P102. Flat Ring Mitral Annuloplasty: does It Really Decrease Leaflet Stress?

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OBJECTIVES: Flat ring annuloplasty has long been considered and import component of mitral valve repair. Intuitively the ring has been thought necessary to restore normal geometry and reduce stress on the repair. Despite this the stress reduction attributes of flat ring annuloplasty have never been quantitatively demonstrated.

METHODS: Two similar mitral valve repair (P3 resection) cases were imaged post operatively using real-time 3D echocardiography. No ring was used in one patient because of active endocarditis. In the other case a flat rigid annuloplasty was used as part of the repair. Full-volume data sets were obtained at mid systole, and analyzed offline using commercially available and custom software. Individual leaflet data were interpolated, reconstructed, and meshed. Finite element analysis was used to determine regional stress distribution in the valve leaflets. Peak and mean Von Misses stresses were determined in each leaflet region (A1-A3; P1-P3).

RESULTS: Anterior leaflet regional peak and mean stresses were greater in the repair with annuloplasty than in the repair without annuloplasty. Annuloplasty, however, reduced peak and average stresses near the area of leaflet resection (P2 and P3).

CONCLUSIONS: While flat annuloplasty decreased stress in the area of leaflet resection (P3) it tended to increase leaflet stress over the A1, A2, and P1 regions. This large area of increased stress is likely due to the annular and resulting leaflet flattening caused by the flat annuloplasty ring.

Regional Stress (MPa)	A1	A2	A3	P1	P2	P3
With Ring (A)						
Mean	0.14±0.06	0.24±0.09	0.16±0.08	0.08±0.04	0.08±0.04	0.07±0.04
Peak	0.29	0.43	0.34	0.18	0.16	0.17
W/O Ring (B)						
Mean	0.11±0.04*	0.19±0.09*	0.16±0.07*	0.05±0.03*	0.09±0.04*	0.12±0.06*
Peak	0.22	0.39	0.35	0.16	0.20	0.25

Regional Mitral Valve Von Misses Stress