

Case Reports

Systemic Giant Cell Arteritis and Cerebellar Infarction

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Background and Purpose: Systemic giant cell arteritis causing cerebellar infarction due to intracranial arteritis of the anterior inferior cerebellar artery has not been previously reported. We report this infrequent occurrence and discuss the differential diagnosis.

Case Description: An 85-year-old woman was admitted with a 2-week history of episodic ataxia, unilateral headaches, and vomiting. She had a history of atrial fibrillation and breast carcinoma. Her mental state was initially normal, and there were right-sided cerebellar signs. An ejection systolic murmur was heard, and peripheral pulses were palpable. A postmortem examination revealed cerebellar infarction due to giant cell arteritis of the anterior inferior cerebellar artery and basilar arteries. Systemic giant cell arteritis was also present.

Conclusions: Giant cell arteritis is a systemic disorder that can infrequently involve intracranial vessels, including the basilar, vertebral, and anterior cerebellar arteries. Cerebellar infarction secondary to the arteritis may occur. The distribution and size of intracranial vessel involvement is distinct from isolated cranial angitis. (*Stroke* 1993;24:899–902)

KEY WORDS • arteritis • cerebellar infarction

We report a case of cerebellar infarction due to giant cell arteritis of the basilar and anterior cerebellar arteries. A similar arteritis involved the carotid, coronary, renal, ovarian, and uterine arteries. Although intracranial involvement by systemic giant cell arteritis has been previously described, cerebellar infarction is a rarely described complication.

Case Report

An 85-year-old woman was admitted with a 2-week history of sudden onset of a right-sided headache associated with nausea and vomiting and episodic ataxia, with a tendency to fall to the right. Her history included atrial fibrillation, hypertension, and a mastectomy for carcinoma of the breast 7 years previously. On examination, her blood pressure was 140/90 mm Hg, and her pulse was regular at 86 beats per minute. Review of systems was unremarkable apart from an ejection systolic murmur. All peripheral pulses were palpable. Mental state was normal. On neurological examination, there was a gaze-evoked horizontal nystagmus that was most marked on looking to the right. Dysmetria and dysdiadokinesis of the right arm were noted, together with a markedly ataxic gait with a tendency toward staggering to the right. She was unable to walk heel to toe. Urea levels and electrolytes were normal. A full blood examination revealed a mild thrombocytosis of $505 \times 10^9/L$ (normal range, 150 to $400 \times 10^9/L$) and an erythrocyte sedimentation

rate of 32 mm/hr (normal, 0 to 1 mm/hr). A computed tomographic scan was reported as showing prominence of the ventricular system and sulci with basal ganglia calcification. No abnormality was noted in the cerebellum. Her condition deteriorated rapidly, and she died 5 days after admission. A postmortem examination was performed.

Postmortem Examination

On neuropathologic examination, the fresh brain weighed 1370 g. Vessels of the circle of Willis showed no evidence of thrombosis, but there was mild atheroma with up to 30% stenosis of the basilar artery. Segmental atheroma in the right middle cerebral arteries were noted. The cerebellar branches of the basilar and vertebral arteries were free of atheroma. There was softening superolaterally in the right cerebellar hemisphere. On sagittal sectioning, a wedge-shaped area of softening with loss of gray-white definition was present in the distribution of the right anterior inferior cerebellar artery (AICA) (Fig 1). In the general autopsy, gross examination revealed rheumatic mitral valve disease, calcification and stenosis of the aortic valve, left ventricular hypertrophy, and patchy myocardial fibrosis. There was generalized atherosclerosis and stenosis of the right renal artery. The right kidney appeared atrophic. No other significant abnormalities were found.

