Advances in Neurophysiological Intraoperative Monitoring During Selective Dorsal Rhizotomy

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INTRODUCTION

For pediatric patients with spastic cerebral palsy, selective dorsal rhizotomy (SDR) could be performed on the lower spinal cord to reduce spasticity (Park et al., 2006). SDR is an irreversible neurosurgical procedure that targets and selectively destroys the spasticity-causing sensory nerves. However, it is not easy to differentiate the spasticity-causing sensory nerves from normal motor nerve roots practically in the operating room. Here, we are presenting a new method to facilitate the identification of sensory nerve roots for SDR.

METHODS

The surgical procedure was performed as described in Park et al (2006). Hook electrodes were used to stimulate the nerve roots (Fig. 1). Scalp electrodes were placed for monitoring SSEP and twisted pair electrodes were placed in muscles that cover the L1-S2 nerve roots (Fig. 2).

RESULTS

We performed the SDR on six pediatric patients. Posterior tibial nerve SSEPs were used to verify the correct anesthetics being used (Fig. 3). In general, we need a relatively high stimulation current for sensory nerve roots to induce EMG responses. However, due to the overlap of the distributions the stimulation current cannot be used as a criteria to differentiate the sensory nerve roots from motor nerve roots (Fig. 4).

With direct stimulation of the nerve root and monitoring the stimulated EMG and cortical SSEP simultaneously, we were able to identify the spasticity-causing sensory nerve roots even at an ambiguous stimulation current level (Fig. 5). All six patients are doing well post-operatively in terms of their motor and sensory function.

Ref: Park et al., 2006, Neurosurg Focus