A. Leland Albright

Children's Hospital of Pittsburgh,
Department of Pediatric Neurosurgery,
Pittsburgh, Pa., USA

Intraoperative Spinal Cord Monitoring for Intramedullary Surgery: An Essential Adjunct?

I have long appreciated the contributions Fred Epstein and his colleagues have made to the care of children with intramedullary spinal cord tumors and enjoyed reading the recent article from his group [1]. I read the article with interest, having recently been an expert witness with Dr. Epstein in a medical malpractice trial concerning the use of intraoperative SSEPs. I wish to offer the following criticisms of the article, not in the sense of derogatory remarks but to express my concerns about the content of the article and its potential medicolegal implications.

The title states that intraoperative monitoring is essential in operations to remove intramedullary cord tumors. 'Essential' is defined as 'necessary' or 'indispensable', so I expected the article would present data demonstrating that monitoring improves outcome and that the data would be substantive enough to make such monitoring the 'standard of care'.

As far as SSEPs are concerned, there is a discrepancy between the Abstract and the rest of the manuscript. The Abstract states that 'both techniques (SSEPs and MEPs) provide fast, practical and reliable information on the functional integrity of the motor tracts of the spinal cord', but the Introduction states, 'Thus, SEPs are slow, unspecific for motor information and tend to disappear early in the course of an intramedullary spinal cord tumor removal ...', the Results sec-

tion states, 'There was little if any correlation between loss or preservation of SEPs at the end of the procedure and postoperative motor function', and the Discussion section states that, 'Our experience does not point to any useful correlation between SEP data and postoperative motor function, SEPs cannot serve as a monitoring parameter for motor function ...'. One of the medicolegal questions in the recent trial was whether or not SSEPs provide information about functional integrity of the motor tracts. We completely agree that data do not demonstrate such a role.

Concerning motor-evoked potentials (MEPs), how do we know that an epidural electrode is monitoring the corticospinal pathways? In the Results section, the epidural MEPs subsection, the authors state that degradation of responses to <50% of baseline indicated significant damage to the corticospinal tract. What proportion of patients had unchanged epidural MEPs, what proportion had around 50% deterioration and what percent had more than 50%, and what were the neurologic outcomes in each group? How did the neurological outcomes of the patients in whom MEPs could be successfully monitored compare to the outcomes of those in whom MEPs could not be monitored?

The manuscript unfortunately does not present data to support the contention that

monitoring of MEPs improves motor outcome, only the statement that 'Unchanged epidural MEPs were associated with preserved neurological function postoperatively in all patients'. Does 'preserved' function mean 'preoperative' function or 'some motor' function. Although the conclusion states that 'the data, particularly MEPs correlated closely with postoperative neurological function', the manuscript does not state the numbers of patients with the various MEP changes nor the numbers with the various neurologic outcomes.

Lawyers are not known for their close reading of the medical literature and some will no doubt latch onto this article as indicating that monitoring SEPs and MEPs are the standard of care for all who operate on children with intramedullary tumors. Yet SEPs are of no value in predicting postoperative motor function and although MEPs may well be of value, we have not yet seen confirmatory data that they are. I have no doubt the authors have the data to address these concerns, and I look forward to seeing them.

Reference

- 1 Kothbauer K, Deletis V, Epstein FJ: Intraoperative spinal cord monitoring for intramedullary surgery: An essential adjunct. *Pediatr Neurosurg* 1997;26:247-254.