Neuropsychological impairment and quality of life after skull base meningioma resection: size and location matter

TO THE EDITOR: We read with great interest the recent article by Zweckberger et al.1 (Zweckberger K, Hallek E, Vogt L, et al: Prospective analysis of neuropsychological deficits following resection of benign skull base meningiomas. J Neurosurg [epub ahead of print February 10, 2017. DOI: 10.3171/2016.10.JNS161936]). As the authors note, this is an important and timely area of research, given the availability of different treatments for skull base meningioma and the limited understanding of neuropsychological and behavioral outcomes in skull base meningioma patients. In their article, the authors describe the neuropsychological outcomes of a heterogeneous group of skull base meningioma patients to provide results of “the first prospective study of neuropsychological outcomes following resection of skull base meningiomas,” noting that “the majority [of patients] demonstrated stable or improved outcome at follow-up assessments.” Interestingly, the authors did not find a relationship between tumor size or tumor location and pre- or postoperative quality of life. Ultimately, the authors concluded that “surgical removal of skull base meningiomas has positive effects on neuropsychological outcome in a considerable majority of patients.” Taken at face value, this conclusion would have important implications for neuropsychological and behavioral outcomes following resection of skull base meningiomas.

We have a somewhat different perspective, derived from our extensive neuropsychological and neuroanatomical investigations of these types of patients (reported in a recent study, of which Zweckberger et al. may not have been aware). The authors have examined a relatively small and anatomically heterogeneous cohort of meningioma patients, which makes the interpretation of their results difficult. Furthermore, a wealth of neuropsychology literature demonstrates that the anatomical location of lesions associated with meningiomas plays a crucial role in the nature and severity of neuropsychological impairment.1,2 Zweckberger et al examined the neuropsychological effects of skull base meningiomas collectively, grouping together patients with pathology in the anterior, middle, and posterior cranial fossae. Obviously, brain lesions in different cranial fossae impact distinct brain regions that subserve distinct brain function. For example, an olfactory groove meningioma may be associated with alteration in real-life decision making and adaptive functioning,1,2 while a posterior fossa meningioma typically is not. Therefore, the specific anatomical location of the skull base meningioma (or any brain lesion for that matter) plays a crucial role in determining the nature of the pre- and postoperative neuropsychological and behavioral impairment and, ultimately, the effects on quality of life. In fact, as has been previously shown, some of the most significant types of impairment seen after olfactory groove meningioma would be missed by routine neuropsychological testing.2

Furthermore, the role of lesion size should not be underestimated. On chronic (>6 months postoperative) neuroimaging, some patients demonstrate large areas of encephalomalacia after meningioma resection, while other patients have no encephalomalacia at all. The location and size of structural brain damage caused by the meningioma likely plays an important role in the degree of neuropsychological impairment and, ultimately, quality of life.

Therefore, while the work of Zweckberger et al. explores an important and timely topic, the results must be interpreted with caution, given the anatomical heterogeneity of the meningiomas studied. Further work in this area should consider the specific anatomical structures affected by the meningioma, as well as the size and location of the chronic postoperative lesion (not only the size of the meningioma preoperatively). Finally, neuropsychological testing batteries should be tailored to assess for impairment related to the specific brain regions involved in the meningioma, including disturbances in personality, decision making, and real-life functioning with ventromedial prefrontal involvement.

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Microsurgery for basilar apex aneurysms in the modern era

TO THE EDITOR: We read with interest the recent manuscript by Bohnstedt et al.1 (Bohnstedt BN, Ziemba-Davis M, Sethia R, et al: Comparison of endovascular and microsurgical management of 208 basilar apex aneurysms. J Neurosurg [epub ahead of print January 13, 2017. DOI: 10.3171/2016.8.JNS16703]). They present their series of consecutive basilar apex aneurysms treated at Indiana University Health Methodist Hospital and St. Vincent Hospital over the last nearly 40 years. They had 47 patients who underwent clip ligation and 161 who underwent endovascular therapy. We have some comments about this paper.

