Autoimmunity Reviews 16 (2017) 811–816

Contents lists available at ScienceDirect

Autoimmunity Reviews

journal homepage: www.elsevier.com/locate/autrev

Review

Myocarditis in auto-immune or auto-inflammatory diseases

Cloé Comarmond, Patrice Cacoub *

[a] Département de Médecine Interne et Immunologie Clinique, Assistance Publique-Hôpitaux de Paris (AP-HP), Groupe Hospitalier Pitié-Salpêtrière, F-75013 Paris, France
[b] Département Hospitalo-Universitaire I2B, UPMC Univ Paris 06, F-75013 Paris, France
[c] INSERM, UMR 7211, F-75005 Paris, France
[d] CNRS, UMR 7211, F-75005 Paris, France
[e] INSERM, UMR_S 959, F-75013 Paris, France

ARTICLE INFO

Article history:
Received 17 April 2017
Accepted 22 April 2017
Available online 29 May 2017

Keywords:
Myocarditis
Autoimmune diseases

ABSTRACT

Myocarditis is a major cause of heart disease in young patients and a common precursor of heart failure due to dilated cardiomyopathy. Some auto-immune and/or auto-inflammatory diseases may be accompanied by myocarditis, such as sarcoidosis, Behçet's disease, eosinophilic granulomatosis with polyangiitis, myositis, and systemic lupus erythematosus. However, data concerning myocarditis in such auto-immune and/or auto-inflammatory diseases are sparse. New therapeutic strategies should better target the modulation of the immune system, depending on the phase of the disease and the type of underlying auto-immune and/or auto-inflammatory disease.

Contents

Myocarditis is an inflammation of the heart muscle. Myocarditis is a major cause of heart disease in young patients and a common precursor of heart failure due to dilated cardiomyopathy [1]. Myocarditis may present with a wide range of symptoms, ranging from mild dyspnea or chest pain to cardiogenic shock and death. It is difficult to estimate the true incidence of myocarditis. The fulminating forms are exceptional (5 to 10 cases per million inhabitants per year) and their incidence seems stable for several decades [2]. Myocarditis results mainly from banal viral infections, but may be also secondary to toxic, allergic or associated with a systemic disease.

Cardiac involvement during auto-immune and/or auto-inflammatory diseases includes the pericardium, myocardium, endocardium, valvular tissue, and coronary arteries. Some auto-immune and/or auto-inflammatory diseases may be accompanied by myocarditis, such as sarcoidosis, Behçet's disease, eosinophilic granulomatosis with polyangiitis (EGPA), myositis, and systemic lupus erythematosus (SLE).

* Corresponding author at: Département de Médecine Interne et Immunologie Clinique, Groupe Hospitalier Pitié-Salpêtrière, 83 boulevard de l'hôpital, F-75013 Paris, France.
E-mail address: patrice.cacoub@aphp.fr (P. Cacoub).

http://dx.doi.org/10.1016/j.autrev.2017.05.021
1568-9972/

However, data concerning myocarditis in such auto-immune and/or auto-inflammatory diseases are sparse. The diagnosis is usually made based on clinical presentation, such as dyspnea, fever, chest pain, and/or palpitations, and non-invasive imaging findings, classically echocardiography. Biological manifestations are non-specific and may include the elevation of troponin and/or C-reactive protein. Endomyocardial biopsy still remains the gold standard for diagnosis confirmation [3]. However, this procedure is not routinely used because of its low sensitivity and potential complications. Cardiac magnetic resonance (CMR) has changed the management of suspected myocarditis in systemic inflammatory diseases by providing a 'positive' diagnostic test [4,5].

There is considerable interest in the accurate detection of myocardial involvement in auto-immune and/or auto-inflammatory diseases, as it may potentially guide therapy aimed at reducing adverse cardiovascular outcomes. Therapeutic options remain limited for both the acute and chronic phases of myocarditis. Most patients respond well to standard heart failure therapy, although in severe cases, mechanical circulatory support or heart transplantation is indicated. Immunosuppressive and immunomodulatory therapies for myocarditis associated to auto-immune and/or auto-inflammatory diseases have potential benefit but further studies are warranted. Persistent, chronic myocarditis usually has a progressive course but may respond to immunosuppression.

