

Editorial

Diastolic Handgrip Stress Test: An Ideal Screening Tool for Identifying Patients with Inducible Silent Ischemia?

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Editorial

The identification of asymptomatic patients with Coronary Artery Disease (CAD) among population represents one of the greatest and hitherto unsolved problems of diagnostic cardiology and health care too. Peter F Cohn has been emphasizing that asymptomatic CAD should be considered as the greatest “silent killer” and that its incidence in population is around 4% [1].

Initial Screening Failure: The screening for silent CAD clearly represents the probably greatest and unsolved problem, despite all impressive developments of our sophisticated diagnostic devices. However, this dramatic problem remains rather unrealized or/and unspoken. There are several issues that should be analyzed for explaining this great initial screening failure.

First, really asymptomatic “healthy feeling and looking” persons are mostly not coming to us cardiologists in practice or hospitals asking to be examined and if they do it, they are mostly examined only by means of rest ECG and echocardiogram and not by more sophisticated techniques. Second, a person might have one or more atypical symptoms that are underestimated by “healthy feeling” persons. Second, a part of persons have a lack of wish are unable to perform the dynamic exercise tests. Third, most of exercise tests are either not convenient or/and completely safe or/and expensive and, above, they often do not fulfill the appropriate use criteria for asymptomatic persons. The US preventive services task force found insufficient evidence to recommend for or against routine screening with rest or exercise Electrocardiogram (ECG) or electron-beam computerized tomography scanning for coronary calcium for the presence of CAD in adults with or without increased risk for CAD [2].

On the other hand, two extensive studies from Duke University analyzing data from hundreds thousands of American registry patients have proved how little current noninvasive tests are actually adding in the diagnosis of CAD. Namely, Patel et al., [3] found that all multiple different combinations of our present diagnostic noninvasive tests show a mean sensitivity of <70% and Douglas et al., [4] reported an even lower and unacceptable specificity for detecting CAD. Moreover, most of our diagnostic tools are expertise-needing and not completely safe as well as often not even appropriate for screening asymptomatic subjects as well as less available out of hospital.

We all know that the widely accepted and applied exercise test modalities namely the treadmill, bicycle, pharmacologic tests as well as stress echo show profound limitations for being applied as screening tools, since they are too time consuming, expertise needing and also have too many false negatives. Thus, there is a need for better methods for triaging pts with silent CAD out-of-hospitals. An improvement of identification of asymptomatic patients with unknown CAD cannot be done only by going on developing extensively complex/cumbersome/time-consuming and expensive techniques that are mainly available in diagnostic centers and applicable by experts. We should start developing some simple, safe and convenient screening tools that are obtainable even in disabled persons everywhere and by every non-expert physician; these simple tools should, however, have a proved firm path ophysiologic basis.

The “Ischemic Diastolic Response” Concept and Handgrip: Among exercise modalities, a low level, short isometric handgrip exercise represents the simplest and most convenient as well as safest exercise modality, which can be applied by any non-expert physician and to any person including disabled, elderly etc. However, an isometric exercise testing has not been hitherto widely applied in cardiology mainly because a much more intense and longer exercise is needed for getting clinically useful results like ST changes or wall motion abnormalities. Alternatively, it has been shown that LV diastolic LVP abnormalities do occur within seconds or few minutes in the earliest silent phase of induced ischemia [5].

Most importantly, conclusive evidence exists that low level handgrip is associated in CAD patients with vasospasm due to endothelial dysfunction [6] and is associated with dramatic ischemia-induced high magnitude left ventricular (LV) pressure (LVP) curve abnormalities in early and above late diastole, but with only slight associated volumetric changes [7,8]. Interestingly, these diastolic LVP changes occur much earlier than any volumetric systolic or diastolic LV changes in presence of inducible ischemia with isometric [5,6] or dynamic [7] exercise in CAD patients. Therefore, we termed these typical diastolic LVP abnormalities an “Ischemic Diastolic Response” [9,10].

It is expected, thus, that if we could detect non-invasively and exactly define this typical and early occurring “ischemic diastolic response” of LVP-derived measures by a simple atraumatic technique, we probably could also identify a great part of “healthy feeling and looking” persons with silent ischemia among population. Of course, in case with an “ischemic response” these persons should be further examined by more sophisticated techniques for excluding some other CV diseases that are also associated with inducible ischemia – like hypertensive or valvular heart disease or hypertrophic cardiomyopathy etc. [10].

Pressocardiograms: can be obtained by placing and fixing a small pressure sensor transthoracically over the LV impulse. These tracings

reflect in time, slopes and relative amplitude the LVP curve in a hitherto unique way [11-13]. Moreover, some relaxation time [12] and relative amplitude [13] pressocardiographic indexes have been found by many authors to correlate significantly with corresponding LVP derived diastolic measures.

Presso Test: By obtaining simultaneously presso and phonocardiogram with a short, low level handgrip termed Presso Test, some characteristic abnormalities in LV relaxation time and above relative A wave ratio have been observed, which were very similar to analogous LVP derived diastolic measures in presence of ischemia. Based on exact pressocardiographic criteria of “positivity” and above of an “ischemic” diastolic pattern, this simple test showed to be useful for separating healthy from symptomatic as well as asymptomatic ambulatory [14,15] or hospitalized [16] CAD patients.

Conclusion

Presso Test’s findings are very similar to those of LVP in CAD patients. This simple diastolic stress test may become a useful screening tool in hands of every non-expert physician for identifying CAD in the out-of-hospital setting. Moreover, Presso Test might also open the road for creating the first “Mobile stress test” devices with automatic diagnosis, revolutionizing both mobile technology and diagnostic cardiology.

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