AJNR

Celebrating 35 Years of the AJNR: November 1986 edition

AJNR Am J Neuroradiol 2021, 42 (11) 2107
doi: https://doi.org/10.3174/ajnr.P6839
http://www.ajnr.org/content/42/11/2107.citation

This information is current as of August 10, 2025.

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November 1986 edition

Time-Dependent Changes in Image Contrast in Brain Tumors After Gadolinium-DTPA

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Time-dependent changes in the contrast enhancement of tumor tissue, tumor necrosis, perifocal edema, and normal brain tissue after IV injection of 0.1 mmol gadolinium-DTPA/kg body weight were studied with spin-echo technique (SE 800/35) in 15 patients with intracranial tumors. Using a region of interest technique, we determined the signal-intensity values of these tissues before and at fixed times up to 68.5 min after administration of the contrast agent. In tumor tissue, the 8.5 min postinjection (p.i.) scan showed a significant increase in signal intensity. The signal intensity of the tumor tissue remained significantly higher than precontrast levels throughout the entire period of observation, decreasing only slightly toward the end of the examination (48.5 and 68.5 min p.i.). Central tumor necrosis exhibited a delayed uptake of the contrast agent, with a maximum signal intensity between 48.5 and 68.5 min p.i. In perifocal edema and normal brain tissue, slight increases in signal intensity after injection of gadolinium-DTPA were measured (statistically significant in the case of edema). This effect, however, was not visually detectable. The present study shows that after one injection, scans with excellent tumor visualization can be obtained between 8.5 and 38.5 min p.i. and with diagnostically valid enhancement at least up to 68.5 min p.i.

MR imaging is becoming increasingly important in the diagnosis of cerebral disorders, [1–5]. Despite the high level of contrast, which is one of the prime advantages of MR as compared with CT, there are various clinical situations in which a contrast agent may be required. It may for example be difficult, especially in the case of brain tumors, to differentiate between the tumor and the perifocal edema, even using various pulse sequences [6–9]. On the basis of the experiences with CT, several authors view this as an indication for an MR-specific contrast medium [1, 9].

Paramagnetic substances can be used as MR contrast agents. Owing to their strong local magnetic fields, they reduce the relaxation times of the surrounding tissue [10]. With appropriate imaging sequences, the decrease in T1 relaxation time after administration of a paramagnetic substance results in an increase in the intensity of the signal.

Received January 22, 1986; accepted after revision May 18, 1986.

Dedicated to Professor W. Frommhold on the occasion of his 65th birthday.

Presented at the annual meeting of the American Society of Neuroradiology, San Diego, January 1986.

This work was supported by the Bundesministerium für Forschung und Technologie, 5300 Bonn, Grant No. 01-VF-142.

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AJNR 7:1013–1020, November/December 1986
0195–6108/86/0706–1013
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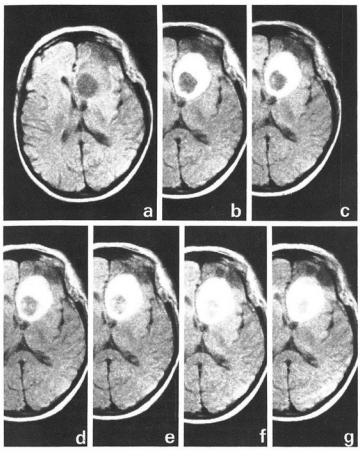

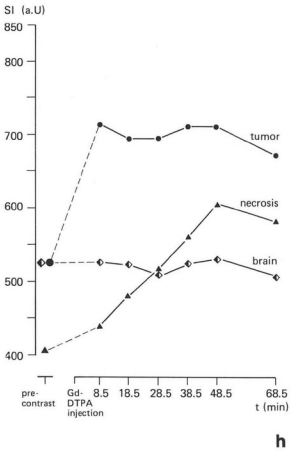

Spontaneous Dissection of the Cervical Internal Carotid Artery: Correlation of Arteriography, CT, and Pathology

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Spontaneous dissection of the internal carotid artery is being recognized as a more frequent cause of acute neurologic deficit, particularly in young persons. Saccular pseudoaneurysm formation may be an associated finding, especially in the presence of tortuosity (coiling) of the cervical internal carotid artery. Of eight patients with nine vessels demonstrating internal carotid artery dissection on arteriography, pseudoaneurysms were found in five arteries. Four of the five pseudoaneurysms occurred in tortuous (coiled) arterial segments. Thin-section contrast-enhanced dynamic incremental CT showed close agreement with the findings on selective arteriography and provided additional information on the presence and configuration of arterial wall thickening as well as the extent of the pseudoaneurysm. Our experience indicates that CT may play an important role in the diagnosis, management, and follow-up of this lesion.

Spontaneous hemorrhagic dissection of the internal carotid artery (ICA) is becoming more widely appreciated as a cause of transient ischemic attack (TIA), or stroke, particularly in relatively young patients [1–4]. Diagnosis is usually based on demonstration by arteriography of a long, tapered, eccentric narrowing of the cervical ICA beginning above the common carotid bifurcation and extending superiorly to the level of the base of the skull [2] or occasionally into the carotid canal [4]. Saccular pseudoaneurysm formation may occur as a result of dissection [4], and sequential arteriograms often demonstrate rapidly changing patterns as the process proceeds to resolution, pseudoaneurysm formation, or further stenosis and occlusion [1, 2].

CT of the neck has recently been suggested as an accurate and relatively noninvasive method for diagnosis and sequential assessment of occlusive changes affecting the common carotid bifurcation and the proximal ICA [5, 6]. We have studied eight patients with spontaneous ICA dissection using sequential arteriography; dynamic thin-section CT of the neck was obtained in five individuals in order to more completely assess both luminal and mural changes in this still incompletely understood lesion.

Materials and Methods

Eight patients with spontaneous cervical ICA dissection were diagnosed on arteriography, including four women and four men, aged 23 to 54 years. Clinical presentations included initial head and neck pain followed by TIAs in two patients, TIAs in two (one with a remote history of severe neck pain), and acute hemispheric stroke in three. Two patients also manifested an ipsilateral incomplete Horner's syndrome. In one patient who suffered a single focal seizure and was being evaluated for possible intracranial mass, contralateral dissection with pseudoaneurysm was an incidental finding on arteriography.

All eight patients underwent percutaneous transfemoral selective common carotid arteriography. Arteriography was performed promptly after clinical presentation in five patients, after 5 weeks of intermittent symptoms in one, and 2 years after the likely initial event in another. Follow-up arteriograms were obtained in five patients at 2 weeks to 14 months after the initial study.

This article appears in the November/December 1986 issue of *AJNR* and the February 1987 issue of *AJR*.

Received January 15, 1986; accepted after revision May 2, 1986.

Presented at the annual meeting of the American Society of Neuroradiology, Boston, June 1984.

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AJNR 7:1053–1058, November/December 1986
0195–6108/86/0706–1053
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