Underlying mechanisms are not completely understood. Autoimmune responses and inflammation are involved in the pathogenesis of myocarditis and its sequela, dilated cardiomyopathy. Persistent autoimmune responses have been postulated to underlie the progression from myocarditis to dilated cardiomyopathy. Autoimmune myocarditis is mediated by $CD4^+$ T cells. Transfer of $CD4^+$ T cells to severe combined immunodeficient (SCID) mice produced disease, while depletion of $CD4^+$ T cells ameliorated experimental autoimmune myocarditis. T

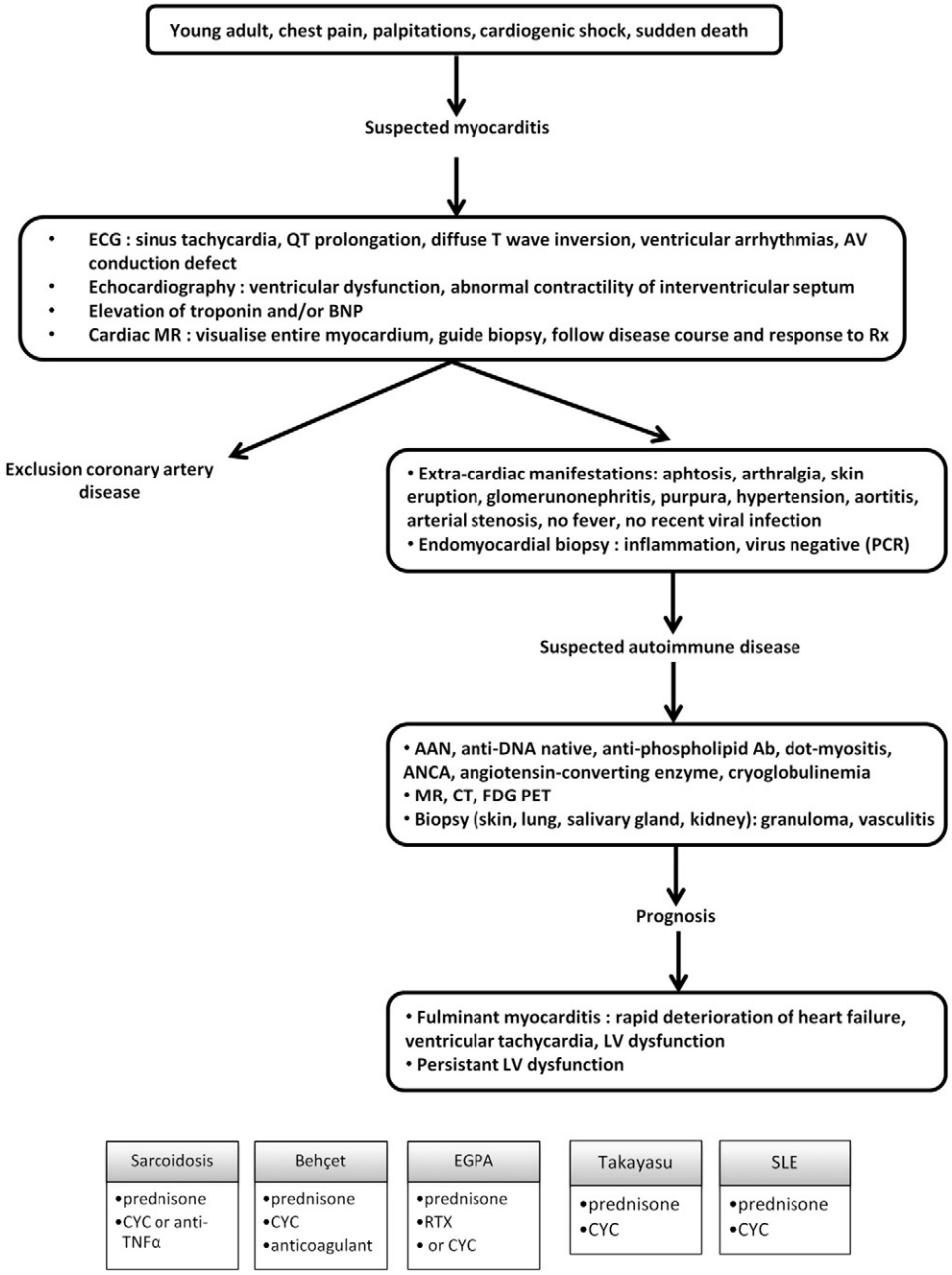

Fig. 1. Algorithm for myocarditis in auto-immune/auto-inflammatory diseases. ANA, anti-nuclear antibodies; ANCA, anti-cytoplasmic neutrophil antibodies; BNP, B-type natriuretic peptide; CT, computed tomography scanner; CYC, cyclophosphamide; ECG, electrocardiogram; EGPA, eosinophilic granulomatous with polyangiitis; FDG PET, 18F-fluorodeoxyglucose scanner; LV, left ventricular; MR, magnetic resonance; RTX, rituximab; SLE, systemic lupus erythematosus; anti-TNFα, anti-tumor necrosis factor alpha.