Resting strain analysis to identify myocardial ischemia in patients with advanced chronic kidney disease

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Background: Chronic kidney disease (CKD) is associated with a higher incidence of cardiovascular death, particularly as the disease progresses and patients are on long term dialysis treatment. Screening for coronary artery disease in asymptomatic or mildly symptomatic patients is challenging and controversial.

Objective: The aim of this study was to investigate the incremental value of resting deformation analysis with speckle tracking echocardiography in predicting positive results on stress transthoracic echocardiography in patients with end-stage renal disease on dialysis (stage 5 CKD).

Methods: Our cohort consisted of 61 consecutive patients (mean age 62.3±11.8, 65.7% men) with stage 5 CKD. Patients with a confirmed diagnosis of pre-existing cardiac diseases, such as obstructive coronary artery disease, heart failure, severe arrhythmias or severe valvular disease were excluded. Patients underwent a resting transthoracic echocardiogram and a dobutamine stress contrast echo (DSCE) protocol. Positive results of DSCE were defined as stress-induced LV wall motion abnormalities (new or worsening pre-existing abnormalities).

Results: The study cohort had normal or mildly impaired systolic function with mean LV ejection fraction (EF) of 49.17% (±10.41) and a mean LV GLS of 14.35% (±4.49) (Figure 1). In addition, half of our population had impaired LA strain, with mean LA reservoir, LA conduit, and LA contractile reserve were 24.11% (±12.61), 10.56% (±5.88), and 13.60% (±9.15), respectively. DSCE was positive for ischemia in 55.7%. Age, gender, and history of diabetes were significantly correlated with positive result in DSCE (p=0.027, p=0.022 and p=0.039, respectively). Additionally, a significant negative association with DSCE results was found for the echocardiographic parameters LV EF, LV GLS, the conduit phase of LA strain, LV end diastolic volume as well as LV dimensions (p=0.002, p=0.002, p=0.004, p=0.002 and p=0.048, respectively). Logistic regression analysis showed that LV global longitudinal strain was independently associated with DSCE outcome (p=0.007), after controlling for covariates. The area under the curve (AUC) to predict positive results for LV GLS was 0.92 with a sensitivity of 96%, a specificity of 56% and an overall diagnostic accuracy of 84% (Fig 2).

Conclusion: The present findings demonstrate that resting LV deformation is associated with the presence of coronary ischemia and may be useful to better identify patients with advanced CKD who might benefit from coronary artery screening.
### Predictive Measures

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>Specificity</th>
<th>Sensitivity</th>
<th>AUC</th>
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<tr>
<td>0.839</td>
<td>0.556</td>
<td>0.955</td>
<td>0.919</td>
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Note. The cut-off value is set to 0.5