

Concentric Versus Delta Bipolar Probes for Intra-neural Fascicle Selection: A Rabbit Model Study

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Abstract-

Background: Bipolar stimulating probes are widely used during intraoperative monitoring in nerve surgery. However, there are no reports comparing different types of bipolar probes. We present the differences between 2 different bipolar probes (concentric and Delta) in a rabbit animal model for brachial plexus injury, focusing on their applicability for intraoperative neuromonitoring in peripheral nerve surgery.

Methods: Using a previously described rabbit animal model, the biceps brachii muscle's compound muscle action potentials (CMAPs) were recorded after stimulation with increasing intensities (ranging from 0.2 to 3 mV) of the middle and lower trunks using both concentric and Delta probes. The correlation between stimulus intensity and CMAP amplitude was studied, as well as interstimulus amplitude variability.

Results: Five rabbit brachial plexuses were studied. CMAP amplitude ranged from 0 to 9 mV. No correlation was found between stimulus intensity and CMAP for the Delta probe (Spearman rank test $R = 0.181$; $P = 0.264$). A strong correlation was found between stimulus intensity and CMAP using the concentric probe (Spearman rank test $R = 0.74$; $P = 0.001$). The Delta probe showed less variability (coefficient of variation 0.01 versus 0.1).

Conclusions: Delta probes elicit highly reproducible, high-CMAP amplitude responses even with low-intensity stimuli. Concentric probes produce slightly less reproducible, progressively higher CMAP amplitudes with increasing stimulus intensities.

Index Terms- peripheral nerve surgery; intraoperative neuromonitoring; EMG probes; cirugía nerviosa periférica; neuromonitorización intraoperatoria; electrodos EMG;

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