# Mortality and heart failure in patients with severe tricuspid regurgitation. Impact of RV volumes and function by CMR

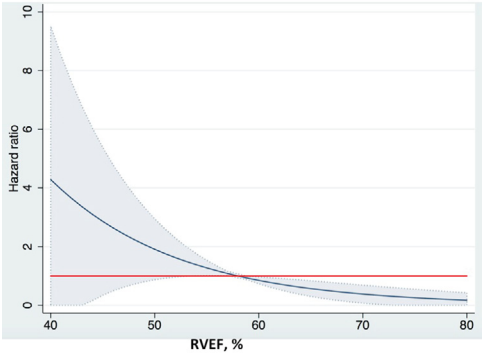
R. Hinojar Baydes, A. Garcia-Martin, A. Gonzalez-Gomez, J.M. Monteagudo, M. Pascual-Izco, G. Alonso-Salinas, S. Rivas Garcia, M.A. Fernandez-Mendez, A. Garcia De Vicente, J.L. Zamorano, C. Fernandez-Golfin

*University Hospital Ramon y Cajal de Madrid, Madrid, Spain*
**Funding Acknowledgement:** Type of funding sources: None.

**Background and objectives:** Right ventricle (RV) dilatation and dysfunction are established criteria for intervention in patients with significant tricuspid regurgitation (TR); however defined thresholds to support intervention are lacking. As a result the optimal timing for surgery in TR remains controversial and surgery is commonly undertaken at a late stage.
**Purpose:** To describe predictive cut-off values of RV size and function of poor prognosis in asymptomatic patients with significant TR.
**Methods:** Consecutive patients in stable clinical condition evaluated in the Heart Valve Clinic with significant TR (severe, massive or torrential TR) undergoing a Cardiac Magnetic Resonance (CMR) study were included. Conventional parameters of biventricular volume and function were assessed in all patients. A combined endpoint of hospital admission due to right heart failure and cardiovascular mortality was defined.
**Results:** 75 patients were included in this study (age 75±8 years, 75% female, 91% functional TR). During a median follow-up of 3 years (IQR: 1.4–3.9 years), 39% of the patients (n=29) experienced the combined endpoint. After adjusting for age and LVEF in a multivariate Cox proportional model, RV-EDV and RVEF were independently associated with cardiovascular mortality and heart failure. Thresholds of RV-EDV $\geq$100 ml/m$^2$, RV-ESV $\geq$40 ml/m$^2$ and RVEF $\leq$58% held the best accuracy to predict outcomes (figure 1). Regression spline model for RVEF and outcomes are presented in the figure 2. They show that RV function negatively impacted event-free survival, with an increase in the HR spline function near the crossing value (red line, RVEF $\leq$58%). In multivariable analysis, following adjustment for age and LVEF, a value of RVEF $\leq$58% and RV-EDV $\geq$100 ml/m$^2$, was associated with 2.29, and 3.91-fold increased risk of heart failure or cardiovascular death respectively (RVEF Hazard Ratio (HR): 2.29 [1.06–4.9], p=0.03, and RV-EDV HR: 3.91 [1.56–9.82], p=0.004).
**Conclusion:** RV size and function are crucial for determining optimal timing for TR intervention. For the first time, cut-off values of RV volume and function are defined in a cohort of consecutive patients based on outcome data. Proposed values provide a basis for prospective studies to establish definitive optimal surgical timing for severe TR.

| PARAMETER | AUC (95% CI) | Cut-off values | Hazard Ratio | CI 95% | P value |
|---|---|---|---|---|---|
| RV-EDV (ml/m2) | 0.76 (0.66-0.87) | 100 | 3.91 | [1.56 – 9.82] | 0.004 |
| RV-ESV (ml/m2) | 0.78 (0.68-0.88) | 40 | 2.85 | [1.27 – 6.44] | 0.011 |
| RVEF % | 0.71 (0.62-0.84) | 58 | 2.29 | [1.06 – 4.9] | 0.03 |

Figure 1. ROC and Cox regressions analysis




Regression spline curve