relationship between the peak instantaneous LV outflow tract gradient at rest and TMA, LVMA and MPMA with a R² value of 0.2 (p<0.04), 0.2 (p<0.02) and 0.3 (p<0.04) respectively.

**Conclusions:** LV obstruction is negatively correlated with mitral annulus angle with the LV and inter-mitral papillary muscles space. These results confirm the relationship between LV obstruction and LV shape in HCM.

### 112

**A new morphological and quantitative approach of aortic atheroma: a preliminary 3D transesophageal echocardiography study**

Nadji Hammoudi (1), Malek Ihaddaden (2), Lila Boubrit (1), Catherine Meuleman (3), Stephane Ederhy (3), Pierre Louis Michel (1), Sonia Alamowitch (4), Ariel Cohen (3)

(1) Hôpital de la Pitié-Salpêtrière, Institut de cardiologie, Paris, France – (2) Hôpital Ambroise Paré, cardiologie, Boulogne, France – (3) Hôpital Tenon, cardiologie, Paris, France – (4) Hôpital Tenon, neurologie, Paris, France

Aortic atheroma is a disease causing vascular complications including isch-emic stroke. Transesophageal echocardiography (TEE) is the diagnostic method of reference for characterization of aortic atherosclerotic plaques (AAP) at risk.

**Objective:** The aim of our study was to evaluate the feasibility and contribu-tion of 3D TEE in the evaluation of aortic atheroma.

**Methods and results:** We prospectively included 82 patients referred for TEE. In addition to conventional 2D TEE, a 3D TEE study of AAP of the descending and horizontal thoracic aorta was performed. Overall, 308 AAP were identified in 2D, 98% of them were analyzed using the 3D approach. We identified 3 morphological types of plaques using the 3D approach (figure 1), 2D characteristics of the 3D types of AAP were different: Type I AAP are thin and rarely calcified; type II AAP are thicker and often calcified; 3D type III AAP have intermediate 2D characteristics (Table). All AAP ulcerations seen in 2D were identified in 3D TEE. 2D thickness measurements from 3D acquisitions correlated well with measurements performed directly on the 2D acquisitions (r=0.91; p<0.001). Area measurements of AAP were feasible in 98%, 14% and 23% of 3D types I, II and III AAP, respectively. The areas of type I AAP were not correlated with those of thickness in 2D (p=0.83).

**Conclusion:** 3D TEE is a feasible method for the analysis of the AAP. It provides a new morphological and quantitative approach of AAP whose clin-ical applications remain to be validated.

**Table – Results**

<table>
<thead>
<tr>
<th>Type I (n=115)</th>
<th>Type II (n=97)</th>
<th>Type III (n=89)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descending Aorta (n)</td>
<td>77</td>
<td>63</td>
<td>49</td>
</tr>
<tr>
<td>Horizontal Aorta (n)</td>
<td>38</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>Plaque thickness (mean ± SD; mm)</td>
<td>1.2±0.5</td>
<td>2.6±1.2</td>
<td>3.2±1.5</td>
</tr>
<tr>
<td>Not calcified plaques (n,%):</td>
<td>103 (80.5)</td>
<td>22 (17.2)</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Slightly calcified plaques (n,%):</td>
<td>9 (8.8)</td>
<td>62 (60.8)</td>
<td>31 (30.4)</td>
</tr>
<tr>
<td>Very calcified plaques (n,%):</td>
<td>3 (4.2)</td>
<td>13 (18.3)</td>
<td>55 (77.5)</td>
</tr>
</tbody>
</table>

**Figure – 3D morphological types of plaques**

### 113

**Prognostic value of right ventricular two-dimensional global strain after cardiac surgery**

Julien Terracelle (1), Matthieu Berry (2), Priscille Jurzak (1), Enrique Alonso (1), Jean-Paul Couletti (3), Jean-Luc Dubois Randé (1), Pascal Gueret (1), Jean-Luc Monin (1), Pascal Lim (1)

(1) Cardiologie, Créteil, France – (2) CHU Rangueil, Toulouse, France – (3) Hôpital Henri Mondor, chirurgie cardiaque, Créteil, France

**Background:** To assess the prognostic value of right ventricular (RV) function by 2D global strain, RV fractional area change (RVFAC) and tri-cuspid annular plane systolic excursion (TAPSE) in patients referred to car-diac surgery.

**Methods:** The study included 344 patients (67±13 years, LVEF=52%±12%) referred for left side cardiac surgery (121 isolated CABG, 146 aortic valve surgery, EuroSCORE 10.5%±13). RV function before cardiac surgery assessed by RV-2D global strain by speckle tracking (6-segments model), RVFAC and TAPSE was compared to postoperative outcome defined by one-month mortality.

