

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

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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).

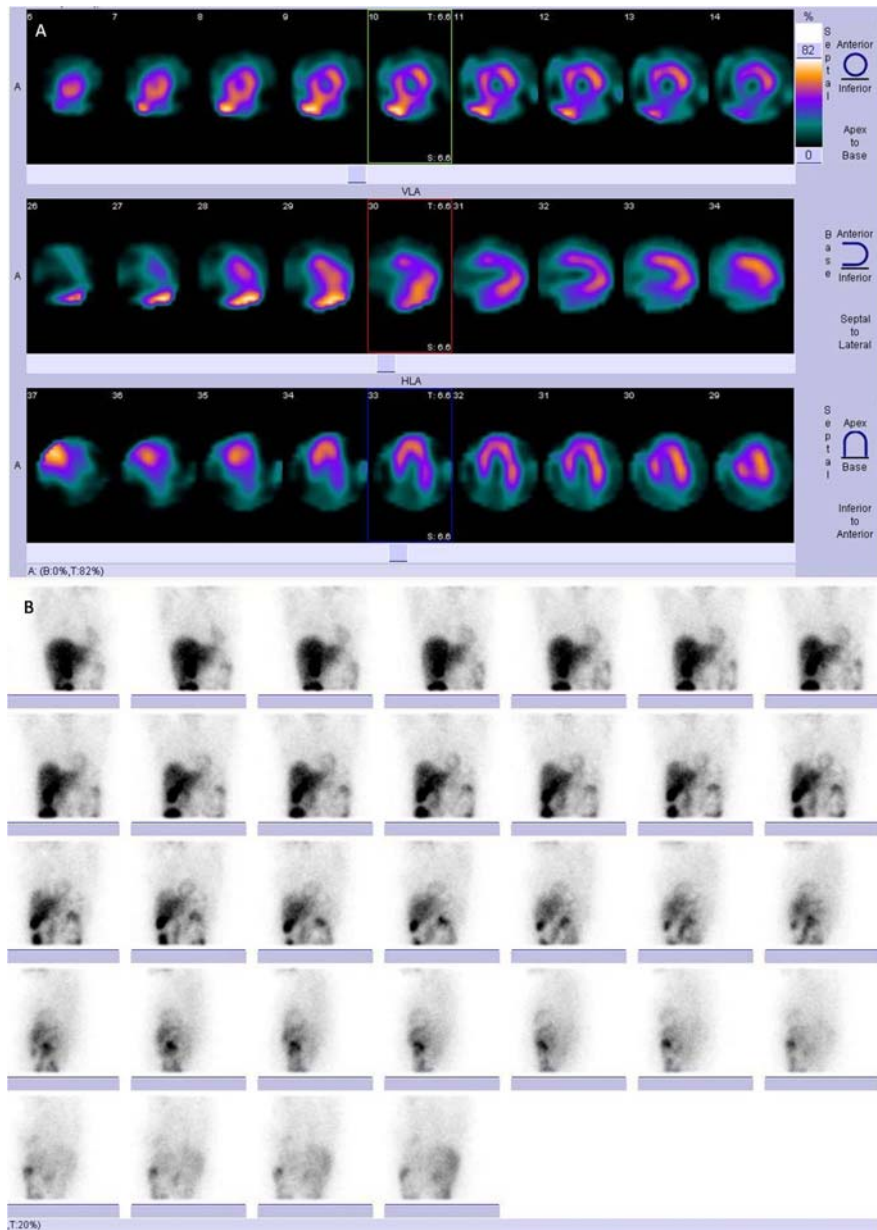


Figure 1: Processed images (A) and raw projections (B) of 60 min SPECT of the patient.

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).

