

Flow mapping of Intraventricular velocity behaviour along the early diastolic filling streamline in patients with atrial fibrillation: implication for HFpEF

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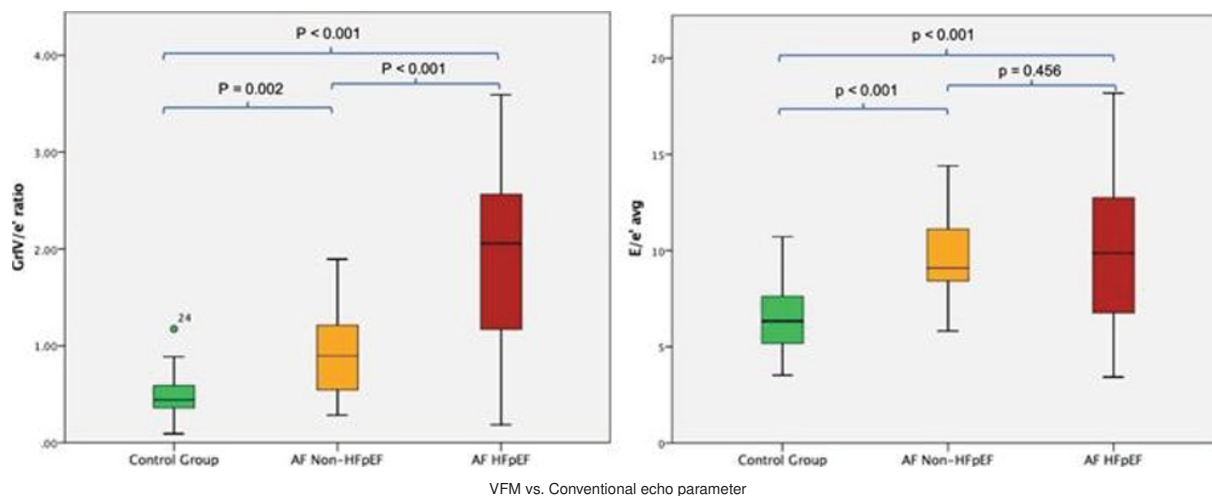
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Aims: Intraventricular velocity distribution reflects left ventricular (LV) diastolic function and can be measured non-invasively by flow mapping technologies. We sought to compare intraventricular velocity gradient during early diastole – obtained by vector flow mapping (VFM) technology – in consecutive patients with normal ejection fraction (EF >55%) and atrial fibrillation (AF) with and without clinical evidence of heart failure (HFpEF), and controls in sinus rhythm. We hypothesised that the VFM-derived Intraventricular Velocity Gradient over e' ratio (GrIV/ e') would discriminate between the groups beyond conventional echocardiographic markers of elevated LV filling pressure.

Methods and results: Two-dimensional streamline fields were obtained using VFM technology in 120 subjects, i) 60 in sinus rhythm with normal systolic and diastolic function, ii) 29 out-patients with AF and no signs or symptoms of heart failure, and iii) 31 patients in AF hospitalized with

signs of HFpEF. We compared the intraventricular gradient along the early diastolic streamline between groups, and correlated it with conventional echocardiographic parameters. GrIV/ e' was the lowest in control group, followed by AF without HFpEF and the highest in AF HFpEF groups (GrIV/ e' = 0.5 ± 0.2 , vs 0.9 ± 0.4 vs. 2.0 ± 1.2 , $p < 0.001$, Figure, left). Conversely, LV filling pressure as determined by E/e' , while lowest in the control group, failed to discriminate between patients with AF with and without ($E/e' = 10.0 \pm 3.7$ vs. 9.5 ± 2.1 , $p = 0.456$, Figure, right).

Conclusion: The novel VFM parameter – reflecting early-diastole intraventricular dynamics – may discriminate between patients with AF with and without HFpEF beyond conventional echocardiography. While further studies are needed to validate its clinical impact, GrIV/ e' has the potential to become a novel parameter for diastolic function assessment in this population.



VFM vs. Conventional echo parameter