**Results:** RV-2D global strain was feasible in 73% of patients (n=250), while RVFAC and TAPSE were computed in all. RV-2D global strain averaged –18±5% and moderately correlated with RVFAC (r=0.49, P<0.0001) and TAPSE (r=0.42, P<0.0001). RV dysfunction was more observed by 2D-strain [61% (n=152) and 47% (n=118) for RV-2D global strain≥-20% and ≥-18%, respectively] than by TAPSE≥16 mm (14%) and RVFAC≥35% (6%). Univariate analysis showed that RV-2D global strain (AUC=0.72, P=0.001), TAPSE (AUC=0.65, P=0.009) and RVFAC (AUC=0.63, P=0.02) were all pre-dictive of postoperative mortality (n=26, 7.5%) but only RV-2D global strain remained associated with outcome (OR=1.1, P=0.03) by stepwise multivariate analysis adjusted to Euroscore. Importantly, in patients with RV dysfunction (RV-2D global strain≥-18%), postoperative mortality was strongly reduced (7.5% vs. 24%, P=0.02) when cardiac pulmonary bypass duration was <2 hours.

**Conclusions:** RV-2D global strain appears more sensitive and superior to conventional 2D echocardiography markers for characterizing RV dysfunction and predict postoperative outcome. In patients with impaired RV-2D global strain, postoperative mortality may be reduced by shortening cardiac pulmo-nary bypass duration.

### 114

**Quantitative NMR imaging in acute myocarditis:T1 and extracellular volume fraction measure with MOLLI at 3T**

Marcel Toussaint (1), Raymond Gilles (2), Noura Azzabou (3), Alexandre Vignaud (4), Andreas Greiser (5), Pierre Carlier (3)

(1) Centre Hospitalier Sud Francilien, cardiologie, Corbeil-Essonnes Codoex, France – (2) CHUAP, Tournai, Belgique – (3) Instituto de myolo-gie, Laboratoire de RM/glyph817, Paris, France – (4) Siemens Healthcare, Saint Denis, France – (5) Siemens Healthcare, Erlanger, Allemagne

**Purpose:** Myocardial T1 and extracellular volume fraction (EVF) have been quantified in patients with Ischemic heart disease using MOLLI sequences. The presence and the extent of late gadolinium enhancement (LGE) have been shown to be a strong predictor of adverse events in myocardial infarction and in cardiomyopathies. Quantitative measurements of T1 and EVF might potentially improve the LGE predictive value. In this study we determined T1 and EVF in patients with acute myocarditis and we compared the results with those obtained in patients with myocardial infarction (MI).

**Methods:** In 6 patients with myocarditis (32.2 year-old, sub-epicardial LGE) and 15 with MI (52.5 year-old, sub-endocardial/transmural LGE) T1 was determined using the inversion-recovery sequence (MOLLI) at 3 Tesla. Pre- and post-Gd (15 mm) short-axis T1 maps were performed. The T1 values were compared in LGE and normal regions of the myocardium. The myocardial T1 values were normalized to the T1 of blood and the EVF is calculated from T1 values of myocardium (myo) and blood pre- and post- Gd.

**Results:** The T1 (absolute value and normalised value to blood) is signifi-cantly higher and the EVF significantly lower in myocarditis than in MI.
Conclusions: Myocardial T1 and EVF were found abnormal in the sub-epicardium of patients with acute myocarditis, but much less than the sub-endocardium of patients with chronic MI. A range of T1 and EVF alterations can be demonstrated with MOLLI. Further investigation will indicate whether the severity and EVF changes might help refine the predictive risk of LGE in various cardiac conditions. In myocarditis, T1 and EVF provide complementary information to T2 mapping, which senses both intra and extracellular compartments.

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Prognostic value of CMR criteria for LV functional improvement in patients with acute myocarditis

Emmanuelle Vermes (1), Peter Faris (2), Matthias Friedrich (2)

Background: Standard diagnostic CMR criteria (“Lake Louise Criteria”) indicate acute myocarditis, if at least 2 out of the following 3 criteria are positive: (1) Myocardial edema/T2, (2) hyperemia/capillary leakage/early Gd enhancement ratio (EGE ratio) and (3) irreversible injury/late Gd enhancement (LGE). However, there is a lack of prognostic data using these criteria regarding LV functional improvement.

Methods: We studied 37 patients referred for acute myocarditis during admission and after a 12-month follow-up. CMR studies included T2-weighted and contrast-enhanced T1-weighted (EGE ratio and LGE) sequences. Global edema was defined as T2 SI ratio (normalized to skeletal muscle) of ≥2 and regional edema as a regional area of SI ≥2SD, consisting of at least 10 contiguous pixels. LV function was analysed using long axis views.

