

Case of Brain Biopsy Proven Giant Cell Arteritis

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Giant cell arteritis (GCA) is categorized as vasculitis of the large and medium-sized vessels. Visual loss is one potential consequence of cranial arteritis. Temporal artery biopsies are performed frequently to demonstrate the involvement of arteritis. On the other hand, cerebral artery involvement with pathological findings is not well documented in patients with GCA. We report a rare case of GCA with cerebral vessel involvement in a 76-year-old woman. (*J Rheum Dis* 2016;23:396-400)

Key Words. Giant cell arteritis, Cerebral artery, Vasculitis

INTRODUCTION

Giant cell arteritis (GCA) is categorized as vasculitis of large and medium-sized vessels. Systemic symptoms are common, while the involvement of vessels may be widespread [1]. The most frequent symptoms associated with GCA are headache and visual impairment since cranial vessels are typically the most affected. Cerebral artery involvement in GCA is particularly rare, and the characteristic histological findings of brain biopsy examination remain unknown. Here, we present a case of vasculitis in a 76-year-old woman who exhibited changes in mental status. In this case, vasculitis presented as intracranial arterial involvement with brain edema, which is infrequent and should be considered in the differential diagnosis of primary angiitis of the central nervous system (PACNS) and brain tumor.

CASE REPORT

A 76-year-old woman was referred to the Department of Neurosurgery because of drowsiness and visual impairment of the left eye due to a lacrimal gland mass. The lacrimal gland mass was diagnosed as a pseudotumor on bi-

opsy examination and subsequently assessed by an ophthalmologist for 1 year. She had had transient headache, mild fever, and weight loss before hospitalization. Upon initial examination, the patient's blood pressure was 148/55 mmHg, heart rate was 62 beats/min, and body temperature was 37.0°C. Physical examination demonstrated that the patient's pupils were 2 mm and 3 mm in her right and left eyes, respectively. The pupil light reflex was prompt and fixed. The motor grades of the extremities were all grade 4, while her sensory function was normal.

A laboratory examination revealed a white blood cell count of 9,080/ μ L (3.5~10.0/ μ L), hemoglobin level of 10.1 g/dL (11.0~15.0 g/dL), and platelet count of 391,000/ μ L (149,000~393,000/ μ L). Sodium and potassium levels were 136 mmol/L (136~144 mmol/L) and 100 mmol/L (101~111 mmol/L), respectively. Alanine transferase and aspartate aminotransferase levels were 20 IU/L (15~41 IU/L) and 8 IU/L (4~43 IU/L), respectively. Albumin level was 3.2 g/dL (3.5~4.8 g/dL) and protein concentration was 6.5 g/dL (6.1~7.9 g/dL). Erythrocyte sedimentation rate (ESR) was 36 mm/hr (0~15 mm/h) and C-reactive protein level was 4.71 mg/dL (0~0.75 mg/dL). Brain magnetic resonance

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imaging (MRI) demonstrated an expanding mass in the left frontal lobe (Figure 1) that exhibited an increased signal in the left frontal lobe with peripheral and dural enhancement; however, the mass was not enhanced with contrast.

The patient underwent a left frontal craniotomy for the brain biopsy. Histological analysis of the specimen revealed an extensive infarction with an organized focus (Figure 2). The tissue adjacent to the necrosis exhibited

frequent multinucleated giant cells. Multinucleated giant cells were also observed in the meningeal and intracortical vessel walls. Notably, the tissue also exhibited wall necrosis and perivascular lymphocytic infiltration. Meningeal arteries frequently demonstrate intimal thickening with luminal narrowing. A few well-formed granulomas were observed that were predominantly located in the meningeal tissue. However, there was no evidence of tuberculosis as assessed by acid-fast bacilli test and

