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MR Imaging of Cerebral Gumma

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Cerebral gumma, as a manifestation of neurosyphilis, is unusual. The CT and MR findings in a patient with a surgically proved frontal convexity granuloma and strongly positive syphilis serologies is presented. To our knowledge, the MR appearance of a syphilitic gumma has not been described previously in the scientific literature.

Case Report

A 43-year-old woman was brought to the emergency room following a generalized tonic-clonic seizure. While in the emergency room, she suffered a second seizure, which began with right facial twitching and progressed to a generalized convulsion. After the seizure, the patient experienced no focal neurologic deficits, and a neurologic examination disclosed no motor or sensory abnormalities. Laboratory studies were within normal limits. The patient had no history of neurologic disease, was on no medications, and gave no history of using ethanol or drugs.

A head CT scan revealed a densely enhancing left frontal convexity mass with surrounding edema, associated with mild displacement of the falx cerebri to the right (Figs. 1A and 1B).

For MR imaging a General Electric 1.5-T Signa system with a spinecho pulse sequence was used. Noncontrast T1-weighted images of the brain, 650/30/1 (TR/TE/excitations), showed a 1 cm × 1.2 cm peripherally situated anterior frontal mass with a peripheral rim of increased signal intensity and a central area of diminished signal intensity (Fig. 1C). There was enhancement of the central portion of the mass following administration of gadopentate dimeglumine (Fig. 1D). T2-weighted images demonstrated lesion hypointensity with surrounding edema (Fig. 1E).

An en bloc resection of a 2.5-cm piece of frontal cortex yielded a 1-cm rounded tan nodule of rubbery consistency. Final pathologic results demonstrated a corticomedullary granuloma composed of a central fibrotic area surrounded by a rather extensive perivascular infiltration of lymphocytes and plasma cells (Fig. 1F), and further characterized by neuronal loss and associated perivascular granulomatous. A Steiner stain was performed in an attempt to identify Treponema pallidum spirochetes, but no organisms could be found. The histologic features of the nodule were thought to be consistent with, but not diagnostic of, a syphilitic gumma.

The pathologic findings prompted serologic testing of the patient, revealing a strongly positive rapid plasma reagin at 1:256, as well as a positive microhemagglutination assay for Treponema pallidum. The patient’s HIV status was not determined.

Discussion

Meningitis, usually asymptomatic initially, is the final common pathway for the later symptomatic forms of neurosyphilis: parenchymatous and meningoencephalitis. The pathophysiology of the transformation from early CNS invasion by Treponema pallidum to chronic parenchymatous disease has not been elucidated.

Previous descriptions of CT findings in neurosyphilis comprise a spectrum of parenchymal abnormalities. Extensive areas of diminished frontal lobe white matter attenuation with cortical atrophy have been described, as well as multiple posterior fossa infarctions. A widespread hemispheric white matter lesion with mass effect, simulating a low-grade infiltrating primary tumor, has been demonstrated in a hemiparetic patient with positive syphilis serologies and confirmatory biopsy. A densely enhancing focal lesion in the pons and midbrain resolved with penicillin therapy, and was presumed to represent a syphilitic gumma. Similarly, a case of multiple cerebral granulomas involving the frontal and occipital area and anterior corpus callosum has been reported, with regression upon penicillin treatment. A cerebellopontine angle mass, mimicking an acoustic neuraoma, proved to be consistent with a gumma at surgical extirpation. Recently, MR and CT features have been presented in three cases of meningovascular syphilis, consisting of multiple small infarcts affecting gray and white matter in scattered vascular territories, indistinguishable from other vasculitides.

In the present case, the physical basis for the observed rim of hyperintensity on unenhanced short TR images (with lesion hypointensity on long TR scans) is not clear. Pathologic evaluation demonstrated no evidence of blood products, excluding T1 and T2 shortening by paramagnetic methemoglobin as a possible mechanism. In mature abscesses, capsule walls exhibiting similar signal behavior have been described, and varying degrees of T2 shortening on long TR studies have been observed in parenchymal granulomatous disease. This phenomenon has been attributed to the production of intracellular paramagnetic free radicals during phagocytosis.

Cerebral gumma has become exceedingly rare in the United States, illustrated by the fact that a seropositive patient with...
Fig. 1.—43-year-old woman with cerebral gumma as a manifestation of neurosyphilis.

A and B, Axial CT sections through high frontal convexities, before and after IV administration of contrast material, show enhancing mass with extensive surrounding edema.

C, Unenhanced axial T1-weighted (650/30) MR image of the brain shows left frontal mass with hypointense core, irregular hyperintense rim, and surrounding vasogenic edema.

D, Contrast-enhanced T1-weighted (650/30) axial MR image shows enhancement of the nodule's central portion.

E, T2-weighted (2500/80) MR image reveals diminished signal intensity of the nodule.

F, High-power photomicrograph of cortical nodule reveals prominent perivascular chronic inflammatory infiltrate by lymphocytes and plasma cells. (H and E)

an intracerebral mass is more likely to have two processes—a cerebral neoplasm and asymptomatic neurosyphilis—than a gumma [9]. Differential considerations for an enhancing parenchymal nodule are extensive, and include glioma, metastasis, tuberculosis, and sarcoid and fungal infections, among others. The radiologic findings, then, are nonspecific, and anatomic localization is of little help [6]. Thus, the diagnosis remains one of clinical and laboratory synthesis.

REFERENCES


