Cardiac management of Duchenne muscular dystrophy: the 2018 DMD care considerations

Implications for the Netherlands

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Timeline:
• Based on 2018 DMD care considerations 2 TelComs June and August 2018
• Discussion on the implications of the DMD care consideration on Cardiac management of DMD for DMD management in The Netherlands
• Discussion of results presented at Duchenne Care Conference 7th Sept
The problem of the myocardium in DMD pts

**CARDIOMYOCYTE DEATH**

- Inflammatory Response
- Fibrosis Formation
- Stretch and Thinning of Fibrotic Region
- Dilation of the Heart
  - ↑ Left Ventricular Volume
  - ↑ Wall Stress
  - ↓ Diastolic Relaxation
  - ↓ Contractility
  - ↓ Cardiac Output
  - Mitral Valve Regurgitation

Normal Heart → Fibrosis with preserved LV function → Progressive LV dysfunction and dilation and fibrosis → End-stage heart failure

*J Am Coll Cardiol 2016;67:2533-46*

*Muscle Nerve 44: 8–19, 2011*
Cardiac follow-up and management of DMD pts

**Most important differences**
- cMRI imaging of choice
- Annual cMRI from age 6-7
- Start ACEi at age 10
Main issues in Cardiac care of DMD patients

Cardiac evaluation
• When to start cardiac evaluation in DMD pts
• How to detect cardiac disease in DMD pts

Pharmacological Intervention
• When to treat DMD pts
• How to treat DMD pts

Invasive treatment of cardiac disease
• Mechanical support of end-stage heart failure
• ICD-treatment for primary or secondary prevention of VT/VF

Cardiac Care in DMD carriers
Cardiac evaluation

• Start from diagnosis-even in young pts
• First-line non-invasive imaging modality in children: echocardiography

• However with advancing age acoustic window hampered by increase in BMI, scoliosis, immobility.
Cardiac evaluation with cardiac MRI

- Advantages of cardiac MRI:
  - Gold standard of cardiac dimensions and function
  - Information on global and focal fibrosis

- Disadvantages of cardiac MRI:
  - Inability to perform cMRI in young children <8yoa or older pts
  - Artifacts from scoliosis repair
  - Time consuming and challenging for pts in non-ambulatory stage, esp pts with contractures or on mechanical ventilation
Cardiac evaluation—how

- **2018 DMD Care consideration:**
  - Annual non-invasive imaging: cMRI imaging modality of choice.

- **Considerations Dutch working group**
  - From diagnosis on: annual echocardiographic examination
  - First cMRI between the age of 8-10 yrs
    - LV dimensions and function
    - Presence and extent of fibrosis
  - Follow-up cMRI
    - For guidance of management/treatment
  - Synchronize cMRI-protocols in the Netherlands
Cardiac evaluation-how

• 2018 DMD Care consideration:
  • Annual non-invasive imaging: cMRI imaging modality of choice.

• Considerations Dutch working group
  • Needed on an annual base?
    • Discussion: what does cMRI add when a patient is already on ACEi with good normal/stable cardiac dysfunction on echocardiography?
    • With good acoustic window and normal function: suggest cMRI 2-3 years
    • If acoustic window deteriorates: increase frequency of cMRI
    • If symptoms of heart failure: indication for cMRI and increase in frequency of cardiac evaluation
    • If cardiac function is seriously depressed and on maximal therapy-
      additional value of cMRI?
Cardiac evaluation-how

ECG and 24h-Holter monitoring

• Optimum frequency of monitoring not established

2018 DMD Care consideration:

• Initiate annual 24h-Holter monitoring with onset of signs of cardiac involvement

Considerations Dutch working group

• Based on recommendation: proposal for cross-sectional evaluation of all DMD-pts with 24h-Holter monitoring and evaluate yield after 2 years
• Further (more specific) recommendation after evaluation of results
Pharmacological Intervention in DMD patients

When and what cardiac medication to start in DMD pts?

2018 DMD Care consideration:

• ACEi or ARB: first-line treatment, additional ß-blocker
• Start ACEi or ARB at the age of 10 years
• With sign/symptoms cardiac failure
• LV dilatation and dysfunction
• Cardiac fibrosis

Considerations Dutch working group

• To follow the 2018 DMD Care consideration
• Preferably with consensus on what ACEi and ß-blocker to use
• Current proposal: ACEi: perindopril and ß-blocker: carvedilol
Advanced treatment of cardiac failure in DMD

• **Maximise pharmacological treatment**
  • Prevent thrombo-embolism
    • No recommendation what agent to use: adult AF-heart failure guidelines
    • At the discretion of the cardiologist

• **Invasive treatment of cardiac failure**
  • With failure of maximal pharmacological therapy
  • Mechanical circulatory support-heart transplant
  • Inherent high risk
  • Only case reports available
  • To be discussed within multi disciplinary team on a case-by-case basis

**Dutch working group to follow 2018 DMD Care consideration**

• In LUMC limited experience with CRT-D in DMD pts with cardiac failure
Primary or secondary prevention of VT/VF in DMD

- **No recommendation in 2018 DMD Care consideration**
- Implantable cardioverter defibrillator (ICD) can be considered as:
  - Primary prevention indication based on adult heart failure guidelines
  - Secondary prevention

**Dutch working group**

- To be discussed within multi disciplinary team on a case-by-case basis
Female carriers

At risk for cardiomyopathy

• Baseline cardiac assessment in early adulthood
• Follow-up cardiac evaluation every 3-5 years
• More frequent evaluation and treatment if signs of cardiac disease develop

Dutch working group to follow 2018 DMD Care consideration
Next steps

Dutch working group vs 2018 DMD Care consideration:
discussion @ Duchenne Care Conference

Writing of Dutch DMD Care considerations based on 2018 Care considerations

Discussion of Dutch DMD Care consideration with Netherlands Society of Pediatric Cardiology and Netherlands Society of Cardiology for approval

After approval implementation of consideration in clinical care