**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
University Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2021

Is indexed right ventricular end-diastolic volume a new key for the tricuspid regurgitation puzzle?

Perez-Camargo, Daniel ; Tagliari, Ana Paula ; Taramasso, Maurizio

DOI: <https://doi.org/10.1016/j.rec.2020.12.002>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-199722>

Journal Article

Accepted Version

The following work is licensed under a Creative Commons: Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) License.

Originally published at:

Perez-Camargo, Daniel; Tagliari, Ana Paula; Taramasso, Maurizio (2021). Is indexed right ventricular end-diastolic volume a new key for the tricuspid regurgitation puzzle? *Revista Espanola de Cardiologia (English Edition)*, 74(8):646-647.

DOI: <https://doi.org/10.1016/j.rec.2020.12.002>

Editorial

Is indexed right ventricular end-diastolic volume a new key for the tricuspid regurgitation puzzle?

Volumen telediastólico ventricular derecho indexado: ¿una nueva pieza para el puzzle de la insuficiencia tricuspídea?

Daniel Perez-Camargo,^{a,b} Ana Paula Tagliari,^{a,c} and Maurizio Taramasso^{a,d,*}

^a Cardiac Surgery Department, University Hospital of Zurich, Zurich, Switzerland

^b Fundación Interhospitalaria para la Investigación Cardiovascular, Madrid, Spain

^c Postgraduate Program in Health Sciences: Cardiology and Cardiovascular Sciences, Faculdade de Medicina da Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

^d HerzZentrum Hirslanden Zurich, Zurich, Switzerland

In the dawn of the growing interest in revisiting the so-called “forgotten valve”, there are many questions on tricuspid regurgitation (TR) assessment and management. A recent article published in *Revista Española de Cardiología* by Rodríguez-Palomares et al.¹ describes 43 prospectively enrolled patients who underwent tricuspid valve surgery due to severe secondary TR; 19 patients (44.2%) had previous cardiac surgery. Although severe TR was the main indication for surgery, with all of the patients receiving a tricuspid ring annuloplasty, 31 patients (72%) required a concomitant left-sided valvular intervention, with mitral valve repair being the most common (60.5%). In the echocardiographic assessment, patients showed signs of right ventricle (RV) dysfunction, such as dilated tricuspid annulus and diminished annular systolic excursion, and 37 patients (86.1%) had massive TR according to the classification proposed by Hahn et al.,² which correlates with RV dilation, annular dilation, and adverse clinical outcomes at 1 year.^{3,4} In line with current literature, 9.3% patients died in the perioperative period. The 3-year mortality was 16.3%, and almost 30% showed a combined endpoint of death or hospitalization for heart failure.

Outcomes after tricuspid valve surgery are poor, and important modifiable factors such as late referral and an underuse of concomitant tricuspid repair at the time of left-sided surgery could help to improve them. Concomitant tricuspid intervention has been thoroughly studied in the last few decades. It does not pose an additional perioperative risk and is associated with favorable outcomes, such as reverse right ventricular remodeling and an improvement in functional status.⁵ Therefore, an early TR guideline-directed intervention favoring repair whenever possible should always be considered to reduce the risk of late TR occurrence or progression. Regarding isolated TR interventions, since contemporary surgery carries a high risk for perioperative mortality and has not demonstrated a clear benefit on survival in long-term follow-up, a more aggressive approach would be reasonable, with surgery being performed at the first signs of

ventricular enlargement and dysfunction, as recommended in current guidelines (class IIa recommendation).^{6–8}

As mentioned by the authors, the main study finding was that end-diastolic right ventricular volume index assessed by cardiac magnetic resonance (CMR) constituted the best predictor of cardiovascular outcomes including TR recurrence during follow-up.¹ Based on this result, the authors suggest that post-TR intervention survival could be improved if patients are referred for surgery before showing an end-diastolic RV volume of 104 mL. Currently, CMR allows for functional assessment of complex right ventricle (RV) shape and is the gold standard for quantitative assessment. Regarding preoperative TR evaluation, a lower end-diastolic right ventricular index was previously associated with favorable RV function recovery after TR surgery,⁹ and Park et al.¹⁰ showed that an RV ejection fraction below 46% was a predictor for cardiovascular death. Importantly, cutoff values for TR severity are currently borrowed from mitral regurgitation; nonetheless, Zhan et al.¹¹ recently reported that a TR volume ≥ 45 mL or a TR fraction $\geq 50\%$ were associated with lower survival at 2.6 years. This evidence, along with that provided in the present article, will strengthen CMR capabilities for risk stratification.

Although multimodality imaging is of major importance in the assessment of these patients, some caveats must be mentioned. CMR is more expensive than echocardiography and is not widely available. Furthermore, like the present study, most studies on CMR evaluation come from large academic centers and do not reflect the current practice for valve disease assessment in the general population. From an individual standpoint, CMR is not feasible in patients with incompatible pacemakers or defibrillators and in patients with atrial fibrillation or premature ventricular contractions imaging quality—and consequently quantitative assessment—might be compromised (specific techniques to overcome this problem have been proposed).¹² Therefore, currently, the appropriateness criterion for using this imaging technique consists of cases with inconclusive echocardiographic examination.^{13–15}

The journey through the tricuspid valve is an exciting field for research that will benefit from an integrative approach to improve assessment and management. We must always remember the importance of a thorough follow-up, so we can optimize the timing of intervention and be able to offer a more individualized, and hopefully, better treatment to our patients.

