Commentary: Presurgical Identification of Patients With Glioblastoma at Risk for Cognitive Impairment at 3-Month Follow-up

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Rijnen and colleagues[1] present a relatively large prospective longitudinal investigation regarding cognitive functioning in patients with glioblastoma (GBM), including formal computerized neuropsychological testing completed shortly prior to tumor resection and again 3 mo postoperatively. Around 50% of patients showed a significant cognitive impairment, both at baseline and at follow-up, and most severely within the domains of processing speed and complex attention. Up to 32% of the sample showed a significant improvement at follow-up with about a quarter showing decline. Regression analyses were conducted with preoperative cognitive performance, sociodemographic characteristics, tumor location, preoperative lesion volume, and rating of baseline physical status as predictors of cognitive functioning at 3-mo follow-up. Lower preoperative cognitive functioning was a significant predictor of the presence of postoperative cognitive impairment across all domains assessed, and female sex was associated with postoperative impairment in visual memory. No other predictors significantly contributed to the models, which correctly classified 72% to 83% of patients.

The authors[1] are commended for the study, which has numerous strengths, including a large sample size and the use of robust methods controlling for repeated neuropsychological testing (eg, Reliable Change Indices, adjustment for practice effects). Additionally, their results may be clinically informative regarding cognitive prognosis, as patients presenting with baseline impairment appear more likely to harbor cognitive deficits at follow-up a few months later. While the establishment of this somewhat intuitive result is welcomed, neurosurgeons are likely to be more interested in questions regarding predictors of cognitive *change* associated with tumor resection. Unfortunately, the authors indicated that such analyses were not feasible in their study due to the low frequency of patients exhibiting a significant cognitive change from the preoperative to 3-mo postoperative follow-up period (ie, improvement or deterioration). As such, it remains unclear which patient and clinical characteristics are associated with better versus worse postoperative outcomes as compared to their baseline status. While some studies provide insight into these questions,[2,3] further work in this area is needed. Such work would allow neurosurgeons to better weigh the risk of postoperative cognitive decline utilizing baseline patient and clinical characteristics.

A particularly interesting aspect of this article involves the use of a computerized neuropsychological test battery (CNS Vital Signs). Neuropsychological practice is increasingly moving toward digital platforms, and data regarding how these tools operate in patient populations are of dire need, particularly within niche populations such as glioma. While validation studies for CNS Vital Signs are promising,[4] the tasks and domains assessed by the tool differ in important ways from traditional paper-and-pencil measures, which may have impacted the study findings. As the authors acknowledge, language and visuospatial abilities are not assessed by the battery, which constitute 2 of the most lateralizing of all cognitive domains. This may account for, at least in part, the lack of association between lesion location and cognitive functioning in their study. Additionally, memory impairment was relatively uncommon in the sample, and most patients (80%) exhibited no change in memory from the pre- to postoperative follow-up period. This is somewhat surprising given our prior work demonstrating that memory is among the most frequently impaired domains in patients with malignant glioma.[5] Additionally, memory constitutes the domain showing the greatest decline in patients with temporal lobe glioma,[3] which represents one of the most common lesion locations for glioblastoma. Notably, the memory measures included in the CNS Vital Signs battery are restricted to a recognition format. Accordingly, the tool is not sensitive to encoding and

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retrieval memory deficits often elicited by free recall paradigms, potentially accounting for the lack of memory impairment in the study sample. Future studies involving computerized cognitive assessment tools should strive to incorporate traditional neuropsychological tools to better understand such potential discrepancies and to further evaluate the operating characteristics of the digital platforms.

Overall, the study by Rijnen and colleagues[1] adds to the literature regarding predictors of cognitive impairment in patients with glioblastoma, which is a primary contributor to decreased quality of life and functional independence in this population.[6] Accordingly, the identification of patients at risk of cognitive impairment represents an important aim, as strategies of mitigating or preventing cognitive impairment may have profound impact upon patient well-being throughout the disease course. It is emphasized that these comments are not intended to detract from the import of the authors' study, which is laudable in design and clarity of reporting. Rather, it is hoped that the above commentary provides a direction and considerations for furthering the general research program involving relationships between cognition and neurosurgical intervention in patients with glioblastoma.

Disclosures

The author has no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

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