Temporal lobe tumor treatment

Temporal lobe tumors causing chronic intractable epilepsy demonstrated excellent results in seizure improvement after surgery [1].

There has been considerable controversy regarding most appropriate management, with some advocating lesionectomy only, and other arguing for more extensive resection.

A study specifically addressing this issue, it was found that patients treated with lesionectomy alone had lower seizure-free outcomes than those with more extensive electrophysiologically guided resection.

In another study, however, postoperative seizure control was achieved in 94% of patients after complete lesionectomy regardless of the extent of seizure focus resection.

Thus, this issue remains to be resolved, and the only agreement at this time appears to be that gross-total resection, as long as it can be safely performed, should be the minimum goal of surgery.

Visual field defects (VFDs) due to optic radiation (OR) injury are a common complication of temporal lobe surgery. Faust and Vajkoczy analyzed whether preoperative visualization of the optic tract would reduce this complication by influencing the surgeon's decisions about surgical approaches. The authors also determined whether white matter shifts caused by temporal lobe tumors would follow predetermined patterns based on the tumor's topography.

One hundred thirteen patients with intraaxial tumors of the temporal lobe underwent preoperative diffusion tensor imaging (DTI) fiber tracking. In 54 of those patients, both pre- and postoperative VFDs were documented using computerized perimetry. Brainlab's iPlan 2.5 navigation software was used for tumor reconstruction and fiber visualization after the fusion of DTI studies with their respective magnetization-prepared rapid gradient-echo (MP-RAGE) images. The tracking algorithm was as follows: minimum fiber length 100 mm, fractional anisotropy threshold 0.1. The lateral geniculate nucleus and the calcarine cortex were employed as tract seeding points. Shifts of the OR caused by tumor were visualized in comparison with the fiber tracking of the patient's healthy hemisphere.

Temporal tumors produced a dislocation of the OR but no apparent fiber destruction. The shift of white matter tracts followed fixed patterns dependent on tumor location: Temporolateral tumors resulted in a medial fiber shift, and thus a lateral transcortical approach is recommended. Temporopolar tumors led to a posterior shift, always including Meyers loop; therefore, a pterional transcortical approach is recommended. Temporomesial tumors produced a lateral and superior shift; thus, a transsylvian-transcisternal approach will result in maximum sparing of the fibers. Temporocentric tumors also induced a lateral fiber shift. For those tumors, a transsylvian-transopercular approach is recommended. Tumors of the fusiform gyrus generated a superior (and lateral) shift; consequently, a subtemporal approach is recommended to avoid white matter injury. In applying the approaches recommended above, new or worsened VFDs occurred in 4% of the patient cohort. Total neurological and surgical morbidity were less than 10%. In 90% of patients, gross-total resection was accomplished.

Preoperative visualization of the OR may help in avoiding postoperative VFDs [2].

1)
Ruban D, Byrne RW, Kanner A, Smith M, Cochran EJ, Roh D, Whisler WW. Chronic epilepsy associated with temporal tumors: long-term surgical outcome. Neurosurg Focus. 2009 Aug;27(2):E6. doi:

10.3171/2009.5.FOCUS0998. PubMed PMID: 19645562.

2)

Faust K, Vajkoczy P. Distinct displacements of the optic radiation based on tumor location revealed using preoperative diffusion tensor imaging. J Neurosurg. 2015 Oct 2:1-10. [Epub ahead of print] PubMed PMID: 26430843.