Superficial temporal artery aneurysm associated with immunoglobulin G4-related disease

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ABSTRACT

A 68-year-old man was admitted because of a pulsatile mass and pain in the left temporal region, and computed tomography demonstrated the superficial temporal artery aneurysm. He underwent aneurysmectomy, and pathologic investigation revealed marked thickness of the adventitia with substantial plasmacyte infiltration. On immunoglobulin G4 (IgG4) immunohistochemistry, IgG4-positive lymphocytes were scattered in the adventitia, and biochemical tests revealed elevation of IgG4 (200 mg/dL). The case satisfied the criteria for both giant cell arteritis and IgG4-related disease (IgG4-RD). This case report suggested that IgG4-RD can occur in the superficial temporal artery and that IgG4-RD may partially overlap with a subtype of giant cell arteritis. (J Vasc Surg Cases and Innovative Techniques 2017;3:243-6.)

Immunoglobulin G4 (IgG4)-related disease (IgG4-RD) has recently been recognized to occur in the cardiovascular system, often manifested as aneurysms and arteritis or periarteritis.[1] In the cardiovascular system, IgG4-RD has been detected in the aorta and main branching arteries,[1-6] but IgG4-RD arising from the superficial temporal artery (STA) has not been documented according to a MEDLINE search. We herein report the first case of IgG4-RD involving the STA. The patient provided his written consent for the publication of this case report.

CASE REPORT

A 68-year-old man was admitted because of a pulsatile mass and pain in the left temporal region. He had noticed the pulsatile mass 2 years earlier and described the appearance and disappearance of left-sided headache every 3 to 4 months without jaw claudication. He had no history of smoking, hypertension, hyperlipidemia, diabetes, craniocerebral trauma, or surgery. A physical examination revealed a pulsatile mass with mild tenderness in his temporal region, and ultrasound demonstrated the expansion of the left STA. The blood cell count and biochemical test results, including C-reactive protein, were within normal ranges. Just as noted on ultrasound, contrast-enhanced computed tomography (CE-CT) demonstrated the expansion of the left STA, measuring 7 mm in diameter (Fig 1). Under a preoperative diagnosis of STA aneurysm, he underwent aneurysmectomy with local anesthesia. There was inflammatory adhesion surrounding the aneurysm. The resected aneurysm was 25 mm in length, and the proximal and distal artery of the aneurysm seemed normal. His postoperative course was uneventful.

Pathologic investigation of the explanted artery revealed marked and eccentric intimal thickening; a regenerative and hyperplastic muscle layer with frequent destruction of elastic membranes; marked adventitial fibrosis in a multilayer pattern, which is associated with sustained or repeated inflammation as a characteristic pattern similar to that of inflammatory abdominal aortic aneurysm; and inflammatory infiltrate, including follicle-like aggregations of lymphocytes (Fig 2, *A-C*). On IgG4 immunohistochemistry, IgG4-positive lymphocytes were scattered in the adventitia (Fig 2, *D*), and the distribution of IgG4-positive lymphocytes met the histopathologic criteria of IgG4-RD. On the basis of these pathologic findings, biochemical tests were performed at 22 days after surgery and revealed elevation of IgG4 (200 mg/dL), but the erythrocyte sedimentation rate, C-reactive protein, rheumatoid factor, antinuclear antibody, and antineutrophil cytoplasmic antibody were within normal levels. Retrospectively, CE-CT from the head to the pelvis before surgery revealed wall thickening and enhancement on the anterior and left walls of the infrarenal abdominal aorta, findings that were compatible with IgG4-related aortitis (Fig 3). On an ophthalmologic test, there were no abnormalities in the eyesight or visual field, although atherosclerotic changes were observed on ophthalmoscopy.

