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Cardiometabolic and Endocrine Correlates of Left Atrial Scar in Patients Undergoing Atrial Fibrillation Ablation

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Background

Atrial fibrillation (AF) is increasingly conceptualized as a manifestation of atrial cardiomyopathy characterized by progressive fibrosis and structural remodeling. Systemic inflammation may contribute to AF progression and pathogenesis. Elevated inflammatory biomarkers may represent a pro-inflammatory state, playing a possible role in AF. Left atrial (LA) scar burden serves as a surrogate for atrial fibrosis; however, its association with inflammatory markers is less well established.

Objectives

1. To evaluate a possible association between LA scar burden and inflammatory markers.
2. To identify additional markers correlated with higher scar burden.

Methods

We retrospectively analyzed patients undergoing first-time AF ablation to explore the association between systemic inflammatory markers and LA scar burden. Biomarkers included
high-sensitivity C-reactive protein (hsCRP), neutrophil-to-lymphocyte ratio (NLR), and N-terminal pro-brain natriuretic peptide (NT-proBNP). Demographics, comorbidities, and CHA_2DS_2-VASc score were recorded. LA scar was quantified during electroanatomic voltage mapping using the BioSense Webster Oct array catheter D1609.

Results

A total of 229 patients with AF were included;107 (46.7%) demonstrated significant atrial scar, while 122 (53.3%) did not have significant scar burden. Of these, 147 patients with complete biomarker data were included in the final analysis. Scar-present patients had significantly higher NT-proBNP, hsCRP, and BMI, along with a higher prevalence of dyslipidemia, obstructive sleep apnoea, and hypothyroidism, and a significantly

different AF type distribution (all $p < 0.05$). On univariable logistic regression, significant predictors of atrial scar included NT-proBNP, BMI, hypothyroidism, Longstanding persistent Atrial Fibrillation (AF LS-persistent), dyslipidemia, obstructive sleep apnea, and CHA_2DS_2-VASc score, with hsCRP demonstrating a borderline association ($p = 0.076$). On multivariable logistic regression, LS-persistent AF was the only independent predictor of significant atrial scar ($p = 0.026$), while BMI and hypothyroidism showed borderline independent associations ($p < 0.10$).

Conclusions

Our findings suggest a possible correlation of inflammatory markers and Left Atrial scar burden. The association of other comorbidities, like higher BMI, hypothyroidism, dyslipidemia, and sleep apnea, with a higher atrial scar burden may be related to myocardial stress. This suggests an interplay of inflammatory markers and comorbidities, which result in a significant scar burden either directly or indirectly