Short PVC Coupling Interval Predicts LV Dysfunction in a Swine Model of Ectopy Mediated Cardiomyopathy

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Introduction: We have previously shown in a swine model of ectopy mediated cardiomyopathy (EMC) that greater PVC dyssynchrony and wider QRS were associated with more severe EMC. However, the effect of PVC coupling interval (CI) on EMC is unclear. We aim to determine the effect of PVC CI in a swine model of EMC.

Methods: Thirteen swine underwent pacemaker implant and were subject to 50% burden of bigeminal PVCs via a lateral CS branch lead to the left ventricle (LV). Pacing occurred at either short (S-CI: 320 ms, n = 7) or long (L-CI: 410 ms, n = 6) coupling intervals for 12 weeks. S-CI animals underwent an additional recovery period of 6 weeks without pacing to study LV recovery. Swine underwent CMR quantification of LV size, function, and strain in sinus rhythm at baseline, at peak cardiomyopathy and after recovery. LV dyssynchrony was quantified as the SD of the time to peak radial strain of 6 segments in the mid-LV short axis view.

Result: There was a significant decline in LV systolic function in the S-CI but not the L-CI swine; the LV systolic function was significantly lower in S-CI compared to L-CI after 3 months of bigeminal PVCs (p< 0.001, Figure 1A). S-CI swine LV function returned to baseline following cessation of bigeminal pacing for 6 weeks. SR LV dyssynchrony increased with S-CI but not L-CI PVCs (p < 0.05, Figure 1B) and normalised with recovery. There was a trend towards greater LV dyssynchrony in S-CI compared to L-CI at 3 months (p=0.08).

Conclusion: In a swine model of EMC, short coupled PVCs from the LV were associated with a greater decline in LV function and dyssynchrony than long coupled PVCs. This suggests short PVC coupling interval is an important mediator of EMC and should be validated in humans.