# A case report of Cardiovascular Disease caused by Anti-neutrophil Cytoplasmic Antibody (ANCA) -associated vasculitis

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**Abstract**

Anti-neutrophil cytoplasmic antibody (ANCA) -associated vasculitis is a group of systemic small vessel vasculitis characterized by the detection of ANCA in serum, which mainly affects small vessels (arterioles, arterioles, venules, and capillaries)but may also have middle artery involvement. We report a case of ANCA -associated vasculiti

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Abbreviations: ANCA=Anti- neutrophil cytoplasmic antibodies, AAV=Anti-neutrophil cytoplasmic antibodies (ANCA) -associated vasculitis

Ethics approval and consent to participate was not applicable.

Written informed consent for publication was obtained from the patient.

All patient information was obtained from the Department of Cardiology, Affiliated Hospital &Southeast University, Nanjing, Jiangsu, China. All data used and analyzed in the current study are included in this article.

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Abstract

**Rationale:**

Anti-neutrophil cytoplasmic antibody (ANCA) -associated vasculitis is a group of systemic small vessel vasculitis characterized by the detection of ANCA in serum, which mainly affects small vessels (arterioles, arterioles, venules, and capillaries)but may also have middle artery involvement. In recent years, with the deepening of studies on ANCA) -associated vasculitis , reports of coronary artery involvement have also repeatedly emerged, updating the view that AAV only involves small vessels in the past. We report a case of ANCA -associated vasculitis.

**Patient concerns:**

We reported a-49-year-old women with dizziness and fatigue for one half year , who visited several hospitals during this period ,and her symptoms recurred.

**Diagnoses:**

In the event of clinical suspicion of AAV, ANCA should first be determined using an antigen-specific immunoassay for proteinase 3-ANCA and myeloperoxidase-ANCA, according to current consensus recommendations.

**Outcomes:**

The symptoms relieved significantly.

**Lessons:**

In recent years, with the deepening of the studies on antineutrophil cytoplasmic antibody (ANCA) -associated vasculitis (AAV), reports of coronary artery involvement have also repeatedly emerged, updating the view that AAV only involves small vessels in the past. Cardiovascular involvement is an independent risk factor for death in patients with AAV, with a 4.811-fold increased risk of death compared to patients who do not develop cardiovascular involvement [1]. Although the proportion of cardiovascular involvement is relatively small in the lungs and kidneys, if it is not diagnosed and treated in time, the consequences are serious. The mortality rate of AAV patients with evidence of cardiac involvement (electrocardiogram, echocardiography, cardiac magnetic resonance imaging, coronary angiography, myocardial biopsy, etc.) has significantly increased[2]. Therefore, clinical attention should be paid to the screening of routine cardiac involvement in patients with AAV.ANCA-associated vasculitis rarely accumulates in the coronary arteries and has a poor prognosis and a high risk of early death.

This case was used as the object of this study to further investigate the clinical features of ANCA-associated vasculitis in order to provide a practical and detailed reference for improving the diagnosis and treatment of this disease.

keywords:

Anti-neutrophil cytoplasmic antibody-associated vasculitis; coronary heart disease; prevention

## 1. Introduction

A 49-year-old women presented to the first local hospital for diagnosis and treatment in July 2021 because of dizziness and fatigue for one month. One month prior , the patient had dizziness, fatigue, poor appetite without obvious cause, and numbness of both feet, accompanied by a needling sensation, and visited the first local hospital. Routine blood examination showed: WBC:6.68*1^ 09/l;HGB:332*10^ 9/l;PLT:332*10^ 9/l,liver and kidney function, urine routine, fecal occult blood showed no significant abnormality , anemia was considered, and blood transfusion and other symptomatic treatments were administered. The patient was discharged after the symptom improved.

Later, the patient experienced aggravated fatigue and went to a second local hospital for treatment. A 13, 2021-13, bone marrow puncture was performed on August 13,2021. The results showed hyperplastic anemia with a granulocyte maturation disorder. The patient‘s condition improved and she was discharged after symptomatic and supportive treatment.

