Cardiomyopathies are diseases of the myocardium associated with cardiac dysfunction. The latest report of the World Health Organization classifies them according to the dominant pathophysiology (Table 1). The diagnosis of cardiomyopathy has been greatly improved in recent years by non-invasive imaging techniques. Cardiovascular magnetic resonance, or CMR, is now firmly established in clinical and research cardiovascular medicine as a tool for evaluating cardiomyopathy.

**Dilated cardiomyopathy.** Dilated cardiomyopathy (DCM) is characterized by left ventricular or biventricular dilatation and impaired contraction. Although a significant proportion of cases is of unknown etiology, viral, genetic, toxic, immune and some other pathological conditions can lead to this condition. The clinical presentation usually involves heart failure, which is often progressive. Recently, myocardial tagging has been reported to provide evidence of severe reductions in fiber shortening and the absence of normal systolic LV wall thickening from base to apex.

**Hypertrophic cardiomyopathy.** Hypertrophic cardiomyopathy (HCM) is characterized by left and/or right ventricular hypertrophy. This results from an inherited defect in the protein components of the cardiac sarcomere. The pathologically characteristic feature is localized but otherwise unexplained myocardial hypertrophy associated with significant myofibrillar disarray. Accurate and early diagnosis of HCM is essential as many of these patients are at risk for recurrent arrhythmias, premature cardiac death. The genetic nature of the disorder has important implications with respect to the screening of family members. MRI shows edema and fibrosis in a heterogeneous pattern in the mid-wall of the left ventricular myocardium in advanced states of this condition.

**Arrhythmogenic right ventricular cardiomyopathy.** Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a disease characterized by enlargement, dysfunction and fibrofatty infiltration of the right ventricle (RV). It is recognized clinically by ventricular tachyarrhythmia, abnormal RV morphology and RV dysfunction. Although rare, it may be responsible for 10-20% of sudden cardiac death due to arrhythmias among young people in certain populations. MRI shows right ventricular enlargement, aneurysm formation and decreased function. Secondary criteria include fatty and fibrofatty replacement of RV and LV myocardium in some cases. ARVC evaluation with MRI can be difficult. The right ventricle shows substantial normal variations, including reduced regional wall motion in the region of the moderator band insertion, highly variable trabeculation, and substantial fat around the coronary vessels and epicardium. Fatty infiltration is not considered a definitive sign of disease in any case, because it can occur in other circumstances. Small amounts of RV fat with normal RV function are seen in normal individuals, but individuals with large amounts of RV fatty infiltration and normal function may be seen.

**Assessment of pulmonary veins and right atrium in patients with atrial fibrillation.** There is an estimative of 2 million persons in US with atrial fibrillation. One of the options to treat atrial fibrillation besides pharmacology intervention is catheter ablation. Over the years, the technique of catheter ablation of atrial fibrillation (AF) using pulmonary vein (PV) approach is a procedure performed in many electrophysiology laboratories. PV stenosis has been identified as a unique complication of this procedure. Increasing evidence suggests that the risk of PV stenosis may be minimized and the success maximized by delivery of radiofrequency (RF) energy to the ostial portion of the PV. The importance of PV anatomy to the success of PV ablation is now appreciated. MRI has the potential to provide accurate images and render 3D reconstruction for precise characterization of each PV.

References