

A case of immunoglobulin G4-related constrictive pericarditis

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Abstract: A 47-year-old man was admitted with a complaint of upper abdominal distension and shortness of breath. The constrictive pericarditis was diagnosed based on the transthoracic echocardiogram (TTE) and chest CT scan. Pathology revealed it is immunoglobulin (Ig) G4-related constrictive pericarditis. Likely, this is the first case of IgG4-related constrictive pericarditis reported in China.

Keywords: Immunoglobulin G (IgG); pericarditis; constrictive

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Introduction

The constrictive pericarditis was involved in many systemic diseases such as, tuberculosis, virus, connective disease, etc. It can also be related with the immunoglobulin (Ig) G4-related disease according to a few case reports previously. We herein report a case of constrictive pericarditis caused by IgG4-related disease. This is likely the first case of IgG4-related constrictive pericarditis reported in China.

Case presentation

A 47-year-old healthy man was admitted to the hospital, complaining “upper abdominal distension for 20 days, and shortness of breath for 15 days”. There was no clear trigger and it gets worse progressively. He has dyspnea, orthopnea, oliguria and edema of lower extremities, subsequently in the last 15 days. Seven days prior to admission, he had one episode of orthopnea at night. Since the onset of symptom, he had poor appetite, gained weight of 5 kg. He could not walk even 200 m because of short of breathing. He was treated with digitalis and diuretic without success. His parents were healthy and his wife and children had no any discomfort during these days.

At admission, temperature was 36.5 °C, pulse rate of 140 beats per minute, respiratory rate of 18 breaths per minute, blood pressure of 141/101 mmHg. Physical examination revealed distension of the jugular vein. Heart rate

was 140 beats per minute, the heart sound was slightly lower. No murmurs or rales were heard. Abdominal distention was observed but palpation was not satisfied. His bowel sounds was normal. Both lower extremities are edematous.

Laboratory examination: leukocyte $6.6 \times 10^9/L$, hemoglobin 121 g/L, platelet $258 \times 10^9/L$, total bilirubin 22.8 mmol/L, direct bilirubin 10.8 mmol/L, aspartate aminotransferase 32 U/L, alanine aminotransferase 22 U/L, creatinine 66 $\mu\text{mol/L}$, erythrocyte sedimentation rate was 7 mm/h, C-reactive protein 1.1 mg/dL, transferrin 184 mg/dL, complement C3 112 mg/dL, complement C4 21 mg/dL, IgG 1,490 mg/dL, IgM 321 mg/dL, IgA 317 mg/dL, IgG1 10.6 mg/L, IgG2 3.85 mg/L, IgG3 0.416 mg/L and IgG4 0.668 mg/L, of all these analysis except IgG1 level was at the high criteria of normal, others are all normal, NT-proBNP (1,137 pg/mL), tuberculosis antibody (-) and PPD test (-).

ECG showed atrial flutter, ventricular rate of 140 beats per minute, V2-V5 ST segment depression (*Figure 1*). The transthoracic echocardiography revealed that left atrial enlargement, mitral flow were alternative more than 25% between different respiratory phase; ventricular wall movement is generally lower, 46% of the left ventricular ejection fraction (LVEF), septum mitral annulus e' value 12 cm/s and lateral wall of mitral annulus e' value 8.46 cm/s (*Figure 2*).

Chest CT found thickened and calcified pericardial wall and bilateral pleural effusion (*Figure 3*).

Abdominal ultrasound and CT scan found widen hepatic

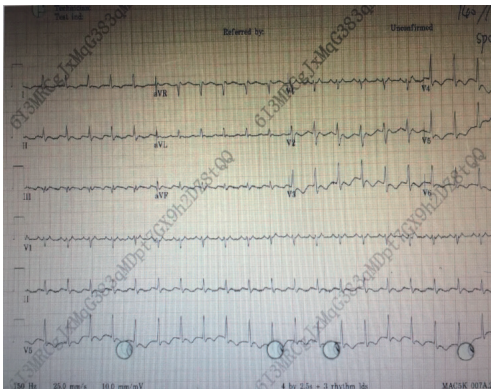


Figure 1 The ECG of the patient when he was admitted.

