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Functional mapping-guided resection of low-grade gliomas in eloquent areas of the brain: improvement of long-term survival.

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Abstract

Object Low-grade gliomas (LGGs) frequently infiltrate highly functional or "eloquent" brain areas. Given the lack of long-term survival data, the prognostic significance of eloquent brain tumor location and the role of functional mapping during resective surgery in presumed eloquent brain regions are unknown. **Methods** We performed a retrospective analysis of 281 cases involving adults who underwent resection of a supratentorial LGG at a brain tumor referral center. Preoperative MR images were evaluated blindly for involvement of eloquent brain areas, including the sensorimotor and language cortices, and specific subcortical structures. For high-risk tumors located in presumed eloquent brain areas, long-term survival estimates were evaluated for patients who underwent intraoperative functional mapping with electrocortical stimulation and for those who did not. **Results** One hundred and seventy-four patients (62%) had high-risk LGGs that were located in presumed eloquent areas. Adjusting for other known prognostic factors, patients with tumors in areas presumed to be eloquent had worse overall and progression-free survival (OS, hazard ratio [HR] 6.1, 95% CI 2.6-14.1; PFS, HR 1.9, 95% CI 1.2-2.9; Cox proportional hazards). Confirmation of tumor overlapping functional areas during intraoperative mapping was strongly associated with shorter survival (OS, HR 9.6, 95% CI 3.6-25.9). In contrast, when mapping revealed that tumor spared true eloquent areas, patients had significantly longer survival, nearly comparable to patients with tumors that clearly involved only noneloquent areas, as demonstrated by preoperative imaging (OS, HR 2.9, 95% CI 1.0-8.5). **Conclusions** Presumed eloquent location of LGGs is an important but modifiable risk factor predicting disease progression and death. Delineation of true functional and nonfunctional areas by intraoperative mapping in high-risk patients to maximize tumor resection can dramatically improve long-term survival.

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