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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

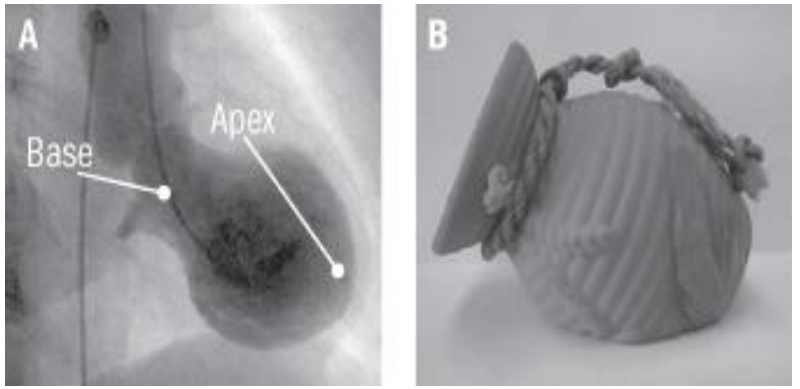
secondary CM

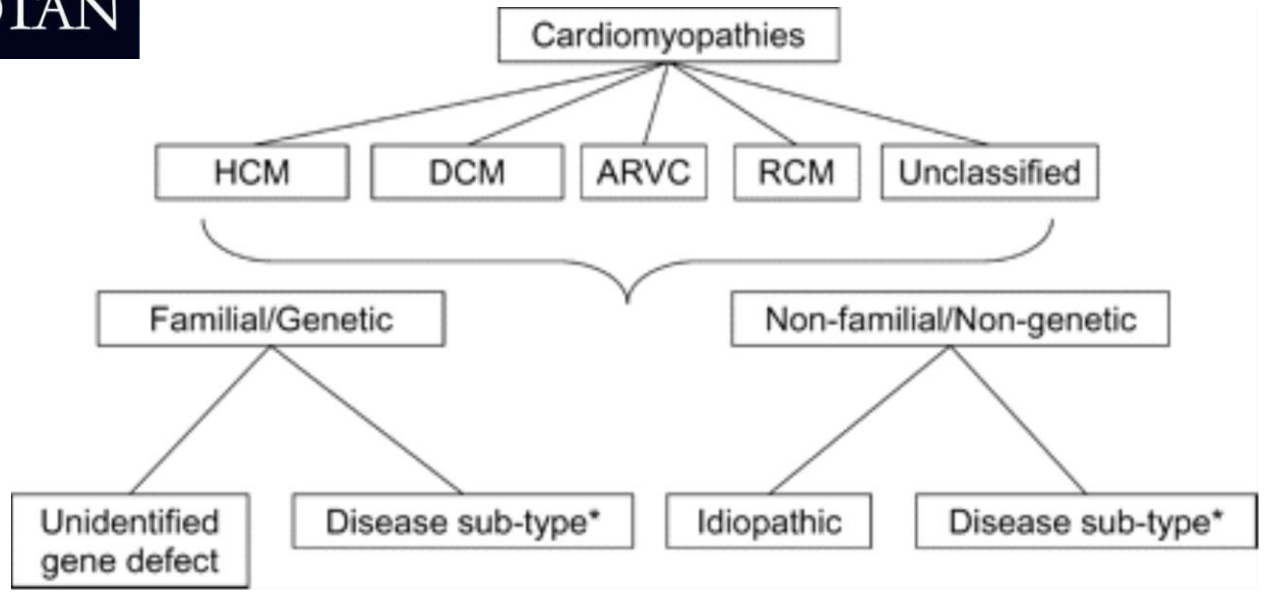
- Left ventricular hypertrophy:
- - Hypertension
- - Aortic valve stenosis
- - supra/ infra valvular aortic stenosis

- - 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” (Takutsubo)





From: Classification of the cardiomyopathies: a position statement from the european society of cardiology working group on myocardial and pericardial diseases

