Assessment of the influence of navigated transcranial magnetic stimulation on surgical planning for tumors in or near the motor cortex.

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Abstract

BACKGROUND: Brain tumor surgery near the motor cortex requires careful planning to achieve the optimal balance between completeness of tumor resection and preservation of motor function. Navigated transcranial magnetic stimulation (nTMS) can be used to map functionally essential motor areas preoperatively.

OBJECTIVE: To evaluate how much influence, benefit, and impact nTMS has on the surgical planning for tumors near the motor cortex.

METHODS: This study reviewed the records of 73 patients with brain tumors in or near the motor cortex, mapped preoperatively with nTMS. The surgical team prospectively classified how much influence the nTMS results had on the surgical planning. Stepwise regression analysis was used to explore which factors predict the amount of influence, benefit, and impact nTMS has on the surgical planning.

RESULTS: The influence of nTMS on the surgical planning was as follows: it confirmed the expected anatomy in 22% of patients, added knowledge that was not used in 23%, added awareness of high-risk areas in 27%, modified the approach in 16%, changed the planned extent of resection in 8%, and changed the surgical indication in 3%.

CONCLUSION: nTMS had an objective benefit on the surgical planning in one fourth of the patients and a subjective benefit in an additional half of the patients. It had an impact on the surgery itself in just more than half of the patients. By mapping the spatial relationship between the tumor and functional motor cortex, nTMS improves surgical planning for tumors in or near the motor cortex.

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