EPENDYMAL ASTROCYTOMA

SUBEPENDYOMA OR SUBEPENDYMAL GLOMERATE ASTROCYTOMA

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This group of gliomas which seems to arise from subependymal astrocytes of the ventricular wall and of the spinal cord central canal, shows a peculiar histological picture and a characteristic biological behaviour (Boykin et al. [3]).

In 1933, Cox [6] described a case of astrocytoma of the fourth ventricle without further clinical information, but showing, a similar histological picture to the ependymal astrocytomas. Riskaer [15], 1941, located two cases of intraventricular astrocytomas, which arise from the septum pellucidum, one of them having histological characteristics of the glioma group concerned. Scheinker [19], 1945, reported seven cases of intraventricular astrocytomas and introduced the nomenclature *subependymoma* for this group of tumours. French and Bucy [8], 1948, described five gliomas of the septum pellucidum, three of which had the characteristics of ependymal astrocytoma. Boykin et al. [3], 1954, reported nine cases, seven of which had intraventricular localization, and two had medular localization. He named them *glomerate subependymal astrocytomas.*

The ependymal astrocytomas are characterized by the following macroscopic aspects: 1) intraventricular localization or in the central canal and a lobulated aspect; 2) grayish-white colour and firm consistency; 3) the small tumours have a smoothe glossy surface to the cut, while the larger ones shows an irregular lobulated aspect, with compact nodules, suggesting that they come from the coalescense of multiple small tumours; 4) the base for the implantation of these neoplasms in sharply indicated from the adjacent subependymal tissue; 5) it grows by expansion inside the ventricular cavity which determines a minimum compression on its base of implantation.

The histological characteristics which give autonomy to the ependymal astrocytomas are the following: 1) sharp outline and lobulated structural conformation; 2) accumulation of small cells encircled by a dense mass of

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fine fibers; 3) a jutting out nucleus and cytoplasm difficult to be seen; 4) cells which are predominantly oval and small, but are uniform and without mitosis; 5) fibrilar matrix made up undulated fine fibers which are parallel, separated from glial groups by non-celular areas; 6) at times, cellular disposition in perivascular crownlike shape; 7) they are neoplasms not much vascularized; 8) at times, it is possible to find fibrosis and calcification in the wall of the small vessels.

OBSERVATIONS

Case 1 — J.G.A., 65 years old, male, reg. 282917, autopsy 99/76 U.E.R.J. Patient with serious leptospirose dies because of renal insufficiency and digestive hemorrhage. The autopsy showed a nodule attached to the wall of the right lateral ventricle, in the parietal-occipital region, of firm consistency, lobulated, and measuring 2x2x1 cm, protruding into the ventricular cavity. To the cut, the surface shows solid and lobulated aspect (Fig. 1).

Case 2 — R.B., 76 years old, male, reg. 284671, autopsy 143/76 U.E.R.J. Patient with arterial hypertension and right side hemiparesis; operated on the scrotum for fistula died on the third pos-operative day. The autopsy showed the existence of cerebral atrophy and periventricular healed infarcts, ischemic necrosis in the internal capsule on the left side and arteriosclerosis of the vessels in the circle of Willis. Besides this, on the wall of the left lateral ventricle, there was an elevated micronodular region of firm consistency and of whitish colour, measuring 2x1x1 cm, which showed solid aspect to the cut.

Case 3 — J.F.S., 42 years old, male, reg. 1242/80 C.B.P., operated in Dr. Paulo Niemeyer's Surgical Clinic. The patient had had occipital bilateral cephalalgia for 2 months during which he suffered from convulsive seizures. He showed right side hemiparesis for 15 days with hyperreflexia and bilateral edema of the papilla. He was operated for a left frontal expansive lesion related to the wall of the lateral ventricle; the tumoral tissue was removed and sent to the laboratory for examination. The macroscopic examination showed a fragment of tissue measuring 5x5x4x2,5 cm of convex-concave, nodular aspect and brownish colour. The external surface was granular and the surface was compact, of firm consistency and grayish-white colour.

Case 4 — A.H.S., 59 years old, male, reg. 4234/80 C.B.P., also coming from Dr. Paulo Niemeyer's Surgical Clinic. The patient had had chephalalgia for two years and progressive loss of eyesight for a year to this date. Seven months ago he showed loss of strength on the left lower limb, besides vomiting, a nauseate state and hiccups. He has been operated for craniotomy and a tumour located on the occipital prolongation of the lateral ventricle has been removed. The macroscopic examination showed various fragments of tissue amounting to a size of about 7x3x5x1,5 cm, weighing 18 grammes. It had a firm consistency, a whitish colour and a homogeneous aspect to the cut.

