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EDITORIAL

Prognostic utility of global longitudinal strain in myocardial infarction

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Abstract

Cardiovascular magnetic resonance (CMR) represents the reference standard for cardiac morphology and function assessment. Since introduction in 2009, CMR feature tracking (CMR-FT) has become a frequently used tool in the assessment of myocardial deformation and wall motion on the basis of routinely acquired b-SSFP cine images. Extensive validation has led to excellent intra- and inter-observer as well as inter-study reproducibility. CMR-FT derived myocardial deformation indices such as left ventricular (LV) strain have been shown to be impaired in cardiac diseases such as cardiomyopathies as well as myocardial infarction. Although LV ejection fraction (LVEF) is the routinely and frequently utilized parameter for systolic myocardial function assessment and major adverse clinical event (MACE) prediction, it fails to assess regional differences. Recently, LV strain has emerged as a superior measure for risk assessment and MACE prediction as compared to the established markers *e.g.*, LVEF. This editorial aims to elucidate current discussions in the field of strain assessment in myocardial infarction in the light of recent data from a large prospective multicentre CMR study.

Key words: Feature tracking; Myocardial infarction; Cardiovascular magnetic resonance; Cardiomyopathy; Prognosis

Core tip: Cardiovascular magnetic resonance feature-tracking bears the potential for superior risk evaluation in infarct patients beyond established risk factors such as left ventricular ejection fraction. However, further clinical trials are inevitably needed to establish vendor independent thresholds for clinical routine use in various cardiac diseases.

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PROGNOSTIC UTILITY OF GLOBAL LONGITUDINAL STRAIN IN MYOCARDIAL INFARCTION

Since introduction in 2009, cardiovascular magnetic resonance feature tracking (CMR-FT) has been applied in research extensively, and its clinical utility has remarkably increased[1-8]. Whilst there is evidence to suggest that some of the CMR-FT indices including global longitudinal strain (GLS) carry independent prognostic implications in dilated and chronic ischaemic cardiomyopathy as well as tetralogy of Fallot[9-11] evidence in myocardial infarction has only recently become available and shows some degree of controversy[12,13]. Gavara *et al*[13] demonstrated the association of CMR-FT derived left ventricular GLS with major adverse cardiac events (MACE). However they failed to demonstrate an additional prognostic value over established CMR parameters in a retrospective collective of 323 STEMI patients. It is important to note that these results are expanded with recent prospective data by Eitel *et al*[12]. Both studies agree on the distinct relationship of myocardial deformation indices with MACE and demonstrate GLS to be the most robust parameter to predict reinfarction, heart failure and cardiac deaths[12,13]. However, the study by Eitel *et al*[12] suggests an incremental prognostic role of CMR-FT derived GLS over and above classical CMR markers of prognosis irrespectively of clinical risk factors in 1235 acute myocardial infarction (AMI) patients (including STEMI and NSTEMI)[12].

Several factors need to be considered that may potentially account for this discrepancy: (1) Even though CMR-FT algorithms are generally based on optical flow technology[1] there are inherent differences in the way strain is being calculated. Whilst the technique used by Gavara *et al*[13] is based on the assessment of several myocardial layers between endo and epicardium the technique used by Eitel *et al*[12] is predominantly based on endocardial boundary tracking[1]. In fact, there is evidence to suggest that small numerical strain differences between both techniques occur in healthy volunteers[14]; (2) since it is well known that 2D deformation imaging techniques are limited in reproducibility on a segmental level mainly because of through plane motion with subsequent fading of features during systole[1], it is interesting to speculate whether the calculation of global strain values from the averages of 16 segmental peak strains as performed by Gavara *et al*[13] is less accurate than their calculation from averaged global strain curves as performed with alternative CMR-FT software which was utilized in the study by Eitel *et al*[12]; (3) as opposed to the methodology used by Gavara *et al*[13] the technique used by Eitel *et al*[12] is based on the average of three repeated measurements to further reduce variability[13-15]; and (4) the differences in sample size and study design may have resulted in greater statistical power in the prospective trial by Eitel *et al*[12] explaining the demonstration of additional clinical value of GLS. Notwithstanding these considerations, further refinements of the underlying technology and additional prospective clinical trials defining the relative diagnostic and prognostic yields of these techniques in identical patient collectives are warranted to establish interchangeability of different CMR-FT techniques in risk stratification in various diseases[9-15]. Taken together, considering recent evidence to suggest a significant role in risk stratification[9-12] and presuming that these findings are confirmed in further prospective trials alongside with the achievement of the latter technology refinements, CMR-FT risk stratification may establish itself within routine CMR imaging following AMI and other cardiac pathologies.

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