Myotonic Dystrophy FOUNDATION

Consensus-based Care Recommendations for Cardiologists Treating Adults with Myotonic Dystrophy Type 1

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Overview

Due to the multisystemic nature of this disease, the studies and rigorous evidence needed to drive the creation of an evidence-based guideline for the clinical care of myotonic dystrophy patients are not currently available for all affected body systems and symptoms. In order to improve and standardize care for this disorder now, 10 leading myotonic dystrophy (DM1) cardiologists in Western Europe, the UK, Canada, Japan and the US joined together to create the Consensus-based Care Recommendations for Cardiologists Treating Adults with Myotonic Dystrophy Type 1. The project was organized and supported by Myotonic Dystrophy Foundation (MDF).

A complete list of authors and an overview of the process is available in Addendum 1. A complete reading list for each of the study area sections is available in Addendum 2.

An Update Policy has been adopted for this document and will direct a systematic review of literature and appropriate follow up every three years. MDF staff will provide logistical and staff support for the update process.

Background

Preventing sudden cardiac death is of high priority in the care of patients with myotonic dystrophy type 1 (DM1). Such deaths in DM1 are mostly attributable to bradyarrhythmias, but may be occasionally due to tachyarrhythmias like ventricular fibrillation/tachycardia. Cardiac dysrhythmia, particularly heart block, is the second leading cause of death in DM1, after respiratory failure.

The impact of DM1 on the heart is mainly on the cardiac conduction system. The conduction defects are progressive over time and may lead to severe bradycardia or even asystole. Patients with severe conduction abnormalities may present with syncope or presyncope. However, patients with milder conduction impairment, but at risk for imminent progression to a life-threatening defect, may be asymptomatic if the block does not cause significant hemodynamic changes. Therefore, conduction delays at the atrioventricular (AV) node, the His bundle and the ventricle need careful assessment and potential intervention. Progressive changes in conduction intervals (PR interval or QRS duration) on the ECG should be considered as important harbingers of high degree AV block in DM1 patients.

Atrial tachycardias are relatively common, and the risk of ventricular tachycardia is further increased in the setting of a cardiomyopathy. The most common type of arrhythmia in patients with DM1 is atrial fibrillation/flutter, which poses increased risk for stroke and peripheral emboli. Various tachyarrhythmias and bradyarrhythmias may cause palpitations, fatigue, chest pressure or pain, dyspnea, syncope, presyncope, lightheadedness or dizziness.

LV structural and functional abnormalities can be observed in up to 40% of patients. However, symptomatic heart failure is not as readily discernable in patients with neuromuscular disease and limited mobility, such as those with DM1.

Hypotension is often found in patients with DM1; although it has been attributed to autonomic dysfunction, the exact mechanism remains unknown.

Recommendations

1. Baseline 12-lead ECG should be performed in all patients upon confirmation of DM1 diagnosis and annually thereafter if asymptomatic

2. Cardiac imaging should be performed in every DM1 patient at baseline and every one to five years thereafter, if the initial imaging study is normal. If the baseline study is abnormal, then imaging can be done more frequently and should accompany a change in status or to monitor medical and/or arrhythmia management. The preferred imaging modalities for DM1 are 2-D echocardiography with strain rate imaging and Cardiac MRI, and Echocardiogram and Cardiac MRI, both of which are acceptable options for screening patients. Choosing which modality to use should be based on local expertise and accessibility. The risk of a cardiomyopathy being present in DM1 is enhanced in one of the following observations:

    a. Abnormal electrocardiogram including (but not limited to) PR interval >200 ms, QRS > 120 ms (including right or left bundle branch block), presence of fascicular block, 2nd or 3rd degree AV block, atrial fibrillation or flutter, or development of ventricular arrhythmias

    b. Symptoms suggestive of heart failure (i.e. dyspnea, edema) or arrhythmias (palpitations, syncope)

    c. Consideration may be given to performing more frequent cardiac imaging in the absence of the above findings in those with a combination of the following: significantly increased CTG repeat length in DM1 (i.e. in excess of 500 – 1000 repeats), and age >40 years

3. Ambulatory monitoring may be utilized to detect ambient or asymptomatic arrhythmias including advanced (nocturnal) AV block and non-sustained ventricular arrhythmias. Such monitoring should be considered in patients with the aforementioned baseline ECG abnormalities or in those with symptoms suggestive of arrhythmias (see point 5 below)

