hypertrophic cardiomyopathy: A 3D speckle tracking imaging study

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Objectives.— To assess LV myocardial deformation with 3D echocardiography in HCM and study the impact of hypertrophy on global and regional systolic deformation.
Patients and methods.— A complete rest echocardiography (GE Vivid 9) was performed in 41 HCM and in 114 control patients. Secondary HCM were excluded. LV systolic deformation was assessed by 3D strains. Values of 3D global LV longitudinal (3DGLS), circumferential (3DGCS), radial (3DRS) and area strain (3DGAS) were obtained from all patients. We classified segments depending on their thickness as first quartile (< 105 mm, $n = 157$), second quartile (105—131 mm, $n = 152$), third quartile (131—166 mm, $n = 162$) and fourth quartile (> 166 mm, $n = 165$).
Results.— All strain values were significantly higher in control than in HCM pts. There was a significant decrease from second quartile to fourth quartile ($P < 0.05$), gradually for longitudinal then radial and circumferential strain values (Table 1).
Conclusion.— 3D echocardiography is a useful tool in HCM patients, bringing in one acquisition all global and regional deformations parameters.
Hypertrophy has an impact on the global mechanics of LV and on regional kinetics of hypertrophic segment impairing gradually longitudinal then circumferential and radial deformation. However, there is also an impact on mechanics of non-hypertrophic segments suggesting an overall involvement of the myocardium.

Table 1 3D strain values.

	< 105 mm segments $n = 157$	105—131 mm segments $n = 152$	131—166 mm segments $n = 162$	> 166 mm segments $n = 165$	HCM patients $n = 41$	Controls subjects $n = 114$
Age (years)					56.6 ± 1 13.5	54.9 ± 12.0
LVEF (%)					62.3 ± 7.1	62.6 ± 4.4
3D GAS (%)	−29.4 ± 10.7	−27.3 ± 9.5[a]	−23.5 ± 110.4[b]	−20.5 ± 7.1[c]	−25.0 ± 10[d]	−34.8 ± 3.2
3DGLS (%)	−14.6 ± 8.5	−12.6 ± 17.8[a]	−9.8 ± 8.1[b]	−7.5 ± 7.1[c]	−11.2 ± 17.7[d]	−20.3 ± 2.7
3DGCS (%)	−18.6 ± 6.5	−17.9 ± 6.7[a]	−16.2 ± 7.0[b]	−14.8 ± 6.5[c]	−16.8 ± 6.9[d]	18.7 ± 2.9
3DGRS (%)	47.31 ± 21.7	42.0 ± 19[a]	35.4 ± 19.5[b]	28.4 ± 14.9[c]	38.3 ± 20[d]	54.6 ± 9.0

[a] $P < 0.05$, 105—131 segments vs. 131—166 mm segments.
[b] $P < 0.05$, 131—166 mm segments vs. > 166 mm segments.
[c] $P < 0.05$, 105—131 segments vs. > 166 mm segments.
[d] $P < 0.05$, HCM patients vs. controls subjects.

http://dx.doi.org/10.1016/j.acvd.2013.03.032

30

Diagnostic value of three-dimensional contrast-enhanced echocardiography for left ventricular volume and ejection fraction measurement in patients with poor acoustic windows: An echo MRI comparison

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Objectives.— Three-dimensional echocardiography (3DE) led to significant improvement in the accuracy and reproducibility of left ventricular volumes (LVV) and ejection fraction (EF) measurements but remains sensitive to patient echogenicity. The aim of this study was to evaluate the impact of temporal resolution, spatial resolution and image dynamic range on the ability of 3-dimensional contrast-enhanced echocardiography (C3DE) to assess LV function compared to CMR.
Patients and methods.— We investigated 54 consecutive patients referred to our institution who underwent LV function assessment using both contrast echocardiography and cardiac magnetic resonance imaging CMR. All patients underwent two-dimensional echocardiography (2DE), non-contrast 3-dimensional echocardiography (NC3DE) and contrast-enhanced (C3DE) and CMR. LVV and EF were calculated for all modalities.
Results.— Left ventricular end-diastolic volume (EDV) was underestimated by 2DE (141.8 ± 58.3 mL), 3DE (145.6 ± 68.6 mL), and to a lesser extent by C3DE (172.3 ± 72 mL) compared to CMR (216.1 ± 85.0 mL, all P values < 0.001). Results were similar for calculation of LVESV. C3DE provided the best agreement with CMR with a greater Lin's concordance correlation coefficient of 0.67, 0.93 and 0.99 respectively for EDV, ESV and LVEF and less drift of the bias for LVV and EF (lowest r^2 coefficient values between the difference and the average of the measurement, respectively $r^2 = 0.14$, 0.18 and 0.01 for EDV, ESV and EF) as well as the best measurement reproducibility. Finally, ultrasound settings (spatial and temporal resolution, dynamic range) had no significant effect on volumes and ejection fraction measurements according to MRI.
Conclusion.— C3DE overcomes 2DE and NC3DE and is a powerful alternative to CMR in patients with poor ultrasound image quality. Furthermore, this study showed that the choice of ultrasound settings, despite a sharp deterioration in spatial and temporal resolution, did not alter the accuracy of LV function assessment.

http://dx.doi.org/10.1016/j.acvd.2013.03.033

31

Is there a cardiac involvement in patients with hemoglobin sickle cell disease?

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Background.— Adult's patients with homozygous sickle cell disease have usually a dramatic left ventricular enlargement and a cardiac high output. Pulmonary hypertension is frequent in this population. Hemoglobin sickle cell disease is currently considered to be a mild variant of homozygous sickle cell disease with less severe anemia. At date no study have been dedicated to describe cardiac involvement of this disease.
Objective.— To investigate cardiac involvement in adults patients with hemoglobin sickle cell disease (SC).
Methods.— Using a case-control design, 64 adults with SC in stable condition (mean age 33.1 ± 10.9 years, 34 women) and 64 age and sex-matched healthy subjects were studied. All patients underwent a complete echocardiography including measurement of the following parameters: Left ventricular ejection fraction (LVEF) and left ventricular end-diastolic volume index (LVEDVi) by biplane method, cardiac index (CI), mitral E to Ea lateral ratio (E/Ea) and tricuspid regurgitation peak velocity (TRV). The exams were reviewed; each parameter was the average of 3 measurements.
Results.— The observed values of LVEDVi, LVEF and E/Ea in patients were significantly different than the corresponding values observed in the control group. However, no patient had LVEF < 50% and no patient had E/Ea ratio > 15.
CI and TRV were similar in the two groups (Table 1).
Conclusion.— Contrary to the patients with homozygous sickle cell disease, patients with hemoglobin sickle cell disease have only a mild left ventricular remodelling. In these patients, pulmonary pressure appears to be normal.