

Common Artifacts and Pitfalls in Nuclear Cardiology Imaging

Adriana Ghilardi (Bergamo)

Myocardial perfusion imaging (MPI) is a consolidated non-invasive imaging modality in the management of patients with cardiovascular disease: diagnosis, establishing prognosis, assessing the effectiveness of therapy and evaluating viability.

However, MPI is a complex process subjected to several artifacts and pitfalls, which may limit its clinical utility. Therefore the causes and effects of these potential factors need to be understood in order to implement means of preventing and/or limiting and, when necessary, actions to correct them.

Technologists play a key role in reducing these artifacts and pitfalls, which may arise at any stage in the MPI process and can lead to mis-diagnosis. These factors may be related to the patient (including unique aspects of the patient's heart), the nuclear medicine equipment, and the actions of the technologist.

In particular we can distinguish:

Pre-imaging issues due to Radiopharmaceutical [Rph] labelling, Patient Preparation, Cardiac Stressing, Radiopharmaceutical Injection; In this step, the role of Technologist is predominantly in *labelling* the Rph, a prerequisite for obtaining optimal imaging quality.

Particular attention should be paid to the *patient's* weight [or better BMI] as well as to the withdrawal or maintenance of cardiovascular and / or interfering drugs.

Exercise *Stressing* [taken to the 85% of the patient's age-predicted heart rate] physiologically preferable while Pharmacological *Stressing* should be reserved for patients unable to reach the 85% of the patient's age-predicted heart rate.

Rph *i.v. injection* must be correct avoiding any infiltrated dose (extravasation).

The patient should be positioned correctly and comfortably to prevent/minimize any *motion*.

Technical Issues related to:

Patients Motion, Gating Problems, Quality Control [QC], Processing Errors;

The patient should be positioned correctly and comfortably to prevent/minimize any motion.

ECG electrode must be placed correctly to obtain optimal Gating. Arrhythmias, especially if severe or numerous, may be a common source of artifacts.

Quality Control of instrumentation is mandatorily required both for daily and routinely tests.

Processing acquired images is another crucial phase in order to obtain correct orientation of myocardial slices, better filtering and Quantification Software

Related Issues: Attenuation, Sub_diaphragmatic Activity.

Attenuation is responsible for one of the most prevalent artifact in MPI: typically involving inferior wall in males and anteroseptal or lateral walls in female.

Prominent activity is often present in sub_diaphragmatic organs adjacent to the heart [liver, stomach and bowel]. The best approach is to wait and adequate adjunctive amount of time after injection before starting acquisition,

Related Issues: Left Bundle Branch Block [LBBB], Pacemaker [PM], After Cardiac Surgery, Cardiomyopathies [CMP], Balanced Ischemia, Dextrocardia, Congenital Heart Disease [CHD] Pericardial Effusion.

There are many different clinical conditions that may cause artifacts: indeed the most frequent is LBBB [typical anteroseptal dyssinergic defect].

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