Intraventricular cryptococcal granuloma

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SYNOPSIS A case is reported of a cryptococcal granuloma occurring within the lateral ventricle. The findings on angiography and brain-scanning led to a preoperative diagnosis of intraventricular meningioma. There are no previous reports of an isotope brain-scan in this condition and angiography usually shows an avascular swelling.

Cryptococcal granulomata of the nervous system are rare, fewer than 50 having been recorded. Of these, only two were intraventricular. A further case is reported here. It is of interest because the unusual features on angiography and brain-scanning led to a preoperative diagnosis of intraventricular meningioma.

CASE REPORT (GM 9984)

A 59 year old previously fit woman had a history of six months of headache, vomiting, and paraesthesiae in the right hand. For two months she had noticed an inward squint of the left eye and during this period she had had several grand mal fits. The onset of confusion precipitated her admission to hospital.

On examination, she was found to be an obese woman who was alert but disorientated. She was

apyrexial, without signs of meningeal irritation. She had bilateral papilloedema, bilateral sixth nerve palsies, and a mild right hemiparesis, maximal in the face and arm.

Investigations were as follows: haemoglobin 13.4 g/dl, white cell count 11 400/mm³ (57% polymorphs, 3% eosinophils), ESR 42 mm/hour (Westergren). Blood WR was negative. Radiographs of the chest and liver function tests were normal. A skull radiograph showed erosion of the dorsum sellae but no other abnormality. A Technetium-99 brain scan (see Fig. 3) showed an area of increased uptake deep in the left temporoparietal region. Left carotid angiography showed a mild degree of hydrocephalus and a slight shift to the right of the midline vessels. There was an upward and lateral displacement of the anterior choroidal artery and the terminal branches of the middle cerebral artery. A right vertebral angiogram showed medial displacement of the occipital branches of the left posterior cerebral artery. In the region of the trigone of the left lateral ventricle was an area of pathological circulation originating

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FIG. 1 Smear of granuloma, stained with toluidine blue to show cryptococci. $\times 200$.

FIG. 2 Section of granuloma, stained with haematoxylin and eosin ($\times 200$) to show cavitations and organisms.

from the deep branches of the posterior cerebral artery. This was characterized by fine blood vessels and a homogeneous staining which persisted to the late venous phase (see Fig. 4). It was thought to show

FIG. 3 Left lateral brain scan showing area of increased uptake caused by the granuloma.

the features of a meningioma circulation (Dr R. D. Hoare). A preoperative diagnosis was made of an intraventricular meningioma.

At operation the brain was found to be extremely tense. After hyperventilation and intravenous mannitol had had little effect, the tension was successfully relieved by lumbar puncture. At a depth of 5 cm, a reddish-brown smooth lobulated mass about 6 cm in diameter was encountered, projecting into the lateral ventricle. Across its surface was draped the enlarged anterior choroidal artery and the remnants of the choroid plexus. The external appearance of the tumour was felt to be consistent with a meningioma. When the vascular surface had been diathermied and incised, a yellow-grey avascular fibrous centre was revealed. When about half the tumour had been excised, two grey jelly-like areas were encountered. At this stage, smears were made of the lesion. When stained with toluidine blue they showed masses of organisms suggestive of cryptococcus (Fig. 1), so excision was halted.

Immediately postoperatively the patient had a dense right hemiplegia. She was started on an intravenous infusion of amphotericin B, 20 000 units every six hours, but her condition gradually deterior-

FIG. 4 Vertebral angiogram. Late venous phase, showing persistent capillary blush in the granuloma.

ated, and she died two days later. Permission for a postmortem examination was refused.