Microscopic study — The histologic picture of the 4 cases described above presents similar characteristics so they can be analysed together. These neoplasms of neuro-ectodermic origin exhibit proliferation of round or oval cells, set in isolated groups and separated by a fibroglial network, made up of criss-crossed or parallel bundles, having a lobulated aspect of imperfect borderline and poorly vascularized. Predominantly fibrilar areas are seen and are distinguished from more densely cellular areas, and at times, assume the shape of perivascular crows (Fig. 2), or at times form elongated and richly fibroglial bundles, in parallel or criss-crossed presentation (Fig. 1b,2,3). The cellular elements are well differentiated, without loss of shape or mitosis. Such structures assume an aspect similar to the configuration of a piloid fibrillary astrocytoma, or even like a cellular ependymoma. However, the method of phosphotungstic acid-hematoxilin of Mallory, besides showing the fibroglia, does not show blepharoplasts.

Study through electron-microscopy (Restricted to case 4) — The material previously fixed in formalin at 10% for 15 days was treated with glutaraldehyde and osmic acid, included in epon an cut in semithin sections (0,5 micron), stained in toluidin blue and cut in ultra-thin section, for electron microscopy inspection. Cellular structures with scattered glial nuclei and multi-vesicular cytoplasm, rich in organels, swollen, with poorly defined membranes, glial intraplasmatic filaments and glialfibrils seen crosswise or lengthwise, where the glial filaments are grouped in bundles (Fig. 4). Cilia, micro-villi or specialized cellular unions have not been found.

DISCUSSION

The basic importance for the histological recognition of this group of gliomas has its grounds in the characteristics of its biological behaviour, that is, a more expansive growth than an infiltrating one, allowing their complete surgical removal.

However, the origin of the ependymal astrocytoma allows a still controversial debate. Bailey [1] had already described such tumours as subependymal gliomas, the same refers to Bodian and Lawson [2] in their series of 9 cases in children. Kernohan et al. [12,13] considered these tumours as astrocytomas; Globus and Kuhlenbeck [9,10] say that these tumours have their origin in the 3rd layer of the persistent subependymal matrix, made up of immature elements that simulate neuroglial tissue; in their neoplasic transformation these cells become mature, that is, they become fibrillary astrocytes. Booykin et al [3], using special staining (Cajal's Gold Sublimate, phosphotungstic acid-hematoxilin) have shown the astrocytic nature of the cells and fibers and, with Bailey's technique (ethil-violet-orange G), have proved the non-existence of blepharoplast in the tumour cells. In this way, in agreement with these authors, the ependymal elements don't take part in the formation of these tumours, for it has never been possible to see epithelial traces, or acinar or papillary arragement; it has not even been possible to detect blepharoplasts in them. The presence of a small number of ependymal cells, may just represent an inclusion rather than a participation of these elements in the neoplasic process.

