

Non-Ischemic Finding on Gated SPECT Myocardial Perfusion Imaging to Explain Symptoms: Case Report

Gated Myokard Perfüzyon Sintigrafisinde Semptomları Açıklayan İskemi Dışındaki Bulgu

Melih Engin ERKAN, MD,^a
Ayşe Nurdan KORKMAZ, MD,^a
Huri Tilla İLÇE, MD,^a
Mesut AYDIN, MD,^b
Mustafa YILDIRIM, MD,^a
Ahmet Semih DOĞAN, MD^a

Departments of
^aNuclear Medicine,
^bCardiology,
Düzce University Faculty of Medicine,
Düzce

Geliş Tarihi/Received: 23.08.2008
Kabul Tarihi/Accepted: 29.12.2008

Yazışma Adresi/Correspondence:
Melih Engin ERKAN, MD
Düzce University Faculty of Medicine,
Department of Nuclear Medicine,
Düzce,
TÜRKİYE/TURKEY
melihenginerkan@gmail.com

ABSTRACT On myocardial perfusion scintigraphy, planar projection images allow detection of both cardiac and noncardiac abnormalities, which may affect interpretation of the myocardial perfusion images, and can explain patient's symptoms so, increased and reduced extracardiac uptakes should be considered. We present such a case demonstrating the importance of systematic inspection of planar projections. A 63-year-old male with progressive exertional dyspnea and fatigue was referred for myocardial perfusion single photon emission computed tomography (SPECT) imaging for evaluating ischemic heart disease. In our case planar projection images demonstrated a large photopenic area around the heart and, mild increased lung uptake. After we performed CT pleural, pericardial effusions, and pulmonary capillary enlargement were realized. After all this findings, patient had medical therapy for heart failure and symptoms were subsided. We suggest that physicians should be careful about inspection of planar projection, tomographic, images on GATED cardiac SPECT study. Evaluation perfusion defects only may not be enough, to explain patient's symptoms.

Key Words: Cardiac-gated single-photon emission computer-assisted tomography; pericardial effusion

ÖZET Myokard perfüzyon sintigrafisinde planar projeksiyon imajları, hasta semptomlarını açıklayabilecek ve imajın yorumunu etkileyebilecek kardiak ve kardiak olmayan anormalliklerin tespit edilmesine katkıda bulunur. Bu yüzden ekstrakardiak artmış ve azalmış aktivite tutulumlarına dikkat edilmelidir. Planar projeksiyonların sistematik incelenmesinin önemini ortaya çıkaran bir vakayı burada sunduk. Altmış üç yaşında erkek bir hastadan, egzersiz ile ortaya çıkan ilerleyici nefes darlığı şikayeti sebebiyle iskemik kalp hastalığı açısından değerlendirilmeye üzere myokard perfüzyon tek foton emisyon bilgisayarlı tomografi (SPECT) sintigrafisi istendi. Vakamızda, planar projeksiyon imajlarında kalbi çevreleyen geniş fotopenik bir alan ve akciğerlerde orta düzeyde diffüz artmış aktivite tutulumu izlendi. CT çalışması uygulandıktan sonra plevral, perikardiyal efüzyonun ve pulmoner kapiller genişlemenin olduğu farkedildi. Tüm bu bulgulardan sonra hastaya kalp yetmezliğine yönelik tedavi uygulandı ve hastanın şikayetleri geriledi. Biz, hekimler tarafından gated kardiyak SPECT çalışmasında planar projeksiyon ve tomografik görüntülerin dikkatle incelenmesi gerektiğini savunuyoruz. Yalnızca perfüzyon defektlerini değerlendirmek hastaların semptomlarını açıklamak için yeterli olmayabilir.

