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Relationship between the morphology of myocardial infarction scar border assessed by cardiac magnetic resonance and the inducibility of ventricular tachycardia

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Introduction: In post myocardial infarction (MI) patients, sudden cardiac death is mainly related to monomorphic ventricular tachycardia (MVT) corresponding to a re-entrant circuit in MI scar. Programmed ventricular stimulation (PVS) indicates the presence of this circuit in case of inducible MVT (iMVT). Late gadolinium cardiac magnetic resonance (LGE-CMR) provides high definition imaging of MI scar. We studied whether the MI scar characteristics assessed by LGE-CMR were related to iMVT.

Methods: We included 54 consecutive patients with a remote MI >6 months who underwent PVS and LGE-CMR. 50% had LVEF >35% (group 1) and 50% had LVEF ≤35% (group II). MI scar morphology was defined by the following parameters: total scar surface (TotSS), transmural (TranSS), endocardial (EndSS), intramural and epicardial scar surface (I+EpiSS).

Results: 21 patients presented iMVT: 10 in group 1 and 11 in group 2 (37% vs 41%, p=0.78). All these patients had large contiguous area of I+EpiSS, looking like a barrier, at the infarct border.

In group I: Patients with iMVT had a lower LVEF (41±3.9 vs. 49.8±8.6%, p=0.005), a greater TotSS (53.3±17.4 vs. 27.6±17.8 cm²; p=0.001), TranSS (22.7±12.3 vs. 5.4±8.3 cm²; p=0.003) and I+EpiSS at infarct border (8.1±4.2 vs. 3.6±4.1 cm²; p=0.01).

In group II: Patients with iMVT had a greater TotSS (97.4±31.4 vs. 59.0±25.0 cm²; p=0.002) and I+EpiSS at infarct border (10.9±5.2 vs. 4.7±3.3 cm²; p=0.0008).

Finally, in multivariate model analysis (including: TotSS, TranSS, LVEF, I+EpiSS) only I+EpiSS was associated with iMVT (p=0.04). I+EpiSS >3.1 cm² (AUC=0.83, Se=100, Sp=55) was a better predictor of iMVT than LVEF ≤43% (AUC=0.64, p=0.03).

Conclusion: A critical surface of I+EpiS at the infarct border may be a key component of the re-entrant circuit of MVT independently

