Cardiomyopathy

NATO Aviation Cardiology Working Group (RTG HFM-251)

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I have no financial relationships to disclose

I will not discuss off-label and/or investigational drug use in my presentation
Cardiomyopathy

What is it?

How do you find it?

Flight surgeon’s perspective

Conclusion
Cardiomyopathy

History: known since the 1980s

“Thickening of the myocardium without apparent reason”

Abbreviations:
CM: cardiomyopathy
HCM: hypertrophic cardiomyopathy
HOCM: hypertrophic obstructive cardiomyopathy
“Idiopathic”

- The heart muscle is hypertrophic or dilated without apparent reason
- no hypertension
- no valve abnormalities
- normal coronaries
- no arrhythmias
- no congenital abnormalities
secondary CM

- Left ventricular hypertrophy:
  - Hypertension
  - Aortic valve stenosis
  - supra/infra valvular aortic stenosis
  - Intensive sports (thick, not bad??)
secondary CM

- Dilatation of the heart
- ischemic (after myocardial infarction)
- valvular (aortic/mitral regurgitation)
- metabolic (diabetes mellitus)
- toxic (chemotherapy, alcohol)
- arrhythmogenic (atrial fibrillation, frequent PVC)
- inflammation (myocarditis)
- pregnancy (peripartum CM)
- “broken heart” (Takotsubo)
From: Classification of the cardiomyopathies: a position statement from the European Society of Cardiology Working Group on Myocardial and Pericardial Diseases
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Cardiomyopathy

- **Dilated (DCM)**
  Enlarged left/ right ventricle, LVEF < 45 %

- **Restrictive (RCM)**
  “stiff, not thick”

- **Hypertrophic (HCM, HOCM)**
  “stiff and thick”, with or without obstruction of the LVOT

- **Arrhythmogenic (Right) Ventricular Cardiomyopathy (ARVC)**
  Fat deposition, affects mainly (not exclusively) the RV

- **Non classified**
  Non-compaction (too many muscle fibers in LV), Takotsubo
Dilated CM

LVEF < 45 %

ICD: LVEF < 35%

25 % genetic.

Prognosis:
Mortality 5 y 30 %.
Restrictive CM

- Stiff heart, metabolic dispositions:
  - Amyloidosis,
  - Haemochromatosis,
  - Sarcoidosis.

- Bad prognosis
Arrhythmogenic (RV) Cardiomyopathy (ARVC)

- Genetic
- RV muscle tissue replaced by fat
- Biggest problem: arrhythmias, worsened by (strenuous) exercise
Unclassified CM

- “Non compaction”
- Too many myocardial trabeculae
- Problem: heart failure
Hypertrophic cardiomyopathy

Apical ("mild")

Obstructive ("severe")
Hypertrophic obstructive CM (HOCM)

Septum: > 16 mm (nl: 12 mm)
• Apical hypertrophic cardiomyopathy
Problems of CM

1) increased left ventricular filling pressures:
   - decreased exercise capacity
   - heart failure
   - “obstruction”: impossibility to pump out enough blood

2) arrhythmias:
   - atrial fibrillation
   - ventricular tachycardia
   - sudden cardiac death
How to find aircrew with CM?

- Complaints: shortness of breath, palpitations, (near)syncope
- Many present without complaints:
  - Abnormal ECG
  - Cardiac murmurs (murmur that *increases* with Valsalva)
  - Family member with cardiomyopathy
Aviator with suspected CM

- What is the next step in an asymptomatic aircrew member with this abnormal ECG?
  - 1) ground the aircrew, awaiting the results of the evaluation
  - 2) send him/her to the cardiologist
- Cardiological evaluation might imply:
  - Echocardiography: LV/ RV function?
  - Exercise test, 24 hour ambulatory ECG: arrhythmias
  - Cardiac MRI: LV/ RV function, fibrosis.
The flight surgeon’s perspective

• - dilated and restrictive cardiomyopathy carry usually a bad prognosis
• - ARVC carries a high risk of arrhythmias
• **Hypertrophic cardiomyopathy** may have an almost normal prognosis in an asymptomatic population.
• However, there remains the risk of (fatal) arrhythmia. For this, a *risk calculator* has been developed, depending on
  • age
  • complaints
  • echocardiographic criteria
  • presence of recorded arrhythmias
The flight surgeon’s perspective

- In general, aircrew with CM with complaints:
  end of the flying career

- Aircrew with CM without complaints:
  Return to flying is possible, not any more eligible for solo flying, but when they have a good exercise capacity, a low risk of ventricular arrhythmia they will be eligible for flying with restrictions (OML, OSL), with yearly follow up.
Thanks to John Ernsting

Thanks for your attention!