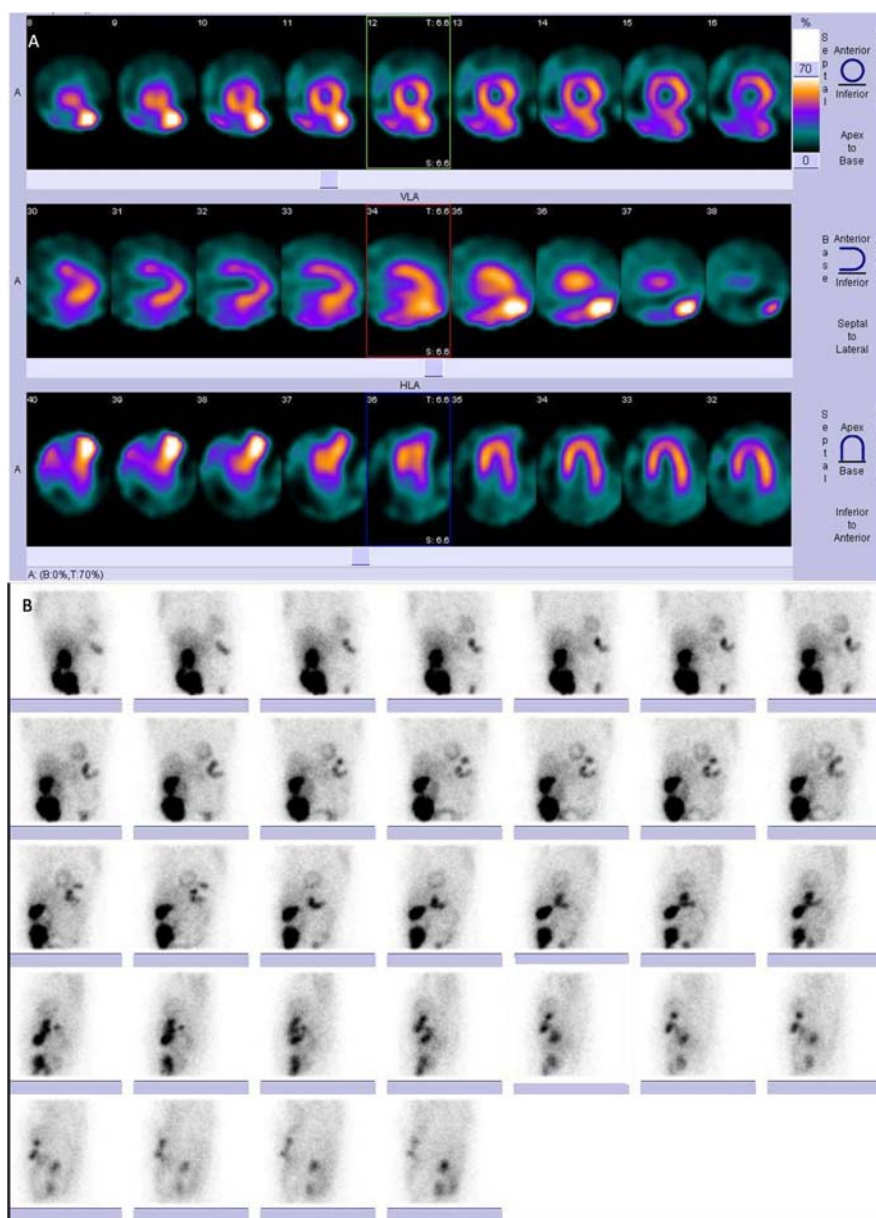


Figure 2: Processed images (A) and raw projections (B) of 1.5 hour SPECT of the patient.

^{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).

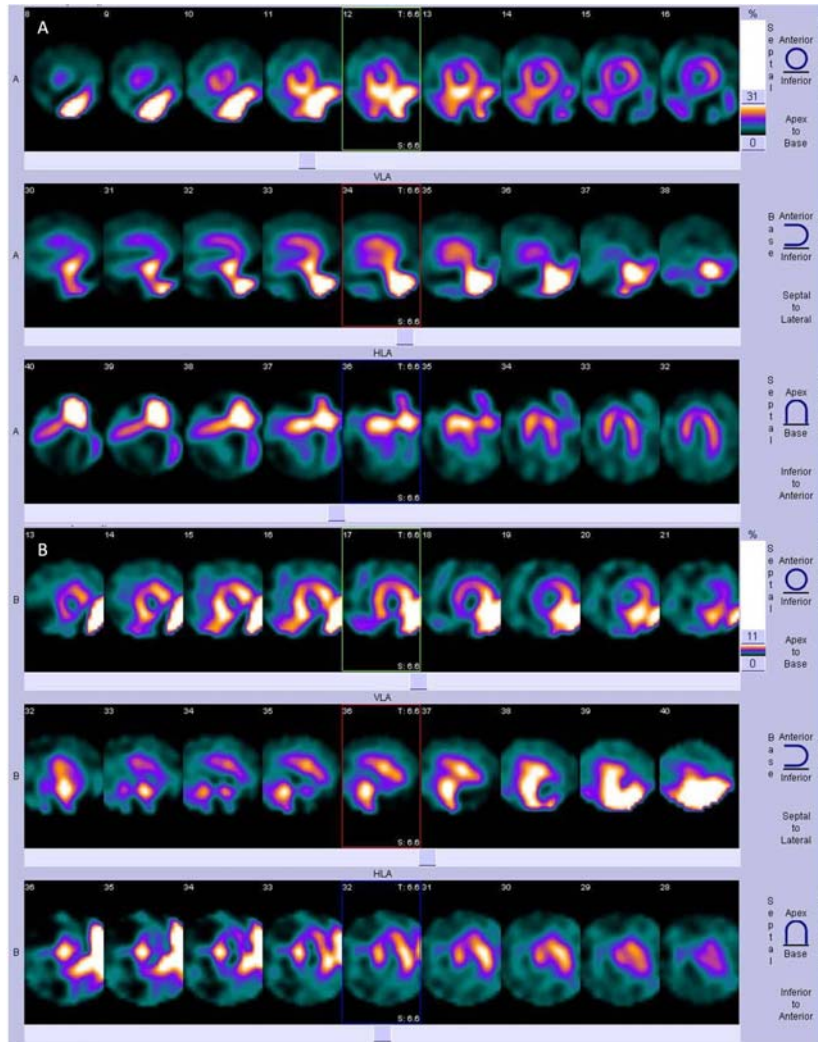


Figure 3: Processed images of 3 (A) and 4 (B) hour SPECT of the patient.