Results:

<table>
<thead>
<tr>
<th>Lack of EF increase</th>
<th>EF increase (Δ EF ≥ 5%)</th>
<th>All patients (n=37)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>LL+</td>
<td>18 (69.2%)</td>
<td>11 (100%)</td>
<td>29 (78.3%)</td>
</tr>
<tr>
<td>Edema+</td>
<td>15 (57.7%)</td>
<td>11 (100%)</td>
<td>26 (70.0%)</td>
</tr>
<tr>
<td>EGE+</td>
<td>17 (65.3%)</td>
<td>11 (100%)</td>
<td>28 (75.6%)</td>
</tr>
<tr>
<td>LGE+</td>
<td>17 (65.3%)</td>
<td>8 (72.7%)</td>
<td>25 (67.5%)</td>
</tr>
</tbody>
</table>

In a multivariate analysis, the presence of global and/or regional edema on admission was the only independent predictor of an increase of EF (β=0.428, p=0.009)

Conclusion: In patients with clinically suspected acute myocarditis, the presence of positive CMR Criteria is associated with LV function recovery. Myocardial edema as defined by CMR was the strongest parameter, indicating that the observed increase of EF may be due to recovery of reversibly injured myocardium.

116

Quantitative analysis of microvascular obstruction is bestly related to clinical prognosis than clinical markers at a 1 year follow-up: a contrast-enhanced MRI study

Marie Le Nezet, Loic Bierre, Victor Mateus, Sylvain Grall, Guillaume Clerfond, Fabrice Pruinier, Alain Furber

CHU Angers, cardiologie, Angers, France

Objectives: To evaluate the clinical prognostic value of a cardiac magnetic resonance (CMR) assessment soon after a first ST-segment elevation myocardial infarction (STEMI).

Background: Clinical factors such as gender, age, blood pressure, heart rate, heart and renal failure have already been described as related to poor clinical prognosis at follow-up. For now, the prognostic value and weight of CMR parameters is not well-defined.

Methods: We followed for 1 year up to 168 consecutive patients with a first STEMI treated with primary angioplasty. We performed CMR at day 5±2 and 3months to assess LV volumes. We used delayed enhancement imaging to assess the infarct size and the presence of MVO. We defined severe MVO as MVO extent being superior to its median value (2.82 gr).

Results:

- 13 major adverse cardiac events (MACE) including 2 cardiac deaths, 1 nonfatal myocardial infarctions, 8 readmissions for heart failure and 2 stroke were documented. In univariate analysis, the MACE was related to age, creatin kinase peak, heart failure, MVO and LV volumes. In a complete multivariate analysis, age (hazard ratio 1.075, p=0.003), end-diastolic LV volume (HR 0.74, p=0.017), end-systolic LV volume (HR 1.046, p=0.039), MVO presence (HR 8.867, p<0.01; Log rank=9.195, p=0.002) and severe MVO (HR 9.906, p=0.002; Log rank=18.090, p<0.001) were the only independent prognostic variables. Of note, clinical marker such as heart failure was strongly related to age and found as non significant in multivariate analysis.

Conclusions: A comprehensive CMR assessment is useful for stratifying risk soon after STEMI; baseline LV volumes and severe MVO are the stronger independent prognostic factors. This result supports the clinical interest of a quantitative assessment of MVO.

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Direct comparison of stress Thallium-201/Rest Technetium-99m dual isotope perfusion imaging with Cadmium-Zinc-Telluride detector versus standard dual detector camera

Gilles Barone-Rochette (1), Mélanie Leclere (2), Alex Calizzano (3), Catherine Ghezzi (4), Gérard Vanzetto (1), Daniel Fagret (3)

(1) CHU Trousseau, radiologie, Chambry Les Tours, France – (2) Université de Calgary, Calgary, Canada – (3) CHU Grenoble, médecine nucléaire, Grenoble, France – (4) Unité Inserm 1039, Grenoble, France

Objectives: To evaluate the clinical and prognostic value of a cardiac magnetic resonance (CMR) assessment soon after a first ST-segment elevation myocardial infarction (STEMI).

Methods: We followed for 1 year up to 168 consecutive patients with a first STEMI treated with primary angioplasty. We performed CMR at day 5±2 and 3months to assess LV volumes. We used delayed enhancement imaging to assess the infarct size and the presence of MVO. We defined severe MVO as MVO extent being superior to its median value (2.82 gr).

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Conclusions: A comprehensive CMR assessment is useful for stratifying risk soon after STEMI; baseline LV volumes and severe MVO are the stronger independent prognostic factors. This result supports the clinical interest of a quantitative assessment of MVO.