Preoperative nTMS Generated Motor Maps Correlate Well with Direct Cortical Stimulation – Initial Experience with 11 Patients

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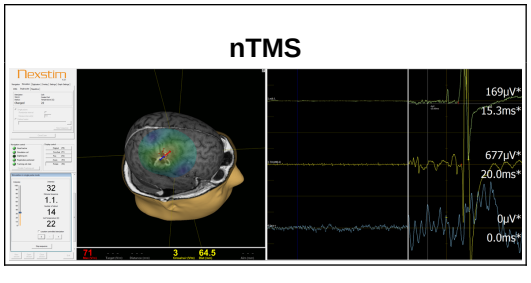
Introduction

The management of brain tumors in and around the eloquent areas presents a specific challenge to the neurosurgeon. The goals are for maximal safe resection, preserving the patient's existing neurological function. Functional information about the cortical and subcortical areas at risk is crucial for the avoidance of neurological deficits after tumor surgery. Although direct cortical stimulation (DCS), remains the gold standard, non-invasive methods of motor mapping are becoming increasingly accurate and useful.

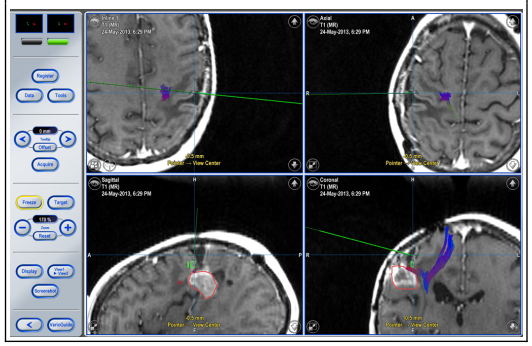
Methods

We describe our initial experience with 11 patients with brain tumors located adjacent to eloquent areas. All cases were performed using navigated transcranial magnetic stimulation (nTMS) and intraoperative direct cortical stimulation (DCS).

nTMS



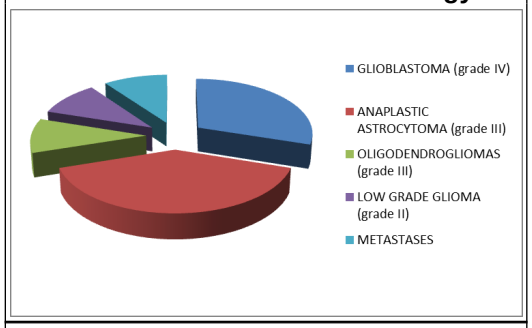
Brain Suite fusion



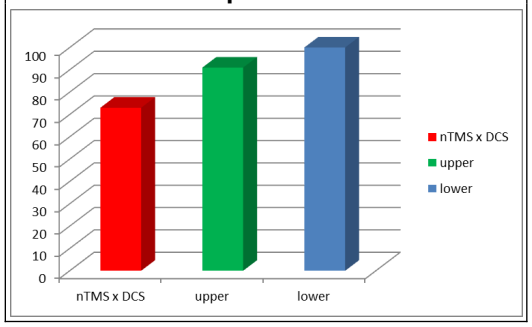
Results

Of the 11 patients 63% were High Grade Gliomas, 27% Low Grade Gliomas and 10% metastasis respectively. In 73% of patients a positive response with nTMS (either upper or lower extremity), correlated well with those generated by DCS. However, of these, the correlation in the upper extremity, alone was 91% (n=11) of cases, and 100% (n=5) in the lower extremity. In 3(36%) cases nTMS was superior to DCS in isolating the lower extremity response while in 1(10%) case DCS isolated the upper extremity response when nTMS failed. There were no adverse events to patients during the stimulation. The mean time for generating a preoperative nTMS map was 20 minutes.

Distribution of Tumors Histology



Correlate response nTMS x DCS



Conclusions

Navigated transcranial magnetic stimulation (nTMS) can be safely used in the presurgical mapping of the motor cortex involving both the upper or lower extremity and the results correlate well with intraoperative direct cortical stimulation (DCS).

Learning Objectives

correlation between brain mapping by navigated transcranial magnetic stimulation and direct cortical stimulation

References

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