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Opinion Article

The Importance of 2D Echocardiography in Stress Management

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DESCRIPTION

Stress echocardiography is a 2D echocardiography paired with a physical, chemical, or electrical stress. The occurrence of a rapid change in regional function during stress serves as the diagnostic endpoint for myocardial ischaemia. Myocardial ischaemia is often caused by a temporary localized imbalance between oxygen demand and supply. The characteristic 'cascade' of events that myocardial ischaemia causes is characterized by the hierarchically ranked order of the different markers in a clearly defined temporal sequence.

Ischemia is accompanied by flow heterogeneity, particularly between the subendocardial and subepicardial perfusion zones, metabolic changes, changes in regional mechanical function, and pain and electrocardiographic abnormalities subsequently. The decrease in Coronary Flow Reserve (CFR) is the most common pathophysiological cause. Ischemia tends to propagate centrifugally with respect to the ventricular cavity, regardless of the force used or the morphological substrate: it primarily affects the subendocardial layer, with the subepicardial layer being affected only later if the ischaemia persists.

Extravascular pressure is higher in the subendocardial layer than in the subepicardial layer, resulting in a higher metabolic requirement (wall tension is one of the key factors of myocardial oxygen consumption) and increased resistance to flow. CFR can be decreased in conditions like microvascular illness (like syndrome X) or Left Ventricular (LV) hypertrophy (like arterial hypertension) even in the absence of Coronary Artery Disease (CAD).

Angina with ST-segment depression and regional perfusion anomalies may occur when this syndrome exists, usually without any abnormalities in regional wall motion under stress. Wall motion abnormalities are more specific than CFR and/or perfusion changes in the diagnosis of CAD. Following is a summary of the three primary specific indications for pharmacologic stress echocardiography:

- Patients with severe arterial hypertension, for example, in whom the exercise stress test is contraindicated.
- Patients with intermittent claudication, in whom the exercise stress test is not practical; and
- Patients whose exercise stress test was nondiagnostic or produced ambiguous results: Inability to achieve the target heart rate response.

The recurrence of chest pain in the absence of significant electrocardiographic modifications, as well as the presence of factors that reduce the reliability of the ECG marker of ischemia. As a result of the existence of left bundle branch block, the ECG is uninterpretable for ischemia, prompting stress imaging. Increased diastolic extravascular resistance and slower and lower diastolic coronary flow are caused by the aberrant sequence of LV activation, which accounts for the stress-induced defect frequently shown by perfusion imaging in individuals with normal coronary arteries.

The best diagnostic method for patients with left bundle branch block is stress echocardiography, notwithstanding the challenges given by aberrant wall motion. Although diminished in the left anterior descending area in the presence of a dyskinetic septum under resting conditions, it is more selective than perfusion imaging and has high sensitivity. Furthermore, pharmacologic stress echocardiography has a strong and independent predictive power in the prediction of future hard events in patients with left bundle branch block, providing a prognostic contribution that is incremental to clinical and resting echo findings in the group with no previous myocardial infarction. Stress echocardiography is a well-established method for diagnosing known or suspected CAD. All main cardiology recommendations endorse it in a variety of therapeutic scenarios. However, because of its low cost, wide availability, and lack of radiation exposure, its standing as an established technology should promote its clinical adoption as the preferred non-invasive imaging approach. Nevertheless these distinctive qualities, there is still a utilization gap with nuclear procedures seen as more objective yet having similar diagnostic and prognosis accuracy.

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CONCLUSION

The variable use of stressors (exercise, inotropic and vasodilation) maximises feasibility, avoids specific contraindications, and allows the assessment to be tailored to each unique patient. A paradigm change will occur when stress echocardiography shifts from a highly skilled qualitative method to a quantitative technique that will make it easier for less competent readers. Technological premises are available, but they have not yet matured to the point where they can be deployed on a routine clinical basis. The majority of society's recommendations and guidelines are based on consensus and the degree of evidence C.