RESPONSE: I thank Dr. Iplikçoglu for his comments regarding my paper and apologize that I did not quote the case report cited; however, the paper by Dr. Iplikçoglu and colleagues gave only a brief description of the magnetic resonance (MR) findings in this case, and the MR characteristics of this lesion were not described in detail. Although the authors state that “unenhanced images may be unsatisfactory because of poor contrast with the brain on both T1- and T2-weighted images,” I cannot agree with their opinion. As we have already described in our paper, falcotentorial junction meningiomas show characteristic MR finding even in the unenhanced image. They include the relationship between the tumor signal intensity and tumor vascularity, the presence of a peritumoral rim, and no parenchymal edema surrounding tumor. Our paper discusses these MR characteristics and the mechanism of the appearance of these findings in detail; we did not think that the unenhanced MR image would be unsatisfactory for the diagnosis of this lesion. In addition, Dr. Iplikçoglu, et al., did not mention the dural enhancement that was very important in differentiating falcotentorial junction meningiomas from other tumors in this region and in planning the surgical procedure. We also discussed the mechanism of the dural enhancement. Because of these reasons we consider our paper to be the first “detailed” description of the MR characteristics of a falcotentorial junction meningioma.

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Sinus Skeletonization

TO THE EDITOR: After reading the article by Lucas, et al. (Lucas CP, de Oliveira E, Tedeschi H, et al: Sinus skeletonization: a treatment for dural arteriovenous malformations of the tentorial apex. Report of two cases. J. Neurosurg. 84:514–517, March, 1996) we would like to make some comments. The authors reported two cases of dural arteriovenous malformations (AVMs) that they termed “. . . of the tentorial apex,” and proposed an aggressive treatment consisting of transarterial embolization and surgical isolation of the arterial component of the dural AVM. This technique of surgical deafferentation was called “sinus skeletonization.” Through a large midline incision, a combined bioccipital and median suboccipital craniotomy was performed. The posterior third of the superior sagittal and the straight and bilateral suboccipital transverse sinuses were skeletonized by incising the dura, the falx, and the tentorium along the sinuses.

The first point concerns the terminology “dural arteriovenous malformation of the tentorial apex,” which we do not think furnishes reliable information about the type of the lesion. In fact, the term does not identify a particular pathological condition, but only the location of the lesion. We believe that intracranial dural AVMs should not be cited as such based only on their location without information about the pattern of the venous drainage, as this affects both the symptomatology and the choice of the proper treatment. It is our2 and others’1,3 belief that intracranial dural AVMs are more properly reported and classified based on the pattern of the venous drainage. According to this classification, the two lesions in the article were either dural AVMs with mixed sinus and leptomeningeal drainage or dural AVMs drained exclusively by leptomeningeal veins.

As correctly reported by the authors, dural AVMs in this area usually have a cortical (leptomeningeal) drainage. Accordingly, we think the two cases in the article could be AVMs of the dural wall of the straight sinus drained by leptomeningeal veins toward the vein of Galen. Particularly during the arterial phase in Case 1, the leptomeningeal draining veins and the ampulla seemed to be visualized earlier than a patent straight sinus. If this was the case, the two lesions were the so-called “dural AVMs with pure leptomeningeal drainage,”1,3 a condition that we have always found associated with the patency of the parent venous sinus.2 The lesions were drained solely by leptomeningeal veins, and the straight sinus was recruited only in a subsequent phase; no direct communication existed between the arterIALIZED veins and the sinus at the point of the fistula. Another possibility, although less probable, is that the two lesions in the article were AVMs drained by the straight sinus with retrograde flow into leptomeningeal veins (mixed drainage).1,5

Regardless of the venous pattern, we believe that “sinus skeletonization” does not represent the best treatment option for intracranial dural AVMs. Rather, its application is toward the arterial deafferentation of the lesion, whereas in our2 and others’ opinion,1,3 the proper treatment is one that handles the venous drainage of the dural AVM. It is for this reason that we think the correct classification of the venous drainage is so important: dural AVMs with mixed drainage and dural AVMs with pure leptomeningeal drainage should be approached in different ways. In our practice,2,5 the former are managed by excision of the involved sinus, whereas the latter are treated by simple obliteration of the draining veins.

Although surgical deafferentation of dural AVMs has already been attempted by Hugosson, et al.,5 the results were not very satisfactory. Despite the recommendation by some neurosurgeons of the arterial deafferentation by endovascular (transarterial) technique,3,7 the results are variable. The fact is that any type of arterial deafferenta-
tion (either surgical or endovascular) may remain partial due to an unexpected anomalous extension of the dural AVM and to the difficulty of the superselective catheterization of all feeding vessels (especially those from internal carotid and vertebral arteries). An incomplete obliteration of the dural AVM invariably results in the maintenance or the recurrence of the arteriovenous shunt. Furthermore, a recurrent dural AVM is often more complex than the initial lesion, because new feeding vessels may be recruited from the internal carotid artery and/or the vertebral arteries. The possibility that surgical deafferentation may be unable to isolate the dural AVM completely is confirmed by Case 1 of the article, in which surgical treatment resulted in partial obliteration of the dural AVM and required subsequent transarterial embolization.

Another comment concerns the technique. In our view, “sinus skeletonization” is not as “simple” and safe as reported in the article. The wide exposure of several venous sinuses (bioccipital and median suboccipital craniotomy with supra- and infratentorial accesses) can be associated with significant risk of air embolism, especially if it is performed with the patient in the semisitting position. Moreover, because the dura around a dural AVM is always hypervascular, the very extensive dural incision proposed in the article may be associated with a not insignificant blood loss. This is true despite the possibility of preoperative transarterial embolization. Finally, the brain retraction of both occipital lobes that is necessary to expose the falcotentorial region may be followed by serious visual difficulties.

We recently reported a series of 20 consecutive patients (1988–1993) who had intracranial dural AVMs with pure leptomeningeal drainage. All patients were treated by the same surgical interruption of the draining veins at the point at which they came out of the dural wall of the parent sinus. After writing this article, we used the same technique in 10 other patients (1993–1995) with the same type of intracranial dural AVM (unpublished data). Accordingly, a total of 30 patients were surgically treated by handling the draining veins of the intracranial dural AVM. This technique was generally safe and always effective in completely and permanently eliminating the flow through the dural AVM (mean follow-up period of 30 months).

Briefly, we would like to present a case from our recent series that seems very similar to the cases reported in the article by Lucas, et al. A 24-year-old woman presented with a subarachnoid hemorrhage and underwent cerebral angiography (Fig. 1) showing a dural AVM with pure leptomeningeal drainage located inside the dural wall of the straight sinus, near the falcotentorial apex. Feeding vessels came from the external carotid artery, the internal carotid artery, and the vertebral arteries. (The venous drainage was via two leptomeningeal veins toward the vein of Galen and the straight sinus, which was quite patent.) After transarterial particulate embolization of the roots from the external carotid artery, the draining veins were clipped through a classic infratentorial–supracerebellar approach. Her postoperative course was uneventful and no arteriovenous shunt was evident on postoperative angiography. Two years later, the patient is neurologically intact and repeat cerebral angiography (Fig. 2) does not show any evidence of dural AVM.

## References