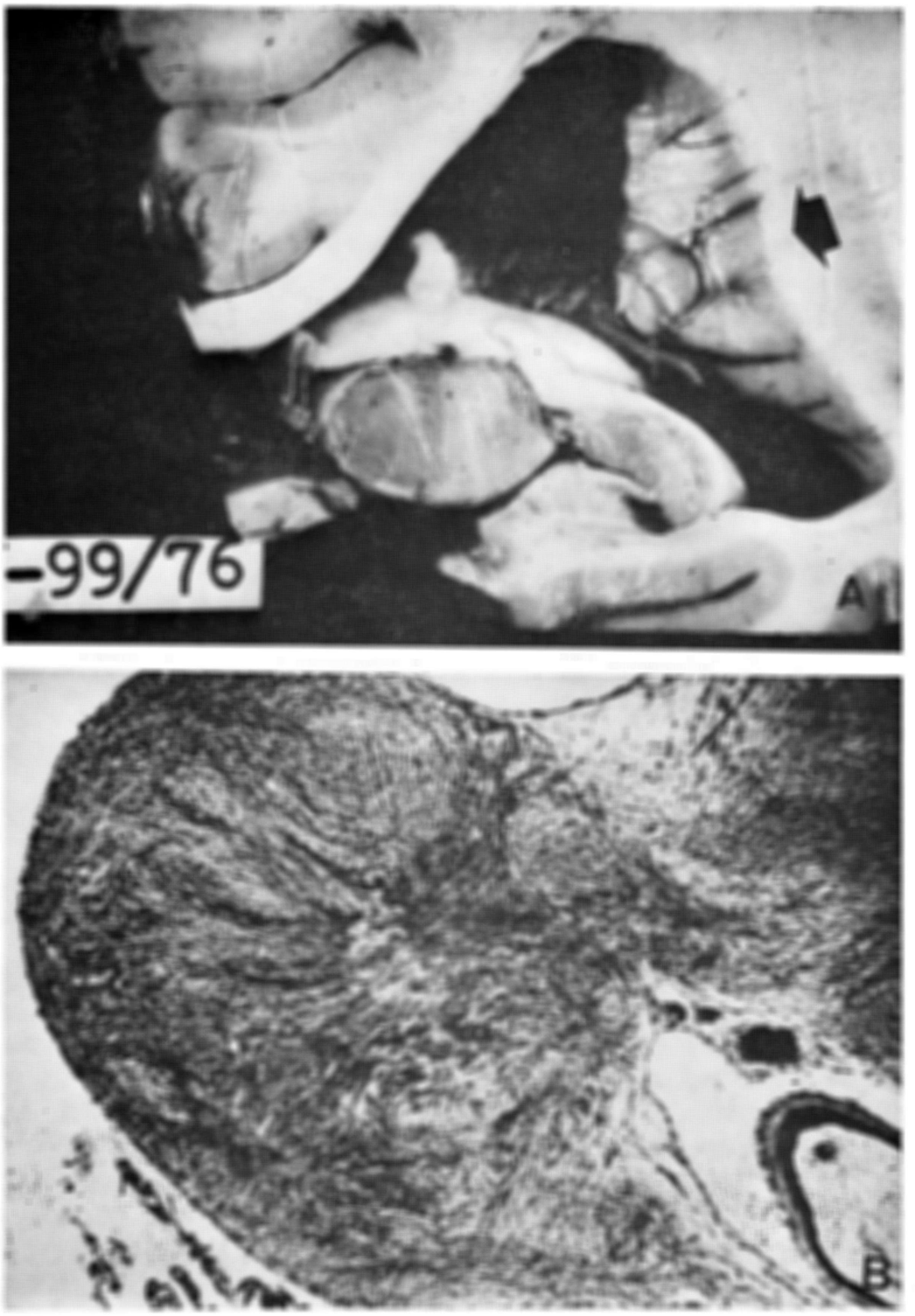

Fig. 1 — Case J.G.A.: (A) frontal section of the brain showing a nodular, lobulated structure, on the ventricular wall, of grayish-white colour, projecting itself into the cavity (see arrow); (B) the histolological section presents a nodular structure composed of criss-crossed or parallel dense bundles (Phosphotungstic acid-hematoxilin 32X).

