Cranioopharyngioma Classification

To the Editor: We read with great interest the article by Kassam et al. (Kassam AB, Gardner PA, Snyderman CH, et al: Expanded endonasal approach, a fully endoscopic transnasal approach for the resection of midline suprasellar cranioopharyngiomas: a new classification based on the infundibulum. J Neurosurg 108:715–728, April, 2008). The authors showed the unparalleled possibilities provided by the expanded transphenoidal approach in combination with endoscope-assisted technology in achieving total and safe resection of cranioopharyngiomas that have a suprasellar and/or intraventricular location. The expanded endonasal approach (EEA) variants described by this group of experts in endoscope-assisted microneurosurgical techniques may introduce a deep change in the old paradigm that considered midline lesions above the diaphragma sellae to be unapproachable via a transsphenoidal route. We are impressed with the technical possibilities of the excision of retroinfundibular cranioopharyngiomas as shown in their article, and we congratulate the authors on the innovative and elegant procedures presented, such as the transposition of the pituitary gland, which opens a free corridor to lesions with a suprasellar retrost Malk position.

In their paper Kassam and colleagues introduced a new topographical classification of cranioopharyngiomas that is based on the relationships of the tumor to the infundibulum and pituitary stalk, as observed in the surgical field by endoscopic viewing. This scheme was helpful in selecting the type of EEA required for the most adequate exposition and safest excision of a lesion. We think this classification highlights important concepts regarding the true anatomical relationships of a tumor to vital neurovascular structures situated at the basal brain surface, especially the undersurface of the optic chiasm and third ventricle floor, which are usually hidden from direct view when using a transcranial approach. Nonetheless, their new system shares with previous schemes the drawback of being based on the particular viewpoint provided by a specific surgical approach, and hence it focuses on a limited description of the anatomical relationships that should be considered preoperatively when deciding on the best approach to such a complex lesion as the cranioopharyngioma. The lack of a unified topographical classification scheme capable of describing in every case the accurate surgical relationships between a tumor and the type of distortion it causes to surrounding neurovascular structures is probably one of the reasons the cranioopharyngioma is, in the words of Harvey Cushing, the “most baffling problem which confronts the neurosur geon.” Nevertheless, the surgical outcome in a patient harboring a cranioopharyngioma is known to be basically influenced by 2 factors: the degree of excision achieved and the damage caused to the hypothalamus during dissection and removal of the tumor. The hypothalamic nuclei are embedded within the third ventricle walls, in close relation to the infundibulum and tuber cinereum, the components of the third ventricle floor that become distorted with the expansion of a cranioopharyngioma. The type of cranioopharyngioma-induced deformation to the third ventricle boundaries—for example, progressive invagination caused by tumoral compression, invasion of the third ventricle by a mass breaking through the floor, or even the replacement of these structures by a lesion growing within the hypothalamus itself—will dictate the final position and functional state of the hypothalamus. Consequently, we think that the usefulness of a topographical classification of cranioopharyngiomas in terms of both planning the surgical approach and predicting the potential risks of injury associated with the lesion excision should be based on an accurate description of the tumor relationships to the third ventricle and the diencephalic structures bordering it.

In the early 1960s French authors initiated theoretical discussions about the different possible relationships between cranioopharyngiomas occupying the third ventricle and the distorted ventricle boundaries.8 Given the chance of approaching an intraventricular lesion via a transcortical-transventricular approach, the position and functional state of the third ventricle walls, containing the hypothalamic nuclei, became of paramount importance. The absence of reliable neuroradiographic methods of diagnosis at that time, together with the usual fatal outcome following attempted excision of a tumor via a frontal transventricular approach, led Pertuiset and colleagues8 to introduce the topographical concept of a pseudointraventricular location for cranioopharyngiomas. This topography would be assigned to any tumor seeming to have a third ventricle location but in fact originating from a suprasellar extraxial position, which would cause invagination and upward stretching of the third ventricle floor during lesion growth. The upward position of the intact third ventricle floor as a thinned membrane capping the tumor would suppose a high risk of hypothalamic injury in the event that a transventricular approach was attempted through these structures to the lesion. Nonetheless, Van Den Bergh and Brucher15 favored the transventricular approach as a safe route for the removal of intraventricular cranioopharyngiomas, even in cases of pseudointraventricular lesions capped by remnants of the third ventricle floor, because they observed that those remnants become atrophic and nonfunctional due to prolonged tumoral compression. They noted instead that the viable hypothalamic tissue remained in a lower position, attached to the basal tumoral pole, which was the area most vulnerable to surgical manipulation.