4. Because of the possibility of sudden death in DM1, invasive electrophysiology (EP) testing should be considered if non-invasive testing indicates elevated risk for serious conduction block or arrhythmias. EP testing should be directed at evaluation for distal conduction impairment (His-Purkinje disease) and inducibility for ventricular arrhythmias, particularly bundle branch reentrant ventricular tachycardia

5. Syncope, presyncope, dizziness or lightheadedness should be considered as potential cardiogenic symptoms in patients with DM1 and prompt an evaluation for tachy- or brady-, arrhythmias and cardiomyopathy

6. Patients and family members should be educated that symptoms such as palpitations, syncope or near-syncope require prompt attention

7. Pharmacologic treatment can be cautiously used to control atrial fibrillation in DM1. Mexiletine, a class 1B anti-arrhythmic with pro-arrhythmic effects, is used to treat myotonia and may provide modest relief from atrial fibrillation. However, the use of any anti-arrhythmic medications/treatments in DM1 requires prior evaluation for underlying structural or functional abnormalities that may complicate its use. Additionally, monitoring during drug initiation is warranted. At a minimum, anti-arrhythmic agents should be used with caution in particular in any patient with conduction system disease and cardiomyopathy in the absence of a pacemaker or ICD

8. Anti-myotonic medications, stimulants and general anesthetics should be used with caution, as these can elevate the risk of cardiorespiratory complications and malignant hyperthermia. Patients should be evaluated preoperatively and cared for by anesthesiologists familiar with DM1. See **https://myotonic.org/toolkits-publications**

9. Management of hypotension is required only if it becomes symptomatic

10. DM1 patients with a reduced ejection fraction (EF < 40%) should be managed using the updated ACC (American College of Cardiology)/AHA (American Heart Association)/HFSA (Heart Failure Society of America) or ESC (European Society of Cardiology) 1, 2 Guidelines for the treatment of heart failure with a reduced ejection fraction. It is reasonable to treat DM1 patients with LVEF <50% similarly, given the known progression of cardiomyopathy in DM1. Guidelines for the treatment of heart failure with reduced ejection fraction serve as a general approach for managing these patients. Recognizing that DM1 patients are prone to the development of hypotension and hyperkalemia, it may be necessary to individualize the management of symptomatic heart failure in DM1 patients

11. Beta-adrenergic blockers, ACE-I, or ARBs may be considered in DM1 patients with LV structural/function abnormalities including left atrial dilatation, left ventricular dilatation, mild LV dysfunction (EF 40-50%), and regional wall motion abnormalities not attributable to non-DM1 conditions (i.e. coronary artery disease, hypertensive heart disease)

12. A primary or secondary prevention pacemaker or ICD is reasonable based on the ACC/AHA/HRS (Heart Rhythm Society) Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities. A primary prevention pacemaker or ICD in a DM1 patient found to be at high risk of cardiac arrest or sudden cardiac death from abnormalities detected via noninvasive or invasive cardiac testing may be considered without a guideline. Patient and family preference with careful informed consent and the assessment of other risk factors affecting morbidity and mortality should be considered in the decision to implant a pacemaker or ICD

13. Cardiac resynchronization therapy may be offered to DM1 patients with LVEF ≤0.35, NYHA functional class III (or ambulatory class IV) symptoms, normal sinus rhythm, and intraventricular conduction delay (QRS duration >150 msec with LBBB pattern) while on optimal guideline-directed medical therapy

14. Coronary artery disease can develop in DM1 patients, and exercise stress testing may not be possible with concomitant neuromuscular involvement. Statins can be used in DM1

15. Multidisciplinary management is needed for DM1 patients including neurology, pulmonology and anesthesiology physicians with expertise in DM1 when considering cardiovascular therapeutics, particularly invasive procedures that require sedation/anesthesia

Addendum 1:

Project Overview and List of Authors

The Consensus-based Care Recommendations for Cardiologists Treating Adults with Myotonic Dystrophy Type 1 was created by a group of 10 international clinicians experienced in the care and treatment of adults living with myotonic dystrophy type 1. They included:

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MDF designed and initiated the consensus-based process and provided project management and document preparation services. MDF team members included Paul Formaker, Leah Hellerstein and Molly White.

Addendum 2:

Reading List

1. Freyermuth F, Rau F, Kokunai Y, Linke T, Sellier C, Nakamori M, et al. Splicing misregulation of SCN5A contributes to cardiac conduction delay and heart arrhythmia in myotonic dystrophy. Nat Commun. 2016; 7: 11067.
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The mission of the Myotonic Dystrophy Foundation is to enhance the quality of life of people living with myotonic dystrophy and accelerate research focused on treatments and a cure.

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My Cause. My Cure.

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