The lumbar cerebrospinal fluid removed at operation had a protein content of 126 mg/dl and 20 white cells/mm³. Of these, four were polymorphs, and the other 16 were at first thought to be lymphocytes, later being found to be macrophages containing small dark basophil particles. Histological examination of the operation specimen (Dr I. Janota) showed granulation tissue with irregular cavities containing organisms, nuclear debris, and stringy watery material. The borders of the cavities contained histiocytes, plasma cells, lymphocytes, neutrophils, and multinucleate giant cells. The organisms were rounded and 10–20 μ m in diameter. They had pale capsules and sharply outlined cores which stained blue with haematoxylin and eosin (Fig. 2) and purple with periodic acid Schiff and Grocott's stains. Their surfaces stained positive with Alcian blue. Their appearance was that of *Cryptococcus neoformans*, and this was later confirmed by culture.

COMMENT

Of the fungi pathogenic to man, *Cryptococcus neoformans* (torulosis, or European blastomycosis) is the commonest to invade the central nervous system. However, this generally takes the form of a meningitis, and discrete granulomata behaving as mass lesions are rare, fewer than 50 having been reported.

The organism is a fungal yeast 5–15 μ m in diameter. It does not form spores but multiplies

by budding, and it has a thick polysaccharide capsule which minimizes the host's inflammatory response to it (Greenfield *et al.*, 1963). Cases have been reported throughout the world, but nowhere occur commonly, although most have been recorded in Australia or the Southern U.S.A. A recent apparent increase in cryptococcal meningitis in South-East Asia has been attributed to improved diagnostic facilities permitting its differentiation from tuberculous meningitis, which it may closely resemble clinically (Tay *et al.*, 1972).

The source of infection is not certain, but, as the yeast is widespread in dust and as a mouth commensal, it is thought to enter the body via the lungs (Rose *et al.*, 1958). Though it may remain confined to the lungs and though lesions may occur in a variety of organs, serious disease is commonest in the nervous system, which it is presumed to reach by the blood. A granulomatous meningitis generally occurs, and it is thought that discrete granuloma might arise either from spread from the subarachnoid space along the perivascular spaces or from spread in the blood stream from the primary site of infection (Greenfield *et al.*, 1963).

Selby and Lopes (1973) have reviewed 37 cases of nervous system cryptococcal granulomata collected from the literature, adding three cases of their own. They are generally solid well-defined masses situated within the substance of the nervous system, and they may be gelatinous or foamy in parts, as was the case reported here. Although they may occur anywhere in the nervous system, only two cases are reported confined to the spinal cord, one intramedullary (Ramamurthi and Anguli, 1954) and one intradural and extramedullary (Ley *et al.*, 1951). In the brain, atypical cases have been reported which were cystic (Rish and Meachan, 1968) and which macroscopically resembled a subfrontal meningioma (Krainer *et al.*, 1946).

Only two cases have been reported in which the granuloma lay within the lateral ventricle (Vijayan *et al.*, 1971; Manganiello and Nichols, 1955). The present case is of interest in that a preoperative diagnosis was made of an intraventricular meningioma on the basis of the results of the brain-scan and angiography. There appears to be no previous report of brain-scanning being done in this condition and,

where angiography has been done, it has been reported as showing an avascular mass, except in the single case reported by Markham *et al.* (1958) where a 'faint tumour shadow' was seen.

Preoperative diagnosis of a brain cryptococcal granuloma may be difficult. In almost 60% there is no history or sign of meningitis, and the course is that of a cerebral tumour (Selby and Lopes, 1973). However, even if there is no clinical evidence of meningitis the cerebrospinal fluid may exhibit changes similar to those seen in tuberculous meningitis. As in the latter condition, the organisms may be difficult to find and, unless special techniques to stain the capsule are used, they may be mistaken for lymphocytes (Greenfield *et al.*, 1963). Recently it has become possible to estimate cryptococcal antigen and antibody in cerebrospinal fluid and serum (Gordon and Vedder, 1966).

Although cases were recorded of successful resection before the days of chemotherapy (Ramamurthi and Anguli, 1954), the risk of cryptococcal meningitis from spillage exists, and a course of postoperative amphotericin B should always be given. If this drug is not tolerated, 5-fluorocytosine may be used (Selby and Lopes, 1973). Good results may be obtained after surgery, and these authors report that 36% of the recorded cases are alive postoperatively for periods of up to 21 years.

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