Cardiac fibrosis is associated with atrial fibrillation risk: a meta-analysis

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Introduction: Fibrosis is a hallmark of structural remodelling that forms the substrate for atrial fibrillation (AF). Recent data suggests that fibrosis detected by late-gadolinium enhancement (LGE) cardiac MRI (CMR) can predict AF. However, this relationship is not well described. Thus, we aimed to evaluate the association of cardiac fibrosis with AF prevalence and progression, and AF recurrence post-catheter ablation.

Methods: PubMed, Embase, and Ovid MEDLINE were searched through June 2019, using the keywords: LGE AND Fibrosis AND CMR AND AF. Included studies were pooled in a random effects meta-analysis and reported as: mean difference (MD); risk ratios (RR); and 95% confidence intervals (95% CI).

Result: After exclusions, we identified 9 studies (2,307 patients) conducted between 2003 and 2015 for LGE and AF. Fibrosis was present in 666 (35.1%) and detected by LV LGE in 7 (78%) and RV LGE in 2 (22%). The presence of AF was higher in patients positive for ventricular LGE than those negative, trending towards significance (RR: 1.51, 95% CI: 0.94-2.45, p=0.09). Pooled LV fibrosis associated with AF progression (RR [NPAF vs. PAF]: 2.2, 95% CI: 1.22-3.94, p=0.009). We identified 8 studies (2,041 patients) conducted between 2006 and 2016 reporting LGE and AF recurrence after catheter ablation, with fibrosis detected in 644 (31.6%) by LA LGE in 8 (88.9%, biased towards one centre). After 17.8±14.2 follow-up years, atrial fibrosis was significantly greater in recurrent AF than controls (MD: 4.97%, 95% CI: 1.23-8.7, p<0.01), and predicted 16% increased risk of AF recurrence (RR: 1.16, 95% CI: 1.07-1.26, p<0.05).

Conclusion: Fibrosis detected by LGE associates with prevalence and progression of AF and is predictive of AF recurrence post ablation. This further supports the proarrhythmic role of fibrosis and selection of patients for ablation therapy based on LGE.