


# STREI: a new index of right heart function in isolated severe tricuspid regurgitation by speckle-tracking echocardiography

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## Aims

Right ventricular (RV) performance determines clinical management in severe tricuspid regurgitation (TR). Right atrial (RA) function complements RV assessment in TR. This study aimed to design a novel index by speckle-tracking echocardiography (STREI index) integrating RA and RV strain information and to evaluate the clinical utility of combining RV and RA strain for prediction of cardiovascular (CV) outcomes.

## Methods and results

Consecutive patients with at least ( $\geq$ ) severe TR evaluated in the Heart Valve Clinic ( $n = 300$ ) were prospectively included. An additional independent TR cohort was included for external validation ( $n = 50$ ). STREI index was developed with the formula:  $[2 * \text{RV-free wall longitudinal strain (RV-FWLS)}] + \text{reservoir RA strain (RASr)}$ . The composite endpoint included hospital admission due to heart failure and all-cause mortality. A total of 176 patients with  $\geq$ severe TR were finally included. STREI index identified a higher percentage of patients with RV dysfunction compared with conventional parameters. After a median follow-up of 2.2 years (interquartile range: 12–41 months), a total of 38% reached the composite endpoint. STREI values were predictors of outcomes independently of TR severity and RV dimensions. The combination of prognostic cut-off values of RASr ( $<10\%$ ) and RV-FWLS ( $>-20\%$ ) (STREI stratification) stratified four different groups of risk independently of TR severity, RV dimensions, and clinical status (adj HR per stratum 1.89 (1.4–2.34),  $P < 0.001$ ). Pre-defined cut-off values achieved similar prognostic performance in the validation cohort ( $n = 50$ ).

## Conclusion

STREI index is a novel parameter of RV performance that independently predicts CV events. The combination of RA and RV strain stratifies better patients' risk, reflecting a broader effect of TR on right heart chambers.

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decisions prior the development of HF symptoms. Our data confirm that the evaluation of the right chambers at this stage should be approached with earlier indices of RA and RV dysfunction.

A comprehensive approach that includes not only quantitative measures of jet severity but also parameters of chamber dimensions, relaxation, stiffness, and contractility may help re-define severity of tricuspid valve disease in future. This approach holds promise in the identification and selection of patients who could benefit from early intervention.

The current prospective study establishes the prognostic utility of combining RA and RV function through the new STREI index in patients with TR. This novel index represents a new tool for early detection of RV dysfunction, holding promise for future studies or clinical trials to guide optimal timing for valve intervention.

## Limitations

This was an observational study conducted at a single centre, which may potentially limit the generalizability and statistical power of the findings. Strain values were measured at one time point whereas longitudinal variation over time may provide additional prognostic information. A considerable number of patients in our study exhibited AF, reflecting the prevalent clinical scenario observed in cases of severe TR. The highly specialized cohort may affect the generalizability of the findings, since symptomatic patients and those with previous admission due to HF were not included. Right ventricular ejection fraction from 3D echocardiography was not measured in this study. Lastly, invasive haemodynamic assessment was not performed routinely in all patients.

## Conclusions

STREI is a novel index by speckle-tracking echocardiography (STREI index) that includes both RA and RV strain information in a single parameter. STREI index outperforms conventional indices of RV performance in patients with  $\geq$ severe TR. The combination of RA and RV strain (STREI stratification) stratifies better different TR groups of risk and may aid in identifying patients who may benefit from earlier intervention.

## Supplementary data

Supplementary data are available at *European Heart Journal - Cardiovascular Imaging* online.

**Conflict of interest:** None declared.

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## Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

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