Eur Heart J. 2007;29(2):270-276. doi:10.1093/eurheartj/ehm342

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

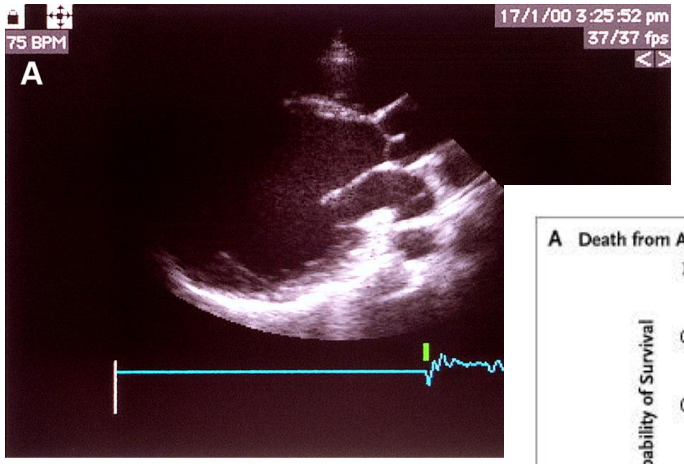
LVEF < 45 %

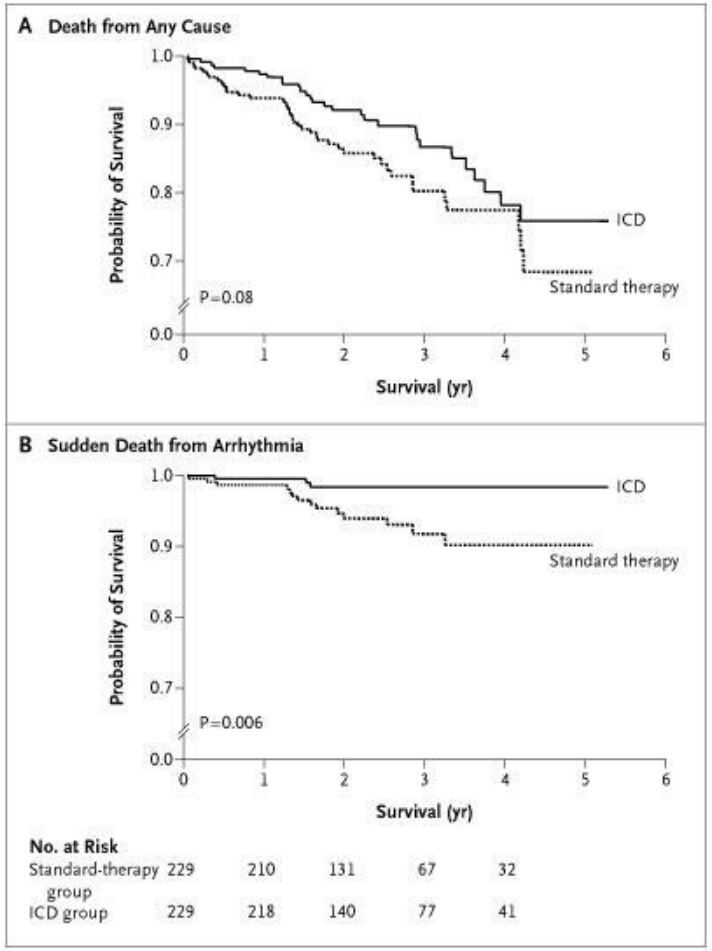
ICD: LVEF < 35%

25 % genetic.

Prognosis:

Mortality 5 y 30 %.

