ANGIOGRAPHIC DIAGNOSIS OF BILATERAL FRONTOBASAL GLIOMAS

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Apart from the relatively rare primary multiple gliomas, the bihemispherical gliomas communicate with each other through the corpus callosum. For this reason the bihemispherical gliomas usually are discussed in the literature under the heading “tumors of the corpus callosum.”

From the point of view of operability and prognosis, however, it seems reasonable to separate the gliomas of frontal localization from the large group of tumors of the corpus callosum and to discuss them as bifrontal gliomas. On the basis of similar viewpoints the significance of the differential diagnostic examination of bifrontal gliomas has increased.

Voris and Adson, according to their report in 1935, had operated on every one of their 38 patients with tumor of the corpus callosum as if they had been suffering from unilateral frontal tumor, because the exact location of the neoplasm could not be determined preoperatively. Dyke and Davidoff, 6 Davidoff and Epstein, 5 Kautzky and Zülch, 12 and Epstein and Epstein 9 determined the characteristic ventriculographic changes in cases of callosal tumors. Lindgren 14 mentioned that it is possible to differentiate the subfrontal extra- and intracerebral tumors from one another by fractionated pneumoencephalography.

The angiographic diagnosis of tumors of the corpus callosum is discussed in several monographs, 3,7,8,13,15,19 but the problem has been elaborated in detail by Tön尼斯 et al. 18 They found that angiography alone does not supply sufficient evidence, especially in the diagnosis of tumors located in the central and posterior one-third of the corpus callosum, and in such cases pneumographic methods also should be employed.

In this report the problem of bilateral frontobasal gliomas will be analyzed. Experience has shown that angiography by itself may supply sufficient diagnostic evidence, and may even yield information enabling one to predict the tendency of the neoplastic growth, 21 which is of great importance in determining whether or not to perform operation.

CLINICAL MATERIAL

At the Institute of Neurosurgery, Budapest, we have had 463 cases of glioma in the period of 1954–1960, including 30 cases of verified bifrontal glioma. In 6 of these cases the bilateral tumor had a frontobasal localization, as determined by angiographic examination alone. There was no need to carry out pneumographic studies for the purpose of local diagnosis or to differentiate between extra- and intracerebral tumors. The correctness of our diagnosis invariably was verified by operation.

RESULTS

In the angiographic diagnosis of bilateral frontobasal tumors it is not the local diagnosis that is most important, but the real problem is whether the angiographic examination does or does not enable one to differentiate the bilateral frontobasal gliomas from the frontobasal extracerebral tumors.

By analyzing our angiograms we observed certain fine changes and characteristics that may be useful in the differential diagnosis.

A. Analysis of the Lateral Arterial Phase. Corresponding to the frontobasal localiza-
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Fig. 1. Lateral angiogram of bilateral frontobasal glioma. The anterior cerebral artery is excessively dislocated dorsally and shows a loose, wavy course. Male, aged 31 years. Bifrontal craniotomy; extensive resection of left frontal lobe; incision of falk. Absolutely free from complaints and able to work for 1½ years. Histology: Astrocytoma.

tion, in general there is a slight depression in the basal direction in the carotid siphon and in the initial portion of the middle cerebral artery. The anterior parts of the anterior cerebral and pericallosal arteries, respectively, are dislocated upward and backward. However, the elevation and backward dislocation of the anterior cerebral artery is different from what one sees, for example, with meningiomas of the olfactory groove. In the cases of glioma examined by us this backward dislocation manifested itself not in a tautness of the anterior cerebral and pericallosal arteries, but in a dorsal displacement of loose, wavy, irregular shape (Fig. 1).

With the above mentioned displacement of the anterior cerebral and pericallosal arteries the genu of the callosal artery also changes in configuration. With bifrontal gliomas the bend corresponding to the knee of the pericallosal artery is one of obtuse angle (Figs. 2 and 3).

The excessive dorsal displacement of the anterior cerebral and pericallosal artery, respectively, indicates by itself the bilateral extension of the tumor. When the tumor is unilateral, the anterior cerebral artery is pushed over to the contralateral side, and therefore the pressure from the frontobasal direction cannot dislocate it dorsally in any great measure.

B. Analysis of the Lateral Venous Phase. The present investigations have revealed no such changes that could be relied upon in the differential diagnosis. The deep cerebral veins showed the changes described by Johanson,\textsuperscript{11} Lindgren,\textsuperscript{14} and Tönnis \textit{et al.};\textsuperscript{18} the septal veins were displaced upward and backward; and the internal cerebral vein was dislocated backward in its initial part. The thalamostriate vein forms an acuter angle with the internal cerebral vein, the latter being displaced backward.

C. Analysis of the Anteroposterior Arterial Phase. In the anteroposterior view the anterior cerebral and the pericallosal arteries are not displaced sidewise, or at least not in such measure as would correspond to the extent of the frontobasal tumor observed in the lateral view. After it arises from the internal carotid artery, the anterior cerebral artery runs horizontally to the midline. This horizontal course of the anterior cerebral artery is a differential diagnostic sign, facilitating distinction from tumors in the midline and from frontobasal extracerebral tumors.