

Dicrotic AR index for predicting paravalvular leakage after trans-catheter aortic valve implantation

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Background/Aims: Paravalvular leakage (PVL) is a frequent complication of transcatheter aortic valve implantation (TAVI) and is associated with increased mortality. The 'AR index' has been used to evaluate PVL, but its accuracy and reliability are uncertain. We aimed to validate the 'AR index' and develop a new hemodynamic index that may precisely predict PVL.

Methods: We retrospectively analyzed 305 patients who underwent TAVI procedures. The patients who underwent TAVI with mechanical hemodynamic support and those absent of an interpretable hemodynamic record were excluded. The traditional 'AR index' was calculated and a 'Dicrotic AR index' was calculated by adding the Dicrotic notch pressure $[(\text{Dicrotic AR index}) = [(\text{Aortic systolic blood pressure}) - (\text{LV end-diastolic blood pressure})] \text{ over } [(\text{Dicrotic notch blood pressure}) - (\text{Aortic diastolic blood pressure})]$, Figure 1). PVL was evaluated by echocardiography and any grade more severe than mild PVL during the first year of follow up was defined as a "significant PVL". The predictive value of 'AR index' and 'Dicrotic AR index' for significant PVL was analyzed using the receiver operating characteristics (ROC) curve analysis.

Results: Overall, 276 patients who underwent TAVI were included. (48.2% male, 79 ± 7 years, STS PROM = 6.3 ± 7.8), along which 78 patients (28.3%) had a mild PVL and 34 patients (12.3%) had moderate PVL. Both the AR index and the dicrotic AR index decreased proportionately to the increased severity of PVL ($p < 0.001$). In ROC analysis, only the dicrotic AR index had a significant predictive value of PVL. (Area Under the ROC Curve [AUC] of AR index: 0.581, 95% CI 0.471-0.692, $p = 0.124$; AUC of new AR index: 0.824, 95% CI 0.746-0.902, $p < 0.001$; AUC comparison p -value < 0.001 , Figure 1). The best cut off value of the dicrotic AR index was 3.3.

Conclusions: The "Dicrotic AR index" is a better hemodynamic modality for assessing the severity of PVL than the "AR index".