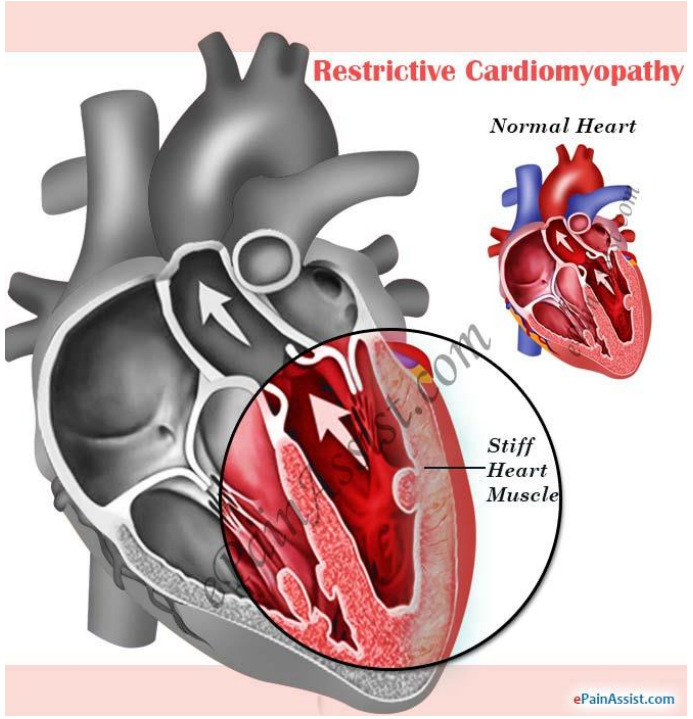




Restrictive CM

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

- Bad prognosis

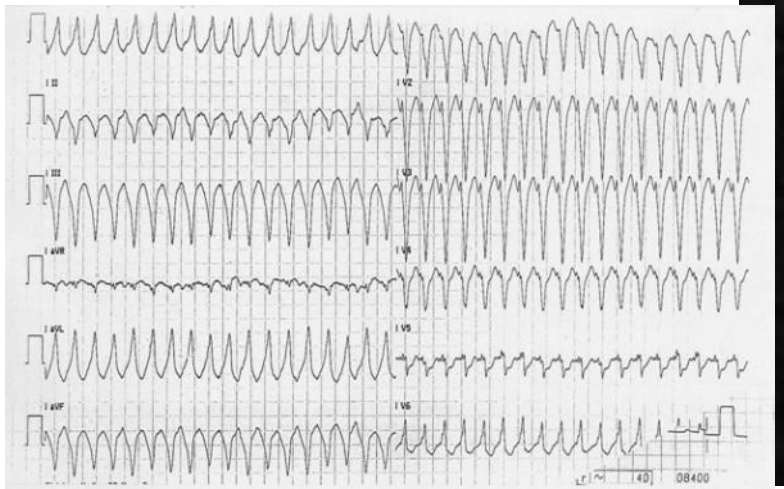


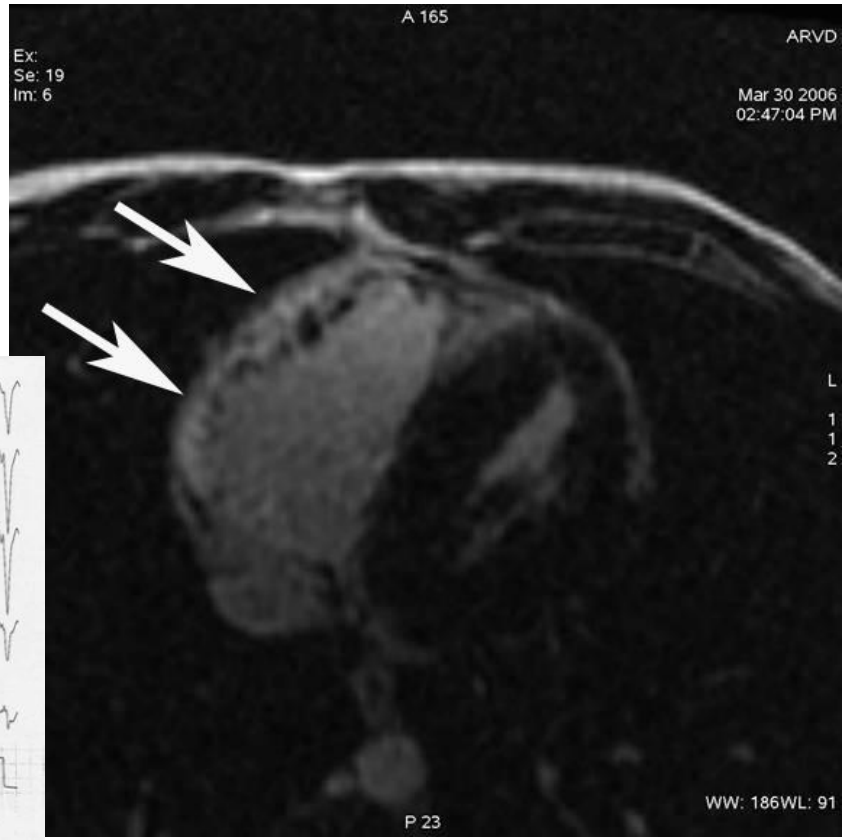
Arrhythmogenic (RV) Cardiomyopathy (ARVC)