SEE RELATED CONTENT:

<https://doi.org/10.1016/j.rec.2020.09.008>

* Corresponding author: Cardiac Surgery Department, University of Zurich, Rämistrasse 100, 8091 Zurich, Switzerland.

E-mail address: m.taramasso@gmail.com (M. Taramasso).

<https://doi.org/10.1016/j.rec.2020.12.002>

1885-5857/© 2020 Published by Elsevier España, S.L.U. on behalf of Sociedad Española de Cardiología.

CONFLICTS OF INTEREST

M. Taramasso is a consultant for Abbott Vascular, Boston Scientific, and 4tech and has received fees from Edwards Lifesciences, CoreMedic, Swissvortex, and Mitraltech. A.P. Tagliari's scientific research is supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (Capes) - Finance Code 001.

REFERENCES

1. Rodríguez-Palomares JF, Lozano-Torres J, Dentamaro I, et al. Predictors of cardiovascular outcomes after surgery in severe tricuspid regurgitation: clinical, imaging and hemodynamic prospective study. *Rev Esp Cardiol*. 2020. <http://dx.doi.org/10.1016/j.rec.2020.09.008>.
2. Hahn RT, Zamorano JL. The need for a new tricuspid regurgitation grading scheme. *Eur Heart J Cardiovasc Imaging*. 2017;12:1342–1343.
3. Vieitez JM, Monteagudo JM, Mahia P, et al. New insights of tricuspid regurgitation: a large-scale prospective cohort study. *Eur Hear J Cardiovasc Imaging*. 2020. <http://dx.doi.org/10.1093/ehjci/jeaa205>.
4. Miura M, Alessandrini H, Alkhodair A, et al. Impact of Massive or Torrential Tricuspid Regurgitation in Patients Undergoing Transcatheter Tricuspid Valve Intervention. *JACC Cardiovasc Interv*. 2020;13:1999–2009.
5. Chikwe J, Itagaki S, Anyanwu A, Adams DH. Impact of concomitant tricuspid annuloplasty on tricuspid regurgitation, right ventricular function, and pulmonary artery hypertension after repair of mitral valve prolapse. *J Am Coll Cardiol*. 2015;65:1931–1938.
6. Axtell AL, Bhambhani V, Moonsamy P, et al. Surgery Does Not Improve Survival in Patients With Isolated Severe Tricuspid Regurgitation. *J Am Coll Cardiol*. 2019;74:715–725.
7. Becerra-Muñoz VM, Rodríguez-Capitán J, Sánchez-Espín G, Such-Martínez M, Gómez-Doblas JJ, de Teresa-Galván E. Outcomes After Surgical Treatment of Severe Tricuspid Regurgitation in a Contemporary Series. *Rev Esp Cardiol*. 2019;72:178–180.
8. Baumgartner H, Falk V, Bax JJ, et al. 2017 ESC/EACTS Guidelines for the Management of Valvular Heart Disease. *Eur Heart J*. 2017;38:2739–2791.
9. Kim HK, Kim YJ, Park EA, et al. Assessment of haemodynamic effects of surgical correction for severe functional tricuspid regurgitation: Cardiac magnetic resonance imaging study. *Eur Heart J*. 2010;31:1520–1528.
10. Park JB, Kim HK, Jung JH, et al. Prognostic value of cardiac mr imaging for preoperative assessment of patients with severe functional tricuspid regurgitation. *Radiology*. 2016;280:723–734.
11. Zhan Y, Debs D, Khan MA, et al. Natural History of Functional Tricuspid Regurgitation Quantified by Cardiovascular Magnetic Resonance. *J Am Coll Cardiol*. 2020;76:1291–1301.
12. Hahn RT, Thomas JD, Khalique OK, Cavalcante JL, Praz F, Zoghbi WA. Imaging Assessment of Tricuspid Regurgitation Severity. *JACC Cardiovasc Imaging*. 2019;12:469–490.
13. Zoghbi WA, Adams D, Bonow RO, et al. Recommendations for Noninvasive Evaluation of Native Valvular Regurgitation: A Report from the American Society of Echocardiography Developed in Col*laboration with the Society for Cardiovascular Magnetic Resonance. *J Am Soc Echocardiogr*. 2017;30:303–371.
14. Chambers JB, Garbi M, Nieman K, et al. Appropriateness criteria for the use of cardiovascular imaging in heart valve disease in adults: A European Association of Cardiovascular Imaging report of literature review and current practice. *Eur Heart J Cardiovasc Imaging*. 2017;18:489–498.
15. Doherty JU, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2017;70:1647–1672.