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Case study

A case of multiple immunoglobulin G4–related periarteritis: a tumorous lesion of the coronary artery and abdominal aortic aneurysm

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Summary Immunoglobulin G4 (IgG4)–related disease can occur in various organs, most of which are glandular or ductal tissues. Here, we report a case of multiple IgG4-related vascular lesions. A 63-year-old patient was found to have an abdominal aortic aneurysm and a tumorous lesion around the right coronary artery. The surgically resected aneurysmal wall and a tumorous lesion of the right coronary artery showed similar histologic features including diffuse lymphoplasmacytic infiltration, occasional eosinophils, and obliterative phlebitis. Immunohistochemically, numerous IgG4-positive plasma cells were evident within the lesions. The serum concentrations of IgG4 in the preoperative period was 456 mg/dL (reference range, <135), which decreased to 242 mg/dL 2 weeks after surgery. We made a diagnosis of multiple IgG4-related periarteritis manifesting as an abdominal aortic aneurysm and a tumorous nodule of the coronary artery. This case report suggested that IgG4-related disease can occur in the vascular system and manifest as an aneurysm or a periarterial mass lesion.

1. Introduction

Recently, much attention has focused on immunoglobulin (Ig) G4 (IgG4)–related diseases, an entity first proposed with regard to autoimmune pancreatitis [1] but since expanded to include the bile duct (sclerosing cholangitis) [2], salivary gland (chronic sclerosing sialadenitis) [3], retroperitoneum (retroperitoneal fibrosis) [4], liver (inflammatory pseudotumor and chronic hepatitis) [2], and lung (inflammatory pseudotumor and interstitial pneumonia) [5]. The diseases are clinically characterized by elevated serum IgG4 concentrations, a high prevalence in adult patients, steroid sensitivity, and a frequent association with IgG4-related sclerosing lesions in other organs, an association which may

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or may not occur simultaneously [6]. IgG4-related diseases share pathological features irrespective of the organ of origin: tumorous swelling of the affected organs, diffuse lymphoplasmacytic infiltration, occasional eosinophilic infiltration, and obliterative phlebitis. Immunostaining of IgG4 reveals numerous IgG4-positive plasma cells diffusely distributed within the lesions [2-6]. That is, not only is IgG4 a serum marker for the diagnosis of IgG4-related disease, but also, IgG4-positive plasma cells might be closely related to the pathogenesis of the disease [1,7].

IgG4-related disease has not been well documented in the cardiovascular system. Recently, we performed a clinicopathologic study of patients with abdominal aortic aneurysm (AAA) and revealed that some patients with inflammatory AAA had high serum IgG4 concentrations and diffuse lymphoplasmacytic infiltration including numerous IgG4-positive plasma cells [8]. That is, a part of inflammatory AAA belongs to the IgG4-related diseases. IgG4-related inflammatory AAA could be estimated as IgG4-related periaortitis (periarteritis) together with retroperitoneal fibrosis.

In this study, we report a case of IgG4-related periarteritis in the coronary artery and abdominal aorta. The case suggested that IgG4-related periarteritis could occur in the cardiovascular system and might manifest aneurysm or a tumorous lesion along the artery.

2. Materials and methods

2.1. Histologic examination

Tissue samples from each surgically resected specimen were fixed in neutral formalin and embedded in paraffin. More than 20 sections (4 μm thick) were cut from each paraffin block. Some of these sections were stained with hematoxylin and eosin (H and E) and elastica-van Gieson (EvG); the rest were used for immunohistochemistry.

2.2. Immunohistochemistry

Immunostaining of IgG and IgG4 was performed by an autostainer (HX System Benchmark, Ventana Medical Systems, Tucson, AZ) as per the manufacturer's instructions. Primary antibodies used were a rabbit monoclonal antibody against human CD3 (LAB VISION, Fremont, CA), a mouse monoclonal antibody against human CD20 (Dako Cytomation, Glostrup, Denmark), a mouse monoclonal antibody against human CD79α (Dako Cytomation), a rabbit polyoclonal antibody against human IgG (Dako Cytomation), and a mouse monoclonal antibody against human IgG4 (ZYMED Laboratory, Inc, San Francisco, CA). Sections were pretreated with heat (sections for CD3 and CD79α) and proteinase (sections for IgG and IgG4). Negative controls were evaluated by substituting the primary antibody with similarly diluted nonimmunized mouse or rabbit serum.

2.3. Laboratory data

Serum concentrations of IgG, IgA, IgM, and IgG4 were analyzed using serum preserved before surgery. The postoperative serum IgG4 concentration was also examined. The serum IgG4 concentration was measured by nephelometry.

3. Clinical history

A 63-year-old woman consulted a cardiologist at our hospital regarding an abdominal pulsatile mass and shortness of breath with palpitations on exertion. The physical finding was noncontributory except for the abdominal pulsatile mass. An abdominal echogram revealed AAA, and echocardiography performed at the same time also revealed a cardiac tumorous mass. The patient was hospitalized for further examination. She had a history of bronchial asthma for 40 years and was treated with oral corticosteroid. At the time of admission, her blood pressure was 118/76 mm Hg. Her pulse was regular and 68/min. Laboratory tests showed only a slight elevation in the white blood cell count (9100/μL; reference range, 3300-8800).

Thoracic computed tomography (CT) and magnetic resonance imaging (MRI) disclosed a tumorous lesion, measuring 3.0 × 2.6 cm in its greatest dimension, surrounding the mid portion of the right coronary artery (Fig. 1A and B). Images during cardiac catheterization showed that the right atrium was considerably compressed by the mass lesion. Coronary arteriography revealed an almost normal flow of the right coronary artery, but we identified focal leakage of contrast medium from the right coronary artery into the lesion. Thus, a diagnosis of pseudoaneurysm with mural thrombus was made. Sinus node artery was not involved. We also identified a 90% stenosis of the first diagonal coronary artery, although this stenosis was not related to the mass lesion around the right coronary artery. Her cardiac function was well preserved. No apparent abnormality was found in electrocardiogram with and without low-grade exercise. Echocardiogram revealed almost normal movement of the left ventricle and a 68% of ejection fraction. Abdominal CT and MRI revealed an infrarenal AAA, which was 5.5 cm in its greatest diameter (Fig. 1C). No other abnormality was noted in the other organs including the pancreas. Then, she underwent combined cardiac and abdominal surgery.

During surgery, an elastic hard mass was found around the mid portion of the right coronary artery. Although a cardiopulmonary bypass was instituted between the ascending aorta and right atrium, on-pump beating coronary artery bypass grafting was conducted (left internal thoracic artery graft to the first diagonal branch and radial artery graft to the right coronary artery). Then, the mass lesion was completely resected, and the ends of the right coronary artery were ligated. After the cardiac procedure, AAA repair was