Clinical Case Review

Assessment of Bicuspid Valve Function Using Vitrea® Software

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INTRODUCTION

The patient is a 55-year-old man with known bicuspid valve being followed for aortic size. The study intent was to evaluate myocardial and valve function. Because the patient had experienced some angina, coronary artery examination was also requested.

Dr. Michael Steigner imaged and evaluated the patient.

METHOD

Brigham and Women's Hospital initially imaged the patient in January 2007 using CT.

FINDINGS

The volumes were loaded into the Vitrea® system from Phases 0-90%. Using the Cardiac Functional CT protocol, the program automatically segmented the left ventricle (LV), picked the end systolic (ES) and end diastolic (ED) phases and calculated the ejection fraction (EF) (*see Figure 1*). EF was calculated to be 56%, ES at 30% phase and ED at 90% phase of the R-R cycle.

These findings were confirmed as accurate by verifying the volumes selected. The image was then rotated and adjusted the axis to exclude as much of the aorta as possible and include as much as possible in the mitral valve plane (*see Figure 2*). The system then recomputed the EF to 59% based on these changes.

The recalculation of EF was confirmed by viewing the definitions of the myocardium and the LV wall (*see Figure 3*). The definitions were satisfactory. The need to edit the autogenerated contours was deemed unnecessary.

The rate to watch animation of cardiac function was then adjusted. A normal EF was obsrved with the semi-automatically calculated EF. The cardiac function was viewed in 3D and the image rotated to view the apex (*see Figure 4*).

Figure 1: Segmentation of LV and Calculation of EF

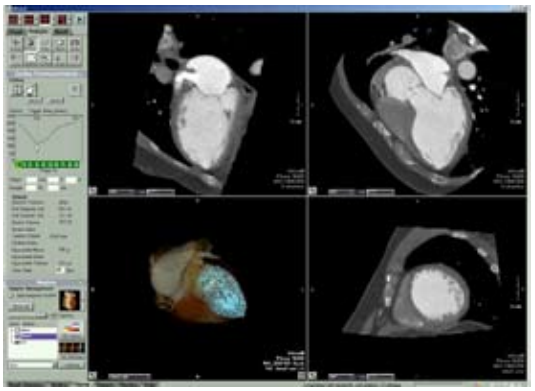


Figure 2: Adjustment of Axis
Figure 3: Definition of Myocardium and LV Wall

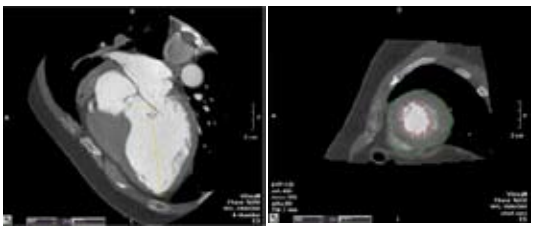
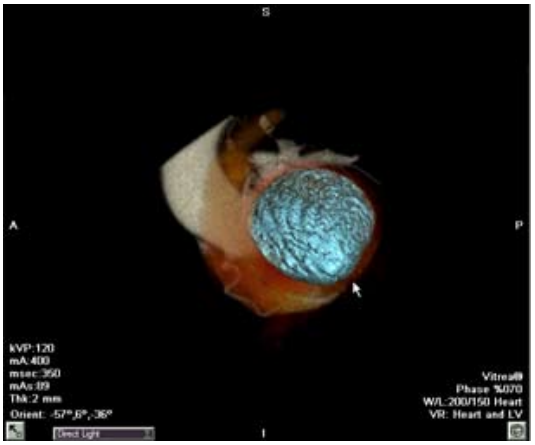


Figure 4: 3D Visualization of Cardiac Function



The bicuspid valve was evaluated by changing the screen layout to 3D MPR Mode and turning off the Automatic Chamber views to get the standard orthogonal planes. The valve was defined by rotating the crosshairs to the axis of the oblique orthogonal valve plane (*see Figure 5*) and the plane adjusted to get the best view of the valve leaflets.

Once the leaflets were visualized, the bicuspid aortic valve function was viewed in 3D by making the contrast transparent and trimming the plane volume to the valve area (*see Figure 6*).

Finally, the 3D image was adjusted by turning off the valve contrast and window leveling to visualize the “fish mouth” appearance of the bicuspid aortic valve (*see Figure 7*).

CONCLUSION

The coronary arteries, EF and bicuspid valve function were assessed as normal. The case was concluded in less than 10 minutes.

Figure 5: Rotation of Crosshairs in the Oblique Orthogonal Plane

Figure 6: Isolation of Valve Area in the Plane

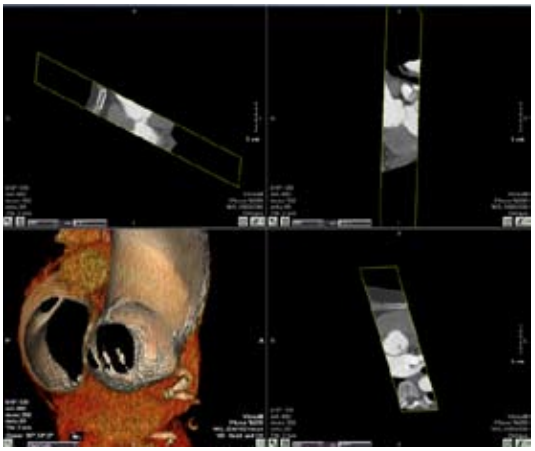


Figure 7: 3D Visualization of Bicuspid Aortic Valve

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