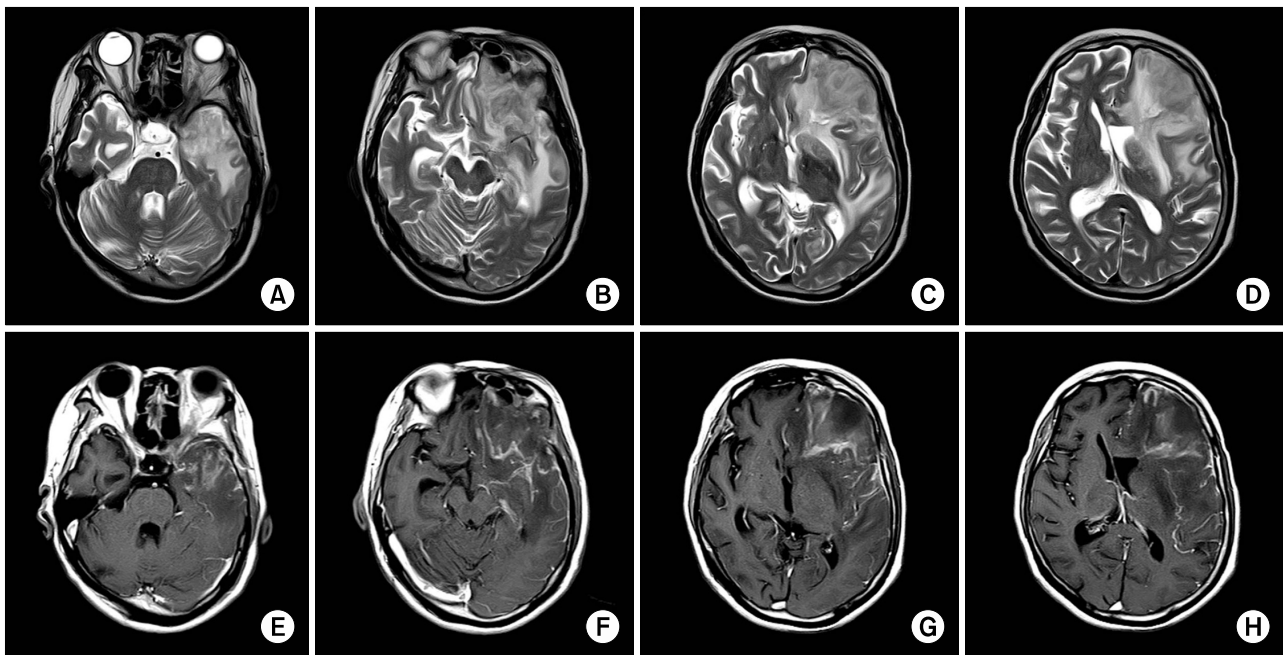


Figure 1. Brain magnetic resonance T1-weighted contrast-enhanced and T2-weighted images demonstrate a mass with vasogenic edema in the left frontal and temporal lobes. (A ~ D) T2-weighted sequence images; (E ~ H) T1-weighted contrast-enhanced sequence images.

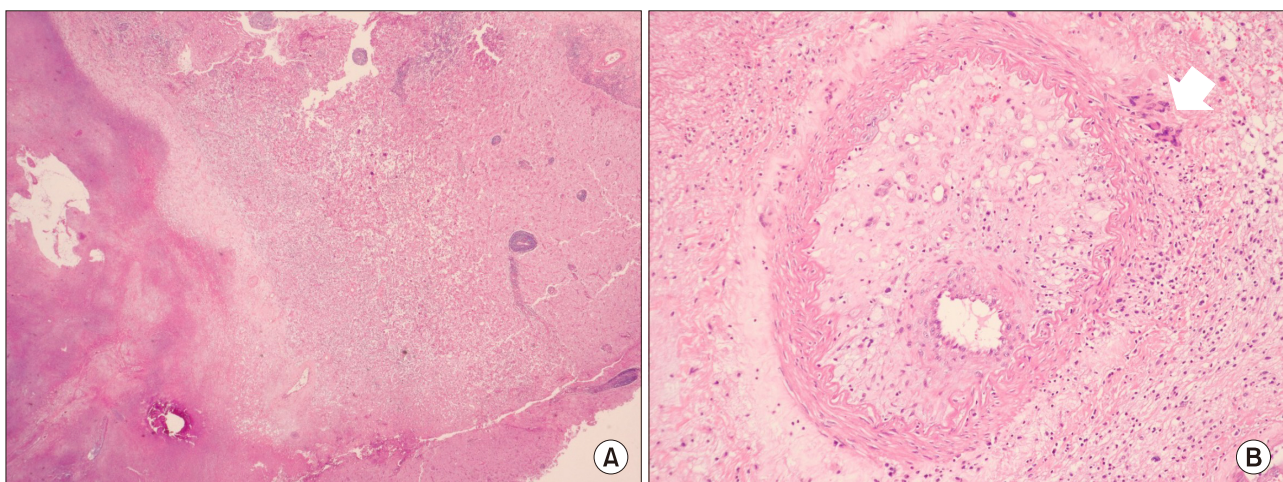


Figure 2. Hematoxylin and eosin-stained sections demonstrating tissue necrosis and perivascular lymphocyte infiltration into the adjacent brain tissue (A, $\times 10$) and artery with intimal thickening and multi-nucleated giant cell (arrow) (B, $\times 40$).

polymerase chain reaction. These findings suggested that the patient had vasculitis of the cerebral vessels.

The patient was referred to the Department of Rheumatology for further evaluation and treatment. On physical examination, no diminished pulse and discrepant blood pressure in the arms and legs was observed. However, we found an absence of the left temporal artery pulse. There was no bruit on auscultation of the carotid, supraclavicular, brachial, or femoral arteries. To investigate further vascular involvement, computed tomography (CT) angiography was performed (Figure 3), which indicated stenosis, subtle beadings, and occlusion of the left temporal artery. In addition, diffuse narrowing and stenosis with slightly decreased distal flow on the M1 segment of the left middle cerebral artery (MCA) were observed. However, no evidence of vasculitis involvement was detected in the other large arteries, such as the aortic, renal, femoral, and subclavian arteries on aorta CT angiography. Immunological tests for the differential diagnosis of vasculitis were performed. Antinuclear antibody level was <1:40 and rheumatoid factor, anti-cyclic citrullinated peptide antibody, and P- and C-anti-neutrophil cytoplasmic antibodies were absent. A systemic review and immunoglobulin G4 (IgG4) subclass test demonstrated no evidence of IgG4-related disease. According to the 1990 American College of Rheumatology (ACR) GCA classification criteria [2], the present patient met at least three parameters: age, decreased pulsation of the temporal artery, and abnormal artery biopsy results.