- Genetic
- RV muscle tissue replaced by fat
- Biggest problem:

arrhythmias, worsened

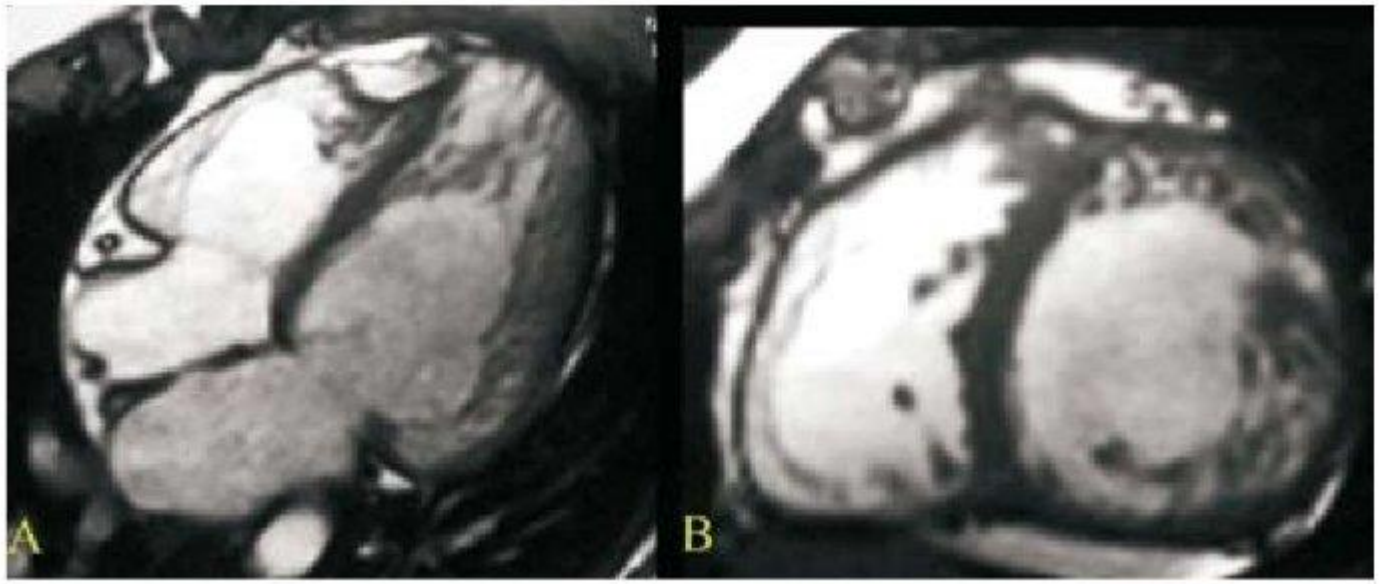
by (strenuous) exercise





Unclassified CM

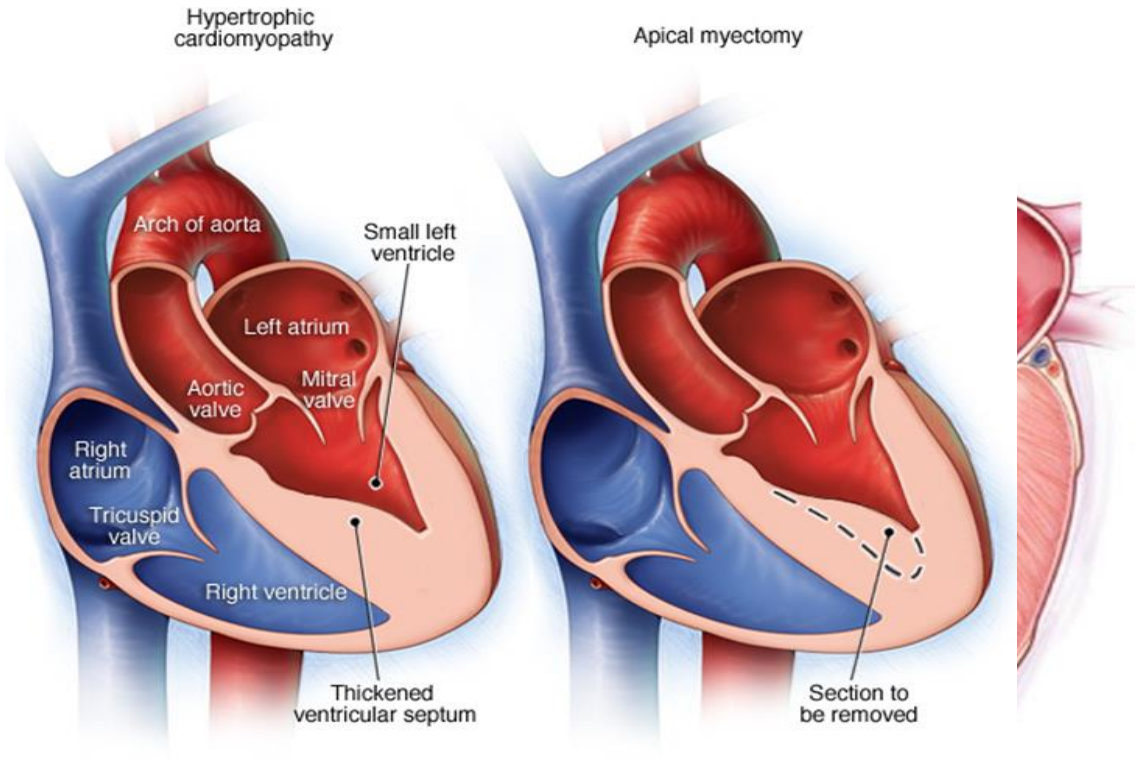
- “Non compaction”
- Too many myocardial trabeculae
- Problem: heart failure



