

### REPLY: Doppler Flow patterns in HCM Patients With Apical Aneurysm Provide Insight into Pathophysiology



We would like to express our gratitude to Dr. Sherrid and Dr. Massera for their kind comments and for sharing their experience with us.

In their recent and comprehensive article<sup>1</sup> they thoroughly investigated the mechanisms of obstruction and the hemodynamic consequences of mid-left ventricular obstruction in a large cohort of patients with hypertrophic cardiomyopathy and left ventricular apical aneurysm.

Although our study<sup>2</sup> was conducted on a small series of cases, it is interesting to note that our patients had a mid-left ventricular systolic mean diameter of 4 mm and an obstructing orifice area of <0.2 cm,<sup>2</sup> which is similar to a mean planimetered area of 0.16 cm<sup>2</sup> as reported by Sherrid et al.<sup>2</sup> We were unaware of their brilliant results when conducting our study.

We fully agree that there are differences in velocity and gradients between Doppler and catheterization measurements. Doppler may underestimate catheter-measured gradients owing to the drop in flow across the orifice. Additionally, Doppler data were obtained under stable rest conditions, whereas LV obstruction may significantly increase during physical or emotional stress.

As suggested by Dr. Sherrid and Dr. Massera, the clinical pearl lies in defining mid-LV obstruction as the complete apposition of the LV walls, rather than relying solely on flow velocity.

In this regard, the diameter and length of the LV tunnel, as well as the shape of the LV cavity, play a significant role in the hemodynamic consequences of obstruction and the occurrence of apical ischemia.

Furthermore, the outstanding images and examples published by Sherrid et al<sup>1</sup> provide confirmation

of the different Doppler patterns that we also described, including the void pattern, the complete paradoxical flow pattern, and rare cases of early systolic retrograde wave.

These elements contribute to a better understanding of the mechanisms, hemodynamic consequences, and diagnostic approaches related to mid-LV obstruction in hypertrophic cardiomyopathy.

We also fully support the importance of conducting further research to confirm the hypothesis that mid-LV obstruction contributes to aneurysm formation, inasmuch as it holds the potential to identify it as a viable therapeutic target.

We sincerely appreciate the valuable insights provided by Dr. Sherrid and Dr. Massera.

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<https://doi.org/10.1016/j.jaccas.2023.101965>

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

#### REFERENCES

1. Sherrid MV, Bernard S, Tripathi N, et al. Apical aneurysms and mid-left ventricular obstruction in hypertrophic cardiomyopathy. *J Am Coll Cardiol Img.* 2023;16:591-605.
2. Lo Russo GV, Pepi M, Mushtaq S, et al. Is there a typical Doppler pattern in patients with apical hypertrophic cardiomyopathy with aneurysm? *J Am Coll Cardiol Case Rep.* 2023;14:101836.