Anatomical, functional and prognostic correlates of resting coronary flow velocity in patients with hypertrophic cardiomyopathy


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Background: The clinical significance of baseline peak diastolic coronary flow velocity (CFV) in the left anterior descending coronary artery (LAD) has not been investigated yet in patients with hypertrophic cardiomyopathy (HCM).

Aim: To assess the anatomical, functional and prognostic correlates of baseline LAD CFV in HCM.

Methods: 384 consecutive adult HCM patients (age=52±15 years, 164 [43%] females) with no known coronary artery disease from 8 centers in 5 countries were prospectively analyzed. All patients underwent comprehensive transthoracic echocardiography including CFV measurement with pulse wave Doppler in the mid-distal LAD. All patients had preserved left ventricular (LV) function. LV force was calculated as (peak instantaneous LV outflow tract gradient+systolic blood pressure)/LV end-systolic volume. Patients were followed for a median of 50 months (IQ range 18-97 months), the outcome measure was a composite endpoint of all-cause death and acute heart failure.

Results: The mean CFV was 36±11 cm/s. CFV was positively correlated with LV maximal wall thickness (r=0.375, p<0.001), LV maximal septal thickness (r=0.320, p<0.001), resting LV outflow tract gradient (r=0.274, p<0.001), LV force (r=0.227, p<0.001), mean E/e′ (r=0.479, p<0.001) and heart rate (r=0.221, p<0.001). During follow-up, 54 events occurred (33 all-cause deaths and 21 acute heart failures). Receiver operating characteristic analysis was used to determine the best cut-off value of CFV (>31 cm/s) to predict the composite endpoint. Patients with CFV >31 cm/s had a significantly worse 10-year event-free survival compared to those with CFV ≤31 cm/s, see Figure.

Conclusion: Higher resting LAD CFV is associated with greater LV wall thickness, higher LV outflow tract gradient, faster heart rate and more elevated left ventricular filling pressures in HCM. Elevated resting CFV may indicate a coronary microcirculation dysfunction either primary or secondary to anatomical (septal hypertrophy), functional (increased myocardial oxygen demand), or autonomic (increased sympathetic drive) determinants. Whatever the underlying endotype, high resting CFV is related to worse prognosis in the long term.
**Figure.** Kaplan-Meier survival curves for the composite endpoint comprising all-cause death and acute heart failure in hypertrophic cardiomyopathy patients stratified by resting left anterior descending coronary artery flow velocity of 31 cm/s. The number of patients at risk is shown.

![Kaplan-Meier survival curves](image)

<table>
<thead>
<tr>
<th>(CFV ≤31 cm/s)</th>
<th>154</th>
<th>72</th>
<th>39</th>
<th>13</th>
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<tbody>
<tr>
<td>(CFV &gt;31 cm/s)</td>
<td>230</td>
<td>131</td>
<td>76</td>
<td>30</td>
</tr>
</tbody>
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*p = 0.013*