

Perfusion vector – a new method to quantify myocardial perfusion scintigraphy images (P369)

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Conclusion

The concept of the perfusion vector is shown to have potential in assisting the visual interpretation in patient MPS studies. Further studies are needed to validate the concept.

Aim

Myocardial perfusion scintigraphy (MPS) is an established imaging modality used for the diagnosis of patients with ischemic heart disease. Software packages for quantification of perfusion data and computer-aided diagnosis systems have been developed in order to make the interpretation of MPS studies more standardized but still it largely relies on visual assessment by the physician. We have previously introduced the concept of the perfusion vector as a new objective quantitative method for further assisting the visual interpretation and tested this concept using simulated images with promising results. The aim of this study was to test the concept in patient studies.

Results

When comparing normal and abnormal patients there was a statistically significant difference for the stress perfusion vector on the x-axis (septal-lateral direction) for apical and lateral defects, on the y-axis (anterior-inferior direction) for apical, inferior and lateral defects, and on the z-axis (basal-apical direction) for apical, anterior and lateral defects (Fig. 1). A significant difference was shown for the difference vector magnitude (stress/rest) between normal and ischemic patients (Fig. 2). The correlation between defect size and stress vector magnitude was also found to be significant (Fig. 3).

Materials and methods

The perfusion vector is based on calculating the difference between the anatomical centroid and the perfusion center of gravity of the left ventricle. The centroid is the geometric center of gravity in a three-dimensional figure. The anatomical centroid of the left ventricle is calculated from MPS images setting the voxels in the myocardium of the left ventricle to 1 and the others to 0. The perfusion center of gravity is calculated by giving the voxels in the left ventricle weights corresponding to their intensity. If the perfusion in the left ventricle is homogeneous these positions will coincide. If not the perfusion center of gravity will deviate from the anatomical centroid thus creating a perfusion vector between these two positions. The size of this vector would then correspond to the severity and extent of the perfusion defect and the direction would reflect the location of the defect. 40 normal and 80 abnormal patient studies were included in the patient study. Perfusion vectors were compared between normal and abnormal (apical, inferior, anterior and lateral ischemia or infarction) studies and also correlated to defect size.

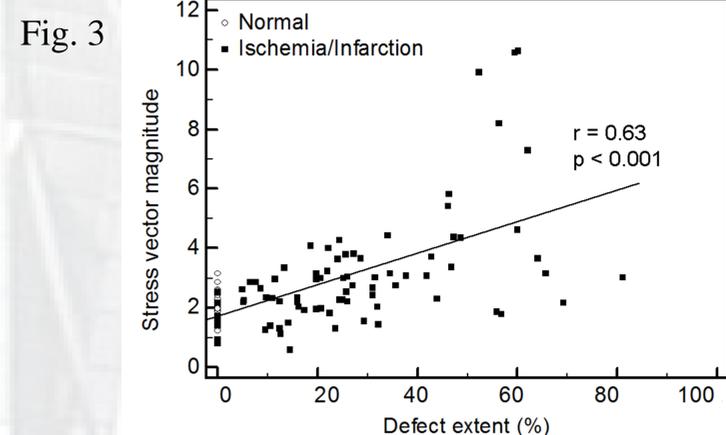
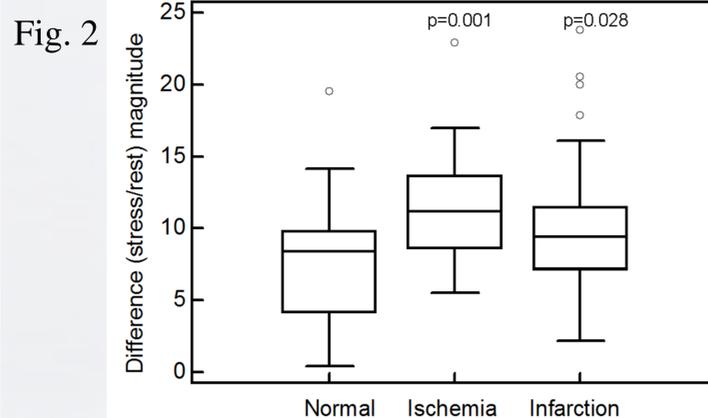
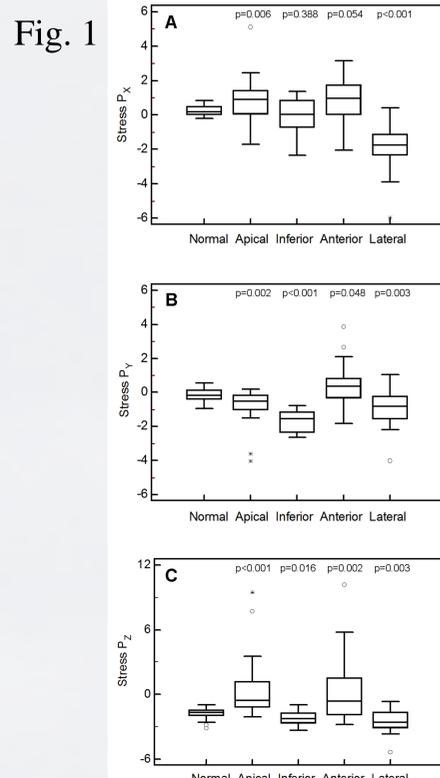


Fig. 1: Stress perfusion vector for normal and abnormal patients.

Fig. 2: Difference vector magnitude (stress/rest) for normal and abnormal patients.

Fig. 3: Correlation between defect size and stress vector magnitude.

Disclosures: Lars Edenbrandt and Karl Sjöstrand are employed by EXINI Diagnostics AB.