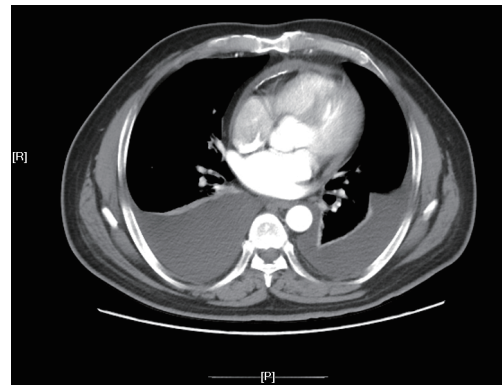


Figure 3 Chest CT image of the cross view which show the calcified pericardial wall.

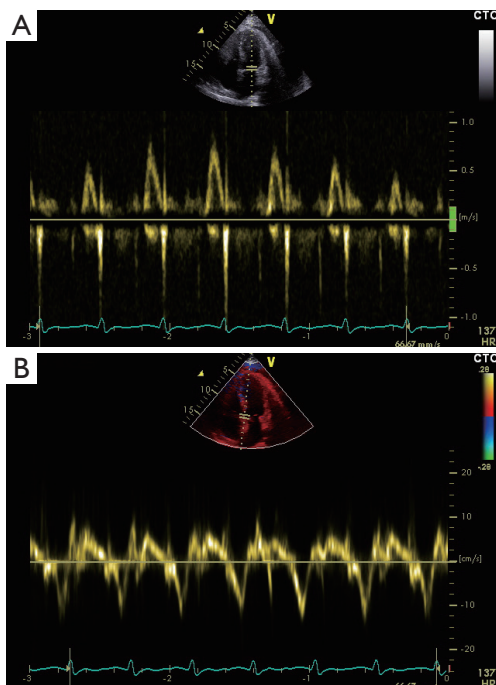


Figure 2 The Doppler velocity wave of the patient before surgery.

vein and inferior vena cava, the congestion of liver, and a small amount of ascites, otherwise, unremarkable.

Constrictive pericarditis was diagnosed and the patient was sent to cardiovascular surgery department.

Surgery

Pericardiectomy was performed through mid-sternal incision. Calcification, thickening and adhesion of the pericardium were observed. Intraoperative catheterization

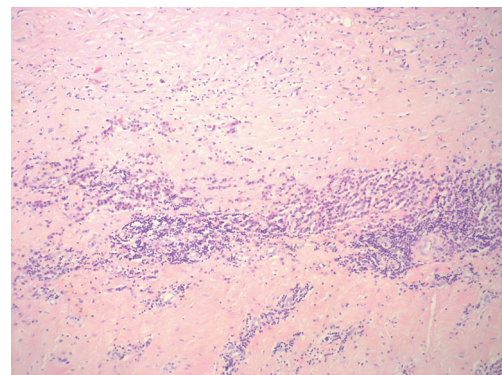


Figure 4 Pericardial thickened, large quantities of plasma cells, lymphocytes infiltration. Germinal centers are observed occasionally. Fibrosis with hyaline degeneration, arranged at least focally in a storiform pattern. HE, $\times 100$.

showed decrease of central venous pressure, from 34 to 16 cmH₂O after the restriction was resolved.

Pathology

Biopsy from pericardium showed pericardium is thickened, large quantities of plasma cells, lymphocytes infiltration. Germinal centers are observed occasionally. Fibrosis with hyaline degeneration, arranged at least focally in a storiform pattern. Obliterative phlebitis can't be found. Immunohistochemistry results: IgG4+ plasma cells (>20/HPF), IgG4/IgG >40% (Figures 4,5).

Pathology diagnosis of IgG4 related constrictive pericarditis.

After the operation, his heart rhythm recovered to sinus

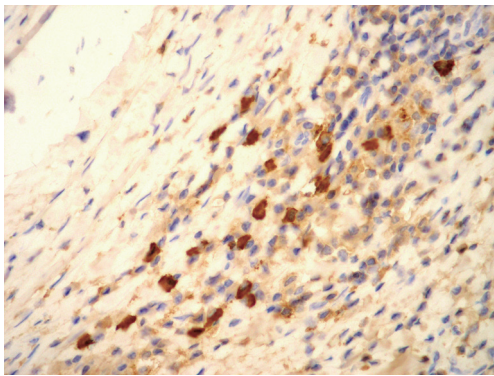


Figure 5 IgG4 positive plasma cells >20/HPF. Immunohistochemistry staining, ×400.

