Diagnostic and prognostic value of rapid pacing stress echocardiography in coronary artery disease: one center experience

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Introduction: Noninvasive evaluation of coronary artery disease (CAD) is challenging in patients (pts) with permanent pacemaker, since the electrocardiogram is often uninterpretable. Rapid pacing stress echocardiography (RPSE) has been introduced as a feasible method to increase heart rate (HR), inducing ischemia in these pts independently of physical exercise and drug administration.

Purpose: To evaluate the diagnostic and prognostic value of RPSE in CAD.

Methods: Retrospective unicenter study including pts with a previously implanted permanent pacemaker who underwent stress echocardiography for evaluation of CAD, during a 10-year period (2008 to 2018). RPSE was performed using ventricular stimulation through external programming of the device. Left ventricular segmental contractility (LVSC) was assessed at several stages: rest before pacing; rest with pacing at 90 bpm; peak, achieved through increasing HR every 3 minutes by 10 bpm until 85% of the target HR (220 minus years of age) or a positive result were achieved; and recovery. The test was considered positive for ischemia when a new or worsened wall motion abnormality, involving at least 2 segments was detected. Pts were followed-up throughout 2 years after RPSE. All-cause mortality, nonfatal acute coronary syndrome (ACS) or angina necessitating revascularization were recorded.

Results: Of 5488 stress echocardiograms, 15 (0.3%) were RPSE: 8 (53.3%) male; mean age 76 ± 5 years. At time of RPSE, 13 pts (87%) had primary hypertension, 9 (60%) dyslipidemia, 9 (60%) diabetes and 7 (46.7%) previous diagnosis of CAD (5 ACS, 6 stable CAD) of which 5 have had previous revascularization (2 percutaneous, 3 surgical). In most cases [8 (53.3%)], the primary indications for RPSE performance was atypical angina. Basal left ventricular ejection fraction was depressed in 3 pts (20%) and LVSC alterations was present in 6 (40%). There were no complications during RPSE. The test was positive in 2 pts (13.3%), both of them had significant CAD in invasive coronary angiography. One patient was submitted to percutaneous revascularization and the other to medical treatment optimization. At a mean follow-up of 20 ± 8 months, only 1 (6.7%) adverse event was recorded, occurring as ACS, 14 months after a negative test result. No significant differences were found in baseline characteristics or outcomes between pts with positive and non-positive RPSE.

Conclusions: In our study, the 2 pts with a positive test had significant CAD and the pts with a negative test had a low rate of adverse events during follow-up, supporting the diagnostic and prognostic value of the RPSE. Furthermore, it seems to be a safe technique. These results have been shown to be statistically significant in several studies published in the literature with higher sample and pre-test probability, the two main limitations of our study. Together, they sustain the applicability of RPSE in CAD, being an area of potential growth in echocardiography.