An external validation of prognostic scores for patients with severe tricuspid regurgitation

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Funding Acknowledgements: Type of funding sources: Foundation. Main funding source(s): Andalusian Society of Cardiology

Background: Three scores have been published in 2022 for assessing prognosis of patients with tricuspid regurgitation (TR): the TRI-SCORE, and those reported by Hochstadt and Wang. All of them have shown to be useful in the prediction of mortality in follow-up. However only one of them has been externally validated, their comparative performance is unknown, and their discriminative ability for broader outcomes has not been investigated.

Purpose: To perform an external validation of available scores for predicting mortality and the combined end-point of mortality and heart failure (HF) admission in follow-up, in an independent cohort of patients with severe TR, and to compare their discriminative ability for this outcomes.

Methods: The validation cohort included retrospectively all consecutive patients ≥18 years with severe TR studied with echocardiography in a tertiary care hospital from 01.01.2008 to 31.12.2017, followed for all cause death and HF admission up to 01.01.2022. Every score was calculated in each patient with variables from the basal visit (Figure 1), and discriminative ability of the scores for predicting events was assessed by means of receiver operating characteristics (ROC) curves.

Results: A total 661 patients (69±13 years, 72% women) with severe TR, followed for up to 14 years (median 5 years, p25-75 2-7 years) were included in the validation cohort, with 384 deaths and 268 patients with 636 HF admissions on follow up. Discriminative ability for predicting death (C-statistic 0.72, 95%CI 0.68-0.76, p<0.0005 for the TRI-SCORE; 0.75, 95%CI 0.71-0.78, p<0.0005 for the Hochstadt score and 0.72, 95%CI 0.68-0.78, p<0.0005 for the Wang score, figure 1A) or the combined end-point (C-statistic 0.74, 95%CI 0.70-0.78, p<0.0005; 0.74, 95% CI 0.70-0.78, p<0.0005 and 0.76, 95%CI 0.69-0.77, p<0.0005, respectively, figure 1B ) on follow up was statistically significant for all of them. Paired comparison among them for predicting the combined end-point were all non-significant. However, the Hochstadt score was superior to the other two scores for predicting mortality in follow-up (p<0.005).

Conclusions: All tested scores showed significant and similar discriminative ability for predicting the combined end-point of mortality or HF admission in this independent validation study of patients with severe TR. However, the Hochstadt score performed significantly better than the other scores for predicting mortality in follow-up.

Score | Variables
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TriScore | Age ≥70 years (+1), NYHA Class III–IV (+1), right-HF signs (+1), furosemide ≥125 mg/d (+1), GFR<30 mL/min (+1), elevated bilirubin (+1), LV EF<60% (+1), and mod/sev RV dysfunction (TAPSE<17mm or SVTD<1.5 cm/s, or visual RV dysfunction; +1)).
Hochstadt | Age 65-79 years (+1); 80-84 years (+2); ≥85 years (+3); BMI≤25 (+1); Liver disease (+2); chronic lung disease (+2); eGFR 31-50 (+1); 21-30 (+3); ≤20 (+5); Hb 8.1-12.5 g/dL (+1); Hbs≥8 g/dL (+2); LV EF≤30% (+1); RAP >5 ands≤15 mmHg (+1); RAP >15 mmHg (+2); LV SVI≥30 (+1); LV EDD≤45 mm (+1); RV dysfunction (+1)
Wang | Age 65-74 years (1); ≥75 years (+2); MI (+1), PAD (+1); chronic lung disease (+1), Cr>1.4 (+1); loop diuretic use (+1); Hb<10g/dl (+1); Platelet<15k/mcl (+1); INR>1.5 (+1); Albumin <3.0 (+2); RV dysfunction (mild +1, moderate +2, severe +3), RV SP>50 mmHg (+1)

Abbreviations: HF heart failure; GFR: glomerular filtration rate; LV: left ventricle EF; ejection fraction; RV: right ventricle; TAPSE: tricuspid plane systolic excursion; TDI: Tissue Doppler imaging; BMI: body mass index; Hb: hemoglobin; RAP: right atrial pressure; SVI: stroke volume index; EDD: end-diastolic diameter; MI: myocardial infarction; PAD: peripheral artery disease; INR: international normalized ratio; SP: systolic pressure.

Score variables
ROC curves