DISCUSSION

STA aneurysms are rare peripheral aneurysms and have been classified as traumatic, iatrogenic, and spontaneous (nontraumatic) according to their etiology. Schechter and Gutstein[7] reported that 92% of STA aneurysms were traumatic and the other 8% were spontaneous. In this case, the patient underwent aneurysmectomy under a preoperative diagnosis of STA aneurysm. A pathologic investigation revealed that the explanted artery showed marked thickness and substantial plasma cell infiltration, with follicle formation in the adventitia. As spontaneous STA aneurysm seems to be mainly caused by acquired

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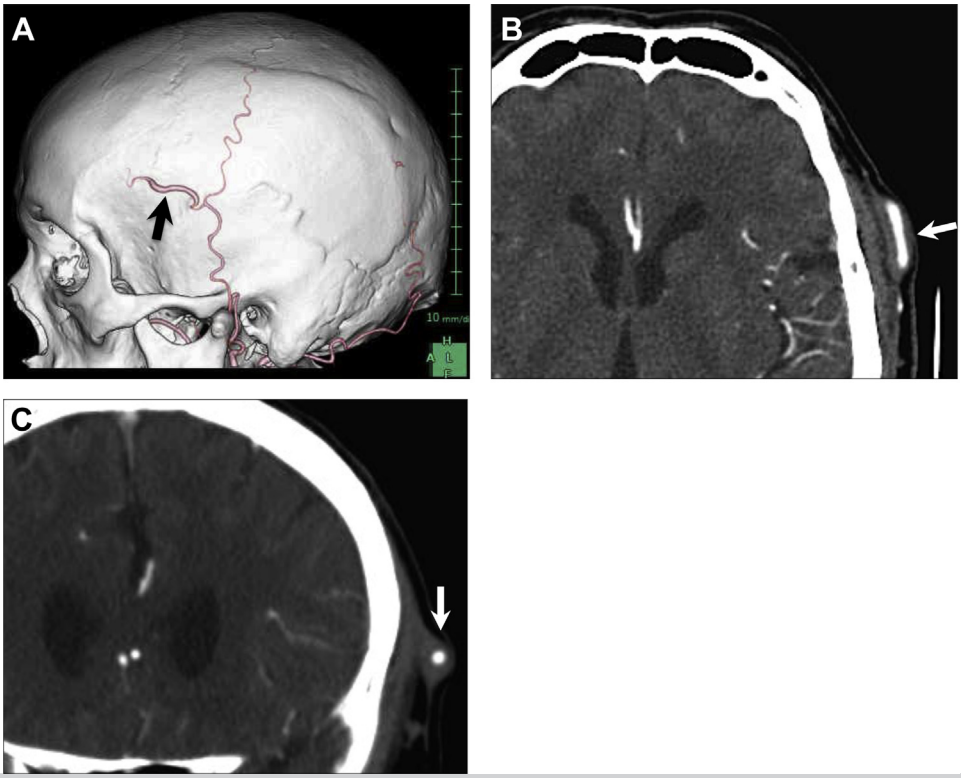

Fig 1. Computed tomography images obtained on admission. **A,** Computed tomography angiography showing superficial temporal artery (STA) aneurysm. The STA was tortuous. **B,** Axial image showing STA aneurysm. **C,** Coronal image showing STA aneurysm. The *arrows* indicate the STA aneurysm.

factors, such as hypertension or atherosclerosis,[8] STA aneurysm merged with inflammation is extremely rare.

Giant cell arteritis (GCA) is a large- and medium-vessel vasculitis, mainly involving the branches of the proximal aorta.[9] According to the American College of Rheumatology classification criteria for GCA,[9] three of the following five criteria are required for a diagnosis of GCA: ≥50 years of age at disease onset, new-onset localized headache, temporal artery tenderness or decreased temporal artery pulse, erythrocyte sedimentation rate of at least 50 mm/h, and abnormal artery biopsy specimen characterized by mononuclear infiltration or granulomatous inflammation. This case had four of these five criteria, and the patient was therefore diagnosed with GCA, although the pathologic findings were not representative of GCA because of the marked thickness of the adventitia with substantial plasmacyte infiltration. The histopathologic features of GCA vary, and Cavazza et al[10] classified GCA on the basis of the localization of inflammation into the following four patterns: transmural inflammation (77.5%), small-vessel vasculitis (9%), vasa vasorum vasculitis (6.5%), and inflammation limited to the adventitia (ILA, 7%). Consequently, this case was best classified as ILA, which is relatively rare. In addition to the pathologic findings and the negative inflammatory response, the case seemed to be uncommon for GCA because of the presence of arterial dilation; the temporal arteries of GCA are usually affected with stenosis or occlusion due to inflammation of the intima.