On October 10, the patient developed fever and was diagnosed and treated at the third local hospital. Her body temperature returned to normal after symptomatic treatment. The patient was discharged after the symptom improved.

On November 2, 2021, the patient experienced dizziness and fatigue again, and visited the fourth hospital for treatment. The patient received a blood transfusion ,fluid infusion , other symptomatic, and supportive treatments. The results of bone marrow aspiration (November 8, 2021) showed that bone marrow hyperplasia was significantly active. Fe staining: extracellular iron (+); the positive rate of intracellular iron was 10%, of which type I accounted for 9% and type II accounted for 1%. On November 8, 2021, whole body CT showed mucosal thickening of the sphenoid sinus and maxillary sinus ,hypertrophy of right inferior turbinate ,left diploic mastoid process, left middle ear mastoiditis, several solid nodules in both lungs, ground-glass nodules in the upper lobe of the left lung, (all less than 5 mm),and a small amount of pericardial effusion.On November 10, 2021, the patient visited our outpatient clinic for diagnosis and treatment. Blood routine: WBC: 9.25 $\times$ 10 $^{9}$/L, HGB: 88g/l, PLT: 525 $\times$ 10 $^{9}$/L, Na +: 159.6 mmol/l, CI: 123.3 mmol/l. The patient was admitted by our hematology department as an outpatient due to "Anemia ". During the course of the disease, the patient had clear consciousness, poor spirit, poor appetite, normal urination, and constipation, with a weight loss of 5 kg in recent the previous 3 months. She was healthy in the past, had a history of anxiety disorder for 2 years, had not taken regular medication recently, had thyroid nodules (TMAI8), and had not received special treatment.On admission, her mental status was normal. Her body temperature was 36.5 degC, pulse rate was 115 beats/min and regular, respiratory rate was 20 breaths/min, and blood pressure was 93/66 mmHg

. Upper abdominal discomfort with tenderness below the xiphoid process.

The patient was initially diagnosed with the following conditions (**Department of Hematology** ): 1. Anemia ; 2. Anxiety disorder; 3. Thyroid nodule

A series of laboratory tests were performed after admission. Laboratory results indicated: WBC:9.81x 10 $^{9}$/L;HBG:78g/;PLT:431x 10 $^{9}$/L;CRP-HS:105.33mg/Lt;RF:55IU/mLt;Na+:165.0mmo1/L,CI:125.6mmo1/f;ferritin761.19ug/l ,EPO:70.02pg/l,TGAb:1500IU/mlt、Anti-nuclear antibody series (13 items): negative; Coob's test: negative; Aspergillus immunological test: 0.113 $\mu$g/L; fungus-D glucan quantitative G test: negative. Gastrointestinal endoscopy,1. Chronic gastritis with biliary obstruction 2. Gastric polyps (biopsy removal) 3. portal inflammation 4. Rough hemorrhoids of the colonic mucosa. The positive rate of intracellular iron in bone marrow aspiration in other hospitals was low, and the patient was given symptomatic treatment such as improving anemia, acid suppression , stomach protection, and anti-anxiety. The possibility of autoimmune diseases was considered after admission, the body temperature fluctuated between 36.5 and 38.9 (as shown in Figure 1), and the conjunctiva was congested with hyperplasia. After further analysis of changes in the condition. The examination of autoimmune disease-related markers was immediately perfected: ANCA: positive; MPO-IgG: 336.37 RU/ml1, anti-CCP antibody: 1.805 KU/ml;

The patient was transferred to the Department of Rheumatology and Immunology at our hospital, and the revised diagnosis was made 1. ANCA-associated vasculitis, 2. Iron-deficiency anemia, 3. Hypernatremia 4. Anxiety Disorders 5. Thyroid nodules 6. chronic gastritis with bile 7. Gastric polyps; methylprednisolone 20 mg ivdrip, hydroxychloroquine sulfate tablets 0.2g po qd ,and the other treatments were the same as above; (November 22, 2021-22) the patient developed chest discomfort, emergency examination of aTnI: 3.2379, ECG (Figure 2) showed: 1.Sinus tachycardia 2. abnormal T-waves3.low QRS; consultation was given, considering that the patient's age, blood pressure, blood glucose, blood lipid, etc. were not significantly abnormal, without coronary heart disease factors; emergency left and right coronary angiography (Figure