Table 1 IgG4-related disease in cardiovascular disorders (6)

Organs	Disease
Veins	Obliterative phlebitis (in pancreas, salivary gland, and pseudotumor), constrictive pericarditis
Arteries	Inflammatory aneurysm of aorta and its large branches, aortitis/arteritis, periarteritis
Heart	Constrictive pericarditis, pseudotumor, coronary artery aneurysm

rhythm after successful cardioversion by amiodarone. His symptom was completely resolved. He was asked to take prednisone to reduce IgG4 infiltration but he refused for some reason.

Discussion

It was reported that 40–50% of cases of constrictive pericarditis are idiopathic in origin (1). The most common causes were thought to be virus or tuberculosis infection. Several cases of constrictive pericarditis associated with IgG4-related disease had been reported worldwide (2-5). Most of the cases of IgG4-related constrictive pericarditis were confirmed after pericardiectomy.

Echocardiography of tissue Doppler images of our patient was helpful in differentiating from the restrictive cardiomyopathy. Chest CT scan supports the diagnosis of constrictive pericarditis, which was consistent with symptom of the patient. There was no evidence of tuberculosis infection and viral infection. According to the postoperative pathological diagnosis, IgG4 related constrictive pericarditis had met the criteria of IgG4 related disease. After

pericardiectomy, clinical symptoms improved significantly.

IgG4 related disease is a chronic autoimmune disease mediated by IgG4 lymphocytes, involving multiple organs and systems. It is characterized by the IgG4 positive plasma cell infiltration in the tissues and organs. The most important diagnostic method is the histopathological examination. Serum IgG4 can be elevated in patients with IgG4 related disease, with low specificity and sensitivity the diagnosis of IgG4 related disease depends on the combination of clinical manifestations, tissue biopsy and imaging features.

It had been discovered that IgG4-related disease involves inflammation and sclerosis in different organs. *Table 1* listed cardiovascular system manifestation of IgG4 related diseases. At present, the most widely used diagnostic criteria on IgG4-related disease are:

- (I) Single or multiple organ enlargement, mass or nodular lesions, or organ dysfunction;
- (II) Serum IgG4 level greater than 1.35 g/L;
- (III) Histopathological findings: (i) the obvious lymphocyte and plasma cell infiltration, with fibrosis and sclerosis evidence; (ii) IgG4 positive plasma cell infiltration: with an IgG4/IgG positive ratio >40%; (iii) IgG4 positive plasma cells >10/HPF.

Patients fulfilled (I)+(II)+(III), which confirmed the diagnosis of IgG4 Rd, but need to exclude Castleman disease, Wegener's granuloma, sarcoidosis, malignant tumor etc.; if patients are diagnosed but hormone therapy is ineffective, diagnosis should be reconsider. A diagnosis of IgG4-RD is possible in patients who fulfill criteria (I) and (II), whereas it is probable in patients with (I) and (III) (7). For patients who cannot be applied to a wide range of non-specificity of the above organs, the diagnostic criteria of organ specificity can be applied.

There is no consensus on the treatment of IgG4-related disease. Prednisone or other immunosuppressive therapy was reported to be helpful (8). It is reported that IgG4 related disease has a tendency to be self-limit, but when the important organs are involved, it must be treated aggressively, otherwise it may lead to significant organ dysfunction or even failure.

There was one case of IgG4-related constrictive pericarditis (3) reported without pathological diagnosis. Combination of serum IgG4 increased and immune pancreatitis, CT examination found that the pericardial thickening and the patient was treated with corticosteroid and resulted in not only recovery of cardiac function, but also reducing the thickening of the pericardium gradually.

In this case, we did not find other organ involved. Patient refused hormonal therapy, but agreed to follow up with us to monitor the long term effect from this disease.

Likely, this is the first case report of constrictive pericarditis caused by IgG4-related disease in China.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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