

Cardiac Manifestations of Wegener's Granulomatosis : A Case Report and Literature Review

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Abstract

Wegener's Granulomatosis is a rare systemic vasculitis. Lesions commonly occur in the upper airways, lungs, kidneys, and can also affect the skin, eyes, joints, peripheral nervous system, and the heart. Cardiac involvement is rare and can affect the endocardium, myocardium, or pericardium. Pulmonary arterial hypertension (PAH) has been rarely reported. We report the case of D.R., a 17-year-old without significant personal medical history, referred for the evaluation of new-onset exertional dyspnea. The clinical examination was normal except for an irregular heart rhythm with a pronounced pulmonary B2 sound. The ECG revealed atrial fibrillation (AF) with incomplete right bundle branch block (iRBBB). A chest X-ray showed cardiomegaly primarily affecting the atria without signs of pulmonary congestion. Precapillary PAH was suggested by echocardiography and confirmed through right heart catheterization. Routine blood tests were normal. Contrast-enhanced chest CT showed no evidence of pulmonary embolism or signs of pulmonary parenchymal involvement. Given the patient's young age, a specific vasculitis work-up was conducted, leading to a diagnosis of Wegener's Granulomatosis.

Through this case report, we will present the cardiac and extracardiac manifestations of this vasculitis, as well as therapeutic management strategies.

Keywords : Exertional dyspnea evaluation, Atrial fibrillation, Incomplete right bundle branch block, Suprasystemic pulmonary hypertension, Precapillary pulmonary arterial hypertension, Wegener's vasculitis.

Introduction

Wegener's Granulomatosis is a rare autoimmune disease, first described in 1939 by German pathologist Friedrich Wegener. It is characterized by systemic vasculitis, combining acute arteriolar and venular angitis with necrotizing granulomas containing giant cells (1). Lesions affect the upper airways, lungs, kidneys, and may also involve the skin, eyes, joints, peripheral nervous system, and heart. Cardiac involvement is rare, but it can affect the endocardium, myocardium, and pericardium (2). Pulmonary arterial hypertension has been rarely reported (3). The disease can occur at any age, with a peak incidence between 40 and 50 years and a slight male predominance.

The pathogenesis is multifactorial (3), suggesting an autoimmune process involving ANCA with activation of T lymphocytes. The proteins most often targeted are proteinase 3 and myeloperoxidase (4). A genetic predisposition has also been suggested.

ENT (Ear, Nose, and Throat) manifestations are the most frequent and earliest. Pulmonary involvement can manifest with chest pain, dry cough, dyspnea, and hemoptysis. Chest X-rays and thoracic CT scans often reveal multiple nodules. Endoscopic exploration with biopsy often confirms the diagnosis. Pleural involvement is rare. Bronchial stenoses are possible. Renal manifestations can range from proteinuria to renal insufficiency (5,6).

Peripheral nervous system involvement is frequent, often appearing early, and may sometimes be the only manifestation of the disease. However, central nervous system involvement occurs in about one in ten patients. Other manifestations include cutaneous-mucosal (purpura, mucosal ulcerations, livedo, pyoderma), musculoskeletal (arthralgia, myalgia, polyarthritis, polymyositis), ophthalmic (keratoconjunctivitis, uveitis, retinitis, optic neuritis), and urogenital (granulomatous prostatitis, pseudotumoral bladder involvement, or ureteral stenosis) (7, 8, 9).

Cardiac involvement is rare. Anatomical frequency is estimated at about 25% in autopsy series. Several cardiac anomalies have been described, including pericarditis, valvular lesions, coronary artery disease, myocarditis, and cardiac arrhythmias. A case of fibroblastic endocarditis complicating Wegener's Granulomatosis was reported, revealed during an autopsy (11). Pulmonary arterial hypertension may result from inflammation leading to increased pulmonary vascular resistance, infiltrate deposition in the pulmonary arterial wall, or elevated left ventricular filling pressures. Cardiac involvement is life-threatening (12).

Mortality was 90% within one year, with an average survival time of five months. Corticosteroids extended survival to eight months. The introduction of cyclophosphamide in the 1970s was a major breakthrough (9). Initial treatment involves corticosteroids with oral cyclophosphamide (CYC). Sometimes, CYC is administered intravenously. Monitoring white blood cell counts is crucial for treatment success. Remission is typically achieved within 3 to 6 months. Azathioprine or methotrexate, which are less toxic, are prescribed after remission. The total treatment duration should be at least one year, but longer for high-risk patients. Corticosteroids are gradually tapered. Plasmapheresis may be required in severe cases or in pulmonary hemorrhage. For localized infections, antibiotic treatment is recommended, with steroids if antibiotic treatment fails (10, 15).

