Spongioblastoma Polare of the Cerebral Hemisphere*

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In a study of 140 cases of cerebellar astrocytomas Ringertz and Nordenstam emphasized that the cellular structure of these tumors was composed mainly of polar spongioblasts. This conclusion corresponded to that of Bergstrand and also to that of Zülch.

Ringertz and Nordenstam also found 10 cases of cystic glioma in the cerebral hemisphere with the same cellular structure as the cerebellar astrocytomas. These 10 patients showed a higher survival rate than patients with ordinary hemispheric astrocytomas. In order to find the incidence and the biologic properties of these tumors, a review of the hemispheric astrocytomas treated at the Neurosurgical Clinic of the Serafimerlasaretet, Stockholm, from 1926 to 1957, has been done.

It has been possible to select 42 cases of glioma of the cerebral hemisphere with the same histological features described by Ringertz and Nordenstam.

Brief Historical Survey

In 1926 Bailey and Cushing wrote: "A few brain tumors are composed almost wholly of unipolar spongioblasts, with a various proportion of bipolar forms." The same type of tumor in 1924 had been called by Josephy "zentrale Neurinom" because of its resemblance to acoustic neurinoma. The term "spongioblastoma polare" first was applied to these tumors by Penfield in 1927, while in 1931 they were called "oligodendrocytome à cellules fusiformes" by Roussy and Oberling. In 1932 Bailey and Eisenhardt found 32 cases of polar spongioblastoma among 870 gliomas of the brain which belonged to Cushing's series of 2,000 verified brain tumors. Among these spongioblastomas, only 6 were located in the cerebral hemisphere. Echols among 12 cases of spongioblastoma polare, found only 1 hemispheric tumor. In 1939 Schär and Christensen published 5 cases of cystic tumors containing intramural nodule which were considered to be congenital malformations. Subsequently several authors have included these tumors among the astrocytomas and called them "piloid" or "pilocytic" astrocytomas.

Gross Anatomy

In this report are included tumors located in the frontal, temporal, parietal or occipital regions of the brain and tumors that involved simultaneously two of these regions. Also considered are 2 tumors attached to the septum pellucidum and 1 that originated from the nucleus caudatus. These latter 3 tumors also extended into the hemisphere. Polar spongioblastomas growing in the basal ganglia, the thalamus and the 3rd ventricle are not included here.

Grossly, the appearance of the tumor has as its dominant feature a cystic formation in 39 of 42 cases, or 93 per cent. This figure seems indeed to be very high. The 58 cases of piloid astrocytoma reported in 1956 by Levy and Elvidge form a material that might be compared with ours. Only 20 (34 per cent) of their cases had a macroscopic cyst. We believe that in our total series of verified brain tumors the number of solid polar spongioblastomas in the cerebral hemisphere is probably greater than the 3 included here. It is possible that some spongioblastomas are classified under other names, and only a total revision of the material might give a true figure.

In all of the 39 cases in which the cyst constituted the bulk of the growth, there was a nodule of solid tissue in one part of the wall.
the so-called "mural nodule." In 16 cases (or 41 per cent) the nodule was in the medial wall of the cyst, which frequently corresponded to the central regions of the brain. However only slightly less often (12 cases, or 31 per cent) the nodule was located in the lateral wall. Locations other than the medial and the lateral were much less common. In 3 cases the nodule was reported to be superior in position, in 2 cases inferior, in 2 cases posterior and in a single case anterior in the wall of the cyst. In 1 case of our series the surgeon did not state the position of the nodule. In 2 cases he could not see any certain nodule of solid tissue in the wall of the cyst, but a specimen taken from where the tissue seemed to be somewhat different in consistency and color showed pathological tissue typical of a spongioblastic glioma.

The solid tumor is reddish-gray, generally fairly avascular, and rather firm, although sometimes it is gelatinous. In a small number of cases the tumor was hemorrhagic. These tumors were never encapsulated, but generally there was a fairly sharp demarcation between tumor and surrounding brain. In many cases the cystic part of the tumor reached the cerebral surface but in only a few cases did the solid part do so. In other cases the tumor was covered by a thin layer of flattened and atrophic gyri.

The mechanism of formation of the cyst is not clear, but it seems possible that the cystic fluid is formed through breakdown of tissue. Wertheimer and Corradi, in a paper on cerebellar astrocytoma, expressed the opinion that there is a transudation and stasis of fluid coming from the cerebellar parenchyma. The edematous microcystic transformation which occurs very often in these tumors is, according to Ringertz and Nordenstam, the source of the frequent macrocysts.

**Histological Appearance**

All of the 42 tumors of this series showed a predominance of spongioblasts, a piloid glial structure and a tendency towards degenerative changes. The cellular structure of these tumors corresponds to that found by Bergstrand and to the description given by Zülch. Ten cases of our present series were previously discussed by Ringertz and Nordenstam in a paper on cerebellar astrocytoma and were recognized to have the same histological characteristics as the latter tumors.

The tumor is partly dense and rich in glial

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**Fig. 1.** Gliomatous tissue which is sparsely cellular. Fusiform nuclei are arranged between parallel bundles of glial processes. There are no mitoses. There is slight vascularization of capillary type. van Gieson’s stain, 240X.