3) was performed on November 23, 2021, which showed no significant stenosis of the left main coronary artery, slow total blood flow in the left anterior descending branch, plaque infiltration, complete occlusion of the middle and distal segments; plaque infiltration in the left circumflex artery, 95% stenosis in the middle segment.

The patient was transferred to the hospital and underwent relevant examinations. ECG (Figure 4) showed the following: 1. sinus rhythm 2. Limb QRS wave low voltage, V3-V6 chest low voltage; echocardiography (Figure 5) showed: FE: 0.52, E/A $<$ 1; abnormal wall motion; mild tricuspid valve; reduced left ventricular function. The modified diagnoses were as follows: 1. Coronary heart disease, acute non-ST-segment elevation myocardial infarction, coronary spontaneous dissection Killip II 2. ANCA-associated vasculitis 3. Iron deficiency anemia 4. Anxiety Disorders 5. Thyroid vein nodule 6.Chronic gastritis Carditis. (November 23, 2021) underwent coronary artery stenting under local anesthesia (Figure 6) and was treated with dual antibody, lipid-lowering, and ventricular rate control. Other treatments were the same as above, and the patient's chest tightness symptoms improved. (November 26, 2021) was transferred to the Department of Rheumatology and Immunology of our hospital for further treatment of the primary disease .Because the patient's vasculitis accumulated in the great vessels, she was administered 100 mg intravenous drip for two days each on the basis of the previous treatment. Reexamination of the ECG showed revealed the following : 1. sinus rhythm 2.The Q wave was abnormal (Figure 7),and reexamination of blood (result: 1) showed that all indicators were lower than before, the condition was stable, and the patient was discharged on December 9, 2021.The patient was instructed to receive an intravenous drip of rituximab 100 mg 1 week after discharge (December 15, 2021), and the discharge medications included methylprednisolone, hydroxychloroquine sulfate tablets, total glucosides of paeony capsules, double antibody, lipid regulation, acid suppression , stomach protection, and anti-anxiety.The patient was followed up at discharge to monitor changes in the patient's condition.

On January 7, 2022, the patient came to the hospital for re-examination and recovered well, and all laboratory indicators decreased, as shown in Table 1. This demonstrates that our diagnostic and therapeutic approaches were correct.

## 2.Discussion

ANCA-associated vasculitis is a systemic, oligoimmune complex necrotizing vasculitis, and there are no uniform diagnostic criteria that need to be combine with clinical manifestations, serum ANCA examination, characteristic pathological changes, imaging examination to make a comprehensive diagnosis. Its clinical manifestations include fatigue, fever, weight loss, arthralgia, sinusitis, cough, hemoptysis, dyspnea, urinary abnormalities, purpura, pericarditis, myocardial lesions and neurological dysfunction. Its pathogenesis is still not very clear, but it is affected by various factors such as environmental exposure, genetic susceptibility, cytokines, complement, ANCA, and immune cells [3]. In this case, the patient was initially treated for anemia at another hospital and our hospital, and the symptoms were not significantly relieved after improving anemia treatment. Combined with the patient's symptoms, signs, and imaging findings, ANCA-associated vasculitis was initially highly suspected, and the author reported this case to improve the clinicians' understanding of the disease.

