An unusual fibro-osseous lesion of the brain

Case report

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An unusual case is described of a fibro-osseous lesion of the brain. Some other causes of densely calcified intracranial lesions are briefly discussed.

KEY WORDS · fibro-osseous lesion · cerebral calculi · calcification

Intracranial calcification may be physiological or pathological, diffuse or focal. Many conditions are associated with radiologically visible calcification. A rare case is reported of a fibro-osseous lesion of the brain, a lesion not usually considered in the differential diagnosis of calcified intracranial lesions.

Case Report

This 55-year-old man was admitted in 1982 with dizziness, headache, and vomiting.

Examination. Results of neurological examination were normal. His general health was excellent. X-ray films and computerized tomography (CT) scanning (Fig. 1) of the skull showed a calcific mass, 3 cm in diameter, straddling the midline. Since its first appearance on skull x-ray films taken in 1974 after a minor concussion, this lesion had increased considerably in size (Fig. 2). Bilateral carotid angiograms showed stretching of the pericallosal arteries as they passed over the mass, which was clearly separate from the inferior margin of the falx (Fig. 3).

Operation. A right frontoparietal craniotomy revealed the mass to be resting on the corpus callosum. The right pericallosal artery was embedded within the upper part of the lesion and was easily freed. Although the outer shell of the mass was flaky, the inner core consisted of hard osseous material. The entire lesion was broken up with rongeurs and was easily removed completely. The patient’s postoperative course was benign, and he had remained neurologically intact when last seen as an out-patient.

Pathological Examination. The tissue consisted of a round hard white calcified mass, 1.5 × 1.4 × 1.0 cm in size, with about 20 smaller masses, each measuring approximately 0.6 cm at greatest dimension. The tissue was fixed in 10% buffered formalin, decalcified in CalEx which has a 0.003-M chelating agent, and stained with hematoxylin and eosin.

Microscopically, fibro-osseous proliferation was demonstrated in which mature bone and fibrous connective tissue were associated with an unusual fibrillary basophilic material (Fig. 4 upper left). This appearance was first described by Rhodes and Davis in 1978. The fibrils of this material were often arranged in parallel with few nuclei (Fig. 4 upper right). At the ends of these fibrils, nuclei formed a dense line separating the basophilic fibrillar material from the fibrous connective tissue. In some areas, small vessels were surrounded by amorphous basophilic calcification (Fig. 4 lower). Rhodes and Davis considered these findings to represent atypical or abortive membranous bone formation.

Discussion

A great variety of pathological conditions can manifest calcification. The character of the calcification, its distribution, multiplicity, location, and associated radiological findings are frequently diagnostic. The differential diagnosis of a large densely calcified mass is diverse and includes primary as well as metastatic brain tumors, infections, familial conditions, and vascular lesions.

Statistically, the most probable cause of a calcified mass is a primary brain tumor. In a review of 1608 gliomas, calcification was found to be visible on x-ray
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films in 9.3%. The gliomas most likely to calcify were oligodendrogliomas, choroid plexus papillomas, ependymomas, and astrocytomas, in that order. However, because of their greater frequency, astrocytomas comprise the largest subgroup that shows calcification. A similar order of frequency was encountered in another large series. Four types of radiological calcification in gliomas were described by Kalan and Burrows. Their Type II calcification, which showed densely packed conglomerations of calcium with a sharply defined margin, approximates the radiological appearance of our patient’s lesion.

In contrast to primary brain tumors, the rate of radiologically visible calcification in metastatic brain tumors is only 1%. With the widespread availability of the CT scanner, this incidence is likely to be higher. Attenuation values have ranged from 50 to 105 Hounsfield units before administration of contrast material. Primary sites have included the ovary, colon, lung, breast, and esophagus. Calcification is frequently found in the central part of the tumor where necrosis has occurred.

Other brain tumors, such as meningiomas, may calcify. The incidence of calcification in meningiomas varies from 3% to 18%. Cranioopharyngiomas, particularly in children, and pituitary stones are often diagnostic because of their location and associated clinical appearance. Lipomas of the corpus callosum typically have a rim of calcium. None with nodular dense calcification has been described. Dermoid tumors, teratomas, and pineal tumors may have radiologically apparent calcification. Messina et al. reported a rare case of primary osteoblastoma of the brain. Primary neuroblastomas of the brain may also calcify.

The term “brain stones,” or cerebral calculi, is applied to non-neoplastic processes, usually of long duration, that culminate in dense calcification. The early reports of cerebral calculi implicated calcification of the intracerebral hematomas. Calcification of tuber-
culomas is said to occur in 6% of cases,\(^1\) and is more likely with solitary lesions than with multiple lesions. In contrast, multiple calcific masses are more common than solitary lesions in tuberous sclerosis.

Whereas the calcification present in giant aneurysms and arteriovenous malformations is curvilinear, that found with some telangiectatic hamartomas and cavernous angiomas is usually dense and extensive.\(^{2,3}\)

The latter calcific lesions may be associated with focal neurological deficit or with seizures and are usually located peripherally rather than centrally. The incidence of calcification in these lesions ranges from 11% to 40%.

Obscure fibro-osseous lesions can present as cerebral calculi. They are rare and their pathogenesis is not known. Rhodes and Davis\(^4\) described a series of seven cases, in six of which the lesions were incidental autopsy findings. In one of their cases, the patient had a 6 × 4-cm mass in the right frontal lobe; in another, nerves were entrapped as the lesion enlarged. In our patient, the lesion surrounded blood vessels. On the basis of our case, the rate of growth of these fibro-osseous lesions can be considered extremely slow.

References

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