Comparative accuracy of various Tl-201 reinjection imaging protocols to detect myocardial viability

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The conventional exercise-3 hours-redistribution thallium-201 [^{201}Tl] imaging protocol has been recognized to be suboptimal for reliable detection of myocardial viability. Although ^{201}Tl rest-reinjection after exercise has improved detection of viable myocardium, it is still underestimated in some patients. The present study was designed to compare detection of viable myocardium in five separate imaging steps: step 1: initial-exercise imaging, step 2: delayed-exercise imaging, step 3: Tl-201 reinjection imaging after delayed-exercise imaging, step 4: separate day rest-reinjection imaging, and step 5: separate day delayed-rest imaging. The study group consisted of 22 patients scheduled for coronary revascularization (either percutaneous transluminal coronary angioplasty or coronary bypass surgery). Pre- and postintervention echocardiographic wall motion and thickness served as independent markers of myocardial viability. Results: Accuracy in identifying myocardial viability gradually improved incrementally from ^{201}Tl imaging step 1 to step 5. The positive predictive value, negative predictive value and overall accuracy were best for the separate day delayed-rest study (step 5) at 90%, 33% and 78%, respectively. Myocardial segments had fixed defects on separate day delayed-rest ^{201}Tl imaging (step 5), but nevertheless echocardiographic evidence of myocardial viability indicated less severe defects than segments judged nonviable by echocardiography (p = 0.021). The overall accuracy of separate day delayed-rest imaging (step 5) in predicting viability improved to 88% when segments with moderate or mild defects were considered viable. In conclusion, the most reliable predictor of myocardial viability with ^{201}Tl imaging is defect severity on separate day delayed-rest images.

Key words: ^{201}Tl exercise-reinjection study, ^{201}Tl rest-injection study, myocardial infarction, coronary revascularization, myocardial viability