The prognosis is unfavorable in 86% of cases, often due to renal and cardiac involvement, as well as hearing loss and deafness (10, 16, 17, 18).

Observation

We report the case of a 17-year-old girl, born to parents with HIV, who was referred to us for the evaluation of new-onset exertional dyspnea. She had a family history of sudden death, with a brother dying at the age of 20. The patient is in NYHA functional class III and complains of asthenia. On examination, she exhibits a prominent pulmonary B2 sound, a murmur of pulmonary insufficiency with tricuspid insufficiency, and peripheral signs of right heart failure with peribuccal cyanosis. Blood pressure is 90/60 mm Hg, and oxygen saturation is 93% in ambient air. The ECG shows atrial fibrillation at 80 bpm, right ventricular overload, with negative T waves in the circumferential leads. A chest X-ray reveals cardiomegaly primarily affecting the atria and the right ventricle, with no signs of pulmonary parenchymal involvement. Echocardiography shows bi-atrial dilation, moderate mitral regurgitation on a remodeled valve, preserved left ventricular function, non-elevated left ventricular filling pressures, severe right ventricular dilation with dysfunction, suprasystemic pulmonary

hypertension at 120 mm Hg, and high pulmonary vascular resistance at 7 WU. There is no atrial or ventricular septal defect, nor a persistent ductus arteriosus.

Viral serologies for HIV and hepatitis are negative. NT-proBNP is elevated at 9,430 pg/ml, with a normal high-sensitivity troponin level and inflammatory anemia. The diagnosis of precapillary pulmonary hypertension was suggested, confirmed by right heart catheterization. Cardiac MRI confirmed the echocardiography findings. A thoracic CT scan showed no signs of pulmonary embolism or pulmonary parenchymal involvement. Specific vasculitis testing was conducted, with a highly positive c-ANCA titer, specific for anti-PR3, confirming the diagnosis of Wegener's granulomatosis. In a 6-minute walk test, the patient walked 300 meters.

The diagnosis of severe pulmonary hypertension was confirmed, and the patient was started on a combination of phosphodiesterase-5 inhibitors and endothelin receptor antagonists, in addition to symptomatic treatment for right heart failure. She was referred to cardiology and rheumatology clinics for further specialized management of her vasculitis.

Discussion

Pulmonary arterial hypertension (PAH) and Wegener's granulomatosis are uncommon conditions. PAH is a pathophysiological disorder that can involve multiple clinical conditions and can be associated with a variety of cardiovascular and respiratory diseases or vasculitis. In a retrospective study of 27 patients with Wegener's granulomatosis and cardiac involvement, Forstot et al. (1, 2) found that pericarditis was present in 50% of cases, coronary artery disease in 50% of cases, myocarditis in 25% of cases, valvulopathies or endocarditis in 21% of cases, conduction disorders in 17% of cases, and myocardial infarction in 11% of cases. Myocarditis is caused by granulomatous involvement of the myocardium, which can progress to dilated cardiomyopathy.

Cardiac involvement is due to inflammation of various structures, including valves, coronary arteries, endocardium, myocardium, or pericardium. Medium and small caliber coronary artery involvement is more common, often asymptomatic but can lead to myocardial infarction and death. Valvular involvement can be primary, caused by inflammation of valvular tissue, or secondary due to endocarditis. Atrial and ventricular arrhythmias result from the aforementioned cardiac abnormalities (2, 5, 9, 12).

The treatment for Wegener's granulomatosis typically combines corticosteroids with cyclophosphamide (CYC), with antibiotic therapy in cases of associated superinfection. The treatment of cardiac involvement depends on the clinical presentation (15, 18).

Conclusion

Cardiac involvement in Wegener's granulomatosis is rarely at the forefront. It should be considered when cardiac abnormalities are not linked to an obvious cause. A biological workup to investigate an autoimmune disease is necessary in such situations, as the presence of even subclinical cardiopathy is a factor for poor prognosis. In practice, and based on literature data, it is advisable to screen for these anomalies.