Since the first report of sclerosing pancreatitis with high serum IgG4 levels in 2001,[11] similar inflammatory lesions with IgG4-positive plasma cells have been identified in several visceral organs and intracranial tissues and are considered to belong to a single disease entity known as IgG4-RD.[12] In the vascular organs, IgG4-RD was first detected in relation to inflammatory abdominal aortic aneurysms.[1] On histopathologic examination, IgG4-related arterial lesions have been characterized by arterial wall thickening, corresponding to inflammation with IgG4-positive plasmacytes, and fibrosis mainly in the adventitia[1-4]; the pathologic findings of this case resembled IgG4-RD. Accordingly, we suspected that this case might be IgG4-RD and performed additional immunohistochemistry of IgG4. Regarding the immunohistochemical findings, substantial IgG4-positive plasmacytes were found to have infiltrated the adventitia, and the distribution of IgG4-positive plasmacytes met the pathologic criteria of IgG4-RD. Furthermore, the biochemical tests revealed elevation of IgG4 (200 mg/dL), and the CE-CT findings were compatible with periaortitis on the infrarenal abdominal aorta. Comprehensive diagnostic criteria for IgG4-RD have been proposed, as follows: clinical features showing characteristic diffuse or localized swelling or masses in one or multiple organs; serum IgG4

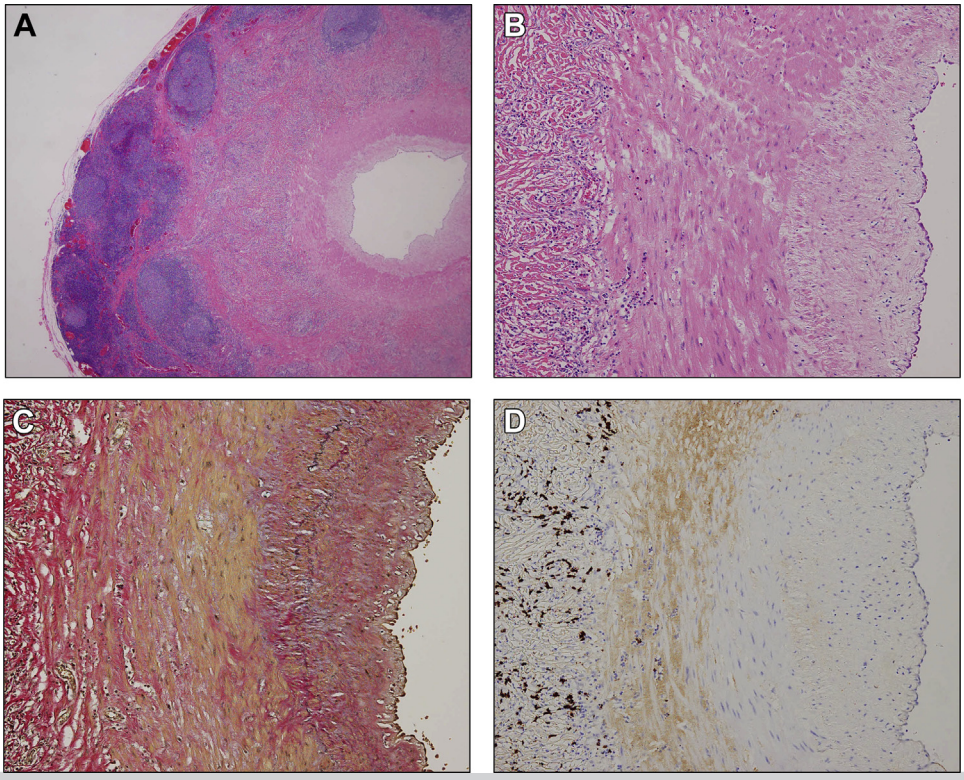

Fig 2. Pathologic findings of superficial temporal artery (STA) aneurysm. Histologic sections show the marked and eccentric intimal thickening, regenerative and hyperplastic muscle layer with frequent destruction of elastic membranes, marked adventitial fibrosis in a multilayer pattern, and inflammatory infiltrate, including follicle-like aggregations of lymphocytes. On immunoglobulin G4 (IgG4) immunohistochemistry, IgG4-positive lymphocytes were scattered in the adventitia, and the distribution of IgG4-positive lymphocytes met the histopathologic criteria of IgG4-related disease (IgG4-RD). **A,** Hematoxylin-eosin stain (×20). **B,** Hematoxylin-eosin stain (×100). **C,** Elastic-van Gieson stain (×100). **D,** Anti-IgG4 stain (×100).

