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Review Article

The role of invasive diagnostics and its impact on the treatment of dilated cardiomyopathy: A systematic review

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ABSTRACT

Background: Dilated cardiomyopathy is one of the most frequent causes of non-ischemic heart failure. Many factors including genetic disorders, infectious agents, toxins, drugs and autoimmune disorders might take part in the development of dilated cardiomyopathy. Diagnosis of left ventricular dilatation is most often limited to performing echocardiography and excluding ischemic etiology (coronary angiography). Since many pathologies take place at the cellular and subcellular level the only way to clarify the etiology of the disease is to examine the myocardium itself (endomyocardial biopsy).
Methods: A systematic literature search was conducted for studies published between September 2000 and September 2015 using the PubMed database.
Results: Of 7104 studies identified, 73 studies were included in this review. Controversies raised by opponents of the endomyocardial biopsy collide with the low percentage of serious complications confirmed in several single-center registries. Based on the available data the overall complication rate varies from 1% to about 3%, with 0.5% risk of serious complications. According to the current recommendations of the European and American scientific societies endomyocardial biopsy should be performed in most cases of left ventricular dilatation and heart failure of non-ischemic etiology. Endomyocardial biopsy allows for making the diagnosis and providing prognostic information especially in patients with familial dilated cardiomyopathy, diabetic cardiomyopathy with dilated phenotype, alcoholic cardiomyopathy, peripartum cardiomyopathy, iron overload cardiomyopathy, as well as inflammatory and viral cardiomyopathy. Iron overload cardiomyopathy, peripartum cardiomyopathy, inflammatory and viral cardiomyopathy are potentially treatable and reversible.
Conclusions: Targeted therapies are more effective when started early before myocardial injury becomes irreversible. Unfortunately, non-invasive techniques are not precise enough to decide if and which targeted therapy is required. Therefore endomyocardial biopsy should be mainly recognized as the essential diagnostic tool and should not be postponed.

Contents

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1. Introduction

Dilated cardiomyopathy (DCM) is defined as left ventricular dilatation and systolic dysfunction in the absence of abnormal loading conditions (arterial hypertension, valve disease) or coronary artery disease sufficient to cause global systolic impairment [1,2]. Right ventricular dilatation and dysfunction may be present [1]. DCM is one of the most frequent causes of non-ischemic heart failure (HF). Several factors might take part in the development of DCM including genetic disorders, infectious agents, toxins, drugs and autoimmune disorders [3].

Diagnosis of left ventricular dilatation is very often limited to echocardiography examination due to its easy accessibility and low cost. Nevertheless, the standard approach in many cases does not allow for making the precise diagnosis.

Echocardiography provides important information about the cardiac morphology and contractility, valve function and pericardium condition. Changes in cardiac morphology and global systolic dysfunction might suggest non-ischemic etiology but coronary angiography is essential to make a final diagnosis. Moreover, echocardiography does not provide reliable information about the tissue structure. Cardiac magnetic resonance might be helpful but it does not give highly specific information about the cardiomyocyte, microcirculation and extracellular matrix condition. Subepicardial late gadolinum enhancement confirms non-ischemic etiology and edema (patchy/subepicardial/septal/global), early gadolinum enhancement (global) along with late gadolinum enhancement (patchy/subepicardial/septal) highly suggest inflammatory cardiomyopathy [4–6]. Their sensitivity is, however, insufficient (about 40–70% in case of fulfillment of at least two criteria) [4,5]. Cardiac magnetic resonance does not provide information about the etiology of the inflammation, and therefore it precludes tailored treatment [5]. Moreover, in case of viral cardiomyopathy cardiac magnetic resonance characterizes low sensitivity and low specificity–in the absence of inflammation late gadolinum enhancement might be the only observed pathology.

It seems that DCM is a group of diseases which often require distinct therapy. Since many pathologies take place at the cellular and subcellular level and non-invasive testing has insufficient sensitivity and specificity the only way to clarify the etiology of the disease is to perform the endomyocardial biopsy (EMB) and examine the myocardium itself [7,8]. Over the last few years EMB has become essential in patients with DCM since due to great improvements in molecular biology and pharmacotherapy several conditions (e.g. peripartum cardiomyopathy, viral/inflammatory cardiomyopathy) are treatable and in many cases completely reversible.

