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Editorial

Epicardial fat and failed recovery after TAVI: A weak yet intriguing correlation

Epicardial adipose tissue (EAT) has garnered increasing interest as a potential biomarker and pathophysiological factor in cardiovascular disease. Positioned between the myocardium and the visceral layer of the pericardium, EAT is metabolically active, secreting pro-inflammatory and vasoactive cytokines. Imaging modalities such as echocardiography, cardiac computed tomography, and magnetic resonance imaging allow for non-invasive measurement of EAT, though standardization and clinical applicability are ongoing. Studies have linked EAT volume with coronary artery disease (CAD), heart failure (HF), and metabolic syndrome [1]. Despite the expanding body of research, its precise role whether as a causal factor or merely a marker of disease, remains uncertain.

The association between increased pericardial and epicardial fat and adverse cardiovascular outcomes has been emphasized in the last decade [2], and a correlation with carotid intima-media thickness, endothelial dysfunction, and coronary artery disease – which are closely interrelated [3]. Given the existence of literature supporting a link between systolic function and epicardial fat, it is particularly interesting to explore this hypothesis in a clinical context where systolic function improvement is anticipated. However, the precise mechanistic pathways remain speculative, warranting further investigation.

Adding to this complexity, recent studies have explored pharmacological strategies targeting EAT: glucagon-like peptide-1 receptor agonists (GLP-1 RAs) seemingly reduce EAT thickness in patients with type 2 diabetes, along with improvements in metabolic markers such as HbA1c, body mass index, and lipid profiles [4]. This positions GLP-1 RAs as a potential therapeutic avenue for modifying cardiovascular risk associated with EAT. However, a paradoxical roles of EAT in heart failure phenotypes has been documented [5]. Specifically, GLP-1 RAs appear to confer benefits in HF with preserved ejection fraction, likely through anti-inflammatory effects and metabolic modulation. However, their use in HF with reduced ejection fraction has been associated with adverse outcomes, suggesting that the effects of EAT modulation may differ based on the underlying cardiac pathology. This underscores the complexity of EAT's role in cardiovascular health.

In the present issue of the Journal, Anwar HS et al. [6] explore the relationship between visceral fat, specifically EAT, and recovery of left ventricular systolic function following transcatheter aortic valve implantation (TAVI). This retrospective analysis provides valuable insight into an emerging area of research, demonstrating a significant direct correlation between higher EAT volume and worse recovery of systolic function post-TAVI.

The authors employed imaging techniques to quantify EAT in a cohort of patients undergoing TAVI. The primary endpoint was the improvement in left ventricular systolic function, assessed by global longitudinal strain (GLS) rather than ejection fraction (EF). Patients were stratified according to recovery of left ventricular function post-TAVI, and the non-recovery group showed a higher prevalence of EAT. However, the non-recovery group exhibited also a higher prevalence of low-flow, low-gradient aortic stenosis and of concomitant coronary artery disease.

These disparities highlight potential confounders and sources of bias, including the significant relationship between EFT thickness and reduced likelihood of recovery, as demonstrated in the multivariate model, and this prompt a cautious interpretation. The limited sample size and retrospective design further constrain the generalizability of the findings.

This study – although retrospective and performed with a modest sample size – adds to the growing body of evidence linking EAT with adverse cardiac outcomes. The observed association between epicardial fat volume and impaired systolic function recovery post-TAVI is intriguing, particularly in the context of efforts to identify predictors of procedural success for this increasingly common and costly intervention.

While the hypothesis that EAT may exert a direct pathogenic effect on myocardial recovery is plausible, it remains equally possible that EAT serves as a marker of broader metabolic derangement or myocardial substrate variation.

Therefore, the observed associations do not establish causality and are influenced by multiple confounders. Further prospective studies with larger cohorts and more rigorous adjustment are needed to elucidate the mechanistic role of EAT in post-TAVI recovery.

Although burdened by inherent methodological constraints, identifying reliable pre-procedural predictors of functional recovery is vital for optimizing patient selection and resource allocation in TAVI [7]. Future research should explore whether targeted interventions to reduce epicardial fat, such as lifestyle modification or pharmacological strategies like GLP-1 RAs, could favorably impact outcomes. As already documented [4], the differential effects of GLP-1 RAs in HF further highlight the complexity of modulating EAT in varying clinical contexts.

In conclusion, while the correlation between EAT and post-TAVI systolic function recovery is compelling, it represents a stepping stone rather than a definitive pathway. The complex interplay between visceral adiposity, myocardial function, and procedural outcomes is anyway fascinating but deserves continued exploration within rigorously designed clinical trials.

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