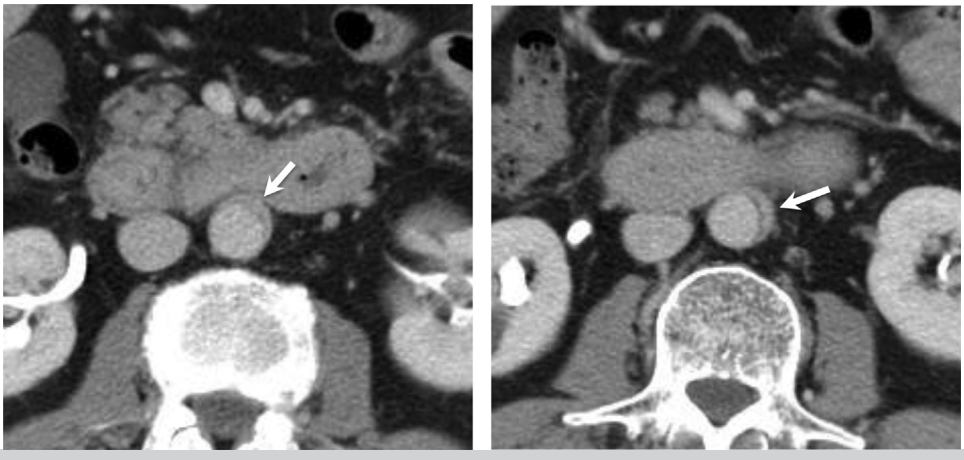

Fig 3. Computed tomography images obtained on admission. Serial axial images show wall thickening and enhancement on the anterior and left wall of the infrarenal abdominal aorta.

concentration >135 mg/dL; and pathologic findings showing marked lymphocyte and plasmacyte infiltration and fibrosis.[13] This case met all criteria and was therefore definitively diagnosed as IgG4-RD. IgG4-related vascular lesions have been observed to spread to medium-sized arteries, such as the coronary arteries and the first to second branching arteries of the aorta,[3-5] but the association of the temporal artery with IgG4-RD has never been reported. Therefore, this was the first case of IgG4-RD involving the STA. Concurrently, IgG4-RD might partially overlap with ILA because they are both characterized by inflammation localized to the adventitia.

The goal of treatment for GCA is to improve the patient's symptoms and to prevent ischemic complications, such as visual loss or stroke.[14] Corticosteroid therapy is the standard of care for GCA but is associated with substantial morbidity and mortality. After initial corticosteroid therapy, corticosteroids are to be tapered gradually during several months, based on the transition of the inflammatory response and substantial morbidity. In contrast, Jia et al[15] found that GCA patients with inflammation involving only small vessels or temporal artery adventitia are not at an increased risk for temporal arteritis-like adverse events despite no documentation of steroid therapy before or after a temporal artery biopsy. Methotrexate and tocilizumab, a humanized monoclonal antibody against interleukin 6 receptor, may be viable alternatives to steroids for GCA treatment.[14,16] Corticosteroids are also effective for IgG4-RD to improve inflammatory symptoms or obstruction due to inflammation.[13] Because this patient had neither residual symptoms, including effects on the vision and inflammatory changes in the craniocerebral arteries, nor an inflammatory response, he did not undergo corticosteroid therapy after surgery and has been followed up by clinical examinations, laboratory studies including evaluations of inflammatory markers, ultrasound for potential small artery disease, and body CE-CT to examine the arteries from the head to the abdomen.

CONCLUSIONS

We herein describe the first case of STA aneurysm that combined the characteristics of GCA and IgG4-RD. This case report suggested that IgG4-RD can occur in the STA and that IgG4-RD may partially overlap with a subtype of GCA.

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