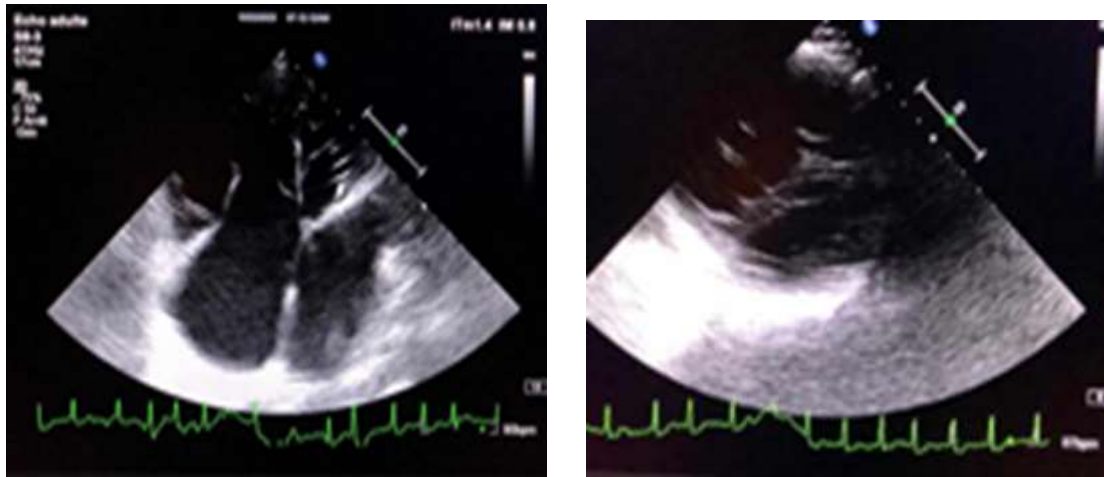


Figure 1: 2D Echocardiography showing dilation of the right heart chambers with paradoxical septum movement.

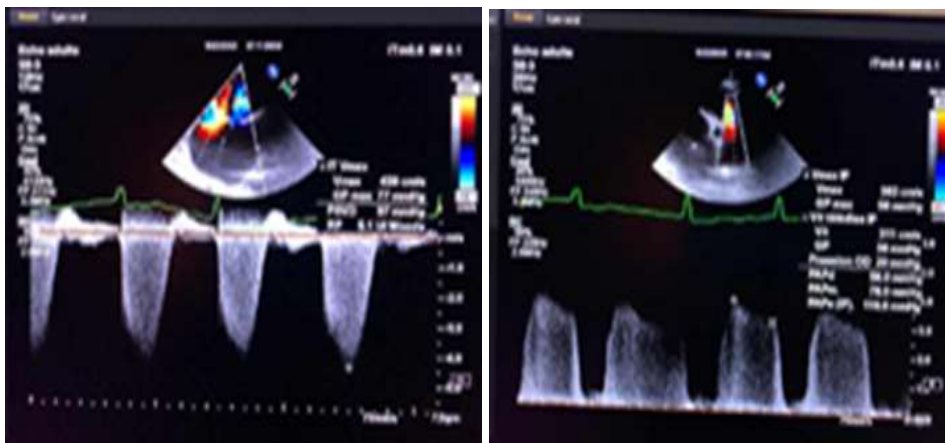


Figure 2: PAH as observed on tricuspid regurgitation flow (systolic pulmonary artery pressure, PAPS) and pulmonary insufficiency flow (mean pulmonary artery pressure, PAPm).

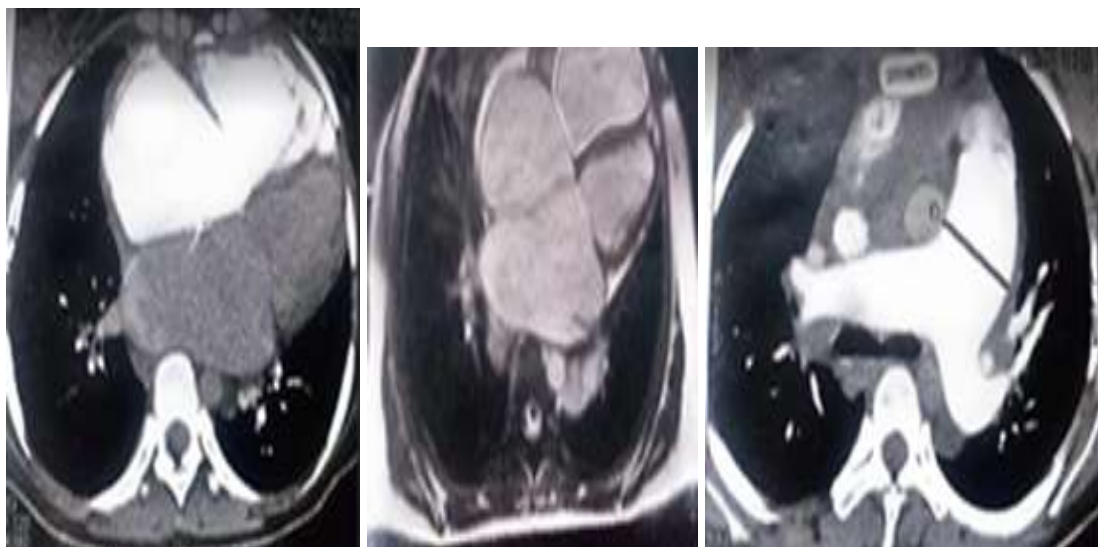


Figure 3: Thoracic CT scan showing dilation of the pulmonary artery, atria, and right ventricle.

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