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Case Reports

Primary Eosinophilic Granuloma of the Frontal Lobe

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Summary. The clinical symptoms, pathological findings and surgical treatment of a case of primary frontal lobe eosinophilic granuloma are presented. Inicially a frontal mass was detected that clinically seemed like a low-growth tumor. After operation, the histological, cytochemical and ultrastructural studies showed positive acid phosphatase, α-naftil-esterase, oil-red and PAS reactions of tumoral cells and the presence of rod-shaped bodies in proliferative histiocytes, all which confirmed the pathological diagnosis of eosinophilic granuloma. Other osseous or visceral histiocytosis-X signs were not observed. The patient remains asymptomatic after a postoperative follow-up of 2 years.

Key words: Eosinophilic granuloma – Frontal lobe – Histiocytosis-X – Ultrastructure.

Introduction

Eosinophilic granuloma (EG) is a benign form of reticuloendothelial proliferation belonging to the group histiocytosis-X and is normally confined to the skeletal system. Circumscribed extraosseus EG primarily involving the gastrointestinal tract (Hou-Jensen et al., 1973; Vazquez and Ayestaran, 1975), lymphnodes (Shamoto, 1977) or lungs (Davidson, 1976) have been described. EG of other organs such as the thymus or parotid gland are extremely rare (Beatty, 1963). Primary EG in the CNS has seldom been reported (Rube et al., 1967; Sivalingam et al., 1977) and no case provides ultrastructural support to confirms its character. When EG has an extraosseus location histological confirmation is not sufficient to confirm its origin and nature, only electron microscopic demonstration of histiocytic cell proliferation with phagocytic activity and rod-shaped cytoplasmatic inclusions are evidence for objective diagnosis of this tumor-like lesion (Nezelof et al., 1973).

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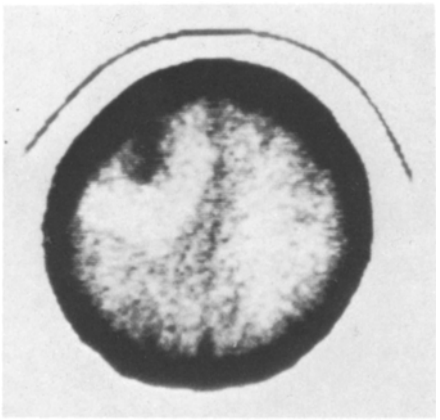

Fig. 1. CT scan section showing the frontal tumoral mass and the peritumoral swelling reaction

This report describes a further case of primary extraosseous eosinophilic granuloma located in the frontal lobe, whose nature and histiogenesis were analyzed by means of histological, histochemical and electron microscopical studies.

Case Report

Three weeks before referral to the Neurosurgical Department of the Hospital Universitario the patient, a 35-year-old male teacher, presented with sudden loss of consciousness, epileptic fits and recent amnesia. This clinical picture was followed by frontal headache, nominal aphasia, loss of interest and writing disturbances. Neurological examination on admission showed a right hemiparesis and pyramidalism. Agraphia and aphasia were confirmed. Cranial nerve functions were intact. Ophthalmoscopy did not show papilloedema. In EEG recordings there was a high voltage slow-wave activity in the left frontal area. ^{99m}Tc gammagraphy showed a large and hot image in the left frontal lobe. CT scans confirmed the former tumor image, suggesting a low-growth, rate frontal tumor process (Fig. 1), probably a meningioma. Later carotid angiography showed a poor tumor vascular supply that changed the clinical diagnosis to a cerebral metastasis at operation a left frontal craniotomy was performed and the dura mater appeared grossly normal. However cortical convolutions at this level were flattened with focal hyperemia and calcification. Under this abnormal cortical area there appeared a white, hard, wedge-shaped tumor mass expanding into the subcortical region, producing a swelling reaction of the white matter. The tumor was totally removed and referred for pathological study. Two days after the pathological diagnosis of EG general X-ray study of the skeleton and bone marrow analysis were done to exclude a secondary origin of the lesion. Both studies were negative. After a postoperative follow-up of 2 years the patient remains asymptomatic, reintegrated into a normal active life. Postoperative EEG recordings showed slow irritative theta waves in anterocentral areas, he is therefore under anticonvulsant control.

