

# Partial recovery of left ventricular function in dilated cardiomyopathy as a result of tuberculosis treatment (RCD code: III-1B.9.o)

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## Abstract

We present the case of a young patient with dilated cardiomyopathy (DCM) and concomitant pulmonary tuberculosis (TB), emphasising the need for an interdisciplinary approach when considering underlying aetiology. A 36-year-old male was admitted to the hospital due to signs of acute heart failure (HF). After diagnostic work-up, which included laboratory examination, echocardiography, and coronary angiography, a diagnosis of DCM was established and therapy was initiated. Despite optimal medical therapy for HF, the patient's condition did not improve. During further diagnostic workup, pulmonary tuberculosis was identified. A significant reduction in HF signs and symptoms and improvement in left ventricular ejection fraction occurred only after TB was treated with 6 months of therapy. The presented case study illustrates the necessity to perform a complete diagnostic workup to identify reversible causes of DCM. JRC D 2019; 4 (2): 60–62

**Key words:** rare diseases, heart failure, echocardiography, multimodality imaging, cardiopulmonary exercise test

## Case presentation

A 36-year-old male was admitted to the Emergency Department due to signs of acute heart failure (HF) which included exertional dyspnoea, orthopnoea, bendopnoea, ankle oedema, typical chest angina, and persistent cough escalating gradually within the previous 4 weeks. Before onset of symptoms, he was working as a construction worker. The patient's illness started with a cough which appeared to be a non-complicated respiratory infection. Antibiotic therapy was initiated with amoxicillin/clavulanic acid. Due to treatment ineffectiveness, clarithromycin was administered. He denied exposure to any chemical agents, smoking, or excessive alcohol consumption. Medical history was negative for asthma, chronic obstructive pulmonary disorder, or any other pulmonary condition. His reported symptoms included breathlessness, cough, fatigue, and ankle swelling. During physical examination on admission, the findings included orthopnoea, bendopnoea, his exercise tolerance was class III of the New York Heart Association (NYHA) scale, heart rate 95 bpm, respiratory rate 24/min, and

blood pressure 105/80 mmHg. Bilateral ankle oedema was present. Auscultation revealed bilateral crepitations and a holosystolic apically located murmur.

Electrocardiogram showed normal sinus rhythm, 90 bpm, normal heart axis, biatrial enlargement, and left ventricular hypertrophy with left ventricular strain (Figure 1). Blood analysis revealed slightly elevated cardiac troponin (TnI) (0.03 µg/l, N <0.01), c-reactive protein (CRP) (27.5 mg/dl, N <10 mg/dl), and D-Dimer (898 ng/ml, N <500 ng/ml). N-terminal-pro B-type natriuretic peptide (NT-proBNP) level was not available. Other laboratory test results such red blood cell count ( $4.37 \times 10^6/\mu\text{l}$ , N:  $4.5\text{--}5.9 \times 10^6/\mu\text{l}$ ), haemoglobin (14.0 g/dl, N: 14–18g/dl), haematocrit (40%, N: 41–53), white blood cell count ( $6.8 \times 10^3/\mu\text{l}$ , N:  $4\text{--}10 \times 10^3/\mu\text{l}$ ), platelet count ( $190 \times 10^3/\mu\text{l}$ , N:  $150\text{--}400 \times 10^3/\mu\text{l}$ ), creatine (1.2 mg/dl, N: 0.7–1.36 mg/dl), Na<sup>+</sup> (141 mmol/l, N 135–145 mmol/l), K<sup>+</sup> (4.5 mmol/l, N: 3.5–5.0 mmol/l), and urea (31 mg/dl, N: 15–45 mg/dl) were within normal reference range or borderline abnormal. To exclude acute coronary syndrome, coronary angiography was performed, which revealed no lesions in the coronary arteries. Tran-

