

Sex related differences in exercise performance in patients with hypertrophic cardiomyopathy: hemodynamic insights through non-invasive pressure volume analysis

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Funding Acknowledgement: Type of funding sources: None.

Background: Women with HCM have worse cardiopulmonary exercise performance compared to men. We used non-invasive pressure-volume (PV) analysis to delineate sex related hemodynamic differences in HCM.

Methods: PV loops were constructed from echocardiograms using left ventricular (LV) volumes indexed to body surface area, Doppler estimates of LV end-diastolic pressure and blood pressure. The end-systolic PV relationship (ESPVR) and end-diastolic PV relationship (EDPVR) were derived from validated single-beat techniques. The area between the ESPVR and EDPVR (isovolumetric PV area), was indexed to an LV end-diastolic pressure of 30mmHg (PVAiso30), as the integrated metric of LV function. LV volume at an end-diastolic pressure of 30mmHg (V30) indexed ventricular capacity.

Results: 202 patients were included, 56 women. Women were older (51 vs 44 yrs, $p=0.012$) and had reduced exercise capacity (5.6 vs 6.9 METs, $p<0.001$). Only 32 patients (16%) had a peak gradient >30 mmHg at rest with no sex differences. Women had significantly lower indexed PVAiso30 (6577 vs 7767 mmHg·mL/m², $p<0.001$) driven by reduced ventricular capacitance (V30 54 vs 62 ml/m², $p<0.001$). In multivariable linear regression indexed V30 was an independent predictor of exercise capacity.

Conclusion: Impaired exercise capacity in women with HCM appears strongly related to abnormalities in passive diastolic properties, suggesting a unique pathophysiology compared to men, and a potential difference in viable therapeutic molecular targets

