Cardiac damage and 1-year clinical outcomes after transcatheter aortic valve implantation: substudy of the LANDMARK trial

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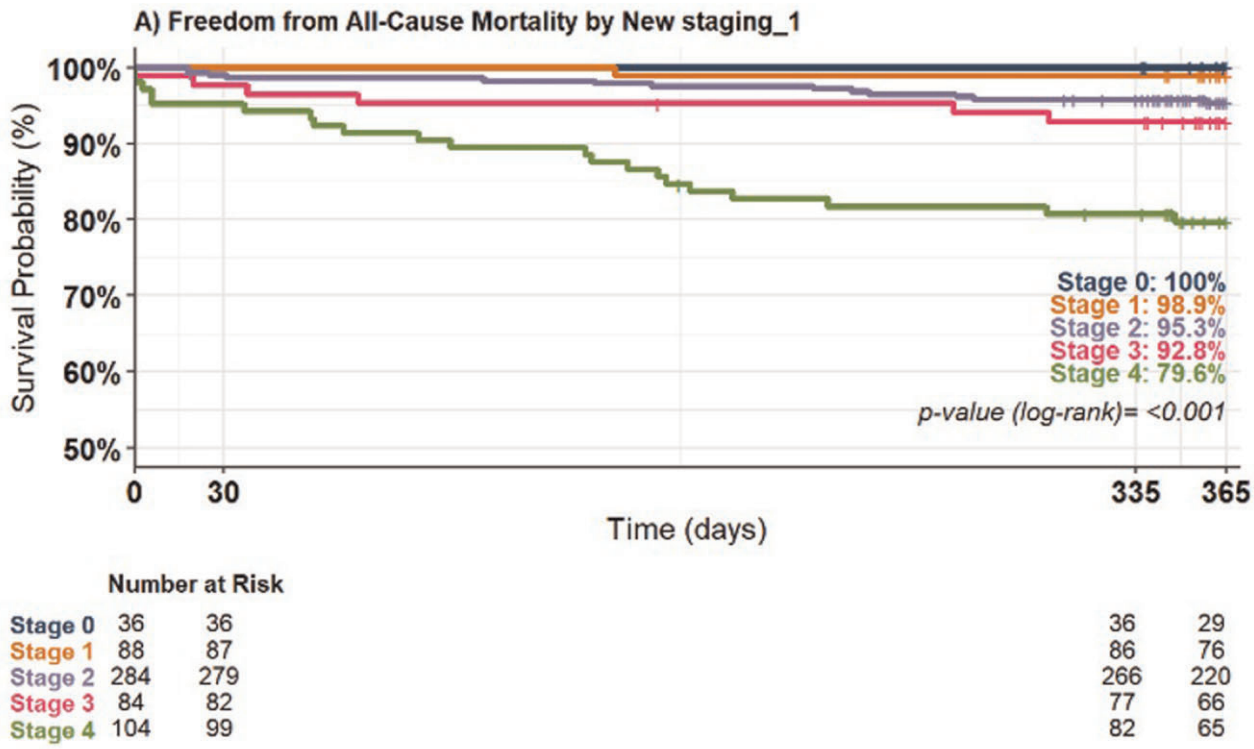
Background: The extent of cardiac damage in patients with aortic stenosis (AS) is associated with worse clinical outcomes.
Purpose: This study aims to report the incidence, temporal change, and clinical impact of cardiac damage in patients with severe AS who underwent transcatheter aortic valve implantation (TAVI) in the LANDMARK randomized trial.
Methods: This is a post-hoc sub-analysis of the LANDMARK randomized, multicentre trial comparing the performance of the Myval transcatheter heart valve (THV) series with the contemporary most common THVs (Sapien and Evolut series). A total of 768 patients with severe symptomatic native AS were assigned in a 1:1 ratio either to receive a novel BE THV (n=368) or contemporary THV (n=368). Preprocedural and one-year transthoracic echocardiography (TTE) were assessed at an independent core laboratory. Using the modifed cardiac damage classification based on the original scheme by P Genereux, patients were categorized into 5 stages (stages 0-4). The definitions of each stage are as follows: stage 0, no other cardiac damage detected; stage 1, left ventricular damage (left ventricular hypertrophy, left ventricular diastolic dysfunction (E/e' >14), or left ventricular ejection fraction <50%); stage 2, left atrial or mitral valve damage (left atrial enlargement [>34 mL/m2], history of atrial fibrillation, or moderate or severe mitral regurgitation); stage 3, pulmonary artery vasculature or tricuspid valve damage (high probability of pulmonary hypertension or moderate or severe tricuspid regurgitation). Probability of pulmonary hypertension was assessed according to the 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension; and stage 4, right ventricular damage (tricuspid annular plane systolic excursion<17mm, right ventricular tissue Doppler S' velocity <9.5 cm/s, or right ventricular fractional area change <35%).
The primary endpoint was all-cause mortality at 1 year. The composite endpoint was defined as death, all stroke and valve- or procedure-related rehospitalisation.
Results: In total, stage of cardiac damage at preprocedural baseline was assessed in 596 patients. The number of the patients in stage 0, 1, 2, 3 and 4 were 36, 88, 284, 84, and 104, respectively. One-year mortality was 0% (stage 0), 1.1% (stage 1), 4.6% (stage 2), 7.1% (stage 3) and 21.2% (stage 4) (global log-rank p-value <0.001, Figure 1). At one year, the composite endpoint occurred in 11.1%, 5.6%, 11.3%, 13.1% and 25.3% in stage 0, 1, 2, 3, and 4, respectively.
In patients with paired baseline and one-year TTE, cardiac damage stage improved in 28.8%, unchanged in 49.8%, and worsened in 21.4% (Figure 2).
Conclusion: The preprocedural staging of cardiac damage by TTE stratified one-year mortality. Patients with stage 4 had higher 1-year mortality, highlighting the prognostic importance of comprehensive echocardiographic staging of cardiac damage in severe AS.

1-year all cause mortality



Change of stages of cardiac damage