Editorial

Postoperative ischemia

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In their article “Postoperative ischemic changes following resection of newly diagnosed and recurrent gliomas and their clinical relevance,” Gempt and colleagues2 examine postoperative diffusion weighted imaging (DWI) studies obtained within 48 hours of surgery. They found that 31% of patients with resection of a newly diagnosed glioma had evidence of ischemia on DWI compared to 80% of patients with recurrent glioma. They also found that neurological deficit occurred more frequently in patients with evidence of new postoperative ischemic lesions. This prompted the authors to conclude that surgery for recurrent tumor puts the patient at increased risk for ischemic lesions. However, the sample size for this study was limited because there was an overall total of 109 surgeries, yet only 25 of these were for recurrent lesions. The newly diagnosed and recurrent tumor patient groups were dissimilar at the start of the study. There were younger patients in the newly diagnosed glioma group (although the mean age was the same), and there were more patients with high-grade glioma in the recurrent tumor cohort. Appropriately, the recurrent tumor group also had a larger proportion of patients who had received radiation and/or chemotherapy. Although this heterogeneity between groups is difficult to eliminate, the small sample size still makes the statistical power to control for these variables limited and thus the conclusions equivocal.

Recently, Dutzmann and colleagues3 conducted a similar study examining 177 consecutive patients with postoperative DWI within 72 hours of first or recurrent glioma surgery. In their study they defined tumors by anatomical location and classified DWI lesions as small or large (> 4 cm3). Dutzmann and colleagues found DWI evidence of ischemia in 28% of patients who underwent surgery for a newly diagnosed glioma. Similarly, they found new DWI lesions in 21% of patients after surgery for recurrent gliomas. These findings contrast sharply with the 80% rate of new DWI lesions found in patients who underwent surgery for recurrent glioma in the study by Gempt et al. Dutzmann and colleagues3 found no difference in the size of ischemic lesions, nor was there a difference attributable to the recurrence of the tumor. In their multivariate analysis they found tumor location to be the best predictive factor for postoperative ischemic lesions. Tumors located in the insular, opercular, and temporal areas tended to be at greater risk. Indeed, Kumabe and colleagues4 have published on the increased risk of ischemic complications associated with opercular gliomas.

It is unclear why there is such a stark contrast between the results of these 2 studies. The study by Gempt and colleagues2 shows that 24% of patients with newly diagnosed glioma had new transient or permanent neurological deficits after surgery, compared to 48% in the recurrent tumor group. Dutzmann and colleagues1 reported that only 10% of their patients had a new neurological deficit, irrespective of whether the tumors were recurrent or newly diagnosed. Gempt and colleagues mention that many of their patients treated for recurrent disease also underwent radiation therapy. This important detail is missing from the paper by Dutzmann et al.: it is possible that differences in adjuvant therapies in the recurrent tumor group may have led to the observed differences in results, although due to the standardization of radiotherapy this seems an unlikely explanation.

In light of these contrasting results, it is debatable which factor is the best predictor of postoperative ischemic lesions—recurrent nature of the tumor or tumor location. Likely it is some combination of both, and a larger multicenter study will be needed to adequately answer the question. One common theme in these 2 papers is that meticulous subpial dissection and avoidance of vessel injury during surgery is key, because even with appropriate microneurosurgical technique ischemic injury can be prevalent after glioma surgery.

Another important point worth reiterating regards follow-up of patients after tumor resection. As Smith and colleagues5 noted in 2005, postoperative ischemic lesions occur frequently after glioma surgery and can later show contrast enhancement and be confused with tumor progression. Therefore, serial DWI is important, starting with the early postoperative MRI. Additionally, as Khan and colleagues6 have shown, recovery of patients with postoperative neurological deficits can be predicted by the amount of DWI change apparent early after surgery. Lastly, adjuvant therapies can lead to changes in the character of the MR images; thus a baseline DWI study is helpful for later distinguishing tumor recurrence from treatment changes.7

Overall, Gempt and colleagues remind us of the importance of meticulous tumor resection. Ischemic lesions
can be common after glioma surgery, and although it is not known which patients are most at risk, it is known that careful surgery is always best. Utilization of DWI is an example of how emerging technologies can influence how we treat and follow tumor patients. Due to the ability to help diagnose postoperative deficits and to delineate ischemic changes from tumor progression, DWI should be standard in both early and continued postoperative imaging for every glioma patient.

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Disclosure

The authors report no conflict of interest.

References


Response

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We thank Drs. Ngwenya and Chiocca for their thoughtful editorial comments. It is very obvious that meticulous surgery is the key to good clinical outcome. It is also obvious that our present study and the study by Dützmann et al.1 cannot be compared in a meaningful manner. There might be differences in location of the tumors, extent of resection, and radio- or chemotherapy prior to surgery, which are all factors that could influence the frequency of ischemic incidence. However, both studies show a higher than intuitively expected incidence of symptomatic and asymptomatic ischemic areas following glioma resection, whether for newly diagnosed or recurrent tumors. This is an important message, because 1) MRI changes during follow-up imaging need to be related to previous ischemic events and 2) controlled studies need to be planned on the basis of these data.

Whether one has been more meticulous than the other remains elusive.

Reference


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