Anahtar Kelimeler: Kardiyak gated-tek-foton emisyon bilgisayar-yardımlı tomografi; perikardiyal efüzyon

Türkiye Klinikleri J Med Sci 2010;30(4):1384-6

At present, nuclear cardiology is the most widely used noninvasive approach for assessing myocardial perfusion and viability.¹ Although myocardial perfusion defects reflect functional ischemia, there could also be ancillary findings predicting a risk of coronary artery

disease and future cardiac events. Increased ^{99m}Tc -sestamibi stress lung-heart ratio (LHR) (normal limit is less than 0.40) may add significant diagnostic value as a marker of coronary artery disease and reduced ventricular function, and portends a worse prognosis.² The importance of areas with reduced tracer uptake should not be overlooked such as pericardial effusions.^{3,4} We present such a case demonstrating the importance of systematic inspection of planar projections.

CASE REPORT

A 63-year-old male with progressive exertional dyspnea and 50% stenosis in left anterior descending artery was referred for myocardial perfusion SPECT imaging. One-day pharmacological (dipyridamol) study was performed using ^{99m}Tc -sestamibi (10 mCi= 370 MBq stress, 30 mCi= 1110 MBq rest). The stress electrocardiogram was negative for ischemia. The tomographic images revealed ischemia on apex, and a fixed defect on anterior wall. Planar projection images demonstrated a large photopenic area surrounding the heart (Figure 1). An increased mild diffuse lung tracer uptake was seen (LHR was 0.54). Post stress and rest gated SPECT images were notable with a left ventricular ejection fraction of 28%. Transthoracic echocardiogram demonstrated reduction in left ventricular systolic function (30% EF), and pericardial effusion (Figure 2A). CT revealed bilateral pleural, and pericardial effusion, and pulmonary capillary enlargement due to left ventricular failure (Figure 2B). Patient had medical therapy for heart failure and symp-

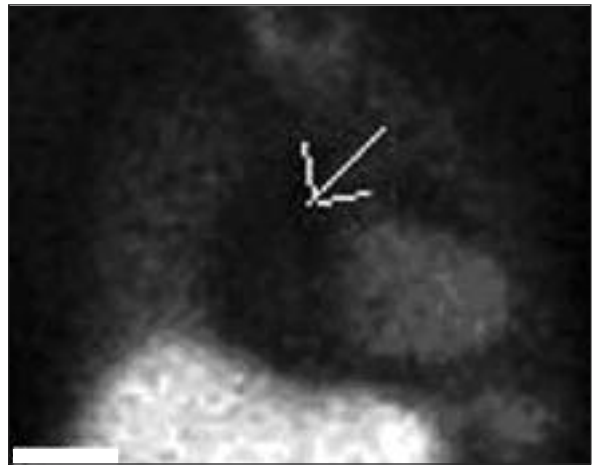


FIGURE 1: Raw planar projection images showing large photopenic area in mediastinum and around heart (arrow), suggestive of pericardial effusion. Note mildly increased lung uptake.

toms seemed subsided in the first month visit. Then, the patient underwent coronary intervention for the stenotic lesions responsible for ischemia.

DISCUSSION

Planar projection images allow detection of both cardiac and noncardiac abnormalities in the cardiac field of view, such as patient motion artifacts, soft-tissue and metallic attenuation artifacts, interfering subdiaphragmatic activity, and abnormal injection-site activity, which may affect interpretation of the myocardial perfusion images.³ Important mediastinal or abdominal incidental findings may also be apparent on inspection of projection data with frequency of as high as 2.8%. Although

