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Commentary

Role of Artificial Intelligence in Cardiology

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DESCRIPTION

Artificial intelligence is the ability of computers and machines to solve problems that require human effort. Advances in computing power have made it possible to analyse large amounts of data quickly, consistently and accurately. This has enabled medical scientists to apply AI to large and complex datasets in ways to improve decision-making, diagnosis, and treatment by recognizing patterns in patient data.

The basic component of an AI system is a "neural network". For example, computer systems are trained by acquiring and analysing hundreds of thousands of sets of similar measurements. It becomes experienced in looking at a specific problem, like ECGs. As a result, AI systems can read simple tests, detect heart condition, and predict possible future problems [1].

The treatment of cardiovascular disease has evolved significantly in interventional cardiology over the last two decades. Percutaneous coronary intervention (PCI) is the cornerstone of the catherisation laboratory, but it can cause many symptoms such as coronary artery disease (CAD), valvular heart disease, cardiac arrhythmia, pericardial disease, myocardial disease, congenital heart disease, and heart failure, but they can be treated.

In recent years, AI has radically changed the outlook for clinical medicine by providing new insights and opportunities to improve treatments. As AI advances from self-driving cars to automated speech recognition systems in other aspects of human life, machine learning (ML) is expanding clinical pathways and opening new frontiers in cardiovascular medicine [2]. By comparison, the application of ML in interventional cardiology (IC) was less obvious. While it is clear that advances in AI in ICs are lagging behind their counterparts, interest in ICs continues to grow. As advances in stenting technology and transcatheter aortic valve replacement (TAVR) or transcatheter mitral valve replacement (TMVR) continue, AI will be beneficial.

Role of AI in Cardiac MRI

Cardiovascular magnetic resonance imaging (CMR) has emerged as a powerful diagnostic modality for assessing various clinical conditions in cardiology. Of the various non-invasive approaches, it is the only option that allows tissue characterization.

Role of AI in Echocardiography

Echocardiography is the primary diagnostic imaging method in cardiology and plays a central role in most diagnostic pathways for multiple pathological entities. In some recent studies, the ML algorithm has shown an innovative application in findings including echocardiography parameters. Echocardiography is widely used, but the results can be non-uniform. These variables can affect the management and outcome of the interventionist. Machine learning can provide fast and consistent results that can assist aspiring interventionists in clinical decision making [3].

Role of AI in Cardiac CT

CT is a non-invasive approach to identify obstructive CAD. CT can be used to visualize the anatomy of the underlying coronary arteries to visualize plaques or stenosis in the coronary artery tree [4]. From an interventionist perspective, cardiac CT plays an important role in the proper selection of PCI. Of all non-invasive modality, CT angiography is very similar to invasive angiography. The ML algorithm can greatly expand the possibilities of cardiac CT

Role of AI in nuclear medicine

Myocardial perfusion imaging (MPI) plays an important role in nuclear medicine and provides important information in CAD. Physicians can detect cardiovascular disease using single-photon emission CT (SPECT). MPI is a non-invasive modality that plays an important role in the risk stratification of CHD. The ML algorithm can be used to integrate clinical information and numerous parameters to predict CAD, revascularization, and major adverse cardiovascular events (MACE). These aspects are especially useful for intervening physicians as they can support clinical management and patient selection for high-risk procedures [5].

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