Histology

Hematoxylin-eosin-stained sections of the basilar and right AICAs revealed segmental giant cell arteritis. A chronic inflammatory cell infiltrate, including multinucleated giant cells, was present in the intima and media. There was disruption and duplication of the internal elastic lamina (Fig 2, left and right). Fibrinoid

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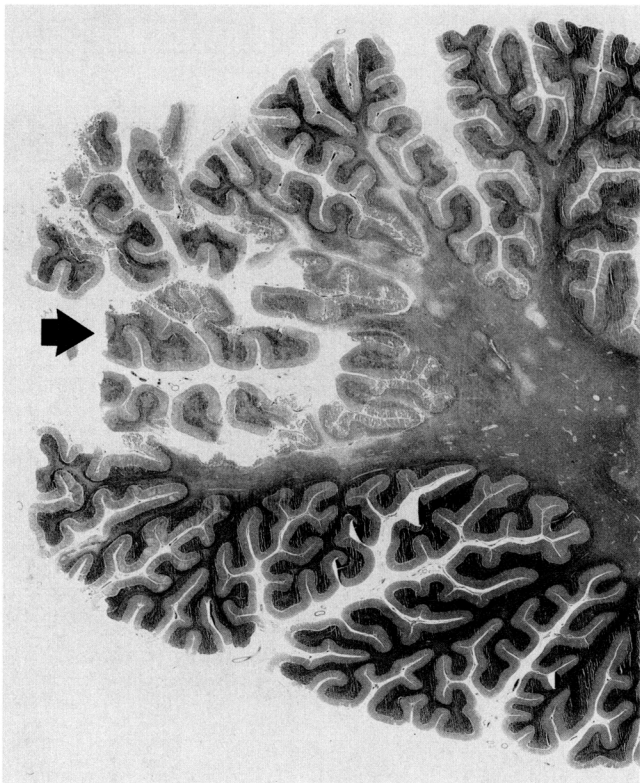


FIG 1. Wedge-shaped infarction of cerebellum in distribution of anterior inferior cerebellar artery (arrow) (whole mount [Weil's stain], original magnification $\times 5$).

necrosis and eosinophils were not seen. Two focal lymphocytic collections were noted in the outer media of the middle and anterior cerebral arteries, and a superimposed thrombus was present in the right AICA. No organisms were identified by Gram's, Fite's, Ziehl-Neelsen, and periodic acid-Schiff staining. There was no evidence of amyloid deposition or immunoreactivity for the Alzheimer β A4 protein within the walls of these vessels. Sections from the region of cerebellar softening showed early necrosis of the molecular and granular layers. Adjacent folia showed loss and chromatolysis of the Purkinje cells and focal Bergmann layer gliosis. The region of the right superior cerebellar peduncle, flocculus, and locus caeruleus of the pons also showed features of early infarction. Vessels of the basal ganglia showed lipohyalinosis and calcification but no other abnormalities. Sectioning of most of the leptomeningeal and cerebral vessels revealed no further vasculitis. There was patchy myocardial fibrosis, and ischemic changes were present in the right kidney. Giant cell arteritis involved the left anterior descending coronary artery, the right renal artery, the carotid artery, and the uterine and ovarian vessels. No evidence of recent infarction was seen in the parenchyma supplied by these vessels. The right renal artery showed prominent myointimal proliferation causing stenosis, and the wall was infiltrated by lymphocytes and foreign body giant cells. As the diagnosis of giant cell arteritis was not suspected at the time of autopsy, the temporal arteries were not sampled. A final autopsy diagnosis of giant cell arteritis, with both systemic and central nervous system (CNS) involvement causing cerebellar infarction, was made.

Previous cerebellar ischemia, as indicated by the proliferation of Bergmann astrocytes (Fig 3), was consistent with the clinical history of a stepwise development of the neurological deficits.

Discussion

Although previously regarded as a predominantly temporal arteritis, giant cell arteritis is now recognized as a systemic disorder.¹ Autopsy studies²⁻⁴ have revealed that intracranial vessel involvement is uncommon and usually limited to the vertebral and basilar arteries. AICA vasculitis has not been described in any previous reports. There is no evidence to suggest that giant cell arteritis causes a diffuse intracranial involvement; however, there has been nosological confusion in the literature with isolated primary angiitis of the CNS (ICA).⁵

Cerebellar or cerebral infarction, predominantly in the distribution of the posterior circulation, has occurred in 6 of 30 autopsied patients with systemic giant cell arteritis due to involvement of the vertebral and basilar arteries but not the AICA.^{2,3,6-8} In nonautopsy studies, the etiology of cerebral infarction in biopsy-proven temporal giant cell arteritis remains presumptive. A clinical study of 166 such cases revealed an incidence of cerebral infarction in 5 patients. This did not exceed the incidence of cerebral infarction in an age-matched population.⁵ Without autopsy it is difficult to exclude atheroma and other more common etiologies of infarction on clinical and angiographic information alone, and the latter do not exclude ICA.

