultures, and the relief of symptoms are enough presumptive evidence to incriminate the preservative as the causative agent.

The second concern is over whether or not the preservatives accounted for the patient's altered state of consciousness. The assumption that acute CSF mor-

phine levels, obtained from acute epidural and intravenous models, have a specific relationship with levels of sedation in the chronic model is an error.<sup>2</sup> I know of no data that correlate CSF and blood morphine levels with the level of consciousness in these chronic cancer patients. Therefore, the pharmacodynamics of the chronic narcotic-accustomed cancer patient support my previous conclusions.<sup>3,4</sup>

The third concern was regarding the new catheter position effecting the degree of relief by catheter tip position. A study of epidurograms will indicate that a three to five segment level of difference in catheter tip location makes no difference in the spread of dye in the space unless there is an area of epidural space obstruction.<sup>5</sup> In this case, no obstruction was seen, and the post-permanent catheter epidurogram was normal, having the same area of distribution as the temporary catheter epidurogram.

Table 1 of our paper points out the cost and preservative content of the many generic morphine products currently on the market.<sup>1</sup> Using the non phenol-formaldehyde containing morphine preparations will result as cost savings to the patient without the potential risk of a preservative-induced epidural space injury. We hope that, in the future, there will be a larger number of inexpensive non-preservative-containing narcotics of

higher concentrations, available on the market for chronic epidural analgesia.

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### Muscle Atrophy following Nerve Block Therapy

*To the Editor:*—Myotoxicity secondary to intramuscular injection of local anesthetics has been reported in laboratory animals and has been associated with complete regeneration of the damaged muscle fibers. This phenomenon has not been commonly described in human subjects. We present a 34-yr-old caucasian female who had chronic periscapular pain probably due to myofascial pain syndrome. Among other modalities used for pain management, the patient received a trigger point injection with 6 ml 0.25% bupivacaine and developed trapezius muscle atrophy as evidenced by significant depression in the superior aspect of the right periscapular area. Two months later, the "walnut-

sized" depression disappeared with almost complete regeneration of the atrophied muscle. This relatively benign and reversible complication appears to occur more frequently than reported and should be considered, particularly after some nerve blocks.

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### Positioning the Endotracheal Tube in an Infant with Tracheoesophageal Fistula

*To the Editor:*—Transesophageal fistula (TEF) and esophageal atresia are relatively common congenital anomalies requiring surgical repair. Approximately

80-90% of TEFs consist of a blind upper esophageal pouch and a distal tracheal fistula to the lower part of the esophagus.<sup>1</sup>