The article by Kassam et al. includes pre- and postoperative MR images as well as beautiful intraoperative endoscopic photographs of a solid cranioopharyngioma occupying the third ventricle; the basal portion of the lesion expands the third ventricle floor and is classified as a Type III retroinfundibular cranioopharyngioma (Figs. 14–16 in their article). After tumor excision, the widely opened third ventricle floor, showing a residual circumferential rim of subependymal bleeding along the area of tumor attachment to the third ventricle walls, could be photographed through an endoscope. Similar intraoperative photographs of intraventricular cranioopharyngiomas have been taken from a
The identification of a craniopharyngioma occupying a tuberal position and with a cystic extension into the third ventricle was originally made by Norman M. Dott in 1938. In his masterpiece, “Surgical aspects of the hypothalamus,” Dott illustrated the detailed relationships of this topographical variant of craniopharyngioma and pointed out the tight adhesions of the inferior tumor capsule to the hypothalamic walls. He claimed the need for a staged combined transventricular and pterional basal approach for these lesions and successfully removed some hypothalamus-centered lesions several decades before the application of similar approaches via microsurgical techniques. Note, however, that the term “tuberal” was not used as a formal category in the topographical classification of craniopharyngiomas until 2 decades later when another British author, Douglas W. C. Northfield, observed a relocation of the third ventricle floor by a tumor mass in 20 of 49 surgically treated cases, with postoperative necropsy confirmation of such a location in many of these cases. Similar findings were observed in 23 of 40 cases surgically treated by William Sweet, one of the neurosurgeons who pioneered the use of the transalamina terminalis approach to remove intraventricular craniopharyngiomas. Sweet also histologically analyzed the tight adhesions between the basal tumor surface and the third ventricle walls, providing evidence of a nonfunctional gliotic cleavage plane that separated the tumor capsule from the hypothalamic nuclei. He argued that safe tumor dissection from the hypothalamus was possible through this gliotic tissue. A modern topographical classification system of craniopharyngiomas based on tumor relationships as displayed on preoperative MR imaging studies was applied by Raybaud et al. in 1991, who considered the infundibulotuberal topography as the most frequently observed type in patients younger than 18 years of age (10 of 23 cases).

In 1985 Juraj Steno challenged the classic topographical concept of craniopharyngiomas—that is, these lesions predominantly occupy an extracerebral suprasellar position—by showing from among the autopsy specimens of 30 nonsurgically treated patients 14 examples of extraventricular lesions, whose equator showed a tight circumferential attachment to the third ventricle floor, and 8 cases of purely intraventricular tumors. These striking figures were confirmed in a recent MR imaging investigation by the same author in a surgical series of craniopharyngiomas, with the extraventricular type occurring in 25 of 44 supradiaphragmatic lesions in children and adults. Once these tumors had been removed, a wide defect in the third ventricle floor could be observed in the surgical field and on postoperative MR images. The MR imaging study of craniopharyngiomas by Eldevik et al. in 1996 showed the occupation of the third ventricle in 10 of 13 children and in 7 of 14 adults. Strictly or mostly intraventricular tumors have also been found in > 50% of the cases in a large series studied by Shi et al. and in a series of children evaluated by Tomita and Bowman. In all of these cases the tumor...