Large variability for ischemic extent values in MPS decreased when physicians were provided with an automated suggestion of ischemic extent

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Aim

Visual interpretation of myocardial perfusion scintigraphy (MPS) studies is dependent on the knowledge of the physician, and subject to inter- and intra-observer variability. Recent studies have shown that patients with significant ischemia have a survival benefit from early revascularization. The European Society of Cardiology recommends that patients with >10% area of ischemia should receive revascularization. In this study we wanted to investigate 1) the inter-observer variability for the extent of reversible perfusion defects reported by different physicians in nuclear medicine, 2) the variability for the reversible perfusion defects obtained from different software tools, and 3) if the inter-observer variability is reduced when the physicians are provided with a computerized suggestion of the delineation of the reversible perfusion defects.

Methods

Twenty-five MPS patients who were regarded as ischemic according to the final report were included. Eleven physicians in nuclear medicine from four different countries delineated the extent of the ischemic defects. After at least two weeks, they delineated the defects again, and were provided a suggestion of the defect delineation by EXINI Heart™ (EXINI). Summed difference scores and ischemic extent values were obtained from four software programs (EXINI, Emory Cardiac Toolbox, Quantitative Perfusion SPECT, and 4DM-SPECT).

Results

The median extent values obtained from the 11 physicians varied between 8% and 34%, and between 9% and 16% for the software programs. There was a considerable variation in the reported amount of ischemic myocardium between the different programs as well as between the different physicians for the 25 patients. The variability among the physicians was large for small, medium-sized and large ischemic areas. For all 25 patients, mean ischemic extent obtained from EXINI was 17.0%. Mean extent for physicians was 22.6% for the first delineation and 19.1% for the evaluation where they were provided computerized suggestion (p = 0.002). Intra-class correlation increased from 0.56 for the first to 0.81 for the second delineation, whereas standard deviation between physicians decreased from 7.8 to 5.9.

Conclusion

There was large variability in the estimated ischemic defect size obtained both from different physicians and from different software packages. When the physicians were provided with a suggested delineation, the inter-observer variability decreased significantly. Physicians should be aware of the large differences between both different physicians and different software packages when giving the amount of ischemic myocardium to the referring physician.
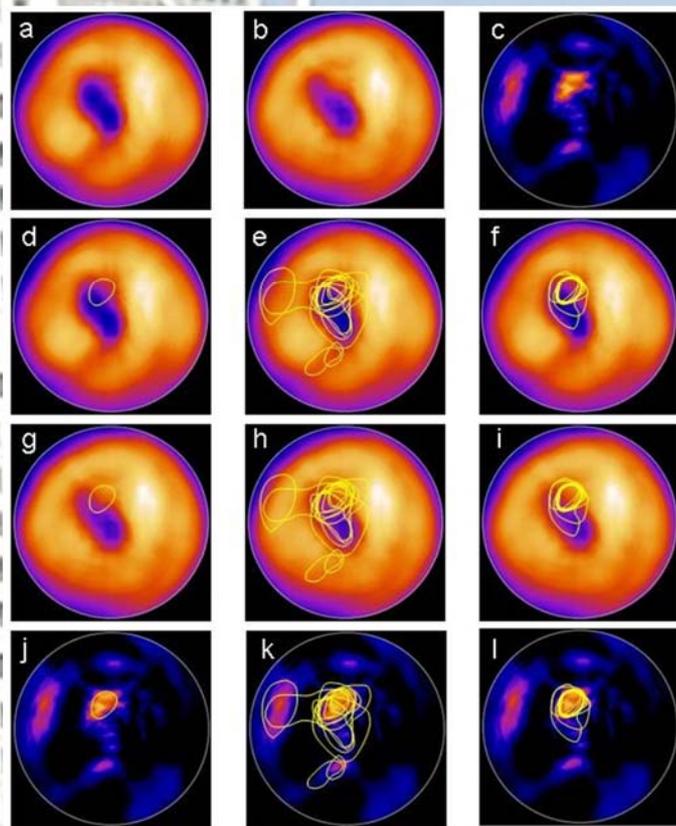

Figure 1

The delineations of the ischemic area made by the physicians and by EXINI for one of the patients. The upper row shows the stress (a) and rest (b) polar plots as well as the difference rest-stress plot (c). The second row shows the delineation made by EXINI (d), the delineations made by the 11 physicians without (e) and with (f) suggestion of the delineation provided by EXINI for stress polar plots. The third and forth rows show the same delineations for rest polar plots (g, h, i) and difference rest-stress plots (j, k, l). The physicians were able to choose between stress, rest or difference polar plots for their delineations.

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