

**Quantitative Modeling of the Mitral Valve by 3D Transesophageal Echocardiography in Patients Undergoing Mitral Valve Repair: Correlation with Intraoperative Surgical Technique**

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**Background:** Mitral valve repair is the procedure of choice for patients with degenerative mitral valve disease (DMVD) with severe mitral regurgitation. We sought to identify specific quantitative mitral valve parameters from pre-operative 3D transesophageal echocardiography (3D TEE) that are associated with the length of the mitral annuloplasty band implanted and the performance of leaflet resection in patients with DMVD undergoing MV repair.

**Methods:** 94 patients (60±11 years, 68% male) referred for MV surgery with adequate quality pre-operative 3D-TEE studies were retrospectively identified. Parametric maps of the MV were generated using a semi-automated MV modeling software. Annular and valvular parameters were measured and indexed to BSA. The implanted annuloplasty band size and leaflet resection were determined based on surgical reports.

**Results:** 3D annular circumference correlated best ( $r=0.74$ ) with the implanted annuloplasty band length and remained an independent predictor on multivariable linear regression analysis. A third of our cohort ( $n=33$ ) had posterior leaflet resection. On ROC analysis P2 segment length of  $\geq 20$ mm (AUC of 0.86, Sens 88% Spec 74%) and P2 leaflet area of  $\geq 3.4$ cm<sup>2</sup> (AUC 0.84, Sens 85% Spec 74%) best discriminated the need for leaflet resection.

**Conclusions:** In DMVD, quantitative 3D annular circumference obtained from semi-automatically generated parametric maps of the mitral valve from 3D TEE data was associated with the surgically implanted annuloplasty band length while the P2 leaflet length  $\geq 20$ mm and area  $\geq 3.4$ cm<sup>2</sup> were associated with performance of leaflet resection. These parameters should be further investigated for pre-operative planning in patients with DMVD undergoing mitral valve repair.