Persistent Sub-diaphragmatic Activity on the Myocardial Perfusion Scan with $^{99m}$Tc-Sestamibi

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ABSTRACT

We present a female patient with atypical chest pain who was referred to our department for ischemia evaluation. $^{99m}$Tc-MIBI myocardial perfusion scan with dipyridamole stress was performed. Sub-diaphragmatic activity in the hepatic tissue and then in the bowel loops caused severe overlap on the inferior wall even on consecutive delayed images. Dipyridamole stress was repeated for the patient with $^{201}$Tl. The study was interpretable this time without any interfering sub-diaphragmatic activity.

Key Words: $^{99m}$Tc sestamibi, Myocardial perfusion scan, sub-diaphragmatic activity


A 40 year old female patient with the history of atypical chest pain was referred to our department for evaluation with myocardial perfusion scan. Pharmacological stress with dipyridamole was performed and 20 mCi $^{99m}$Tc-MIBI was injected intravenously. 60 minutes later, SPECT of the thorax was performed with a dual head variable angle gamma camera (E.CAM, Siemens). Sub-diaphragmatic activity in the hepatic tissue with a prominent overlap on the inferior wall was noticed in the first set of images (Fig. 1). The patient was ordered to drink a glass of milk and imaging was repeated after 30 minutes. This time bowel activity caused overlapping on the inferior wall (Fig. 2).
Two, three, and even four hour delayed SPECT imaging (after oral intake of water) wasn’t free of interference of sub-diaphragmatic activity (Fig. 3). The study was repeated with $^{201}$Tl. This time no interference from sub-diaphragmatic activity was apparent and the study was interpretable (Fig. 4).
$^{99m}$Tc-MIBI is a widespread radiopharmaceutical for myocardial perfusion imaging, which has biliary excretion (1). This property can cause significant sub-diaphragmatic activity with resulting reconstruction problems (2). Many techniques were reported to lessen sub-diaphragmatic activity, such as the oral administration of water (3), oral iodinated contrast medium (4), carbonated water (5), milk (6), or solid food (7-9).

**Figure 2:** Processed images (A) and raw projections (B) of 1.5 hour SPECT of the patient.
In contrast to $^{99m}$Tc-bound agents for myocardial perfusion scan, $^{201}$Tl has significantly lower sub-diaphragmatic activity (1,10). This was the property which we exploit in our case.

What was peculiar in our case was persistent bowel activity despite oral intake of water and several delayed imaging.

Figure 3: Processed images of 3 (A) and 4 (B) hour SPECT of the patient.
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The study with $^{99m}$Tc-MIBI was not interpretable due to overlap of the subdiaphragmatic activity on the inferior wall. By using repeating the study with $^{201}$TI, almost no bowel activity was noted.

We recommend using $^{201}$TI for myocardial perfusion imaging in case of persistent sub-diaphragmatic activity of $^{99m}$Tc-MIBI.

REFERENCES