磁共振成像

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封面文章

高血压（hypertension, HTN）是一种常见且高发的心血管疾病，是我国目前重大的公共卫生问题，也是多种心脑血管疾病的重要病因和风险因素。高血压性心脏病（hypertensive heart disease, HHD）是长期高血压引起的心脏结构和功能改变的疾病，其主要特征包括左心室肥厚（left ventricular hypertrophy, LVH）、心脏舒张功能受损和心肌弥漫性纤维化。舒张功能障碍是HHD病程早期的显著特征，也是心力衰竭（heart failure, HF）风险增高的早期标志。因此，早期诊断对于延缓HHD疾病进展和预防心力衰竭具有重要意义。

超声心动图是目前评估心脏功能和血流动力学的常用方法，但受限于声窗质量和操作者经验，难以全面定量评估全心室功能。近年来，心脏磁共振（cardiac magnetic resonance, CMR）四维血流（four-dimensional flow, 4D Flow）技术凭借其良好的组织分辨率和全面评估血流动力学的功能，逐渐成为研究心血管功能异常的有力工具。然而，尽管关于CMR 4D Flow技术的研究已有广泛开展，但从血流动力学视角评估HHD患者左心室舒张功能障碍的研究仍较为有限。

本研究利用CMR 4D Flow技术结合常规心功能参数，量化分析HHD患者左心室舒张期血流动力学和舒张功能的变化。根据左心室射血分数（left ventricular ejection fraction, LVEF）将HHD患者分为HHD LVEF减低组（LVEF<50%）和HHD LVEF保留组（LVEF≥50%），并纳入健康志愿者作为对照组。三组人群采用3.0 T磁共振稳态自由进动序列及CMR 4D Flow序列扫描。采用CVI42软件后处理分析图像，包括左心功能参数及舒张早晚期二尖瓣血流速度参数。使用单因素方差分析或Kruskal-Wallis检验比较组间差异，结合相关性分析评估二尖瓣峰值速度比率（ratio of mitral peak velocity, E/A）与容积参数及功能参数的关系，全面评估HHD患者左心室舒张功能障碍的特征。结果显示，CMR 4D Flow技术能够定量评估HHD患者的左心室舒张功能，并可灵敏检测其早期变化，为早期识别和诊断HHD左室舒张功能障碍提供了一种无创新方法，对提高HHD的早期诊断率和选择临床干预的时机具有重要价值。详见内文第111页。

《磁共振成像》杂志2025年稿约

《磁共振成像》杂志（Chinese Journal of Magnetic Resonance Imaging）是由中华人民共和国国家卫生健康委员会主管、中国医院协会和首都医科大学附属北京天坛医院主办的学术期刊，ISSN 1674-8034，CN 11-5902/R，创刊于2010年1月，创刊主编为美国医学科学院外籍院士戴建平教授，现任主编为金征宇教授。本刊为月刊，入编《中文核心期刊要目总览》2017年版和2020年版，被评为中国精品科技期刊、北大中文核心期刊、复旦大学核心期刊（A类）、中国科技核心期刊、中国科技论文统计源期刊、中国科学引文数据库（CSCD）核心期刊（2021—2024年度）、临床医学领域高质量科技期刊分级目录收录期刊（中国科协公布）。同时，本刊被中国知网、中国学术期刊数据库、中华医学期刊网、中国科学引文索引（CSCI）数据库、国家科技期刊开放平台、中文科技期刊数据库等国内数据库收录，还被美国《化学文摘》（CA）、《乌利希国际期刊指南》、日本科学技术振兴机构数据库等国际数据库收录。本刊参与中华医学会期刊出版集群（中国科技期刊卓越行动计划二期-集群-A2项目）建设。

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作者在本刊官网点击在线投稿后查看投稿须知栏目，可查阅2025年稿约。

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About the cover

Hypertension (HTN) is a common and prevalent cardiovascular condition, representing a significant public health issue in China. It is a major cause and risk factor for various cardiovascular and cerebrovascular diseases. Hypertensive heart disease (HHD) is characterized by structural and functional changes in the heart caused by prolonged hypertension. Its primary features include left ventricular hypertrophy (LVH), impaired diastolic function, and diffuse myocardial fibrosis. Diastolic dysfunction is a prominent early feature of HHD and serves as an early indicator of increased risk for heart failure (HF). Therefore, early diagnosis is essential for delaying the progression of HHD and preventing HF.

Echocardiography is currently the most commonly used method for evaluating cardiac function and hemodynamics. However, it is limited by acoustic window quality and operator dependency, making it challenging to achieve comprehensive and quantitative assessments of global ventricular function. In recent years, cardiac magnetic resonance (CMR) four-dimensional flow (4D Flow) technology, with its superior soft tissue contrast and capability for comprehensive hemodynamic assessment, has become a powerful tool for studying cardiovascular functional abnormalities. Despite the widespread application of CMR 4D Flow technology, studies evaluating left ventricular diastolic dysfunction in HHD patients from a hemodynamic perspective remain limited.

This study utilized CMR 4D Flow technology combined with conventional cardiac functional parameters to quantify and analyze diastolic hemodynamic changes in HHD patients. Patients were classified into reduced LVEF (LVEF < 50%) and preserved LVEF (LVEF ⩾ 50%) groups based on left ventricular ejection fraction (LVEF), with healthy volunteers included as a control group. All participants underwent 3.0 T magnetic resonance imaging using steady-state free precession and CMR 4D Flow sequences. Image post-processing was performed using CVI42 software to evaluate changes in left ventricular functional parameters and mitral flow velocity parameters during early and late diastole. One-way analysis of variance (ANOVA) or Kruskal-Wallis tests were applied to compare differences among groups. Correlation analysis was conducted to assess the relationships between the ratio of mitral peak velocities (E/A) and both volumetric and functional parameters, providing a comprehensive evaluation of left ventricular diastolic dysfunction in HHD patients. The results demonstrated that CMR 4D Flow technology enables quantitative assessment of left ventricular diastolic function in HHD patients and sensitively detects early diastolic abnormalities. This novel, non-invasive method offers significant potential for the early identification and diagnosis of left ventricular diastolic dysfunction in HHD, improving early diagnostic rates and informing the optimal timing of clinical interventions. Please see text page 111.

REVIEWS