



Stress-only Nuclear Myocardial Perfusion Imaging

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Background

Inducible myocardial ischemia from coronary artery disease is diagnosed when blood flow to the heart at stress is significantly less than blood flow at rest. The identification of inducible ischemia is important in people with chest pain, because with proper treatment the risk of a major adverse cardiac event is greatly reduced. Many different conditions can cause chest pain, most of which are benign and non-life threatening. However, inducible ischemia can be life threatening, and when left untreated the consequences are severe.

One of the best and most thoroughly validated method of testing for inducible ischemia is stress-rest myocardial perfusion gated SPECT imaging. This involves injecting a patient with a radiotracer at rest and during peak stress. The radiotracer is primarily designed to map blood flow to the heart. However, using a gated SPECT protocol also allows determination of left ventricular size, wall motion, and ejection fraction. Inducible ischemia is suggested by abnormalities in any of these imaging variables at stress, that are not present at rest. Because the objective is to identify abnormalities at stress that are not present at rest, current utilization guidelines for myocardial perfusion gated SPECT recommend imaging both at rest and immediately post-stress.

Newer research in myocardial perfusion imaging has looked at the possibility of imaging patients only post-stress, and omitting the rest scan. The reasoning for this is that if the stress scan is normal, then the rest scan is medically unnecessary, financially costly, and exposes patients to excess radiation. Although not yet widely validated, stress-only imaging may be reasonable in low-risk patients as long as any abnormal stress study is followed-up with a rest scan. Nevertheless, at the current time, clinical practice guidelines have not fully addressed or endorsed stress-only imaging, and nearly all nuclear cardiology clinics continue to perform stress-rest imaging.

There are several reasons for continuing the practice of stress-rest imaging until more research is done. One reason is that myocardial perfusion imaging is not indicated in low-risk patients, so the research doesn't

apply to clinical medicine. The research protocols for stress-only imaging typically involved attenuation correction SPECT, a technique that has not been widely accepted due to a relative lack of solid evidence supporting its use. Another reason is that risk stratification prior to imaging is often inexact, so it is medically safer to assume at least an intermediate risk and perform a stress-rest study. Finally, the goal of myocardial perfusion imaging is to maximize sensitivity, since the consequences of failing to identify inducible ischemia can be severe. Stress-only imaging is not thought to be as sensitive as stress-rest imaging.

Conclusion

The current prevailing medical practice to perform stress-rest imaging as a routine appears to be clinically appropriate, with a recent clinical update (2009) from the American Society of Nuclear Cardiology concluding that a stress-only strategy "does not yet have sufficient data to support a widespread utilization." Nevertheless, the research supporting stress-only imaging continues to grow, with one recent paper finding its use even in high-risk patients to be appropriate in some circumstances.

Reference(s)

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