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EDITORIAL

When is a patient too old or too sick for TAVI? Rethinking futility in advanced aortic stenosis

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This editorial refers to 'Cardiac damage and outcome in transcatheter aortic valve replacement patients—a COMPARE-TAVI 1 trial sub-study', R. Carter-Storch *et al*., https://doi.org/10.1093/ehjci/jeaf300.

The question of when a patient with severe aortic stenosis (AS) is 'too old' or 'too sick' for transcatheter aortic valve implantation (TAVI) has accompanied the evolution of this therapy since its inception. Initially developed for inoperable or extremely high-risk patients, TAVI has progressively expanded across the entire surgical risk spectrum, fundamentally challenging traditional concepts of patient selection and futility.

Cardiac damage (CD) staging has emerged as a comprehensive framework describing the cumulative myocardial and extracardiac consequences of long-standing AS.[1] Advanced CD stages, particularly those involving pulmonary hypertension, tricuspid regurgitation, and right ventricular dysfunction, have consistently been associated with impaired outcomes after aortic valve replacement. Consequently, these findings have often fuelled concern that intervention may come too late in the disease trajectory.[2]

In this context, the study by Carter-Storch *et al*.,[3] published in this issue of the European Heart Journal—Cardiovascular Imaging, provides important and timely insights.[3] Using data from nearly 1000 all-comer patients enrolled in the COMPARE-TAVI 1 trial, the authors investigate whether advanced CD truly identifies patients in whom TAVI is futile, and whether comorbidities contributing to right heart dysfunction modify this relationship.[3,4]

A central strength of the study lies in its differentiation between AS-related and comorbidity-related CD. While CD staging was originally conceived to capture AS-driven myocardial injury, clinical evidence suggests that similar structural and functional alterations may arise from non-valvular conditions such as chronic obstructive pulmonary disease, atrial fibrillation, mitral valve disease, or prior coronary artery bypass grafting.

The authors demonstrate that such comorbidities are common among patients with stage 3–4 CD. Importantly, however, the presence of these comorbidities did not translate into a significantly higher rate of futility after TAVI. One-year futility—defined as death or persistent NYHA class III–IV dyspnea—was low and not significantly different across CD stages, irrespective of whether advanced CD was attributed primarily to AS or to comorbidity burden.

These findings challenge a simplistic interpretation of advanced CD as a marker of irreversible disease in which valve intervention is unlikely to confer benefit. Rather, advanced CD appears to identify patients with greater baseline symptom burden and more complex pathophysiology, who nonetheless remain capable of deriving meaningful functional improvement from TAVI.

Beyond survival, the present study provides valuable data on patient-centred outcomes. Patients with stage 3–4 CD had worse baseline functional capacity, reflected by higher NYHA class and shorter 6-min walk test distances. Nevertheless, they experienced a similar relative improvement in functional status at 1 year compared with patients in earlier CD stages. Although absolute functional limitations persisted, the magnitude of improvement underscores that symptomatic benefit remains achievable even in advanced stages of cardiac remodelling.

From a clinical standpoint, this distinction is critical. Symptom relief and preservation of functional independence are often primary treatment goals in elderly patients with AS, sometimes outweighing modest differences in long-term survival. The data by Carter-Storch *et al*.[3] reinforce the concept that TAVI can deliver clinically meaningful benefit even when structural abnormalities are only partially reversible.

These observations align closely with contemporary guideline recommendations.[5] Current European and international guidelines emphasize that advanced age, comorbidity burden, or ventricular dysfunction alone should not preclude definitive valve replacement in patients with severe, symptomatic AS. In parallel, isolated balloon aortic valvuloplasty has largely retreated to a bridge or bailout strategy, reflecting its limited durability and symptomatic efficacy compared with TAVI.

By demonstrating low futility rates even among patients with advanced CD and relevant comorbidities, the COMPARE-TAVI 1 substudy provides empirical support for this paradigm shift. The data argue against withholding TAVI solely on the basis of CD stage and instead support a holistic, patient-centred assessment by the multidisciplinary Heart Team.

Importantly, these findings should not be interpreted as a call for indiscriminate intervention. Advanced CD remains a marker of increased risk and should prompt careful discussion regarding expectations, residual symptoms, and long-term prognosis. However, CD staging should inform shared decision-making rather than function as an exclusion criterion.

In summary, the study by Carter-Storch *et al*.[3] reframes the question of futility in contemporary TAVI practice. Advanced CD and comorbidity, in isolation, do not define a threshold beyond which TAVI ceases to

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be beneficial. For many patients with severe AS, TAVI remains a safe and effective therapy capable of improving symptoms and functional capacity, even in the presence of advanced cardiac remodelling. The challenge ahead lies not in defining who is 'too sick' for TAVI, but in refining our ability to identify the rare patients in whom valve intervention truly cannot alter the clinical trajectory.

I, Dominik Buckert, declare that I don't have any conflicts of interest concerning this editorial.

Author contributions

Dominik Buckert (Conceptualization [lead]; Writing—original draft [lead]; Writing—review & editing [lead])

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Data availability

No new data were generated or analysed in support of this research.

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