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Short Communication

Significance of Magnetic Resonance Imaging (MRI) in Cardiology

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ABOUT THE STUDY

Technological advancements that allow for the rapid acquisition of high-quality images, Magnetic Resonance Imaging (MRI) has become an important imaging modality in the non-invasive evaluation of cardiovascular diseases. In the evaluation of myocardial function, Magnetic Resonance Imaging (MRI) is considered the gold standard. Over the last decade, Cardiac Magnetic Resonance Imaging (CMRI) has advanced rapidly, firmly establishing it as a reliable and clinically important technique for assessing cardiac structure, function, perfusion, and myocardial viability. Its versatility and precision are unrivalled by any other imaging modality. CMRI is a non-invasive, high-resolution imaging technique that does not require the use of a potentially nephrotoxic contrast agent or radiation. It has been extensively compared to other well-established non-invasive imaging modalities and has been shown to be superior in a variety of situations, particularly in terms of assessing cardiac and great vessel morphology and left ventricular function [1].

CMR imaging is used to assess regional and global ventricular function, as well as to answer anatomy questions. The identification and quantification of nonviable, edematous, inflamed, infiltrated, or hypo perfused myocardium is among the many tissue characterization approaches enabled by state-of-the-art CMR sequences. These tissue changes are used not only to help diagnose cardiomyopathies, but also to gain a better understanding of tissue pathology *in vivo*. In ischemic and non-ischemic cardiomyopathies, the extent of myocardial fibrosis as imaged by contrast-enhanced CMR correlates with adverse patient outcome, and the extent of myocardial fibrosis as imaged by contrast-enhanced CMR correlates with adverse patient outcome [2].

CMR imaging's current role in clinical cardiology, including coronary artery disease, congenital heart disease, non-ischemic cardiomyopathies, and valvular disease, is discussed. Cardiac Magnetic Resonance (CMR) has emerged as an important tool for the diagnosis of cardiomyopathies, providing highly accurate information on changes in a cardiac morphology, function, and tissue composition at the macroscopic level. The technique of myocardial delayed enhancement is a potentially promising tool for diagnosis, management, and prognosis in myocardial tissue characterization. Dilated cardiomyopathy, hypertrophic cardiomyopathy, restrictive cardiomyopathy, arrhythmogenic right ventricular disease, myocarditis, and other cardiomyopathies can now be diagnosed and prognosed using a variety of CMR techniques [3].

In cardiovascular medicine, Magnetic Resonance Imaging (MRI) has become a very useful diagnostic tool, and its importance is growing. MRI can accurately assess myocardial function as well as the anatomy of the heart and great vessels. The availability of MRI scanners in only a few centers and long scanning times has previously hampered this method. Modern cardiovascular MR scanners, on the other hand, have made this technique more useful by reducing scan times and simplifying scanning protocols.

The non-invasive nature of MRI, the lack of ionizing radiation, high spatial resolution, and three-dimensional imaging capacity are all advantages. In addition, the contrast agents used in imaging are non-toxic. It has a few drawbacks, including long scanning times and breath-hold periods. The role of MRI in patients who have pacemakers or defibrillators is unknown. Patients with newer-generation ICDs and pacemakers, on the other hand, can be safely scanned by MRI without causing any harm to the patients or the implanted devices, according to a recent study. Artifacts caused by motion and respiration can occur, complicating image interpretation [4].

The most common application of MRI in cardiology is to describe anatomy. It's been particularly useful as a supplement to echocardiography in the evaluation of congenital diseases. It can calculate shunt fraction and describe atrial and ventricular septal defects. The use of MRI in the treatment of complex congenital cardiovascular diseases is now widely accepted. It has also become increasingly important in the follow-up of patients after corrective surgeries, such as the Fontan operation, Fallot tetralogy correction, coarctation repairs, and other procedures. MRI has also been shown to be effective in the diagnosis of aortic diseases such as atherosclerosis, aortic aneurysms, and the aortic

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dissection. Coronary artery imaging is a newer application of MRI. Recent research has found that detecting left main or three-vessel coronary artery disease has a high sensitivity (100%) and specificity (85%) [5].

CONCLUSION

This modality, however, is hampered by a number of issues, including a long scanning time and low spatial resolution, and should only be used for research purposes at this time. In the future, newer pulse sequences, novel algorithms, and better contrast agents will undoubtedly solve these problems. Identification of high-risk coronary plaques that aren't necessarily stenotic could be a future imaging modality for MR. This could lead to better risk stratification of patients with subclinical disease and, as a result, more accurate treatment.

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