Despite obvious therapeutic benefits, EMB still raises controversies. The literature search was performed in order to summarize the current state of knowledge on invasive diagnostics in DCM.

2. Materials and methods

2.1. Literature search and data extraction

A search was carried out on September 1, 2015 using the PubMed database (United States National Library of Medicine National Institutes of Health) with the following search strategy in order to select the data existing in the literature: ((“Diagnostics (Basel)”[Journal] OR “diagnostics”[All Fields]) AND (“cardiomyopathy, dilated”[MeSH Terms] OR (“cardiomyopathy”[All Fields] AND “dilated”[All Fields]) OR “dilated cardiomyopathy”[All Fields] OR (“dilated”[All Fields] AND “cardiomyopathy”[All Fields]))) OR ((“Diagnostics (Basel)”[Journal] OR “diagnostics”[All Fields]) AND non-ischemic[All Fields] AND (“heart failure”[MeSH Terms] OR (“heart”[All Fields] AND “failure”[All Fields]) OR “heart failure”[All Fields])) OR (endomyocardial[All Fields] AND (“pathology”[Subheading] OR “pathology”[All Fields] OR “biopsy”[All Fields] OR “biopsy”[MeSH Terms])) OR ((“heart”[MeSH Terms] OR “heart”[All Fields] OR “cardiac”[All Fields]) AND (“magnetic resonance spectroscopy”[MeSH Terms] OR (“magnetic”[All Fields] AND “resonance”[All Fields] AND “spectroscopy”[All Fields]) OR “magnetic resonance spectroscopy”[All Fields] OR (“magnetic”[All Fields] AND “resonance”[All Fields]) OR “magnetic resonance”[All Fields]) AND (“cardiomyopathy, dilated”[MeSH Terms] OR (“cardiomyopathy”[All Fields] AND “dilated”[All Fields]) OR “dilated cardiomyopathy”[All Fields] OR (“dilated”[All Fields] AND “cardiomyopathy”[All Fields])))) OR ((“genetic therapy”[MeSH Terms] OR (“genetic”[All Fields] AND “therapy”[All Fields]) OR “genetic therapy”[All Fields] OR “genetic”[All Fields]) AND (“etiology”[Subheading] OR “etiology”[All Fields] OR “causality”[MeSH Terms] OR “causality”[All Fields]) AND (“cardiomyopathy, dilated”[MeSH Terms] OR (“cardiomyopathy”[All Fields] AND “dilated”[All Fields]) OR “dilated cardiomyopathy”[All Fields] OR (“dilated”[All Fields] AND “cardiomyopathy”[All Fields])))) OR (“diabetic cardiomyopathies”[MeSH Terms] OR (“diabetic”[All Fields] AND “cardiomyopathies”[All Fields]) OR “diabetic cardiomyopathies”[All Fields] OR (“diabetic”[All Fields] AND “cardiomyopathy”[All Fields]) OR “diabetic cardiomyopathy”[All Fields]) OR (“cardiomyopathy, alcoholic”[MeSH Terms] OR (“cardiomyopathy”[All Fields] AND “alcoholic”[All Fields]) OR “alcoholic cardiomyopathy”[All Fields] OR (“alcoholic”[All Fields] AND “cardiomyopathy”[All Fields])) OR ((“peripartum period”[MeSH Terms] OR (“peripartum”[All Fields] AND “period”[All Fields]) OR “peripartum period”[All Fields] OR “peripartum”[All Fields]) AND (“cardiomyopathies”[MeSH Terms] OR “cardiomyopathies”[All Fields] OR “cardiomyopathy”[All Fields])) OR ((“iron overload”[MeSH Terms] OR (“iron”[All Fields] AND “overload”[All Fields]) OR “iron overload”[All Fields]) AND (“cardiomyopathies”[MeSH Terms] OR “cardiomyopathies”[All Fields] OR “cardiomyopathy”[All Fields])) OR (inflammatory[All Fields] AND (“cardiomyopathies”[MeSH Terms] OR “cardiomyopathies”[All Fields] OR