Pathology

The surgical specimen was fixed in formalin and blocked in paraffin. For histological study the material was stained with standard and Gomori's reticuline

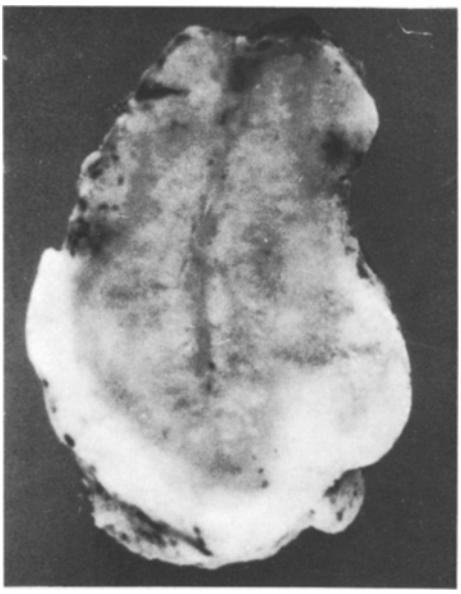

Fig. 2. Surgical specimen

techniques. Acid phosphatase, α-naftil-estearase, oil-red and PAS techniques were used in the cytochemical examination. A part of the tumor was fixed in 2.5% gluteraldehide, post-fixed in 1% osmium tetroxide and embedded in epon. After this preparation thin sections were stained with uranyl acetate and lead and later examined with Jeol-100 B electron microscope.

Gross Pathology

The material removed was a solid firm mass, 3.5 cm in longest diameter, showing a dark yellow or red-spotty color in the central area (Fig. 2). The whole tumor mass was sited between the frontal grey and white matter, which surrounded the process with a capsule-like structure, keeping continuity with the nervous tissue.

Histology

The neoplasm was composed of groups of histiocytic cells located around small vessels and forming a typical and confluent granulomatous pattern (Fig. 3A), in which the histiocytes, polymorphonuclear leucocytes, lymphocytes and some fibroblasts formed a compact block. Most of the leucocytes had an eosinophilic character and together with the histiocytes, were the most frequent cellular type (Fig. 3C). An increase in the reticulin weft was observed around the vessels coinciding with the granulomatous pattern (Fig. 3B). The vascular structures of this granuloma were provided with a thick hyaline basal membrane and