Figure 3. Computed tomography with angiography shows left temporal artery stenosis and occlusion (wide arrow) as well as left middle cerebral artery stenosis (narrow arrow).

The patient was treated with high-dose methylprednisolone at a daily dose of 1 mg/kg for 4 weeks. We also added low-dose aspirin for thromboprophylaxis [3]. After 1 week of steroid therapy, her mental status and speech recovered; however, she still had disorientation and gait disturbance. Methotrexate was added for steroid sparing [4]. The patient was subsequently referred to another hospital for rehabilitation therapy. After 3 months, the prednisolone dose was tapered to 10 mg. Although her symptoms were consistent with her state at discharge, regression of the MCA stenosis and brain mass was detected on follow-up CT angiography.

DISCUSSION

GCA is the most frequent vasculitis type in elderly individuals in Europe and North America [5]; however, the incidence of GCA remains low in Asians. In Japan, the prevalence of GCA among individuals aged >50 years is 1.47 per 100,000 population [6]. Although no studies have investigated the incidence of GCA in Korea, a few cases with rare manifestations have been reported [7,8].

The present case exhibited uncommon features of GCA, including cerebral artery involvement and brain edema. The most common manifestations of GCA are headache, visual symptoms, and jaw claudication. In addition, patients with GCA frequently exhibit polymyalgia rheumatic-related symptoms at diagnosis [9]. The criteria for a diagnosis of GCA proposed by the ACR are as follows: age >50 years; recent onset of localized headaches; abnormalities of the temporal artery, such as temporal artery tenderness or reduced pulsation; increased ESR (≥ 50 mm/h); and abnormal findings on an arterial biopsy examination, including vasculitis with predominantly mononuclear cell infiltration, granulomatous inflammation, or evidence of giant cells [1]. The temporal artery is the most common biopsy site because it is easy to access and a frequently involved site. Since an expanding mass similar to a brain tumor was observed in the present case, biopsy was performed for diagnosis. After biopsy, we found that the pathological finding was vasculitis of a brain artery, a rare case, and vasculitis was involved in the temporal artery on CT angiography.

It was interesting to note the histological features of the brain vessels in GCA. Histological findings of GCA demonstrated inflammation of the arterial wall, with fragmentation and disruption of the internal elastic lamina [10]. Multinucleated giant cells are found in <60% of

cases and are not specific to the disease. GCA exhibits three histopathologic features: classic, atypical, and healed. The classic pattern is characterized by marked intimal thickening and transmural inflammation. Fusion of histiocytes results in granulomatous inflammation with multinucleated giant cells. Because this pattern is not specific to GCA, including the present case, imaging modalities such as MRI, ultrasonography, and positron emission tomography are required [11]. In a histologic review of our case, the finding that inflammatory cells infiltrated the vascular structure was reasonable to diagnose vasculitis. After CT angiography was performed for the differential diagnosis of vasculitis, vasculitis involvement of GCA was confirmed.

However, intracranial vessel involvement in GCA remains rare. A previous case report series only demonstrated two cases of GCA with cerebral vasculitis from a review of 463 patients with central nervous system vasculitis [12]. Larivière et al. [13] presented eight patients with biopsy-confirmed GCA with a history of stroke prior to GCA diagnosis. Among them, intracranial cerebral artery involvement was observed in four cases on brain magnetic resonance angiography.

The differential diagnosis from PACNS was important in our case. Primary vasculitis limited to the CNS is referred to as PACNS. Generalized systemic vasculitis can also involve the CNS; in such cases, it is referred to as secondary vasculitis of the CNS. In our case, it might be difficult to distinguish PACNS and GCA because the histopathological findings are similar for both diseases [14]. However, definite temporal artery vasculitis was observed on CT angiography after brain biopsy and PACNS was excluded.

Despite treatment, vascular stenosis is rarely resolved. However, early diagnosis and treatment may partially attenuate the involvement of large vessels in GCA [15]. In the present case, stenosis of the left MCA was resolved after 3 months of treatment, suggesting that early steroid therapy is required to prevent damage to other vessels.

In conclusion, we reported a rare case of GCA diagnosed by brain biopsy examination. Although it was suspected that the patient had had a brain mass with edema, the histological findings showed inflammation of the cerebral artery and brain necrosis. Although it has been established that GCA occurs in the large arteries, the present case demonstrated that it may also develop in the cerebral arteritis. Therefore, cerebral arteritis with GCA involvement should also be considered when inflammation of

the brain and edema are observed in patients with GCA.

SUMMARY

Here, we reported a rare case of GCA with cerebral artery involvement. The present case demonstrated that GCA may present with cerebral artery involvement that was confirmed by brain biopsy examination. These findings suggest that it is necessary to consider the imaging characteristics of angiography, in addition to histological findings, for the differential diagnosis of vasculitis.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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