Letters to the Editor

NEUROSURGICAL FORUM

Endoscopic endonasal transsphenoidal approach to pituitary adenomas

TO THE EDITOR: We read with great interest the article by Juraschka et al.1 from the University of Toronto, Canada (Juraschka K, Khan OH, Godoy BL, et al: Endoscopic endonasal transsphenoidal approach to large and giant pituitary adenomas: institutional experience and predictors of extent of resection. J Neurosurg 121:75–83, July 2014). They timely and properly focus the readers’ attention on the particular clinical and surgical challenges in the management of giant pituitary adenomas, which constitute a subgroup of lesions that have been classically defined by a maximum diameter ≥ 4 cm. They consider giant adenomas those tumors with a volume of at least 10 cm³ or a maximum diameter ≥ 3 cm. As a matter of fact, in their study, in which they used the above-mentioned inclusion criteria, the authors analyzed the clinical and surgical outcomes in a series of 73 patients who underwent surgery via an endoscopic endonasal transsphenoidal approach at their institution in a 6.5-year timeframe. They report that they used, in almost one-third of their patients, an extended endoscopic approach.

Obviously, the majority of their patients harbored a clinically nonfunctioning pituitary macroadenoma and complained of visual disturbances (either visual acuity and/or visual field defects) and/or endocrine hypofunction. According to preoperative MRI, a cystic component was present in 50.1% of tumors, a hemorrhagic component in 24.7%, sphenoid sinus invasion in 35.6%, anterior extension in 16.4%, posterior extension in 31.5%, suprasellar lateral extension in 26.0%, optic nerve compression in 94.5%, and hydrocephalus in 5.5%

Such percentages, particularly the 35.6% with a component inside the sphenoid sinus or the 30.1% with the presence of a cystic or hemorrhagic lesion, in our opinion, are confusing since they do not actually indicate only those tumors that pose technical difficulties in their surgical management. In other words, what causes the difficulties in surgically treating giant adenomas are the supra-parasellar components of the tumor, which are those involving the most critical neurovascular structures, having a greater risk of injury by the surgeon. Indeed, a tumor with a diameter measuring more than 3 or 4 cm, but with a reasonable part of it extending inside the sphenoid sinus or more downward, does not necessarily pose the same technical risks or have the same outcome as a surgically treated mass with a predominant component in the supra-parasellar areas, even if that mass has a smaller diameter. Similarly, an adenoma with a soft consistency or with a cystic component is easier to remove than a same-sized lesion with a harder texture; or a tumor predominantly in the midline has a location that is certainly more favorable for removal than a lesion with eccentric lateral paraventricular extensions. It is easily understood that the possibility of achieving gross-total removal is greater for adenomas, even giant ones, with more surgically favorable features (sizable component in the sphenoid sinus, soft consistency, no invasion of the cavernous sinuses, and so forth) than for a big adenoma with unfavorable features.

In the authors’ study, however, considering such a heterogeneous group of lesions together, pooled only on the basis of measures and not stratifying them on the basis of their different characteristics, might in some way have corrupted the actual extent of resection rate, the overall visual outcome, and the percentage of complications, which deeply differ from one another if we consider the direction and site of growth of the neoplasm. Thus, we do not agree with the authors when they conclude that sphenoid sinus invasion may represent a tumor characteristic that decreases the likelihood of successful and complete endoscopic transsphenoidal surgery. The presence of a component in the sphenoid sinus, and therefore far from the neurovascular structures, might be considered a favorable feature in obtaining greater tumor debulking. On the contrary, in our experience, the true giant pituitary adenomas that extend mainly in the intracranial compartment present a greater rate of complications.

Finally, we are sincerely thankful to the authors for having focused attention on the surgical management of giant pituitary adenomas and the uncommon challenges they pose regarding the predictability of obtaining a gross-total removal and improving preoperative deficits.

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DTI in brain tumor surgery


The objective of this study was to test the accuracy of diffusion tensor imaging (DTI) and its reliability to guide real-time safe neurosurgical removal of a brain tumor. For this reason, I believe that this article presents an important contribution to the increasing literature related to functional neuroimaging technology and its role in improving neurosurgical operative technique.

However, Mandelli et al.4 reported a limitation associated with the use of DTI intraoperatively, manifested by poor sensitivity in detecting the lateral aspect of the corticospinal tract. This limitation recounted by the authors was attributed to problems in the technology itself; alternatively, we should consider that this limitation could be the result of tumor impact on the brain networks mediated by the neuroplasticity,1 or, in other words, because of a decline in the functionality of the corticospinal tract (which indeed might be transferred partially to another tract or network by the process of the neuroplasticity). This consideration is very important as it may affect the way that we interpret and utilize the data provided by DTI.

The above concept is supported by several clinical and research observations. For instance, Wang et al. showed that in brain tumor patients the brain networks are altered when compared with healthy controls.2 For example, theta band connectivity has been reported to be pathologically increased in brain tumor patients. The authors compared the functional brain networks of a group of patients with brain tumors before and after surgery. They found statistically significant changes in network features in the beta 13- to 30-Hz band after the surgical intervention.3 These global alterations in functional brain networks could be explained theoretically by reviewing the findings of a recently published study conducted by Butz and van Ooyen on neuroplasticity.2 The authors pointed out that persistent local changes in the neuronal activities led to massive global structural and network changes according to a simple homeostatic regulation rule.2 To prove their concept, they showed how focal retinal lesions produce neuron and network changes in the visual cortex.2 Because brain tumors present a challenge to the local neural discharge homeostasis, and based on the previous concept, brain tumors should also lead to global changes in functional and even structural networks. This may explain several clinical observations in the context of brain tumors, such as recruitment of cortical areas ipsilateral to the tumor and redistribution of eloquent areas around the tumor and the fact that many patients with large intracranial tumors may present with minimal neurological deficits.1

The impact of brain tumors on brain functional networks (locally and globally) should receive more attention and promote fruitful research endeavors. Such research projects may pave the way for optimal ways of using DTI and other functional neuroimaging methods in neurosurgery and help anticipate potential surgical outcome.

Finally, and keeping in mind other concerns and limitations of DTI including its underestimation of long-range connections and its inability to capture the pathway (or more precisely, the directionality) of a fiber tract that is inconsistent with the normal anatomy, the recommendation of Mandelli et al. remains the best strategic plan in our contemporary neurosurgical practice, that is, to couple the use of DTI information with intraoperative electrophysiology mapping for neurosurgical resection of brain tumors.

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References

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