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MR Imaging of Angiographically Occult Vascular Malformations

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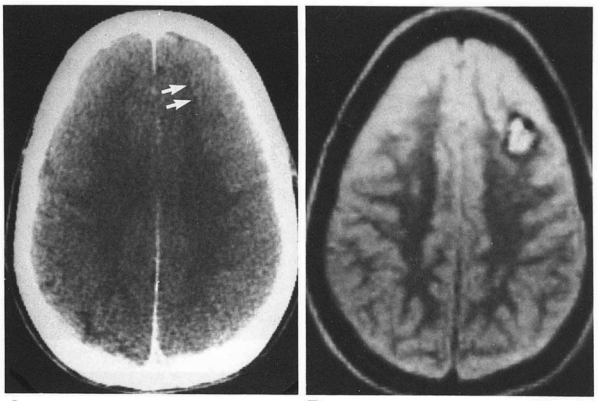
Eleven patients with 15 angiographically occult arteriovenous malformations were studied by magnetic resonance (MR) imaging and computed tomography (CT). Five patients had biopsy proof; six were clinically diagnosed from the long-term clinical follow-up (more than 3 years) and imaging features. Of the 15 lesions, 11 were recognized by both CT and MR. Each method was falsely negative for two lesions. The most useful contribution of MR in the characterization of angiographically occult arteriovenous malformations was the depiction of hemorrhagic foci in 12 of 13 lesions seen on MR. High-attenuation foci indicative of hematomas were seen in only five lesions on CT; the rest were iso- or hypoattenuating. CT detected two very small lesions, in one case as punctate foci of enhancement and in the other as punctate calcification, that were not seen with MR. MR complements CT in characterizing angiographically occult arteriovenous malformations and in distinguishing them from similar-appearing lesions, in particular, small neoplasms. However, when such lesions are seen with only focal calcification and subtle enhancement on CT, routine MR may miss them.

The detection and accurate diagnosis of angiographically occult arteriovenous vascular malformations (AVMs) of the brain on the basis of clinical or radiologic manifestations was uncommon until the introduction of computed tomography (CT). Although CT criteria have now been well established and serve to improve detection of these lesions [1–3], preoperative discrimination from tumors remains problematic. The relative sensitivity and specificity of magnetic resonance (MR) imaging in these lesions is as yet unreported. However, this modality does have promising capabilities in depicting vascular structures with great anatomic detail and in identifying hemorrhagic lesions [4]. The purpose of our present study was to establish in a preliminary fashion the relative value of MR in the diagnosis and characterization of AVMs.



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MRI of Optic Chiasm and Optic Pathways

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Eight verified lesions of the optic chiasm were examined on 0.5 T magnetic resonance (MR) and GE 9800, 8800 computed tomographic (CT) scanners. Enlargement of the optic chiasm was demonstrated in all cases. There was some change of MR signal compared with brain in all but one case, which had no resemblance to contrast enhancement on CT scans. The signal was specific for hematoma in one case. Abnormal signal, probably signifying tumor spread into the optic radiation, was detected on T2-weighted images in one case. The resolution of MR scans is similar or superior to CT, and sagittal views are most useful in evaluating lesions in this location.

Abnormalities of the optic chiasm are difficult to detect on CT scans because of the poor contrast difference between this structure and the subarachnoid space and the frequent occurrence of streak artifacts in this region [1–4]. Primary lesions are seldom distinguishable from secondary involvement by adjacent pathology. Metrizamide CT is usually performed for detailed delineation of lesions in this location [5]. High-resolution MR scanning is reported to be helpful in evaluating the normal optic chiasm and nerves, but documentation of pathologic lesions is limited [6]. Our study was aimed at comparing MR with plain CT and metrizamide CT in the evaluation of lesions of the optic chiasm, tracts, and radiation.

Subjects and Methods

Eight patients with lesions of the optic chiasm were examined: Three had primary optic chiasm tumors, two had extensions of optic nerve gliomas posteriorly into the optic chiasm and tract, one had a hematoma (probably secondary to a glioma), one had infiltration by an incompletely excised craniopharyngioma, and one had intracranial extension of retinoblastoma. Spin-echo (SE) MR scanning was performed on a 0.5 T superconducting scanner: Single- or multisection scans in the axial and sagittal planes were obtained in all cases using echo times (TEs) of 30 msec, repetition times (TRs) of 500 msec (SE 30/500), T1-weighted technique, and TE 90, TR 1500 (SE 90/1500), T2-weighted technique, in all cases. Supplementary coronal sections and SE imaging using multiecho (SE 30–120/2000) and inversion-recovery techniques were used in selected cases. Multisection scans were 8 mm; single sections were 10 mm thick. Two signal averages were used in all scanning sequences. Spatial resolution was 1.2–1.5 mm.

CT was performed using GE 8800, 9800, or equivalent third- or fourth-generation scanners: 1.5–3-mm-thick axial or coronal sections were obtained after a single dose of intravenous contrast material in all cases. Metrizamide CT using 1.5 mm axial sections with multiple-plane reconstruction was performed in two cases.

Results

The optic chiasms were enlarged in all five cases of glioma: symmetric in three and asymmetric in two (figs. 1 and 2). There was extension into the optic tract in two, with compression of the ambient cistern, and displacement of the midbrain in

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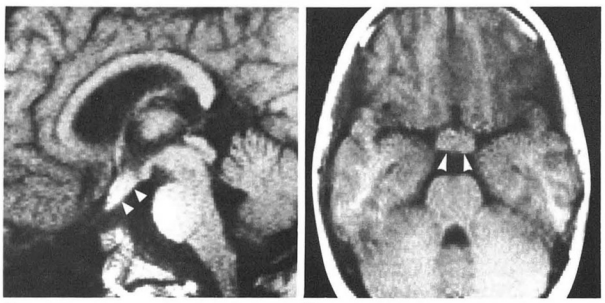

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