

Assessment of Standard and Non-Standard Echocardiographic Acoustic Windows to Visualize the Right Ventricle in patients with Tetralogy of Fallot

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Purpose:

The importance of the right ventricle (RV) in assessing patients with congenital heart disease, pulmonary hypertension, heart failure and CAD is increasingly recognized. It is difficult to monitor changes in RV size and function using echocardiography because of difficulty with visualization. The purpose of this study is to evaluate the ASE published guidelines for RV imaging and evaluate alternate non-standard views to visualize the RV.

Background:

Accurate volumetric information of the RV using 2D or 3D imaging requires complete visualization of the RV. This project evaluates the optimal views for visualization of the RV and offers additional non-conventional acoustic windows for those with limited acoustic windows.

Methods:

Image acquisitions were done in 5 normal and 5 subjects with TOF. Each subject was imaged from multiple acoustic windows including parasternal, apical, right upper sternal border (RUSB), high and low parasternal, subcostal and foreshortened apical. We then superimposed the scan plane from each image on a surface reconstruction of the RV in that patient to assess the position of the scan plane relative to the 3D reconstruction. The reconstructions were done using the Piecewise Smooth Subdivision Surface software developed at the University of Washington and the VentriPoint Medical System.

Results:

The addition of non-standard acoustic windows improved visualization of the RV. The basal to mid-ventricular inferior lateral wall was the most difficult area to visualize. Low parasternal and foreshortened apical views with rotation around the RV proved to be the most effective acoustic windows to visualize this region as shown in the Figure 1. High parasternal acoustic windows and RUSB provided optimal visualization of the pulmonary infundibulum, PV leaflets and RVOT. Additionally, the 4 chamber view was found to miss the true apex in TOF whereas an oblique view of the apex taken from a low parasternal or oblique foreshortened apical provided optimal visualization of the RV apex in TOF patients.

Conclusion:

Visualization of the entire RV is critical to assess volume and function. The addition of non-standard acoustic windows allows for more complete visualization of the RV in those patients that are difficult to image, especially those with dilated RV's.