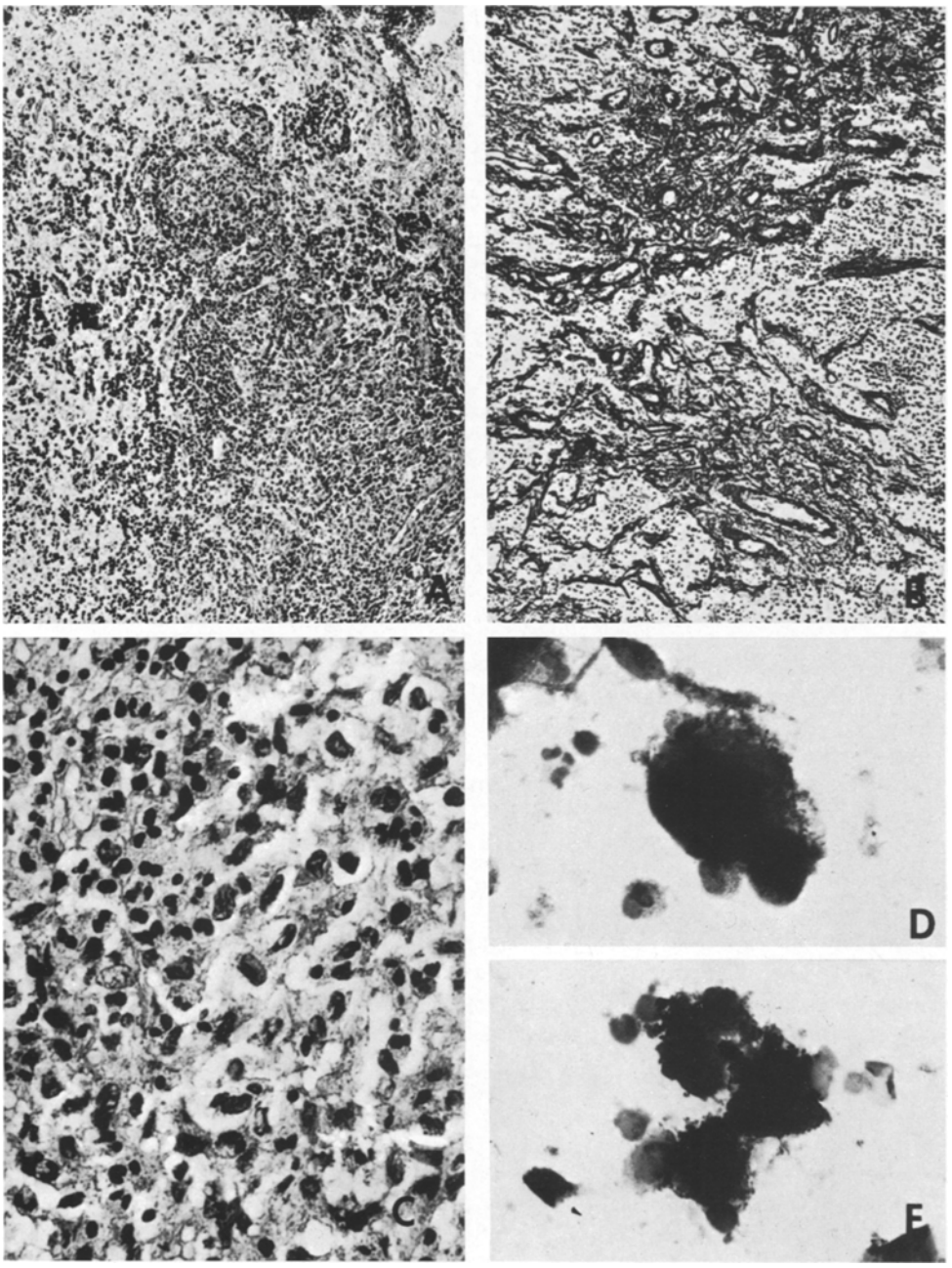

Fig. 3. A General microscopic tumoral view with granulomatous characters. HE. Obj. ×6.3. **B** Tumoral reticuline pattern. Gomori's stain. Obj. ×6.3. **C** Tumoral proliferative histiocytes and eosinophilic infiltration. HE. Obj. ×16. **D** Positive acid phosphatase reaction in histiocytes. Obj. ×40. **E** Positive α-naftil-estearase reaction in histiocytes. Obj. ×40

