Use and success evaluation of percutaneous aortic balloon valvuloplasty in different hemodynamic entities of severe aortic stenosis in the TAVR era

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Background: In the era of transcatheter aortic valve replacement (TAVR), there is renewed interest in percutaneous balloon aortic valvuloplasty (BAV), which may qualify as the primary treatment option of choice in special clinical situations. Success of BAV is commonly defined as a significant mean pressure gradient reduction after the procedure.

Purpose: To evaluate the correlation of the mean pressure gradient reduction and increase in the aortic valve area (AVA) in different flow and gradient patterns of severe aortic stenosis (AS).

Methods: Consecutive patients from 01/2010 to 03/2018 undergoing BAV were divided into normal-flow high-gradient (NFHG), low-flow low-gradient (LFLG) and paradoxical low-flow low-gradient (pLFLG) AS. Baseline characteristics, hemodynamic and clinical information were collected and compared. Additionally, the clinical pathway of patients (BAV as a stand-alone procedure or BAV as a bridge to aortic valve replacement) was followed-up.

Results: One-hundred-fifty-six patients were grouped into NFHG (n=68, 43.5%), LFLG (n=68, 43.5%) and pLFLG (n=20, 12.8%) AS. Underlying reasons for BAV and not TAVR/SAVR as the primary treatment option are displayed in Figure 1. Spearman correlation revealed that the mean pressure gradient reduction had a moderate correlation with the increase in the AVA in patients with NFHG AS (r: 0.529, $p<0.001$) but showed no association in patients with LFLG (r: 0.145, p=0.239) and pLFLG (r: 0.030, p=0.889) AS. Underlying reasons for patients to undergo BAV and not TAVR/SAVR varied between groups, however cardiogenic shock or refractory heart failure (overall 46.8%) were the most common ones. After the procedure, independent of the hemodynamic AS entity, patients showed a functional improvement, represented by substantially lower NYHA class levels ($p<0.001$), lower NT-pro BNP levels (p=0.003) and a numerical but non-significant improvement in other echocardiographic parameters like the left ventricular ejection fraction (p=0.163) and tricuspid annular plane systolic excursion (TAPSE, p=0.066). An unplanned cardiac re-admission due to heart failure was necessary in 23.7% patients. Less than half of the patients (44.2%) received BAV as a bridge to TAVR/SAVR (median time to bridge 64 days). Survival was significantly increased in patients having BAV as a staged procedure (log-rank $p<0.001$).

Conclusion: In daily clinical practice, the mean pressure gradient reduction might be an adequate surrogate of BAV success in patients with NFHG AS but is not suitable for patients with other hemodynamic entities of AS. In those patients, TTE should be directly performed in the catheter laboratory to correctly assess the increase of the AVA. BAV as a staged procedure in selected clinical scenarios increases survival and is a considerable option in all flow states of severe AS. (NCT04053192)

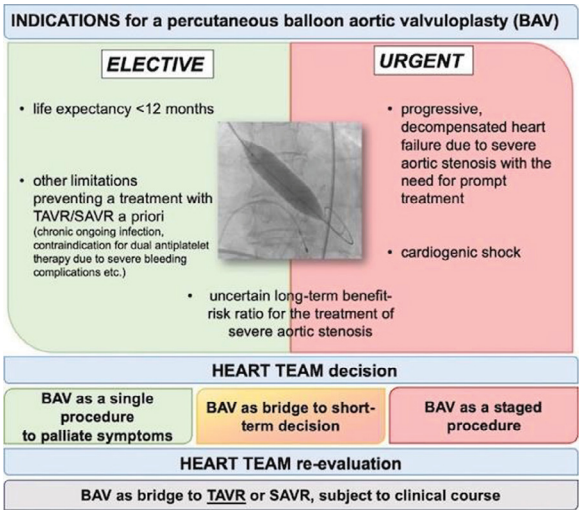

Figure 1