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.

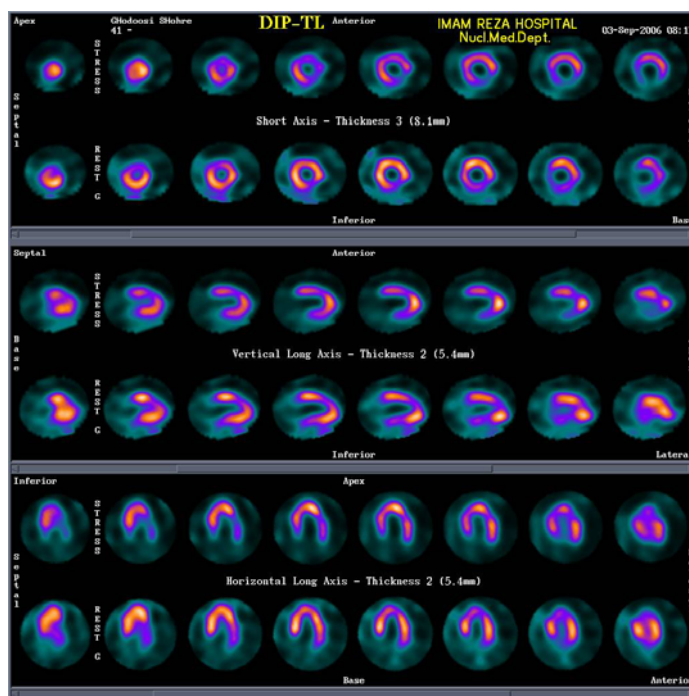


Figure 4: Processed images of ^{201}Tl SPECT of the patient.

The study with $^{99\text{m}}\text{Tc}$ -MIBI was not interpretable due to overlap of the subdiaphragmatic activity on the inferior wall. By using repeating the study with ^{201}Tl , almost no bowel activity was noted.

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

REFERENCES

1. Wackers FJ, Berman DS, Maddahi J, Watson DD, Beller GA, Strauss HW, et al. Technetium-99m hexakis 2-methoxyisobutyl isonitrile: human biodistribution, dosimetry, safety, and preliminary comparison to thallium-201 for myocardial perfusion imaging. *J Nucl Med.* 1989; 30:301-311.
2. Rehm PK, Atkins FB, Ziessman HA, Green SE, Akin EA, Fox LM, et al. Frequency of extra-cardiac activity and its effect on $^{99\text{Tc}}\text{m}$ -MIBI cardiac SPET interpretation. *Nucl Med Commun.* 1996; 17:851-856.
3. van Dongen AJ, van Rijk PP. Minimizing liver, bowel, and gastric activity in myocardial perfusion SPECT. *J Nucl Med.* 2000; 41:1315-1317.
4. Iqbal SM, Khalil ME, Lone BA, Gorski R, Blum S, Heller EN. Simple techniques to reduce bowel activity in cardiac SPECT imaging. *Nucl Med Commun.* 2004; 25:355-359.
5. Hara M, Monzen H, Futai R, Inagaki K, Shimoyama H, Morikawa M, et al. Reduction of infracardiac intestinal activity by a small amount of soda water in technetium- $^{99\text{m}}$ tetrofosmin myocardial perfusion scintigraphy with adenosine stress. *J Nucl Cardiol.* 2008; 15:241-245.
6. Garcia EV, Cooke CD, Van Train KF, Folks R, Peifer J, DePuey EG, et al. Technical aspects of myocardial SPECT imaging with technetium-99m sestamibi. *Am J Cardiol.* 1990; 66:23E-31E.
7. Boz A, Gungor F, Karayalcin B, Yildiz A. The effects of solid food in prevention of intestinal activity in Tc-99m tetrofosmin myocardial perfusion scintigraphy. *J Nucl Cardiol.* 2003; 10:161-167.
8. Boz A, Karayalcin B. Which is better for inferior wall evaluation: a full or empty stomach? *J Nucl Med.* 1996; 37:1916-1917.
9. Boz A, Yildiz A, Gungor F, Karayalcin B, Erkilic M. The volume effect of the stomach on intestinal activity on same-day exercise-rest Tc-99m tetrofosmin myocardial imaging. *Clin Nucl Med.* 2001; 26:622-625.
10. Kapur A, Latus KA, Davies G, Dhawan RT, Eastick S, Jarritt PH, et al. A comparison of three radionuclide myocardial perfusion tracers in clinical practice: the ROBUST study. *Eur J Nucl Med.* 2002; 29:1608-1616.