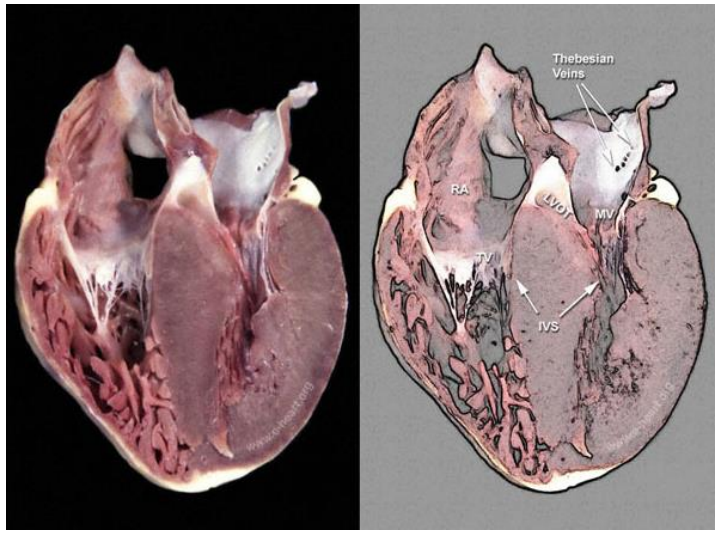
Hypertrophic cardiomyopathy

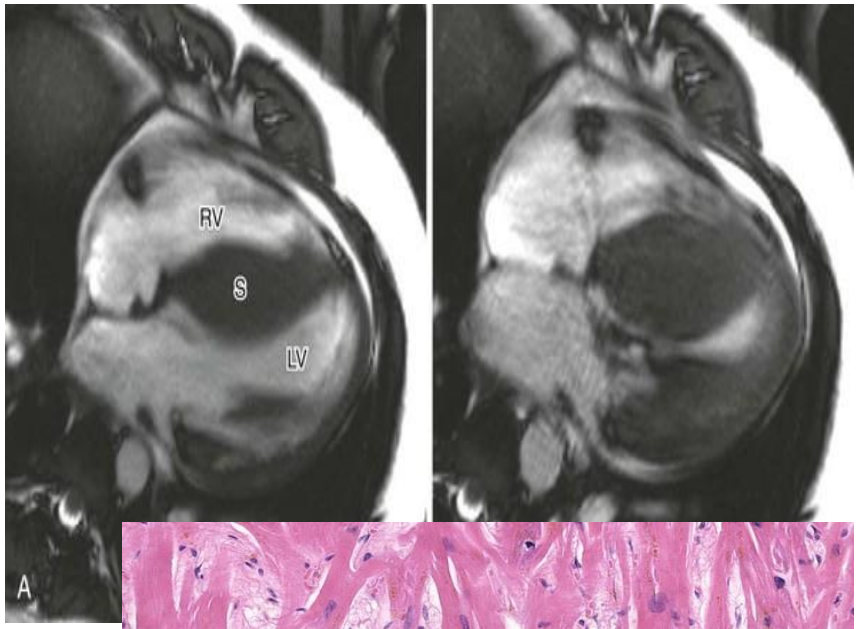
Apical (“mild”)

