Mini Review

An Overview of Dilated Cardiomyopathy

Peysh A. Patel* and Noman Ali#

Department of Cardiology, University of Leeds, London

*Both contribute equally

Abstract

Dilated cardiomyopathy (DCM) is a myocardial disease characterised by impaired left ventricular systolic function in conjunction with enlargement of the cardiac chambers. A number of pathogenic pathways have been implicated, including genetic mutations in cytoskeletal components or autoimmune response to acute viral myocarditis. In a significant proportion of patients, the cause remains unknown. In spite of this uncertainty, it is recognised that a common pathophysiological basis lies beyond the initial insult, involving neurohormonal dysregulation and adverse cardiac remodelling. Current treatments are focused upon these mechanisms, but there remains a conspicuous lack of upstream therapies to prevent establishment of the disease. This brief review outlines our current understanding.

PATHOPHYSIOLOGY

Dilated cardiomyopathy (DCM) is considered to be familial in around 50% of cases, with the most common pattern of inheritance being autosomal dominant [1]. Mutations in cytoskeletal components such as actin, desmin and α-tropomyosin have been found [2]. Many secondary causes, including chemotherapeutic agents, alcohol excess and peri-partum (within late third trimester of pregnancy or up to 6 months post-partum), likely arise when incomplete penetrant genetic disease is unmasked by myocardial insult or stress. In those with no family history or clear precipitants, DCM is thought to arise from acute myocarditis [3]. A triphasic model is proposed, with an initial myocardial insult followed by chronic inflammation and leading to ventricular remodelling and dysfunction. Enterovirus and adenovirus are most strongly implicated. Indeed, polymerase chain reaction (PCR) techniques to detect viral RNA in cardiac tissue have returned positive in up to 35% of DCM patients [3]. A labelling of ‘idiopathic DCM’ should only be made after confident exclusion of other subtypes.

Whatever the initial insult, secondary neurohumoral activation with pathological remodelling leads to increased wall stress [4]. Activation of the beta-adrenergic system, production of angiotensin II and generation of inflammatory cytokines and reactive oxygen species (ROS) can result in apoptosis of cardiomyocytes. Hence, it is unsurprising that traditional pharmacotherapeutic agents indicated for treatment of congestive heart failure (CHF) antagonise these pathways. Altered calcium handling and release of atrial and B-type natriuretic peptides (BNP) are also implicated [5] (Figure 1).

DIAGNOSTIC STRATEGIES

A rigorous exploration of family history is warranted. However, in view of phenotypic variability, this should always be allied with clinical symptoms and signs. These are similar in presentation to conventional CHF, though patients are often less symptomatic. BNP measurement can provide useful adjunct information. ECG may show evidence of atrial fibrillation (AF) and/or bundle branch block (BBB) morphology which will guide management considerations including resynchronisation. A Holter monitor may confirm reduced heart rate (HR) variability due to excess sympathetic drive, and is associated with adverse prognosis [6].

Echocardiography is mandated to formulate the correct diagnosis. In patients with DCM, the left ventricle will be dilated (LVEDD >5cm [women] or 6cm [men], thought it should be indexed to body surface area [BSA]). This will be associated with impaired systolic function. Classic DCM will manifest as dilatation of all four chambers and there may be co-existent right ventricular systolic dysfunction. Secondary valvular disease due to annular dilatation, such as functional mitral or tricuspid regurgitation, is often present [6]. Cardiopulmonary exercise (CPEX) testing plays a role in measuring adequacy of cardiac response to exertion and is a predictor of risk [7]. Cardiacmagnetic resonance imaging (MRI) may provide supplementary data and a more accurate assessment of chamber volume and function in patients with Echocardiograms that are of suboptimal image quality [8]. Lastly, no patient should be labelled as true idiopathic DCM without excluding coronary disease via functional imaging or formal angiography [6] (Figure 2).
MANAGEMENT OPTIONS

General advice relates to avoidance of precipitants, such as alcohol. Patients with established peri-partum cardiomyopathy have a 50% chance of functional recovery [9]. However, they should be strongly advised against future pregnancies as the mortality risk is 1% with recovered function and significantly higher at 10% in those with persistent dysfunction [9]. Referral to a geneticist is indicated in familial cases and screening ought to be offered to first-degree relatives. Pharmacological therapy is consistent with established guidelines for CHF with introduction of loop diuretics for symptomatic relief, in addition to angiotensin-converting enzyme (ACE)-inhibitor and beta-blocker therapy. Commencement of an aldosterone antagonist is warranted in patients with moderate or severe left ventricular systolic dysfunction [10]. Anticoagulation is required to abrogate risk of thromboembolism in patients with coexistent CHF and AF, based on their CHA\textsubscript{2}-DS\textsubscript{2}-VASc score. As alluded to, resynchronisation therapy may be an option in patients with persistent symptoms despite optimal therapy if there is evidence of dysynchrony (i.e. BBB pattern) [10]. Patients should be risk stratified for sudden cardiac death (SCD) based on symptoms and screening for significant dysrhythmias such as non-sustained ventricular tachycardia (NSVT). In some cases, primary prevention implantable cardioverter defibrillator (ICD) is warranted [11]. In young patients such as those with previous myocarditis, resistant symptoms may necessitate referral to a tertiary centre and work-up for cardiac transplantation [12].

CONCLUSION

DCM remains a condition which is associated with significant morbidity and mortality. Advances in recent years have allowed for a greater understanding of the pathophysiological basis of the disease. Furthermore, breakthroughs in the field of heart failure have provided clinicians with increasing therapeutic options. However, there still remains a notable lack of disease-specific treatments, thus highlighting the importance of ongoing research into this condition.

REFERENCES

3. Mason JW. Myocarditis and dilated cardiomyopathy: an inflammatory


Cite this article