Recent Updates of CMR (I): Flow Quantification and New Trends

SY05-1

Flow Quantification and New Trends

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The current general trends in cardio-vascular magnetic resonance imaging (CMR) can be described as quantification, speed and new applications.

As a part of quantification in CMR, ECG-gated GRE sequence with velocity encoding (VENC) gradients, also known as phase contrast (PC) imaging has been used to quantify velocity in the heart and vessels.

Traditionally, standard 2D cine PC MRI with one-directional through-plane velocity encoding is commonly used for quantitation of blood flow passing through the plane. In recent years, considerable progress has been achieved including new methodological advances such as 4D Flow MRI using time-resolved volumetric cine imaging with velocity information in each of three spatial directions. A large number of studies have shown evidences that 4D Flow MRI can provide a better understanding of hemodynamics in patients with cardio-vascular diseases. However, for the acquisition of velocity information in each of three spatial directions, at least 4 velocity encoded images are required, leading to significantly prolonged scan time and moreover its post-processing required dedicated software. As a result, initial limitations for 4D Flow MRI into clinical routine MRI were mainly related to long acquisition time and lack of evaluation software. Thus, continued developments to shorten scan times based on parallel imaging, alternative data sampling strategies and compressed sensing reconstruction have been proposed. Combination with advanced acceleration technique allows the acquisition of 4D Flow MRI within routinely acceptable acquisition time and various free or commercial tools exist or are being established.

This presentation describes the comprehensive review of the phase contrast MRI methodology, current trends and several developments in flow quantification.

Keywords : Flow quantification, Phase contrast MRI, VENC Imaging, 4DFlow

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Clinical application of flow evaluation

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2D phase contrast MRI is widely used to quantify flow in current clinical practice. Recently introduced 3D phase contrast MRI(4D flow MRI) is promising method to understand hemodynamics of cardiac chambers as well as great vessels.

In this lecture, current clinical application of 2D phase contrast MRI will be summarized. In addition, results of recent clinical 4D Flow studies regarding the aorta, ventricles, and atria in various adult and congenital heart diseases will be briefly reviewed.

Keywords : 4D flow, Cardiac magnetic resonance

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Updates on CMR: Perfusion, Delayed-enhancement, and Mapping

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Cardiac MR techniques continue to evolve rapidly due to the introduction of new approaches for accelerating MR acquisition, improving signal-to-noise ratio and contrast-to-noise ratio and migrating to higher magnetic field strengths. In this 25 minute talk, the speaker will introduce currently available the latest cardiac MR sequences of perfusion, delayed-enhancement, and mapping, and clinical unmet needs, and briefly touch future technical directions.

Keywords : 키워드 오류 Example 서식 유지