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MRI

磁共振成像

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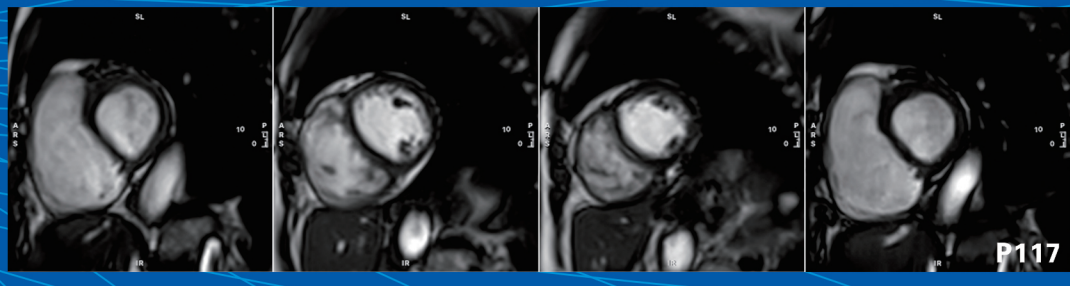

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封面文章

肺动脉高压(pulmonary arterial hypertension,PAH)是以异常的肺血管重构和进行性的肺血管阻力升高为特点的病理生理综合征。持续升高的肺血管阻力和降低的血管顺应性导致右室(right ventricular,RV)后负荷增加,继而引起RV肥厚、扩张,最终导致右心衰竭甚至死亡。早期识别PAH患者RV结构改变及功能异常并进行及时治疗干预,能够降低心衰风险并降低死亡率。心脏磁共振(cardiovascular magnetic resonance,CMR)具有无创、无辐射等特点,其中CMR电影成像是目前无创评估RV大小、形态和功能的"金标准"。

目前,标准的CMR电影成像采用2D分段采集结合回顾性心电门控技术(cine-SegBH),要求患者在多次呼气末屏气进行图像采集,并结合心电门控重建出电影图像。PAH患者常常表现为呼吸困难、胸痛等临床症状,在电影图像采集过程中往往难以配合屏气,且晚期的PAH患者常常合并房颤等不同类型的心律失常,导致心电门控失效,重建出的电影图像质量差难以达到诊断需求。因此,一种准确可靠的能够在自由呼吸状态下进行图像采集的电影序列是十分必要的。

本研究对比了一种新的结合压缩感知、高速实时成像及回顾性全自动非刚性运动校正技术的自由呼吸电影序列(cine-MoCo)与标准cine-SegBH在PAH患者电影图像质量、RV功能参数及应变参数评价的表现。首先,通过结合主观评价、欧洲CMR质量评估标准评价的定性评价及边缘锐利度测量的定量评价方法对电影图像质量进行评价,结果显示cine-MoCo能够在降低扫描时间的同时获得相似甚至更优的电影图像质量。进而,采用Pearson相关分析、组内相关系数(ICC)统计学方法,对两电影序列的RV功能参数及应变参数相关性及测量结果可靠性进行评价。相关性分析结果显示,两电影序列评估的各参数间均表现出弱到强相关性。ICC结果显示,两序列均可获得可靠的测量结果。此外,采用配对t检验统计学方法对两电影序列的RV功能参数及应变参数进行定量分析。结果显示,各RV功能参数间差异均无统计学意义,然而RV应变参数分析中cine-MoCo获取的应变值均低于cine-SegBH,应变率分析中,除舒张期RV纵向应变率外,其他应变率间差异均无统计学意义。进一步将PAH患者按照WHO功能Ⅰ、Ⅱ级定义为轻度组,Ⅲ、Ⅳ级定义为重度组。结果显示,在重度组中cine-MoCo测量的应变值与cine-SegBH一致,提示cine-MoCo在重度PAH患者应变评价中具有更高的准确性。本研究结果显示cine-MoCo是一种可靠的自由呼吸电影序列,能够缩短图像采集时间并获得更优的图像质量,能够准确评估RV功能的各项参数,并且能够准确评估重度PAH患者的RV应变参数。详见内文第114页。

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资讯 | Information

2022广州胃肠影像高峰论坛胜利召开

为提高我国消化道疾病精准诊疗水平、促进消化道疾病科学研究，2022广州胃肠影像高峰论坛暨胃肠肛门盆底疾病影像诊疗新技术学习班（以下简称会议）于2022年8月10—13日在广州市成功举办。本次会议由《磁共振成像》杂志社与中山大学附属第六医院（以下简称中山六院）主办，广东省人民医院和中山大学附属第一医院协办，会议主题为“守真、创新、未来”主题。 本次公益活动为国家级继续医学教育项目，邀请到了2位长江学者、5位国家杰出青年科学基金获得者、2位国家自然科学基金优秀青年基金获得者以及全国著名影像学专家在内的70余位专家授课，采用线上、线下相结合的方式举办，全部课程免费在线学习。除宁夏、台湾、香港、澳门以外，来自我国30个省、自治区、直辖市的影像学及相关专业医生2769人报名参会，线上观看人次超过1.3万。

