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A PROSPECTIVE EVALUATION OF SELECTIVITY IN A HIGH-RESOLUTION SPINAL CORD STIMULATION PADDLE

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Introduction

Spinal cord stimulation (SCS) offers significant pain relief for many patients. However, often discrete painful regions are left untreated. Whether these areas can be selectively targeted by modulating structures lateral to the dorsal columns has not be studied. Here we investigate whether a high-resolution spinal cord stimulation (HR-SCS) paddle with greater medio-lateral coverage offers greater selectivity to commercially available devices.

Materials and Methods

In this prospective IRB approved study (clinicaltrials.gov NCT05459324), we compare evoked EMG responses from 9 muscle groups obtained during intraoperative neuromonitoring (IONM) between HR-SCS (8 columns) and commercially paddles (2-4 columns). All subjects provided inform consent prior to any study related activities taking place. Column locations were normalized by overlaying fluoroscopic images of both paddles. Medial contacts were considered the 3 contacts closest to midline and presumably those that modulate the dorsal columns. There were varied number of recordings at each thoracic level T9,T10>T7,T6>T8. There was not enough data at T8 to perform statistical analysis.

Results/Case Report

Our study included 21 patients (14F:7M; mean age 56). 11 patients were diagnosed with neuropathic pain, 8 with failed back surgery syndrome, and 2 with complex regional pain syndrome. At stimulation amplitudes < 6mA and at 10mA, the max root mean-square value (RMS) % change was greater across all contacts with HR-SCS as compared to commercial paddles. % max RMS for HR-SCS was significantly higher in both distal and proximal leg muscle groups with activation of medial contacts at T6 and T9. Lateral contact stimulation resulted in additional muscle group activation both distally and proximally not only at T6 and T9 but also at T7 and T10.

Discussion

Our findings demonstrate that HR-SCS is able to selectively stimulate muscles throughout the lower extremities at lower amplitudes than often required for evoked EMG responses from commercial paddles

during IONM. Further stimulation of lateral contacts offered greater muscle activation in proximal and distal muscle groups at all thoracic levels. We are hopeful that this improved selectivity will correlate with improved pain relief for patients who undergo SCS for FBSS and chronic neuropathic pain.

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Disclosures

Yes

Tables / Images