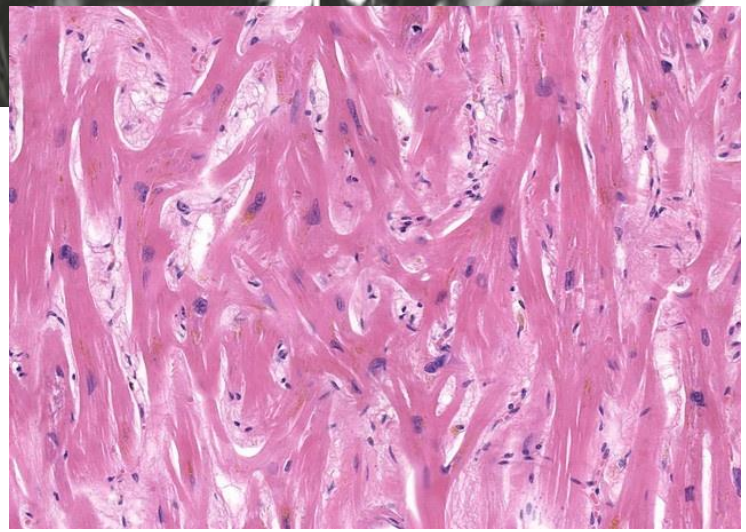
Obstructive (“severe”)



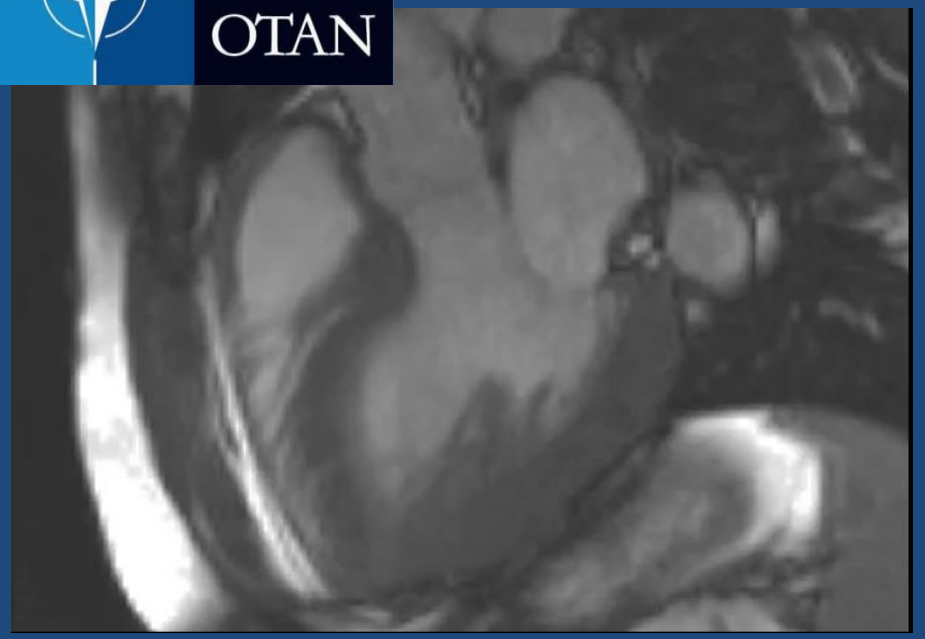
Hypertrophic obstructive CM (HOCM)