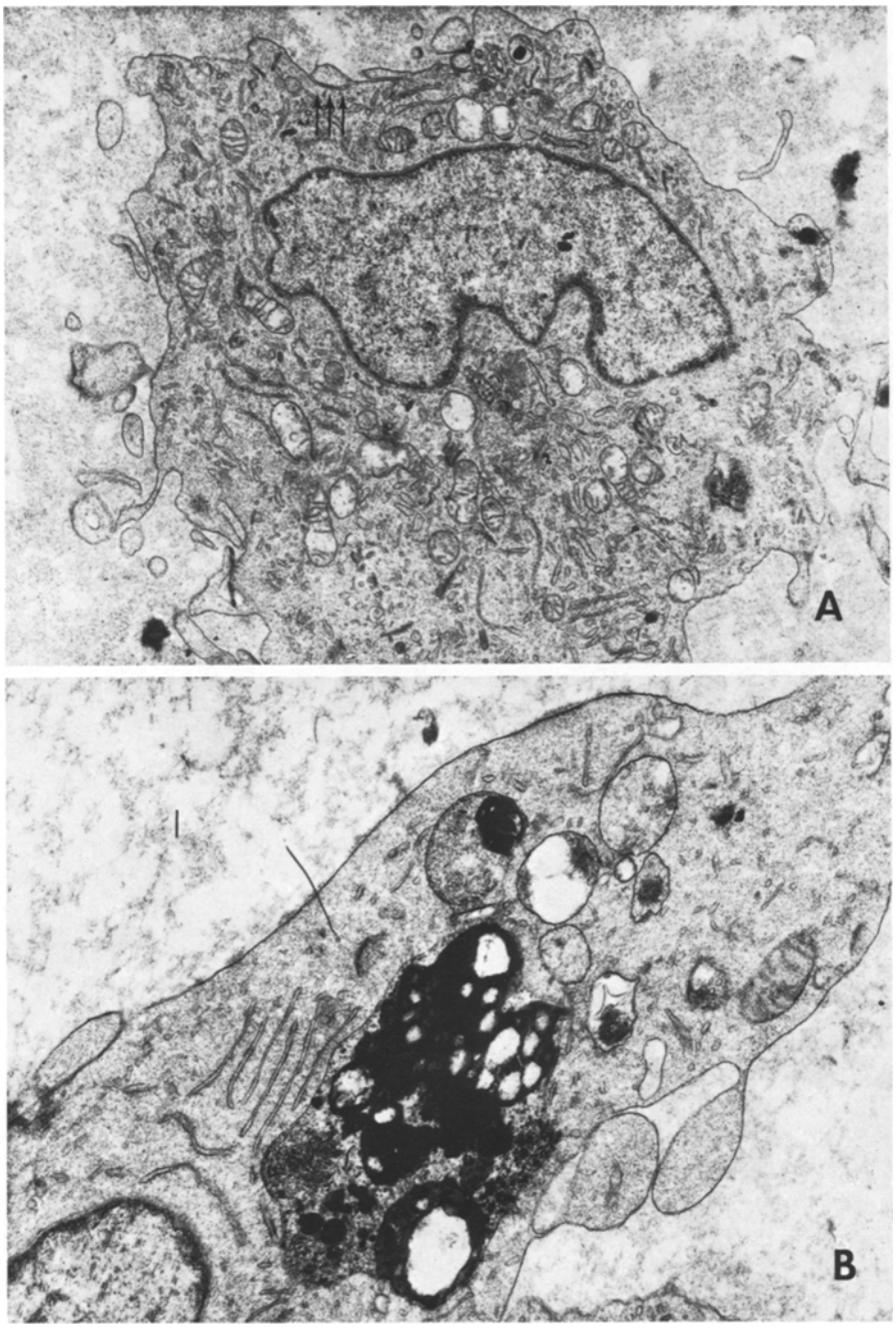

Fig. 4 A and B. Electron microscopic aspect of the histiocytes. **A** General aspect. Rod-shaped body beside the plasmatic membrane (*arrow*). ×40,000. **B** Intracytoplasmic fagosome in histiocyte. ×40,000

