International Journal of Cardiology 277 (2019) 272–273

Contents lists available at ScienceDirect

International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard

Editorial

Combining functional assessment with coronary flow evaluation with vasodilator stress echocardiography in post CABG patients: Improving insight into coronary pathophysiology☆

Mazen Hadid [a,1], Vamsi Kodumuri [b,c,1], Mukesh Singh [a,d,*,1]

[a] Department of Cardiology, Swedish American Heart Institute, Rockford, IL, United States
[b] RUSH University Medical Center, Chicago, IL, United States
[c] Department of Cardiology, Cook County Hospital, Chicago, IL, United States
[d] University of Illinois College of Medicine at Rockford, IL, United States

ARTICLE INFO

Article history:
Received 26 October 2018
Accepted 2 November 2018
Available online 6 November 2018

Stress echocardiography is an established diagnostic and prognostic tool for evaluation of coronary artery disease (CAD) [1] and has class 1 indication for assessment of symptomatic patients after coronary artery bypass graft surgery (CABG). Coronary flow velocity reserve (CFVR) measured by transthoracic Doppler echocardiography has been validated against myocardial blood flow reserve measured by positron emission tomography and invasively using a Doppler wire and has shown excellent repeatability and reliability [2–4]. Recently published iPOWER study concluded that transthoracic echocardiographic measurement of CFVR is highly feasible, and in experienced hands, 89% of examinations are of good quality [5]. A reduction in CFVR may reflect either upstream epicardial CAD (unable to provoke RWMAs because of moderate disease or masking effects of antianginal therapy) and/or downstream myocardial or microcirculatory disease. Several publications have considered a CFVR value ≥ 2 as normal and suitable to infer good prognosis or absence of significant coronary artery stenosis [6–8]. Low CFVR assessed by echocardiography has been shown to have prognostic implications in various populations [6,7,9] and has potential use in risk stratification and monitoring of treatment intervention.

In the present issue of the International Journal of Cardiology, Cortigiani et al. [10] present findings from their study assessing the additive prognostic value of dual imaging stress echocardiography, combining the evaluation of regional wall motion and Doppler echocardiographic derived CFVR of the LAD, in patients with history of CABG. They prospectively studied 349 patients with history of CABG from 4 Italian Cardiology institutions in an observational study design. 262 (75%) of these patients had symptoms suspicious for ischemia while 87 (25%) were asymptomatic. They found that the 3-year hard event rate was 59% in patients with both ischemia and abnormal CFVR, 42% in patients with ischemia only, 21% in patients with abnormal CFVR only, and 7% in patients with no ischemia and normal CFVR. A negative stress result with a normal CFVR was associated with 2.5 fold lower risk of death or myocardial infarction than a negative stress result with an abnormal CFVR (2.9 vs 7.5%; $p = 0.002$) (IJC). Risk was highest for the symptomatic subset with inducible wall motion abnormalities and abnormal CFVR and the lowest for the asymptomatic subset without wall motion abnormalities and normal CFVR. They concluded that inducible ischemia and abnormal CFVR were strong and independent prognostic indicators. These results are similar to previously published studies in various other conditions [6,7,9].

Although, the study by Cotigiani et al. [10] suffers from some limitations, authors should be acknowledged for addressing an important clinically relevant issue. The authors correctly state that their findings are only observational and that the study population comprised of predominantly males and the results need validation in larger group of diverse population. This study demonstrates that dual imaging functional assessment is highly feasible using vasodilator SE in real world patients. It also provides evidence that it is possible to identify different strata of risk in CABG patients with vasodilator dual imaging stress echocardiography with prognostic implications. Thus, dual imaging stress echocardiography could be a very useful tool to enhance our management strategies based on coronary pathophysiology in daily clinical practice.

References

[1] P.A. Pellikka, S.F. Nagueh, A.A. Elhendy, C.A. Kuehl, S.G. Sawada, American Society of Echocardiography, American Society of Echocardiography recommendations for performance, interpretation, and application of stress echocardiography, J. Am. Soc. Echocardiogr. 20 (9) (2007) 1021–1041.
[2] M. Saraste, J. Koskenvuo, J. Knuuti, J. Toikka, H. Laine, P. Niemi, et al., Coronary flow reserve: measurement with transthoracic Doppler echocardiography is reproducible and comparable with positron emission tomography, Clin. Physiol. 21 (2001) 114–122.

☆ Declarations of interest: None.
DOI of original article: https://doi.org/10.1016/j.ijcard.2018.09.105.
* Corresponding author at: Department of Cardiology, Swedish American Heart Institute, Rockford, IL, United States.
E-mail address: drmukeshsingh@yahoo.com (M. Singh).
[1] This author takes responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation

https://doi.org/10.1016/j.ijcard.2018.11.002
0167-5273/

[3] C. Caiati, C. Montaldo, N. Zedda, R. Montisci, M. Ruscazio, G. Lai, et al., Validation of a new noninvasive method (contrast-enhanced transthoracic second harmonic echo Doppler) for the evaluation of coronary flow reserve: comparison with intracoronary Doppler flow wire, J. Am. Coll. Cardiol. 34 (1999) 1193–1200.
[4] D.J.R. Hildick-Smith, R. Maryan, L.M. Shapiro, Assessment of coronary flow reserve by adenosine transthoracic echocardiography: validation with intracoronary Doppler, J. Am. Soc. Echocardiogr. 15 (2002) 984–990.
[5] M.M. Michelsen, A. Pena, N.D. Mygind, D. Frestad, I. Gustafsson, H.S. Hansen, J. Kastrup, J. Bech, N. Høst, E. Prescott, Coronary flow velocity reserve assessed by transthoracic Doppler: the iPOWER study: factors influencing feasibility and quality, J. Am. Soc. Echocardiogr. 29 (2016) 709–716.
[6] A. D'Andrea, S. Severino, C. Mita, L. Riegler, R. Cocchia, R. Gravino, et al., Clinical outcome in patients with intermediate stenosis of left anterior descending coronary artery after deferral of revascularization on the basis of noninvasive coronary flow reserve measurement, Echocardiography 26 (4) (2009) 431–440.
[7] J.A. Lowenstein, C. Caniggia, G. Rousse, M. Amor, M.E. Sánchez, D. Alasia, et al., Coronary flow velocity reserve during pharmacologic stress echocardiography with normal contractility adds important prognostic value in diabetic and nondiabetic patients, J. Am. Soc. Echocardiogr. 27 (10) (2014) 1113–1119.
[8] Y. Matsumura, T. Hozumi, H. Watanabe, K. Fujimoto, K. Sugioka, Y. Takemoto, et al., Cut-off value of coronary flow velocity reserve by transthoracic Doppler echocardiography for diagnosis of significant left anterior descending artery stenosis in patients with coronary risk factors, Am. J. Cardiol. 92 (12) (2003) 1389–1393.
[9] R. Sicari, F. Rigo, L. Cortigiani, S. Gherardi, M. Galderisi, E. Picano, Additive prognostic value of coronary flow reserve in patients with chest pain syndrome and normal or near-normal coronary arteries, Am. J. Cardiol. 103 (2009) 626–631.
[10] L. Cortigiani, Q. Ciampi, F. Rigo, F. Bovenzi, E. Picano, R. Sicari, Prognostic value of dual imaging stress echocardiography following coronary artery bypass graft surgery, Int. J. Cardiol. 277 (2019) 266–271.