Right Ventricular Ejection Fraction

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Indications and Purpose of the Scan

• In patients with suspected right ventricular pathology such as significant valvular heart disease, left to right shunts, complex congenital heart disease, or arrhythmogenic right ventricular dysplasia, CMR is a highly reproducible method of assessing the right ventricular volume and ejection fraction.

Description

• Images already used to calculate left ventricular volumes and ejection fraction can be used for right ventricular volume and ejection fraction calculation without any additional time. Additional views can be obtained to evaluate the right ventricular free wall motion.

Why CMR (Specific Advantages)

• The right ventricle is a difficult cardiac structure to image with traditional cardiac modalities such as transthoracic echocardiography.
• With CMR, the right ventricle can be easily visualized, and highly reproducible volumetric and systolic function assessment can be performed, even in patients with congenital heart disease.1,2
• A variety of cardiac pathology that can affect the right ventricle can be easily identified with cardiac MRI. Primary pathology that can affect the right ventricle include: Arrhythmogenic right ventricular dysplasia, Uhl's anomaly, Ebstein's anomaly. Right ventricular infarct, thrombus, sarcoidosis can also be easily identified with cardiac MRI. In patients with tetralogy of Fallot and other complex congenital heart disease, left-to-right shunts (e.g. atrial septal defects, anomalous pulmonary venous return), pulmonary hypertension, severe tricuspid or pulmonic valvular regurgitation, the effect on the right ventricle can be reliably measured and follow over time.3-5

Evidence

   a. 20 normal volunteers, 20 patients with ASD and 20 patients with Tetralogy of Fallot underwent CMR. Right ventricular volume and ejection fraction were obtained from short axis cine, and were measured by 2 independent readers and had high inter-(ICC: 0.94-0.99) and intra-observer (ICC = 0.96-0.99) reproducibility

   b. 50 patients with congenital heart disease underwent CMR. Right ventricular volume and ejection fraction were obtained based on both short axis cines and axial cines and were measured 3 times. There was high inter- and intra-observer reproducibility with both methods.

Contraindications

• Any implanted device that is not MRI conditional
• Inability to lie flat
• Inability to tolerate the scan
• Altered mental status/ inability to follow verbal commands in scanner
• Severe arrhythmias
Appropriateness

- Evaluation of Ventricular and Valvular Function Procedures may include LV/RV mass and volumes: Assessment of complex congenital heart disease including anomalies of coronary circulation, great vessels, and cardiac chambers and valves: A (9)
- Evaluation for arrhythmogenic right ventricular cardiomyopathy (ARVC), patients presenting with syncope or ventricular arrhythmia: A (9)

More Information

- Case of the Week - Number 17-09: Concealed Right Ventricular Infarction Revealed By Cardiac MRI
- Case of the Week - Number 16-07: Uhl’s Anomaly: You’ll Recognize It When You See It
- Case of the Week - Number 11-22: Ebstein Anomaly In An Asymptomatic Air Force Professional
- Case of the Week - Number 11-13: Fibro-Fatty Replacement And Other Abnormalities In Suspected ARVC

References