Myocardial Contrast Echocardiography With Triggered Ultrasound Does Not Cause Ventricular Premature Beats: Evidence From PB127 Studies

Ali R. Barghchi, Kevin Wei, Linda Crousse, Floridela Villameusa, Harvey Feigenbaum, Nelson B. Schiller, Robert B. Weyman, James Weinsieck, Jean-Christophe Naqvi, Robert Sipperly, Jonathan H. Goldman, Mark Monaghan, Anthony DeMada, POINT Investigators, University of California San Diego, San Diego, California, Point Biomedical Corporation, San Carlos, California.

BACKGROUND: Myocardial contrast echocardiography (MCE) with high mechanical index (MI) triggered ultrasound and contrast agents has been associated with increased frequency of ventricular premature beats (VPB). However, the relation between VPB, triggered ultrasound and contrast has not been systematically examined. PB127 is a novel contrast agent which is associated with decreased MI triggered ultrasound and contrast. Our aim was to show that PB127 does not cause VPB.

METHOD: MCE was performed with triggered harmonic power Doppler in early diastole (MI=1.0). 71 individuals (cohort A, age 44 +/- 15 years) were studied at rest and another 64 (cohort B age 64 +/- 13 years) were allocated to dipyridamole (n=60) or pacing (n=2). Continuous ECG was recorded to evaluate VPB (>15 mins interval) at baseline and during infusion of PB127 pre stress (dose max. 0.175 mg/kg, < 60 minutes). Percentage GRFS complex with ultrasound trigger (UT) and trigger failure were compared with PB127 triggered ultrasound and contrast (p=0.02) in B (paired t). No ventricular arrhythmias were noted.

CONCLUSION: PB127 does not cause increased VPB frequency during imaging with triggered ultrasound at MI of 1.

Sensitivity Specificity Accuracy PPV NPV
MV n=57 121/135 36/38 151/171 121/121 36/50
MV n=74 71/74 147/148 218/222 71/172 147/150
p 0.185 0.450 0.006 0.785 <0.001

Quantitative Real-Time Myocardial Contrast Echocardiography for Detection of Coronary Artery Disease: Comparison With MIBI SPECT and Coronary Angiography

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Recent experimental studies shown that real-time power modulation myocardial contrast echocardiography (RT-MCE) permits accurate detection of myocardial perfusion (MBF) abnormalities, both at rest and during pharmacological stress. However, the ability of RT-MCE to detect angiographic coronary artery disease (CAD) in patients (pts) remains uncertain. Accordingly, we studied 33 pts (64 +/- 9 years) without previous infarction, compared with both rest and dipyridamole RT-MCE and MIBI SPECT. Results of both tests were compared to those of coronary angiography. Methods: RT-MCE, MIBI reserve was quantified by measuring microbubbles velocity (β) and myocardial blood volume (A) at rest and during dipyridamole. With SPECT, MBF was assessed semi-quantitatively and graded as normal, fixed defect or reversible defect. Data were analyzed on both a segmental and per vascular territory basis. Segments and vascular territories were considered as ischemic (Is) or non-ischemic (Nis) depending on the presence or absence of a significant (>50%) stenosis on the supplying artery by quantitative coronary angiography. Results: Significant CAD were found in 16 pts and involved 26 vascular territories. With both rest and dipyridamole RT-MCE, MBF reserve was significantly higher in Is (2.6 ± 1.3 and 2.9 ± 1.5) than in Nis segments (1.4 ± 0.8 and 1.2 ± 1.0, both p<0.001). By use of cut-off values: 1.85/1.85 S R reserve and 1.87/1.87 S MBF reserve (derived from ROC curves analyses), the sensitivity and specificity of RT-MCE for detection of Is segments were 74%, 78% and 75%, respectively for β reserve and MBF reserve. The ability of RT-MCE to detect CAD in vascular territories was also investigated. With both rest and dipyridamole perfused vascular territories were considered to be abnormal if at least 2 adjacent segments were deemed ischemic during dipyridamole. Accordingly, RT-MCE correctly identified 24/26 (92%) Is territories and 36/43 (84%) Nis territories, whereas SPECT correctly identified 19/29 (65%) Is and 34/43 (79%) Nis territories. Conclusion: Our data suggest that quantitative RT-MCE during high-dose dipyridamole allows for an accurate delineation of both the presence and severity of coronary disease in pts without previous MI.

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