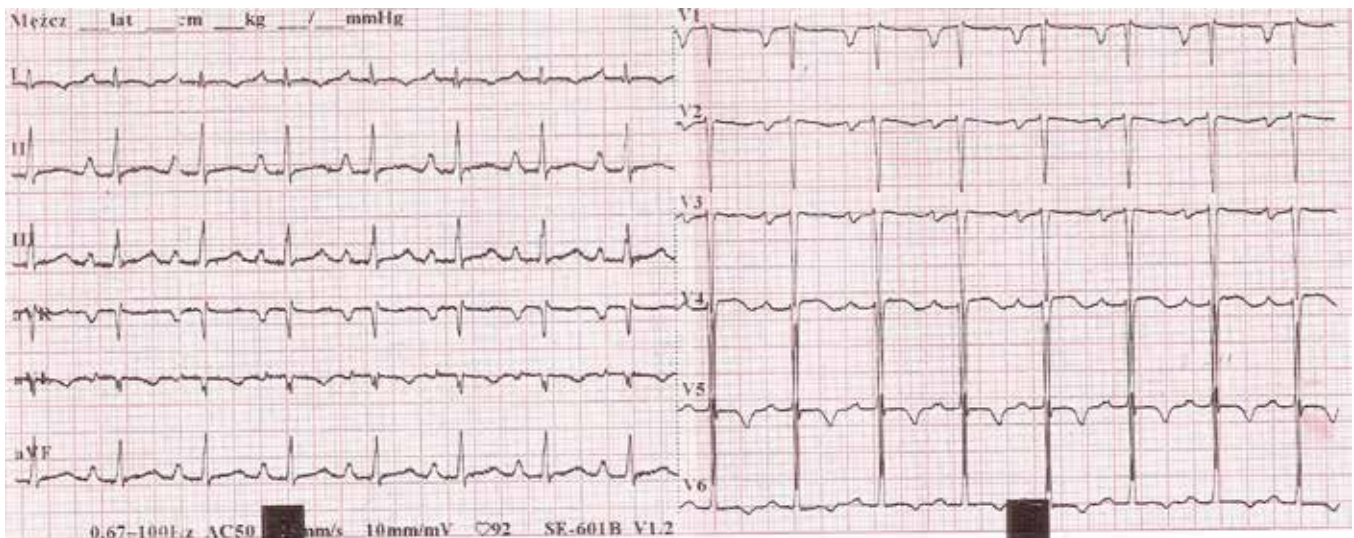
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**Figure 1.** Description in the main text

sthoracic echocardiography (TTE) revealed dilatation of the left ventricle (LV) with severe systolic impairment. Measured values were as follows: LV end diastolic dimension (LVEDD) 63 mm, interventricular septum (IVS) 9 mm, LV posterior wall (LVPW) 12 mm, left atrium (LA) 48 mm, right atrium (RA) 16 cm<sup>2</sup>, end diastolic volume (EDV) 204 ml, end systolic volume (ESV) 146ml, LV ejection fraction (LVEF) 26%, tricuspid annular plane systolic excursion (TAPSE) 19 mm, right ventricular systolic pressure (RVSP) 30 mmHg, and mild mitral regurgitation (effective regurgitant orifice area [ERO] 0.13 cm<sup>2</sup>, regurgitation volume [RV] 20 ml) as a result of mitral annulus dilatation (diameter 42 mm) (Figure 2). Chest radiography performed on admission showed lobar consolidation and enlargement of the cardiac silhouette (Figure 3). Abdominal ultrasound was unremarkable.

## Patient management

Optimal medical therapy (OMT) was initiated including recommended pharmacotherapy for HF including a loop diuretic to control symptoms of congestion, angiotensin-converting-enzyme inhibitor (ACEI), beta-blocker, and mineralocorticoid receptor antagonist [1]. The patient was transported to the reference centre where endomyocardial biopsy (EMB) and cardiac magnetic resonance (CMR) were performed. EMB was negative for inflammatory infiltration and failed to identify the specific cause of DCM. Ergospirometry was completed with a metabolic equivalent (MET) of 6.3. CMR was attempted but could not be completed because of an intensive cough. The patient was referred to a pulmonologist, who initiated a pulmonary workup. Sputum culture was positive for mycobacterial growth. Pulmonary tuberculosis (TB) was diagnosed and therapy was introduced including treatment with pyrazinamide, rifamazine (isoniazid+rifampicin), and ethambutol lasting for 2 months and subsequent 4-month therapy of rifamazine. Implantation of an implantable cardioverter defibrillator (ICD) was planned for primary prevention of sudden cardiac death (SCD), as the patient was still categorised as NYHA

class II and LVEF did not improve despite OMT lasting more than 3 months. Implantation of ICD was delayed since the treatment course of TB was not completed.

