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The effect of pulsed field ablation in porcine left ventricle on the spatial ventricular gradient

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Spatial ventricular gradient vector (SVG), a measure of the ventricular electrical heterogeneity, was applied to quantify morphological changes observed in ECG after application of pulsed field ablation (PFA) at four doses in the left ventricle of five swine (35 lesion sites). SVG arises from spatial and temporal heterogeneity of ventricular depolarization and repolarization processes. It is calculated from the orthonormal vectorcardiographic leads X, Y and Z, which were reconstructed from the 12-lead ECG. An increase in SVG magnitude was observed ($p < 0.05$) immediately after PFA delivery at the two largest doses of PFA and specifically in the apical region of the heart regardless of the dose. The effect was mostly transient and tended to disappear within 4 minutes post-ablation except for a minority of lesion sites. Therefore, the electrical heterogeneity of the left ventricle can be modified in a large enough volume of the myocardium to be detected in SVG even after a single application of PFA. The generally short-lived change in SVG most likely arose from the transiently electrically stunned myocardium surrounding the catheter tip beyond the actual PFA lesion.