ON THE OCCURRENCE OF EPILEPSY CAUSED BY ASTROCYTOMA OF THE CEREBRAL HEMISPHERES

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It is well known that brain tumours produce epilepsy. Many tumours, of the brain itself, of the meninges, of the blood vessels and of other secondary structures, have been reported as causing seizures at one time or another during their clinical course. Tumours of the brain substance itself, such as the gliomas, are probably the ones that most often present themselves with convulsive disorders, and of these the astrocytomas, by far the most frequent glioma of infancy and middle age, undoubtedly constitutes the largest percentage.

Astrocytomas, being histologically benign, slow-growing neoplasms, give us the opportunity to observe a rather prolonged evolution and thus the chance to analyze their different clinical features, among which the occurrence of seizures is prominent.

Different classifications of the astrocytomas have been given in the last 35 years. Bailey and Cushing1 in 1926 divided them in two groups: protoplasmic and fibrillary. However, in 1937 Elvidge et al.2 stated that there were no protoplasmic astrocytes under pathological conditions and proposed another classification dividing the astrocytomas in three groups: piloid, gemistocytic and diffuse. Kernohan3 divided the astrocytomas according to their degree of malignancy from Grades I to IV. Russell4 recently has adopted a new classification based on the histological aspects of these tumours, although she admits that her classification is "neither consistent nor strictly logical." She divides the astrocytomas into five groups as follows: 1) Protoplasmic. 2) Fibrillary, with two variants: a) diffuse and b) circumscribed. 3) Pilocytic. 4) Gemistocytic. 5) Anaplastic.

Since the classification proposed by Elvidge et al.3 in 1937 continues to be useful clinically and adequate from the histological standpoint, we can see no reason to abandon it. Therefore in the present study of epilepsy as a prominent feature of astrocytomas of the cerebral hemispheres, we shall continue to refer to it considering that there would be very little advantage, if any, in adopting some other type of basic classification.

The purpose of this article is to review the occurrence of convulsive disorders as one of the clinical features in patients with cerebral astrocytoma, establishing a correlation between this, the patterns of the seizures, the electroencephalographic changes and the pathological picture of the neoplasm.

From 1945 to 1960, 209 patients with astrocytoma of the cerebral hemispheres were studied at the Montreal Neurological Institute. Of these, 100 presented epilepsy at some time during their clinical courses, the frequency of seizures in this group, therefore, being of the order of 48 per cent. In 88 of the 100 the convulsive disorder was the initial symptom and 89 of them were admitted for "investigation of seizures." Symptoms leading to admission in the remaining 11 cases were variable, from persistent headaches, loss of memory, progressive drowsiness and slight disturbances of vision to hemiplegia and progressive deepening of coma. Twelve of our patients did not present epilepsy as the initial symptom but late in the course of their illness. One-half of them started with headache which, when localized, appeared on the same side as the tumor, but this happened

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in only 2 patients. Other symptoms were nausea, vomiting, insomnia, changes in personality, loss of memory, dizziness, weakness of one limb and ataxia.

The age and sex incidence of astrocytoma producing seizures is approximately the same as that of astrocytoma not producing seizures, and this has been reported by many other authors. Table 1 shows our own summary.

The 100 patients in our series presented symptoms of variable duration, from 1 day to 30 years with a mean of 47.5 months. Duration of seizures in this group was equally impressive, from 1 day to 30 years with a mean of 44.2 months. Reviewing the charts of these patients one finds that 62 of them presented absolutely no neurological deficit and only the remaining 38 presented some sort of incapacitation varying from minimal monoparesis to the deep state of coma. Only 11 (28.9 per cent) of the 38 with neurological signs presented papilledema and strangely enough the duration of seizures in these 11 patients was from 3 months to 8 years with a mean of 3.8 years.

Anatomical Considerations. Astrocytomas causing epilepsy can be found in any of the cerebral lobes and in fact, in the patients of this series, we have found them in every possible area of the hemispheres and the diencephalon. However, it is interesting to note that 48 out of the 100 patients presented tumours located purely within the frontal lobe and in 15 more the frontal lobe was invaded and sharing the neoplasm with either the parietal or the temporal lobes or with both; consequently in a total of 58 patients the frontal lobe was found to be affected. The temporal lobe follows in frequency of involvement (14 per cent), and next the parietal lobe (13 per cent). Astrocytoma confined to the occipital lobe was encountered in only 1 case, but the occipital lobe was involved by tumours growing from the parietal or the temporal lobes in a total of 4 cases. We found 71 tumours growing within one lobe and 29 within two or more cerebral lobes.

Pathological Considerations. Almost one-half of our patients with astrocytoma and seizures proved to have the piloid type of neoplasm (47 per cent). Astrocytoma dif fusum was found in 24 of the cases, 15 were of the gemistocytic variety and 14 were left unclassified. It is worth noticing the high incidence of the piloid astrocytoma, which in unselected patients is of the order of 51 per cent.2

Seizure Patterns. Eighty of our patients presented clinically focal cerebral seizures; 20 were classified as cerebral seizures unlocalized. None of the patients presented centrencephalic seizures although 5 seizure-producing tumours were either confined to or involved the diencephalon.

The pattern of the seizures was that to be expected in view of the location of the tumour, according to the lobe affected in 77 patients; the pattern was that of a neighboring lobe (not affected) in 3 cases, and in 2 the pattern was that of a lobe distant to the involved one. Table 2 shows the correlation between the pattern of the seizure and the histological type of the tumour.

These figures should be compared with