The 2014 Diagnostic and Prognostic Imaging (MR, CT) of the Various Cardiomyopathies: Myocarditis, Dilated, Infiltrative (Amyloid, Sarcoid), Hypertrophic, Noncompaction

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Disclosures

• No personal conflicts of interest

• Institutional research agreement/support from Philips Medical System

• Gd-based contrast agents are not FDA-approved for cardiac imaging
CCTA - Stress

Rochitte et al. Eur Heart J 2014;35:1120
Wong et al. J Am Coll Cardiol 2014;63:1904

Sensitivity

Specificity

CTA+CTP: 0.87 (95% CI 0.84-0.89)
CTA: 0.82 (95% CI 0.75-0.86)
n = 381
CCTA - FFR

n = 254

Nørgaard et al. J Am Coll Cardiol 2014;63:1145
Kim et al. J Am Coll Cardiol Img 2014;7:72
LGE - viability

Shah et al. JAMA 2013;309:909
CMR - Fibrosis
CMR – ECV expansion

Individuals with DM (n=231)

Survival from death/HF hosp (%)

Follow-up (years)

Log-rank p <0.001

ECV tertile 1

ECV tertile 2

ECV tertile 3

HR 3% ECV=1.52 (95% CI 1.21-1.89)

Adjusted for age, gender, LVEF, MI size

Wong et al. Eur Heart J 2014;35:657

Individuals without DM (n=945)

Survival from death/HF hosp (%)

Follow-up (years)

Log-rank p <0.001

ECV tertile 1

ECV tertile 2

ECV tertile 3

HR 3% ECV=1.46 (95% CI 1.25-1.71)
DCM - LGE
DCM - midwall LGE

Gulati et al. JAMA 2013;309:896
Almehmadi et al. Circ Cardiovasc Imaging 2014;7:593
DCM - LGE extent

Death/ICD discharge

ICD discharge

Low risk: - NICM: LGE=0% + NT-proBNP<545 pg/ml
- ICM: LGE<23% + NT-proBNP<848 pg/ml

Mordi et al. J Am Coll Cardiol Img 2014;7:561
Kwon et al. Heart 2014;100:206
DCM - LGE

9 studies, n=1,488, mean f/u 2.5 years

Annual event rate (%)

Death: p=0.01
HF hosp: p=0.002
SCD: p<0.001

CMR - sarcoidosis
Sarcoidosis - LGE

n = 155 (suspected)

Kaplan-Meier Survival Curves: Endpoint 1 (Hard Events Only)

Cumulative Survival Free of Aborted SCD and ICD Shocks

p-log-rank < 0.0001

Greulich et al. J Am Coll Cardiol Img 2013;6:501
Sarcoidosis - PET

Blankstein et al. J Am Coll Cardiol 2014;63:329
Acute myocarditis - CMR
Acute myocarditis - CMR

n = 57, biopsy proven

Francone et al. J Am Coll Cardiol Img 2014;7:254
Acute myocarditis - CMR

Radunski et al. J Am Coll Cardiol Img 2014;7:667
Luetkens et al. Radiology 2014;273:383
Acute myocarditis - CMR

Radunski et al. J Am Coll Cardiol Img 2014;7:667
Luetkens et al. Radiology 2014;273:383
LV noncompaction

n = 2,742; mean f/u = 9.5 years

LV noncompaction

n = 102

- Increased trabeculations: 25% vs. 7%
- LVNC criteria: 8% vs. 2%

Gati et al. Circulation 2014;130:475
HCM – LGE

4 studies, n = 1,063, mean f/u = 3.1 years

Cardiac death
HR=2.91 (1.01–8.42)

SCD/aborted SCD
HR=2.39 (0.87–6.58)

HF death
HR=5.68 (1.04–31.07)

All cause death
HR=4.46 (1.53–13.01)

Green et al. J Am Coll Cardiol Img 2012;5:370
# 2014 ESC Guidelines on diagnosis and management of hypertrophic cardiomyopathy

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
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<tbody>
<tr>
<td>In the absence of contraindications, CMR with LGE is recommended in patients with suspected HCM who have inadequate echocardiographic windows, in order to confirm the diagnosis.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>In the absence of contraindications, CMR with LGE should be considered in patients fulfilling diagnostic criteria for HCM, to assess cardiac anatomy, ventricular function, and the presence and extent of myocardial fibrosis.</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>CMR with LGE imaging should be considered in patients with suspected apical hypertrophy or aneurysm.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>CMR with LGE imaging should be considered in patients with suspected cardiac amyloidosis.</td>
<td>IIa</td>
<td>C</td>
</tr>
</tbody>
</table>

Elliott et al. Eur Heart J 2014;35:2733
HR 5% LGE=1.24 (95% CI 1.06-1.45); P=0.007

+ LVEF: HR=1.1 (95% CI 0.92-1.31); P=0.30

Ismail et al. Heart 2014;100:581
HCM - LGE

n = 1,293

Adjusted for conventional SCD risk factors and LVEF

Chan et al. Circulation 2014;130:484
Amyloid - CMR

Pozo et al. Heart 2014;100:1688
Amyloid - CMR

Dungu et al. J Am Coll Cardiol Img 2014;7:133
Amyloid - CMR

Fontana et al. J Am Coll Cardiol Img 2014;7:157
Karamitsos et al. J Am Coll Cardiol Img 2013;6:488
te Riele et al. J Am Coll Cardiol 2014;64:293
CMR-derived PVR

\[ PVR \text{ (WU)} = 19.38 - \left[ (4.62 \times \ln PA \text{ vel}) - [0.08 \times RVEF] \right] \]
CMR-derived PVR

Patients with LVEF ≥50% (n=27)

Patients with LVEF <50% (n=132)

Survival from death/HF hosp (%)

Follow-up (days)

Log-rank p < 0.001

PVR ≤5.2 WU

PVR >5.2 WU

Fabregat-Andres et al.
Eur Heart J Cardiovasc Imaging 2014;15:1391
Thank you