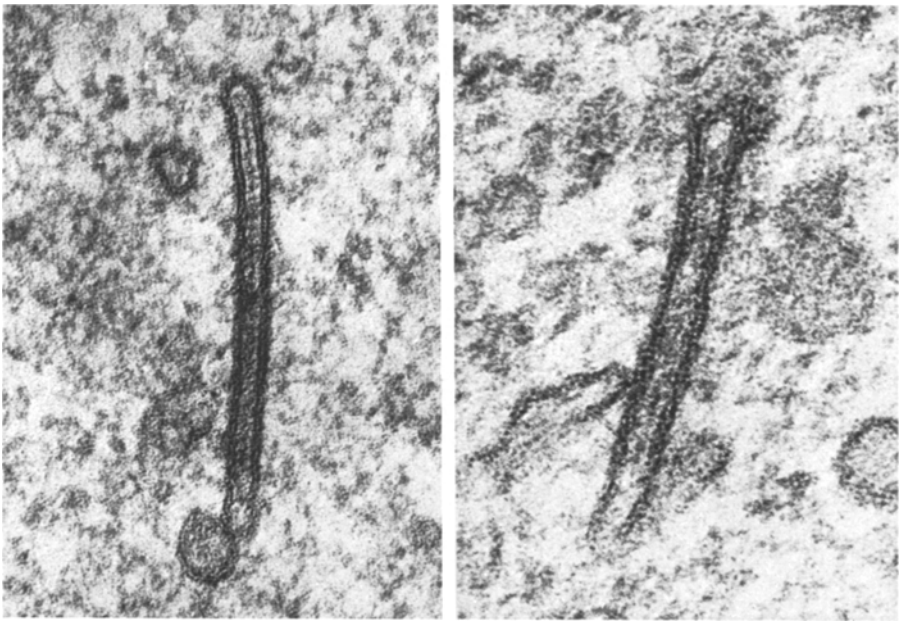

Fig. 5. Typical ultrastructure of the intracytoplasmic rod-shaped bodies. × 120,000

a hyperplasic reactive endothelial proliferation. Small newly formed capillaries occasionally appeared in close contact with the reactive inflammatory cells. Haemorrhagic fields were also noted. All the vascular findings were of reactive character and did not participate in the tumor proliferation. Histiocytes had an ovoid or indented nucleus and abundant eosinophilic cytoplasm. Binucleated foam cells with lipid laden cytoplasm were also observed.

Microglial proliferation was found at the tumoral periphery, but without a direct participation in the neoplasm. Some of these microglial cells showed lipidic cytoplasmic inclusions.

Cytochemistry

The cytochemical study showed a prominent cytoplasmic acid phosphatase activity in almost all cells (Fig. 3D). As well as to α-naftil-estearase (Fig. 3E). Some cells also showed a positive reaction to cloro-acetate-estearase, which normally appears in the eosinophilic granulocytes. PAS positive granules were observed in the foamy histiocytes. Positive oil-red lipids also appeared in some proliferative histiocytes.

Electron Microscopy

Histiocytes showed a diverse appearance. Normally the cytoplasm was abundant with a precise outline, large digitations and numerous microvilli (Fig. 4A). Pha-

gocytic activity, with the participation of an increased number of lysosomes was also observed. The lysosomes appeared as rounded cytoplasmic inclusions of dense homogenity enclosed by a membrane-like structure, variable in number and with differing electron density (Fig. 4B). Rod-shaped bodies usually appeared sparsley in the histiocytic cytoplasm, at a variable distance from the cell membrane. The Langerhans-like bodies were of similar character to those described in osseus EG or other histiocytosis-X diseases. These rod-shaped bodies were found in over 50% of all histiocytes studied by electron microscopy (Fig. 5). Histiocytic nuclei were round or ovoid with some irregularities in the outer membrane. Nucleoli were evident in these cells.

Polymorphonuclear eosinophilic leucocytes with cytoplasmic granules, and some isolated fibroblasts with rather abundant rough endoplasmic reticulum were also observed among histiocytes.

Discussion

Primary eosinophilic granuloma in the CNS is a rare process (Cardozo et al., 1974; Sivalingam et al., 1977) although other forms of focal histiocytosis-X, usually with hypothalamic locations, have been reported. Other systemic forms of histiocytosis-X in the CNS, have been described more often (Braunstein et al., 1973; Kaufman et al., 1976; Kepes et al., 1969; Rube et al., 1967).

The diagnosis of EG as a form of histiocytosis-X is based on the electron microscopic confirmation of the presence of rod-shaped Langerhans type granule cells (Nezelof et al., 1973; Benisch et al., 1977). In none of the cases of EG of the CNS reported in the literature has the presence of rod-shaped bodies in proliferative histiocytes been described but in our conventional microscopy was typical and rod-shaped bodies in the histiocyte cytoplasm were shown ultrastructurally.

The differential diagnosis of this process is between parasitic infections or granulomata of the CNS such as microgliomatosis, tuberculoma or sarcoid granuloma. All these processes have been excluded in the present case. The possibility of a focal expression of the systemic form of histiocytosis-X (Hand-Schuller-Christian disease) was discarded after the general X ray study and bone marrow analysis. A favorable postoperative follow-up after 2 years from the operation confirmed the benign character of the lesion.

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