1) In their Results section they report the rate of cranial nerve palsy as 55.3% in the open-surgery group and 16.2% in the endovascular group (p = 0.000), and then report the rate of mono- or hemiparesis as 27.7% in the clipped group versus 10.6 in the endovascular group (p = 0.008). Oddly, the authors then report the Glasgow Outcome Scale (GOS) score at discharge as statistically equivalent, and state that the 2 modalities therefore offer equivalent functional results. The GOS is a very coarse (and probably inappropriate) measurement of functional status in this cohort, and given the data on cranial nerve deficits and hemiparesis presented here, it is very hard to justify this conclusion. Perhaps an extended GOS or modified Rankin Scale would have been more appropriate and the conclusions different. With the data presented here, endovascular treatment seems to be definitely superior to the surgical arm in their hands. No statistics are given in regard to aneurysm morphology in the 2 groups. They state that there was an “endovascular first” approach, but no morphology numbers are given to support this claim. It would be helpful to the reader to know why the authors believed that some aneurysms should be sent for clipping over coiling.

2) Our institution also published a series not cited by this group.2 In our series of 100 consecutive basilar artery (BA) apex aneurysms treated over 7.5 years, there were 63 ruptured (24 clipped, 39 coiled) and 37 unruptured (13 clipped, 24 coiled) aneurysms. Eleven of 37 clipped BA apex aneurysms (29.7%) experienced third cranial nerve palsy. All but one had recovered completely by the 3rd month of follow-up. Cranial nerve disability was taken into account in assessing the patient’s functional status at 3 months and 1 year. Seventy percent of the patients with ruptured aneurysms and 92% of the patients with unruptured aneurysms had a good outcome as measured by a modified Rankin scale score of 0–2 at 3 months, with no statistical difference between the clipped and coiled groups. Of the endovascularly treated patients, 17.4% required retreatment. In the ruptured, clipped group there were 3/37 patients with residual aneurysms (8%), 1 of whom later required retreatment with endovascular procedures (stent-assisted coiling). There were no residual lesions for unruptured clipped aneurysms.

3) In our series of BA apex aneurysms,2 we used a number of operative nuances that may have been responsible for the better (equivalent to endovascular) results from microsurgery. For the extended transsylvian approach, these included the following: orbitozygomatic osteotomy in most cases, anterior clinoidectomy and optic nerve decompression, posterior clinoidectomy when needed, fibrin glue injection into the cavernous sinus, temporary occlusion of the BA with burst suppression and motor evoked potential monitoring, protection of the perforator-aneurysm plane with a rubber dam once the dissection has been accomplished, and brief periods of adenosine arrest as needed. Very low-lying BA aneurysms were treated by a subtemporal, transapical, transcavernous approach. When the aneurysm did not have a clippable neck, terminal BA occlusion was used, usually after a bypass into the posterior cerebral artery to revascularize it (typical V1–2 with a radial artery graft). There was a statistically significant difference in morphology between the coiled and clipped aneurysms in our group, with the latter having a low dome-to-neck ratio, aspect ratio, and a very broad neck.

4) Expertise in surgical clipping of BA apex aneurysms is rapidly declining. This is due to the rapid advancement of less invasive endovascular technology that is easier to learn and deploy. These devices do a very good job of obliterating the vast majority of BA aneurysms, and provide good patient outcomes—with the caveat of needing more short-term monitoring and accepting higher retreatment rates at low risk for further morbidity. Because of this, present-day cerebrovascular surgeons have even less experience and expertise with microsurgical treatment, which favors an endovascular technique in almost all cases. There are still BA aneurysms that are better treated by microsurgical techniques, and microsurgery still offers durability, which may be important for patients who live far away from major medical centers and may not be likely to come back for follow-up angiography. In many countries, clipping of aneurysms is still cheaper due to the costs of endovascular devices. How to train future surgeons to