Resection of Motor Eloquent Metastases Aided by Preoperative nTMS-Based Motor Maps—Comparison of Two Observational Cohorts.

Abstract:

Preoperative mapping of motor areas with navigated transcranial magnetic stimulation (nTMS) has been shown to improve surgical outcomes for peri-Rolandic lesions and, in particular, for gliomas. However, the impact of this technique on surgical outcomes for peri-Rolandic metastatic lesions is yet unknown. To investigate the impact of nTMS on surgical outcomes for peri-Rolandic metastatic lesions, various clinical parameters were analyzed in our international study group. Two prospectively enrolled cohorts were compared by investigating patients receiving preoperative nTMS (2010-2015; 120 patients) and patients who did not receive preoperative nTMS (2006-2015; 130 patients). Tumor location, pathology, size, and preoperative deficits were comparable. The nTMS group showed a lower rate of residual tumor on postoperative magnetic resonance imaging (odds ratio 0.3025; 95% confidence interval 0.1356-0.6749). On long-term follow-up, surgery-related paresis was decreased in the nTMS group (nTMS vs. non-nTMS; improved: 30.8 vs. 13.1%, unchanged: 65.8 vs. 73.8%, worse: 3.4 vs. 13.1% of patients; p = 0.0002). Moreover, the nTMS group received smaller craniotomies (nTMS: 16.7 ± 8.6 cm² vs. non-nTMS: 25.0 ± 17.1 cm²; p < 0.0001). Surgical time differed significantly between the
two groups (nTMS: 128.8 ± 49.4 min vs. non-nTMS: 158.0 ± 65.8 min; p = 0.0002). This non-randomized study suggests that preoperative motor mapping by nTMS may improve the treatment of patients undergoing surgical resection of metastases in peri-Rolandic regions. These findings suggest that further evaluation with a prospective, randomized trial may be warranted.