Autopsy studies⁹ have shown that cerebellar infarction is usually caused by occlusion of the vertebral artery (50%), and less frequently the basilar artery (35%) or a cerebellar artery (20%). Cardioembolic occlusion is more frequent than thrombotic occlusion except in AICA territory infarcts, in which the situation is reversed. Artery-to-artery embolism has also been implicated in AICA occlusion. Cerebellar watershed and lacunar infarcts may also occur. Rare causes include arterial dissection, fibromuscular dysplasia, infective emboli, thrombosis related to the lupus anticoagulant,¹⁰ and intracranial systemic GCA, as in our case. Necrotizing arteritis secondary to amphetamine and cocaine use has also been associated with cerebellar infarction.¹¹

Intracranial involvement by systemic giant cell arteritis must be distinguished from ICA of the CNS, which usually involves headache and either multifocal or focal neurological deficits or rapidly progressive dementia. The erythrocyte sedimentation rate is not elevated, and the cerebrospinal fluid often contains inflammatory cells. Because the vasculitis is frequently segmental, open biopsy may not be diagnostic. The histopathologic features of ICA at biopsy or at postmortem examination may vary from classic granulomatous vasculitis, in which multinucleated giant cells are present within vessel walls, to perivascular lymphocytic cuffing only. At autopsy these vessel changes are often seen adjacent to small infarcts or hypoxic neuronal damage.^{12,13} The etiology remains unknown. Although the microscopic features of giant cell arteritis and ICA are similar, both the distribution and size of the vessels involved distinguishes these diseases. Intracranial involvement of giant cell arteritis appears to be restricted to a focal and