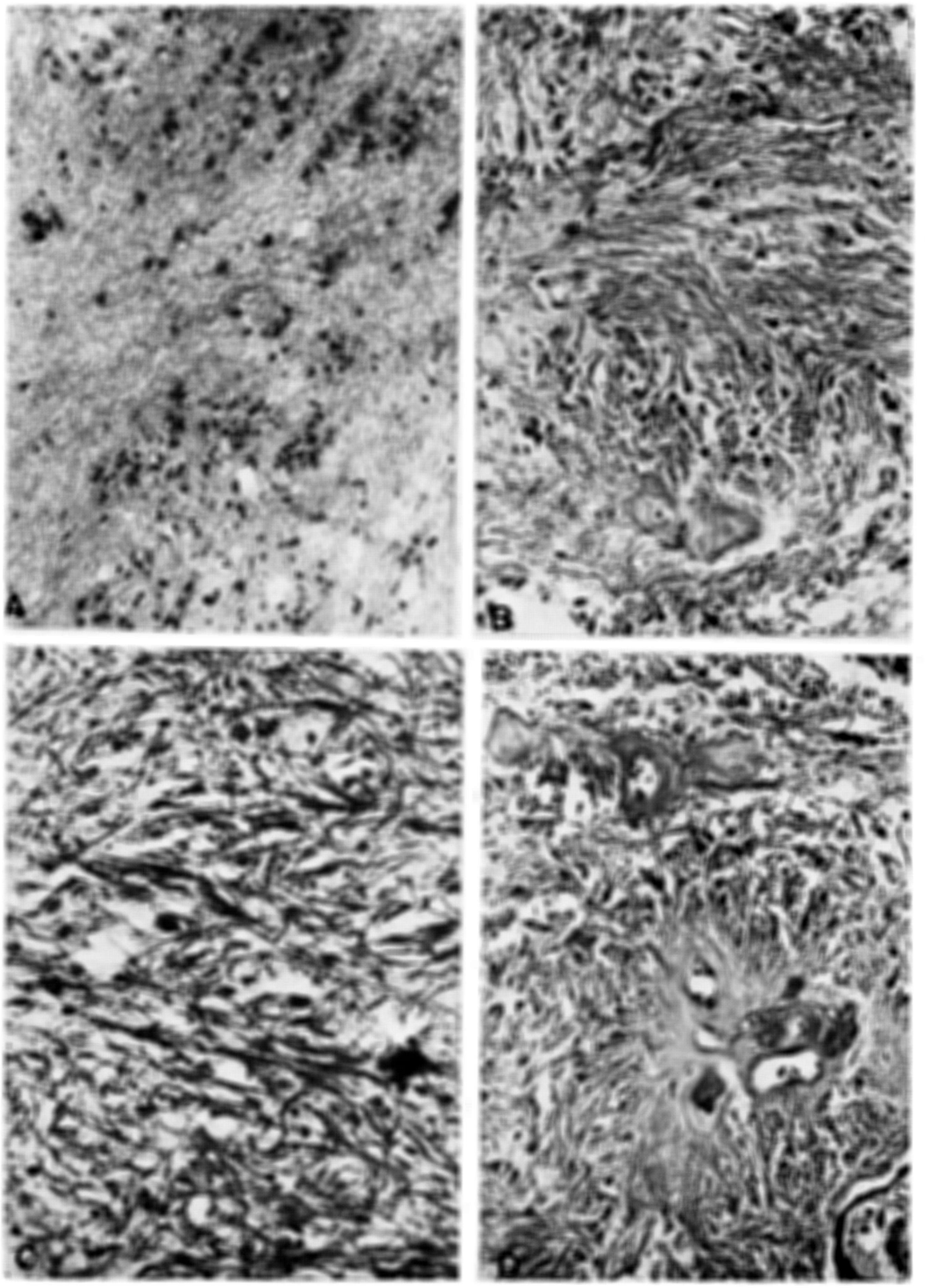

Fig. 2 — In (A) and (B) a neoplasic structure is seen, composed of cells groups separated by bundles of glial fibers, resulting a lobulated configuration; (C) a detail of the neoplasia showing a great amount of criss-crossed or parallel glial fibers and occasional round nuclei; (D) a detail of the neoplasia showing perivascular crowns arrangement (A and B — H&E 100X; C — Phosphotungstic acid-hematoxilin 250X; D — H&E 100X).

Fig. 3 — A semi-thin section (0,5 micron) stained with toluidin blue showing numerous criss-crossed alongated glial fibers with interspersed oval cells (400X).