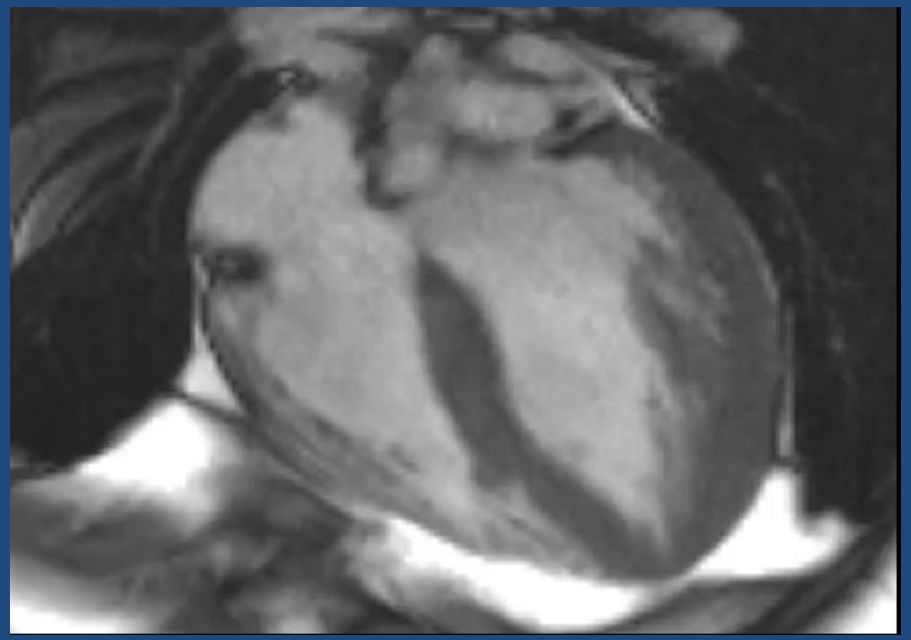




Septum : > 16 mm (nl: 12 mm)



