

Multiplanar review analysis of 3D echo in an adult with a subaortic membrane

Clinical Case Portal

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Abstract

A 35 year old with murmur attended for 2D echocardiogram, this showed a complex mobile structure in the LVOT. She declined TOE so 3D echo was performed. We found that a low frame rate (20 fps) combined with the smoothing and filtering inherent in 3D volumetric rendering resulted in disappointing images of a rapidly moving complex structure but multi-planar review analysis of the "raw" 3D dataset was superior.

Introduction

A 35 year-old female was referred for echocardiography after a clinical finding of murmur in pregnancy. Imaging windows were limited by the physiological changes of pregnancy but a mobile structure was identified in the LVOT (Figures 1 and 2). There was no significant gradient in the LVOT and the aortic valve was otherwise normal.

Case Report

After successful delivery, she returned for further assessment. She declined TOE so 3D echo was performed. Full volume 3D echocardiographic datasets were obtained.

Volumetric reconstruction was initially performed which showed a bar-like structure (Figures 3 and 4) moving in the LVOT. It was felt that this smoothed and rounded structure did not reflect the complexity of the mobile structure seen on 2D transthoracic echocardiogram and that the combination of poor temporal resolution with voxel filtering and manipulation had "smoothed out" a complex 3D object. Adjustment of parameters on the software did not improve matters.

In view of this, a multiplanar review analysis of the "raw" 3D dataset was performed (Figure 5). Although still limited by a temporal resolution of 20 fps, the complexity and movement of the structure could be more readily appreciated with "in-plane" imaging in 3 dimensions (Figures 6 and 7). A curved membrane was identified in the LVOT consistent with a subaortic membrane,

Using a combination of 2D and 3D MPR data, a diagnosis of discrete subaortic membrane (without significant stenosis) was made with a superior attachment just below the aortic valve with extension near the anterior mitral valve leaflet inferiorly

Discussion

3D echocardiography offers the possibility of examining the heart from an infinite number of planes and solving the problem of restricted imaging windows.

The technology can be limited by issues such as relatively poor temporal resolution (20 fps in our case) but each new generation of scanner is improving on this.

3D volume rendering involves manipulating the transparency of voxels as well as introducing surface lighting and shading. Whilst results are often pleasing to the eye, important information can be removed in the process and care must be taken when interpreting a heavily "filtered" image.

Multiplanar review analysis allows detailed examination of unfiltered "raw" data simultaneously in 3 separate planes which can be adjusted at will. It is ideally suited to the assessment of the morphology of subaortic stenosis [1].

Conclusion

3D echocardiography offers great potential for the assessment of mobile structures with a complex morphology but limitations exist in terms of temporal resolution and artefacts produced by the 3D volumetric rendering process. Multiplanar review analysis is helpful if volumetric imaging appears unsatisfactory.

References

1. Barucha T, Ho SY, Vettukattil JJ. Multiplanar review analysis of three-dimensional echocardiographic datasets gives new insights into the morphology of subaortic stenosis. Eur J Echocardiog 2008; 9: 614-620.

Fig. 1 :

[2D echo: arrow shows membrane in LVOT](#)



Video 1 :

[2D parasternal long axis video of LVOT](#)



Video 2 :

[3D parasternal long axis video](#)



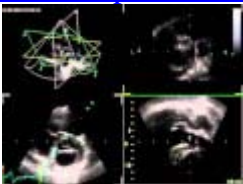
Fig. 2 :

[3D volumetric reconstruction](#)



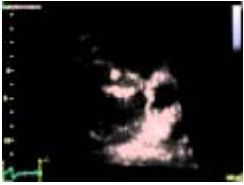
Video 3 :

[3D multiplanar review of LVOT](#)



Video 4 :

[MPR oblique long axis through LVOT and Aortic valve](#)



Video 5 :

[MPR oblique 3 chamber view](#)

