GUEST EDITORIAL

Doppler Myocardial Imaging in the Assessment of Regional Myocardial Function in Longitudinal Direction Pre- and Post-PTCA

Please see page 178 for the article by Strotmann et al., to which this editorial pertains.

The present study accurately demonstrates the advantages of regional tissue Doppler echocardiography (TDE) in that the easily applicable pulsed Doppler myocardial imaging (DMI) is shown to sensitively detect the effect of the release of ischaemia on regional wall motion. However, the authors describe a model scenario of a single vessel coronary heart disease (CHD). Apart from the microvascular component of CHD, in multivessel disease, a much more complex situation must be expected including interactions among ischaemic segments and between ischaemic and non-ischaemic segments. The authors correctly concede that DMI measurements cannot exclude the influence of neighbouring segments dragging and pulling the target segment. Moreover, the same is obviously true with respect to those segments being opposite to the target segment. These limitations of TDE have been underestimated in the past so that many hopes pinned on this method were unfortunately dashed and, therefore, TDE failed to gain significant acceptance as a clinical tool to objectively assess systolic left ventricular function.

Other problems associated with quantitative TDE neglected by the majority of studies are a strong afterload dependence of systolic TDE-indices and a relative overestimation of subepicardial velocities in comparison with intramural or subendocardial velocity parameters. As known from previous investigations, afterload opposes the shortening of the muscle fibres during contraction[1]. In parallel, increases in afterload decrease systolic wall velocities[2]. Thus, systolic wall motion indices cannot be considered as estimates of contractility as it is frequently assumed. Doppler myocardial imaging parameters obviously also reflect the ventriculo-arterial coupling. In contrast, preload seems to be of minor influence on wall motion velocity parameters[3]. Load dependence might be one explanation for the one result of the present investigation suggesting that DMI allows to compare regional left ventricular function intra-individually but not necessarily interindividually.

Despite improved echocardiographic and tissue Doppler imaging quality, DMI does not encounter the problem of inhomogeneous colour encoding of the ventricular wall. For example, during the slow-filling phase the subepicardial wall velocity was shown to be markedly higher than the subendocardial velocity. This was surprising, since both subepicardial and subendocardial velocities were expected to be equally low at this time interval of the cardiac cycle[3]. The reason for this phenomenon is probably that the myocardium provides less intensive signals compared to the pericardium and the border-line area between myocardium and pericardium. As a result, small dropouts may occur in the Doppler myocardial signal depending on the individual sound conditions, causing a relative overestimation of the much more homogeneous signals originating from subpericardial layers of the myocardium.

With the present paper the authors contribute to the efforts made during the last decade in order to establish tissue Doppler imaging approaches as clinically useful tools. Nevertheless, standardized quantification of myocardial function using these techniques remains challenging.

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References