- Apical hypertrophic cardiomyopathy



Problems of CM

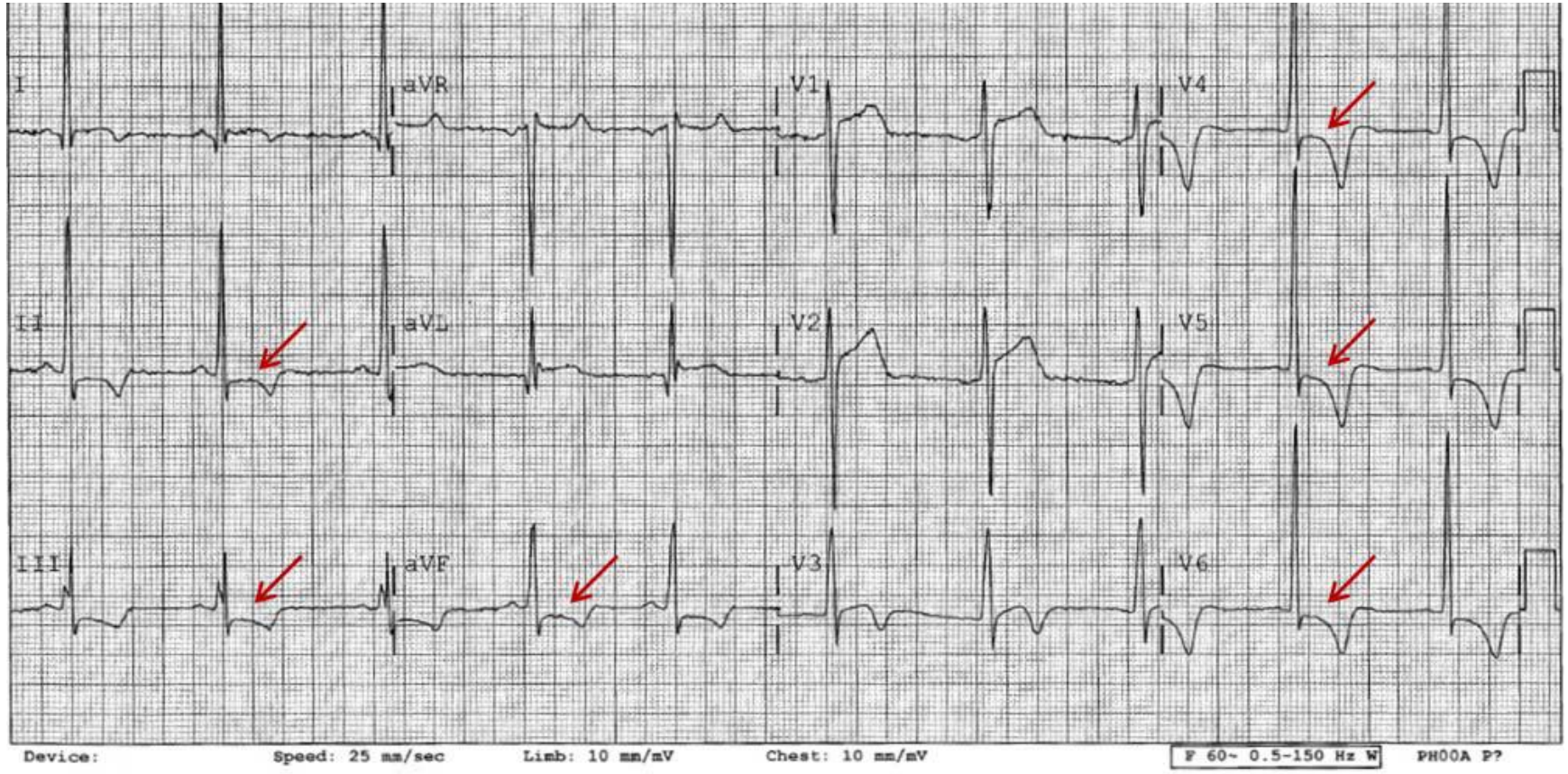
1) increased left ventricular filling pressures:
- decreased exercise capacity
- heart failure
- “obstruction”: impossibility to pump out enough blood

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

ECG HCM


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
Device:
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10 mm/mV
F 60~ 0.5-150 Hz W
PH00A P?

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
- **Hypertrofic cardiomyopathy** may have an almost normal prognosis in an asymptomatic population.
- However, there remains the risk of (fatal) arrhythmia. for this,a *riskcalculator* 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:

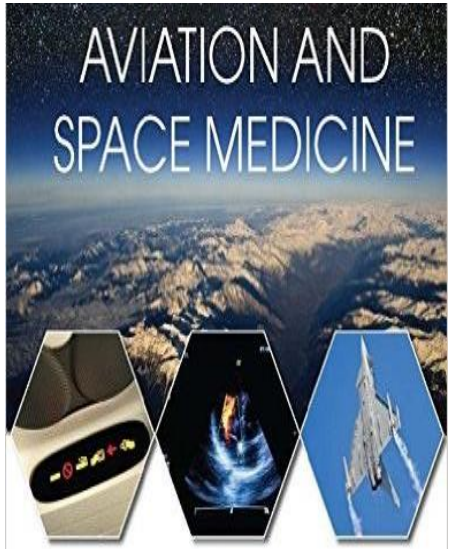
end of the flying career

- 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!