

## P80. An Intra-annular Hemispherical Mounting Frame For Aortic Valve Repair

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**OBJECTIVES:** A hemispherical model was developed in which human cadaveric aortic valves were represented as 3 hemispheres nested within a cylindrical aorta, all with the same radii (JHVD 2008;17:179-186). By mathematically describing the junction between the leaflets and aorta, annular geometry could be defined (Figure A, heavy line). In this study, a prototype annuloplasty frame based on this model was used to repair isolated porcine aortic root preparations.

**METHODS:** The model predicted that leaflet free-edge length (L) could be used to define valve diameter (D) necessary to create competence by the equation: Required  $D=L \times 3/\pi$ . Eight isolated porcine aortic roots were perfused with saline at a pressure of 75mmHg, and valve leak was measured before and after vertical incision of 2 or 3 subcommissural areas to produce gross incompetence. Annuloplasty frames, sized by the model, then were sutured to the valve annuli, and the leak again was determined. Differences were evaluated by a two-tailed paired t-test.

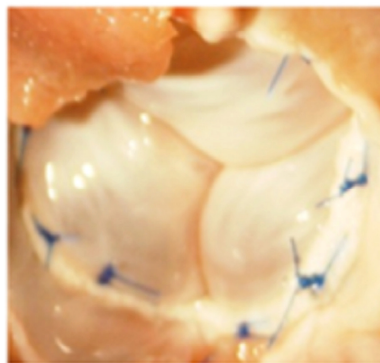
**RESULTS:** All 8 normal porcine aortic valves had negligible leak at baseline. With commissural incision, regurgitant volume increased to 522 ml/min + 378 ml/min (mean + SD). After hemispherical annuloplasty frame insertion, measured leak decreased to 52 ml/min + 40 ml/min ( $p=0.004$ ) (Figure B).

**CONCLUSIONS:** A 3-dimensional intra-annular aortic valve annuloplasty frame was developed based on a hemispherical model of valve geometry. In isolated porcine aortic root preparations, insertion of the frame into disrupted annuli routinely and effectively restored valve competence. These initial results support continued testing and application of the hemispherical mounting frame for aortic valve repair.

Figure



A



B