SUPPLEMENTARY VIDEOS

Video 1 (tavFlow.mpg): Blood flow visualization based on time resolved 3D pathlines for a normal tricuspid aortic valve. Note the central systolic flow immediately downstream from the aortic valve plane.

Video 2 (uniFlow.mpg): Blood flow visualization based on time resolved 3D pathlines for a unicuspid aortic valve. Note the systolic flow directed toward the inner curvature of the ascending aorta immediately downstream from the aortic valve plane and opposite the partial raphe.

Video 3 (trueFlow.mpg): Blood flow visualization based on time resolved 3D pathlines for a **true bicuspid aortic valve.** Note the systolic flow directed along the right wall of the ascending aorta immediately downstream from the aortic valve plane.

Video 4 (rlFlow.mpg): Blood flow visualization based on time resolved 3D pathlines for a RL bicuspid aortic valve. Note the systolic flow directed along the right-anterior wall of the ascending aorta immediately downstream from the aortic valve planeand opposite the visible RL raphe.

Video 5 (rnFlow.mpg): Blood flow visualization based on time resolved 3D pathlines for a RN bicuspid aortic valve. Note the systolic flow directed along the inner wall of the ascending aorta immediately downstream from the aortic valve planeand opposite the visible RN raphe.

Video 6 (quadFlow.mpg): Blood flow visualization based on time resolved 3D pathlines for a quadricuspid aortic valve. Note the central systolic flow immediately downstream from the aortic valve plane and poor coaptation with mild regurgitation.