中国医师协会放射医师分会现任会长、《磁共振成像》杂志主编金征宇教授、中国医师协会放射医师分会候任会长梁长虹教授、广东省医学会李国营副会长兼秘书长莅临开幕式并致辞，他们充分肯定了此次会议对促进我国消化道疾病影像诊断水平提升、促进学术交流的意义，高度认可多年来中山六院在消化道疾病诊治领域取得的成绩和对医学事业的贡献，赞扬了孟晓春教授团队在消化道疾病影像诊断方面取得的成绩。中山六医院院长助理邓艳红教授、放射科主任孟晓春教授、《磁共振成像》杂志社贺光军社长、广东省人民医院刘再毅教授、中山大学附属第一医院冯仕庭主任出席开幕式并致词。

“精准治疗、影像先行”，开幕式后会议围绕肝脏、胃肠道、肛管及肛周肿瘤、炎症、遗传与代谢性疾病，以及消化道相关分子影像和影像组学/人工智能研究、消化道影像检查技术与护理、影像学科如何在未来发展中迎接机遇与挑战等多个领域展开学术讲座。

本次会议延续了往届会议全面、严谨、专业的风格，围绕消化系统疾病主题，授课内容涵盖从检查技术到疾病诊断，再到科学前沿及学科管理的各个环节，促进了学术的交流与进步。与会代表纷纷表示本次内容丰富、精彩、实用，对今后工作有很大帮助。

（供稿：孟晓春，贺光军）

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157 Proton exchange rate quantification-based lesion detection in ischemic stroke using chemical exchange saturation transfer imaging
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About the cover

Pulmonary arterial hypertension (PAH) is a progressive pathophysiological condition characterized by abnormal pulmonary vascular remodeling and pulmonary vascular resistance elevating. The elevated pulmonary vascular resistance and reduced compliance in PAH result in an increased right ventricular (RV) afterload, further leading to RV hypertrophy in the early disease stage and RV dilatation and RV failure ultimately. Early identification of RV structural changes and RV dysfunction in PAH patients and timely performing treatment intervention can reduce the risk of RV failure. Cardiac magnetic resonance (CMR) is a non-invasive non-radiation modality, and CMR cine imaging is currently the gold standard for evaluating RV morphology and function.

Currently, the standard cine imaging with 2D segmented acquisition and retrospective ECG gating (cine-SegBH) needs multi-breath-hold to acquire image signals and reconstructs cine images by combining ECG gating. However, PAH patients often experience dyspnea and chest pain, which are often difficult to cooperate with breath-hold during cine image acquisition. In addition, severe PAH patients often have different types of arrhythmias such as atrial fibrillation, resulting in ECG gating failure and reconstruction of poor-quality cine images. Therefore, an accurate and reliable free-breathing cine imaging is very meaningful in clinical practice.

This study compared a free-breath cine imaging with compressed sensing real-time imaging and retrospective fully automated non-rigid motion correction (cine-MoCo) with the standard cine-SegBH for evaluating cine image quality, RV function parameters, and RV strain parameters in PAH patients. Firstly, the cine image quality is evaluated by combining subjective evaluation, the European CMR registry standardized criteria, and edge sharpness measurement. Results showed that cine-MoCo was able to achieve similar or even better image quality with reduced image acquisition time compared with cine-SegBH. Secondly, Pearson correlation analysis and intra-class coefficient correlation (ICC) were used to evaluate the correlation and the reliability of measurements between the two cine sequences. Correlation analysis results showed that all quantitative parameters showed weak to strong correlations and ICC results showed that both cine sequences can obtain reliable measurements. Thirdly, paired *t* test was used to quantitatively analyze the RV functional parameters and strain parameters measured by the two cine sequences. Results showed that there is no statistical difference between the RV functional parameters, but the strain values measured by cine-MoCo were lower than those measured by cine-SegBH. Strain rates, except for the RV diastolic global longitudinal strain rate, were no statistical differences measured by the two cine sequences. According to the WHO function class, PAH patients are further defined as mild PAH groups (WHO Ⅰ, Ⅱ) and severe PAH groups (WHO Ⅲ, Ⅳ). Results showed that there were no significant differences in strain values measured by cine-MoCo and those measured by cine-SegBH in the severe PAH group. Our finding showed that compared with cine-SegBH, cine-MoCo can shorten image acquisition time, obtain equivalent or even better IQ, achieve precise quantitative analytic results for RV function in patients with PAH, and obtain accurate strain evaluation in patients with severe PAH. Please see page 114.

TECHNICAL ARTICLE

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