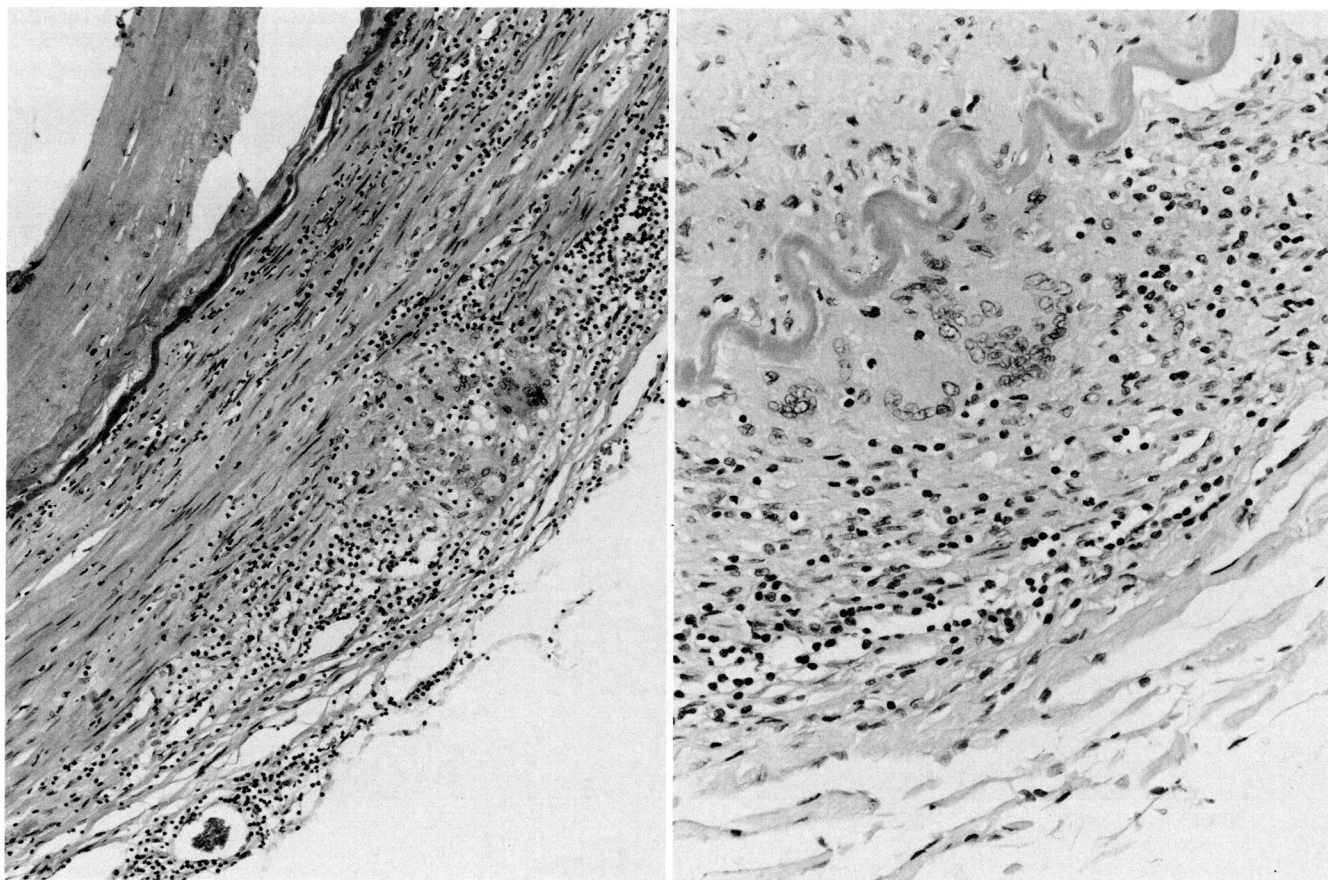


FIG 2. Left, giant cell arteritis of the basilar artery (hematoxylin-eosin, original magnification $\times 200$). Right, multinucleated giant cells adjacent to internal elastic lamina of anterior inferior cerebellar artery (hematoxylin-eosin, original magnification $\times 400$).

segmental involvement of the vertebral arteries and, rarely, the proximal circle of Willis. In contrast, ICA is multifocal and involves small-caliber vessels (200 to 400

μm) including leptomeningeal, superficial cortical, and occasionally deep white-matter vessels. The diagnosis of ICA should be made only after exclusion of systemic infection, inflammation, and other causes of systemic vasculitis, particularly varicella-zoster virus infection. Although endarteritis obliterans is more common, tuberculous meningitis may occasionally cause a granulomatous vasculitis, as can sarcoidosis and Takayasu's arteritis. However, involvement of the CNS is rare in the latter two conditions.¹⁴ Granulomatous angiitis has also been reported in patients with cerebral amyloid angiopathy, in which amyloid is deposited in vessel walls. In these cases amyloid has been found in the cytoplasm of multinucleate giant cells.¹⁵

We report the uncommon occurrence of systemic giant cell and intracranial arteritis in which the terminal event appears to have been cerebellar infarction superimposed on previous, episodic cerebellar and brain stem ischemic episodes.

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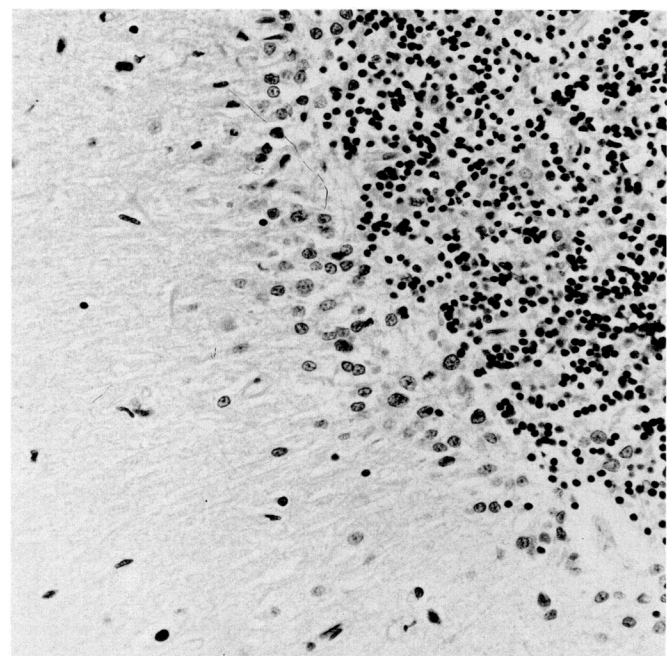


FIG 3. Loss of Purkinje cells and Bergmann layer gliosis in cerebellum (hematoxylin-eosin, original magnification $\times 400$).

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