On the first admission, the patient only experienced dizziness, fatigue, and poor appetite, and was preliminarily diagnosed with anemia. The symptoms were relieved after symptomatic treatment, and similar symptoms recurred after discharge. The symptoms lacked specificity and were not diagnosed at an early stage. The diagnosis was delayed for half a year .The diagnosis of ANCA-associated vasculitis is usually delayed or missed because the disease has few characteristic symptoms and most patients present systemically with multisystem damage, which can lead to early failure to make an accurate diagnosis if changes in each system are considered separately[4].When the diagnosis is delayed or missed, there is a significant difference in the prognosis of patients: only 11 percent of patients survive for more than two years without treatment[5].If detected in a timely manner, ANCA-associated vasculitis responds well to immunosuppressive therapy and has a prognosis similar to that of other chronic inflammatory diseases .In a foreign randomized

controlled trial, 60-90% of patients achieved remission of the disease, and the 2-year survival rate was as high as 90-97%[6, 7].On the 13th day after admission, the patient had chest discomfort, emergency examination of aTnI was3.2379 ng/ml, coronary angiography results showed 95% stenosis in the middle segment of the right coronary artery, and the patient was diagnosed with coronary heart disease. The patient's blood pressure, blood glucose, and blood lipids were within the normal range, without chest tightness, chest pain ,or other symptoms after activity, no smoking history, and no family history of coronary heart disease ;therefore coronary artery stenting was suspected to be caused by vasculitis. If the diagnosis was confirmed for the first time, vasculitis was likely not to involve the coronary artery. Since the coronary artery was involved, the patient's prognosis would be worse and the risk of early death would be higher.

Treatment strategies for ANCA-associated vasculitis are mainly based on disease classification and severity and are generally divided into three stages: induction of remission (3 to 6 months), maintenance of remission (at least 18 months), and prevention of relapse .In recent decades, high-dose glucocorticoids and cyclophosphamide have historically been the mainstay treatment for ANCA-associated vasculitis .This regimen is highly likely to transform the usual treatment outcome of severe ANCA-associated vasculitis from death to disease control and temporary remission[8] However, not all patients can achieve remission with this drug combination, and those who do often experience flares of disease that require repeated treatment[9-14].In addition, the side effects of cyclophosphamide, as well as the multiple side effects of long-term glucocorticoid therapy, are major causes of long-term illness and death[9-11, 13-17].Recent years have demonstrated that rituximab is an effective alternative to cyclophosphamide, and rituximab-based regimens are more effective than cyclophosphamide-based regimens in inducing remission in patients with relapsed disease. Methylprednisolone and hydroxychloroquine sulfate tablets were started when the patient was definitively diagnosed with ANCA-associated vasculitis; however, coronary artery involvement occurred during hospitalization; therefore, rituximab was used in combination to better relieve symptoms and improve the prognosis. In summary, ANCA-associated vasculitis is a syndrome with an unclear etiology, diverse clinical manifestations, easy misdiagnosis and missed diagnosis, and rapid progression of the disease in critically ill patients. Numerous studies have reported that ANCA-associated vasculitis easily involves the kidneys and lungs, while there are few reports of cardiovascular involvement;therefore we are inexperienced in vasculitis involving the heart and easily ignore the problem of the heart, so cardiovascular accidents should be considered as early as possible when vasculitis is encountered, as well as to prevent further aggravation. The possibility of vasculitis is considered when non-specific symptoms such as unexplained fever, weight loss, loss of appetite, and chronic sinusitis occur. Autoimmune antibody screening should be performed as early as possible, and timely detection and treatment should be performed to save patients' lives.

## 3.Author contributions

Zulhumar Aysa contributed to patient information acquisition and manuscript writing; Yong Qiao 、Gao-Liang Yan 、 Cheng-Chun Tangparticipated in the diagnosis and treatment of the patients. Zhan-neng Yang revised the manuscript and all authors have read and approved the final manuscript.

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**Fig 1** : Change in temperature after admission

**Fig2** 2021-11-22ECG:1.Sinus tachycardia 2. abnormal T-waves3.low QRS voltages

**Fig3** :Coronary artery CTA Imaging

**Fig4** 2021-11-23 ECG:1.Sinus tachycardia 2.low QRS voltages V1-V3 low voltage

Fig.5 Echocardiography

Fig6: Angiographic results before and after stent implantation

Fig7 2021-11-28ECG

Table 1 laboratory test

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