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A Quantitative Study of Simulated Bicuspid Aortic Valves KAI SZETO, TRAN NGUYEN, University of California, San Diego, JAVIER RODRIGUEZ, Universidad Carlos III, Madrid, Spain, PETER PASTUSZKO, University of California, San Diego; Rady Children's Hospital, San Diego, VISHAL NIGAM, University of California, San Diego; Children's Hospital, San Diego, JUAN LASHERAS, University of California, San Diego — Previous studies have shown that congentially bicuspid aortic valves develop degenerative diseases earlier than the standard trileaflet, but the causes are not well understood. It has been hypothesized that the asymmetrical flow patterns and turbulence found in the bileaflet valves together with abnormally high levels of strain may result in an early thickening and eventually calcification and stenosis. Central to this hypothesis is the need for a precise quantification of the differences in the strain rate levels between bileaflets and trileaflet valves. We present here some in-vitro dynamic measurements of the spatial variation of the strain rate in pig aortic vales conducted in a left ventricular heart flow simulator device. We measure the strain rate of each leaflet during the whole cardiac cycle using phase-locked stereoscopic three-dimensional image surface reconstruction techniques. The bicuspid case is simulated by surgically stitching two of the leaflets in a normal valve.

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