

Prognostic value of three dimensional-vena contracta area in patients with secondary mitral regurgitation

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**Background:** Effective regurgitant orifice area (EROA) is an important quantitative measurement for mitral regurgitation (MR) grading. Yet, the accuracy of this method is limited in patients with secondary mitral regurgitation (SMR). Three-dimensional (3D) color Doppler echocardiography allows for the direct assessment of the vena contracta area (VCA). The prognostic value of 3D-VCA in patients with secondary MR has not been investigated.

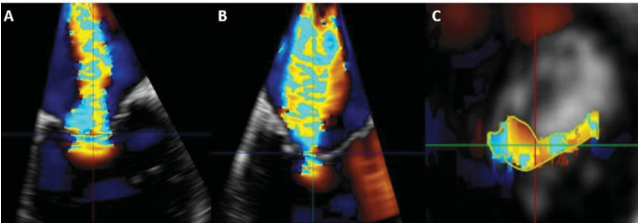
**Purpose:** The aim of the present study was to assess the association between 3D-VCA and prognosis of patients with SMR.

**Methods:** A total of 218 patients (69% men, median age 74 years) with significant SMR were retrospectively analyzed. 3D-VCA was measured offline with dedicated software, from restored 3D color Doppler full volume datasets of the mitral valve (Figure 1). The population was divided according to the American College of Cardiology expert recommendation for the grading of severe MR ( $VCA \geq 50 \text{ mm}^2$  and  $VCA < 50 \text{ mm}^2$ ). Patients were followed up for the combined end point of all-cause mortality or heart failure hospitalization.

**Results:** Of the total population, 63% had an ischemic etiology, 60% had atrial fibrillation and 25% cardiac resynchronization therapy. Patients with  $3D\text{-}VCA \geq 50 \text{ mm}^2$  needed more diuretic therapy, had a larger left ventricle and atrium, and had more post-procedural residual MR. A total of 82% of patients underwent MitraClip device implantation, 17% had mitral valve repair and 1% had mitral valve replacement. During a median follow-up of 28 months, 130 (60%) met the combined end point (101 (46%) patients died and 81 (37%) were hospitalized due to heart failure). When dividing the population according to the cut-off of 3D-VCA, patients with a  $3D\text{-}VCA \geq 50 \text{ mm}^2$  had a worse prognosis compared with their counterparts (Figure 2). In a multivariable Cox regression analysis,  $3D\text{-}VCA \geq 50 \text{ mm}^2$  remained independently associated with the composite endpoint of all-cause mortality or heart failure hospitalization (HR=1.454, 95% CI 1.020–2.072, p=0.038).

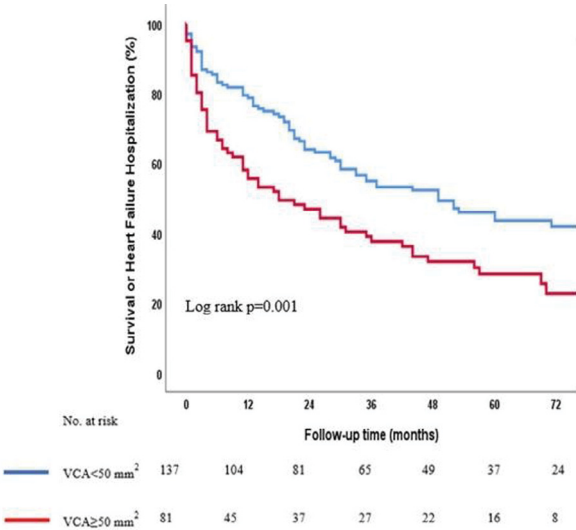
**Conclusion:** In patients with SMR, a  $3D\text{-}VCA \geq 50 \text{ mm}^2$  was independently associated with a combined endpoint of death or heart failure hospitalization.

Choosing the systolic frame with the largest MR jet. Panel A and B: Setting the 3D planes parallel to two orthogonal jets and at the narrowest point of the two orthogonal views, set the point of the VC. Panel C: Short axis view of the VC and the area obtained.



3D, three dimensional. MR, mitral regurgitation. VC, vena contracta. VCA, vena contracta area.

Figure 1. Method of 3D-VCA measurement



MR, mitral regurgitation. VCA, vena contracta area. 3D, three dimensional.

Figure 2. Kaplan-Meier survival curve