## Follow up

One year later, after a complete course of antimycobacterial treatment lasting for 6 months, the patient was re-hospitalised due to total loss of consciousness. This was preceded by symptoms of gastroenteritis lasting for 2 days and manifested as nausea and vomiting with dehydration, resulting in hypotension and elevated serum creatine. He was treated symptomatically for dehydration. During hospitalization, TTE was performed and showed partial regression of LV dilatation and dysfunction (LVEDD 48 mm, IVS 11 mm, LVPW 10 mm, LA 32 mm, RA 15 cm<sup>2</sup>, EDV 146 ml, ESV 76 ml, LV EF 48%, TAPSE 21 mm, RVSP 27mmHg). Exercise tolerance improved and 11.0 METS was obtained in ergospirometry. Optimal medical therapy was extended. NT-pro-BNP result was still not available at the time. After a rapid and complete recovery from dehydration the patient was discharged.

During follow-up, 2 years after the initial diagnosis, the patient is free of HF symptoms. NT-pro-BNP was 48 pg/ml (N<125 pg/ml) and TTE showed no progression of myocardial dysfunction since the previous exam (EDV 144ml, LVEF 46%).

## Review of literature and discussion

DCM is currently defined as left ventricular or biventricular dilatation with coexisting systolic dysfunction. It is recommended to document contractile dysfunction using 2 imaging modalities or 1 modality in 2 separate studies [2]. Exclusion of primary valve disease is required and severe coronary artery disease sufficient to cause global systolic dysfunction should be ruled out [3, 4]. It is important to perform a diagnostic workup for DCM, as its aetiology may be reversible. Currently, causes of DCM are classified as



**Figure 2.** Echocardiography, PLAX – post recovery, shows normal LVEDD (48 mm), IVS 11 mm, LVPW 10 mm, LA 32 mm)



**Figure 3.** Chest X-Ray P-A – description in the main text

either genetic or nongenetic. Genetic mutations include, but are not limited to, the following genes: TTN, LMNA, MYH7, TNNT2, and SCN5A. An underlying genetic predisposition can interact with environmental factors as well. These environmental factors include excessive alcohol intake, toxic effect of drugs, nutritional deficiencies, especially thiamine (Vitamin B1) deficiency, endocrine disorders (e.g. hypo-/hyperthyroidism, Addison's disease, Cushing's disease, pheochromocytoma), autoimmune diseases (PM/DM, EGPA, GPA), Takotsubo cardiomyopathy, and tachyarrhythmic cardiomyopathy.

Myocarditis is a well-recognized cause of DCM. TB-induced myocarditis is diagnosed extremely rarely, as it usually made post-mortem, due to latent clinical progression. The prevalence of myocardial TB has been reported as 0.4–2% [5], however, cases presented in the literature occurred mostly in immunocompetent patients [6]. Concomitant pulmonary infection was reported in the majority of cases (56%). Response to treatment varied, but 68% of patients responded well to antimicrobial treatment. The main histopathological pattern of TB-induced myocarditis includes tu-

berculoma with caseation, miliary tubercles, or diffuse infiltration. Most commonly, cardiac TB manifests as pericarditis, with myocardial involvement being extremely rare. Cardiac TB can have various clinical presentations, and some of these have been previously described in the literature: RVOT obstruction by tuberculoma [7], restrictive cardiomyopathy arrhythmias [8], and sudden cardiac death [9]. In cases with possible cardiac involvement it is crucial to monitor ventricular function during antimycobacterial treatment, as certain drugs are cardiotoxic (isoniazid, streptomycin) [10]. Moreover, successful TB treatment can cause TB-associated inflammatory reconstitution syndrome (TB-IRIS) with myocardial involvement and secondary inflammatory cardiomyopathy.

DCM of a TB aetiology in Poland is considered rare, although in many countries with higher TB incidence it should be considered in the differential diagnosis [11].

## Conclusions

EMB in the presented case was negative for TB myocardial involvement. Currently, there are no guidelines regarding the diagnosis of myocardial TB. Furthermore, there is no data defining EMB sensitivity and specificity in TB myocardial involvement. In the presented case, there was lack of improvement despite OMT for HF and partial regression was obtained only after antimycobacterial treatment. Therefore, a full diagnostic workup of DCM requires an interdisciplinary approach, including diagnosing and treating concomitant conditions.

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