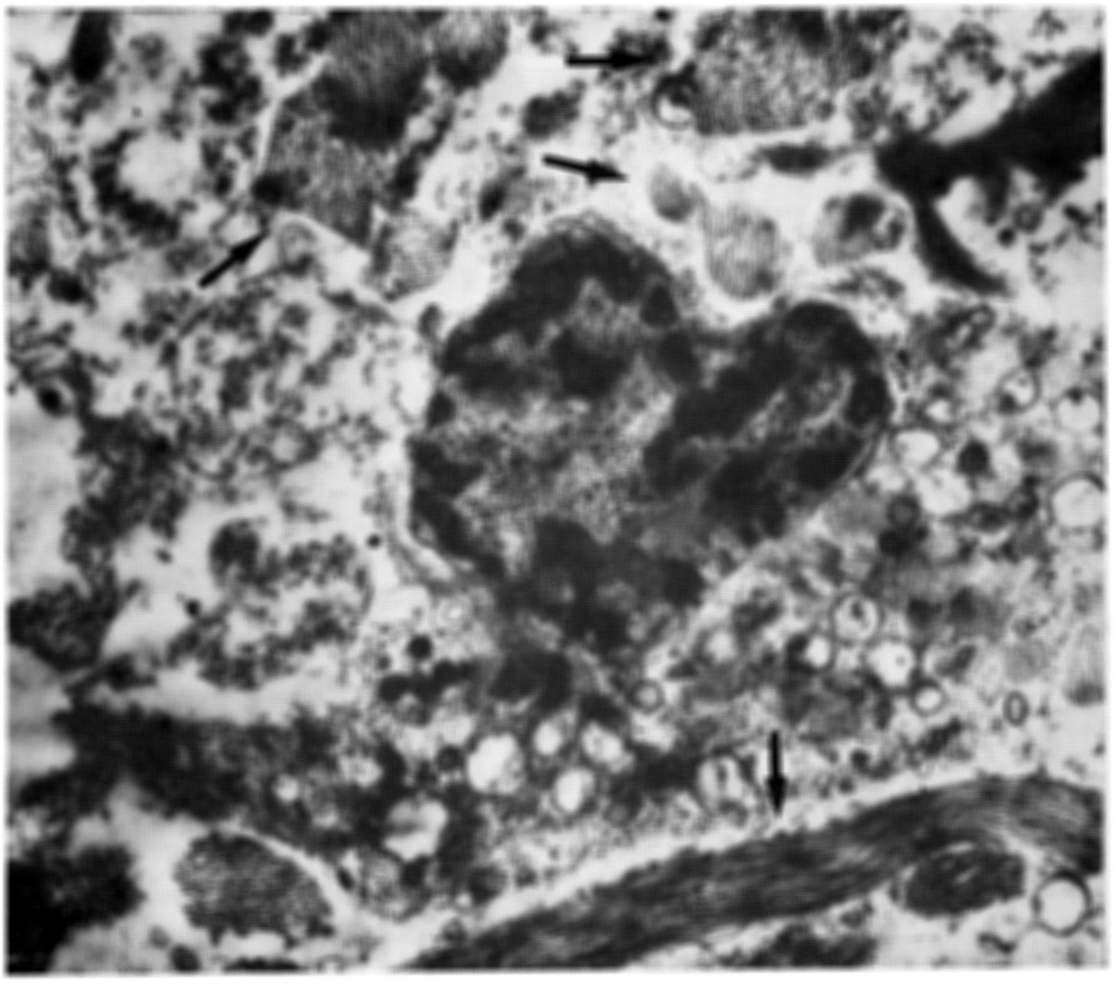

Fig. 4 — Electron microscopy showing glial filaments and subsequent glial fibers shown in transverse or longitudinal sections (see arrows) M.E. 11.000X.

However, it is worthwhile to remark that, Mackay [14], Eisenhardt (quoted by Kaplan [11]), Tardini [20], Rubinstein [17], Russel & Rubinstein [18] and Zulch & Wechsler [23], consider such tumours as ependymomas.

Roussy & Oberling [16] have classified them as *ependymogliomas* because of the simultaneous presence of ependymal and astrocytic cells, because he believed in the predominance of one or another cellular type and in the possibility of transformation of ependymal cells into astrocytes. Dublin [7] is also of the same opinion.

In agreement with Chason [5], in the genesis of these tumours the rise of ependymal and astrocytic neoplastic cells would occur. This opinion is bases on the findings of cells that form typical astrocytic fibers, and also of cells with cytoplasmatic granules and vacuoles, besides cells with occasional formation of rosettes. In his experience the author shows that such neoplasms arise from subependymal areas which contain mixed cell rests. This theory of a mixed composition of gliomas is suported by Zimmerman [22] who, through animal experimentation, has demonstrated that gliomas area frequently made up of multiple cell types.

To reinforce such ideas we must mention the recent colaboration of Yao-Shi Fu et al. [21] who, using tissue culture and electron microscopy, have confirmed the presence of ependymal cells as well as the presence of astrocytes in these tumours; *in vitro* the ependymal cells only form glial filaments but rosettes as well with cilia, micro-villi and specialized cell unions.

Considering the arguments presented above, we propose to name them ependymal astrocytomas which is more appropriate, because of the origin of such tumours and versatility of the ependymal cell.

SUMMARY

The histological study of four cases and one by electron microscopy of subependyomomas allowed us to obtain morphostructural characteristics of ependymocytes and astrocytes. Comparing these findings to those of the present day literature, we propose to name these tumours ependymal astrocytomas.

RESUMO

Ependimoastrocitoma, subependimoma ou astrocitoma glomerulado subependimário: registro de 4 casos.

O estudo histológico de quatro casos de subependimoma, um deles pela microscopia eletrônica, permitiu-nos obter características morfoestruturais de ependimócitos e astrócitos. Comparando estes achados com os da literatura, propomos denominar tais neoplasias como ependimoastrocitomas.

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