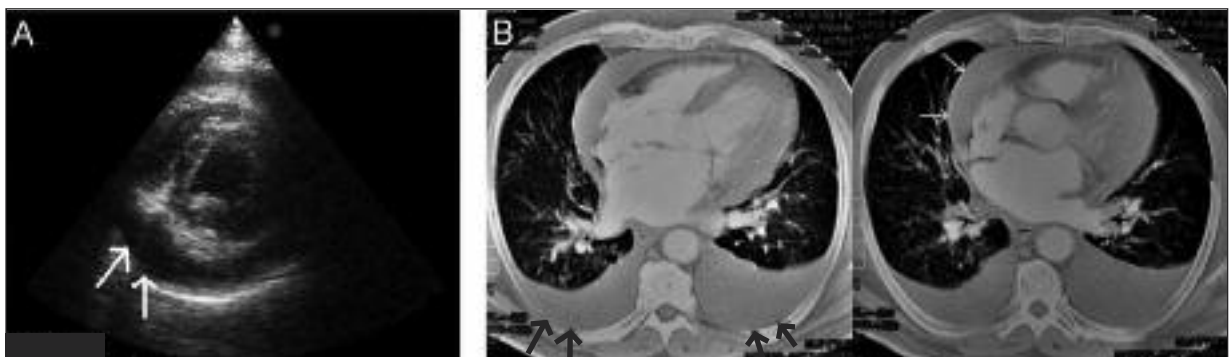


FIGURE 2: In addition to pericardial effusion (white arrows) on echocardiography (A) and CT (B), pleural effusion (black arrows) and vascular enlargement, due to increased pulmonary capillary pressure are seen on CT.

the major impact of these findings with usually increased uptake seems to be detection of malignancy, thyroid disease, ectopic parathyroids, or inflammation, the importance of areas with reduced tracer uptake should not also be overlooked such as ascites, effusions or cysts.⁵⁻⁷

Pericardial effusion may accompany certain cardiac and non cardiac diseases, causes haemodynamic abnormalities ranging from undetectable or mild, to life threatening, and is detected by echocardiography which is the most common and sensitive method.⁸⁻¹¹ CT and MRI may also be used and may be more accurate.¹² The diagnosis of pericardial effusion using myocardial perfusion SPECT study is uncommon but, areas of reduced tracer uptake around the heart related to pericardial effusion which is unknown before the SPECT study, may be critical for proper interpretation of the cardiac scan or may lead to important diagnoses.⁵

There are a few case reports on diagnosis of pericardial effusion by radionuclide cardiac SPECT study. Four pericardial effusion cases with the typ-

ical appearance of a “halo” of photopenic area surrounding the heart on planar projection and tomographic images, and a “rocking” motion of the heart on GATED images were reported by Patel et al.,⁴ Askew et al.,¹³ and Herzog et al.,¹⁴ with typical appearance as mentioned before.⁴ One case was also reported as the echocardiogram had underestimated the amount of pericardial effusion compared to myocardial perfusion imaging, by Spieth ME et al.¹⁵ In our case, although the appearance of photopenic halo was seen around the heart, the rocking motion of the heart was not seen on GATED images.

Planar projection images allow detection of both cardiac and noncardiac abnormalities which may affect interpretation of the myocardial perfusion images, and can explain patient symptoms.² The physician should be careful about inspection of planar projection, tomographic, and gated images of cardiac SPECT study. Evaluation of only perfusion defects may not be enough to explain patient’s symptoms.

REFERENCES

- Turkmen C, Cantez S. [Nuclear cardiology]. *Turkiye Klinikleri J Int Med Sci* 2005;1(42):67-86.
- Higgins JP, Higgins JA, Williams G. Stress-induced abnormalities in myocardial perfusion imaging that are not related to perfusion but are of diagnostic and prognostic importance. *Eur J Nucl Med Mol Imaging* 2007;34(4):584-95.
- Hendel RC, Gibbons RJ, Bateman TM. Use of rotating (cine) planar projection images in the interpretation of a tomographic myocardial perfusion study. *J Nucl Cardiol* 1999;6(2):234-40.
- Patel AD, Abo-Auda WS, Gupta H, Iskandrian AE. Detection of pericardial effusion during Tc-99m sestamibi cardiac imaging. *J Nucl Cardiol* 2003;10(1):102-4.
- Williams KA, Hill KA, Sheridan CM. Noncardiac findings on dual-isotope myocardial perfusion SPECT. *J Nucl Cardiol* 2003;10(4):395-402.
- Raza M, Meesala M, Panjrath G, Ghanbarinia A, Jain D. Abnormal photopenic area on nuclear perfusion imaging. *J Nucl Cardiol* 2005;12(5):607-9.
- Gowda A, Chhabra A, Gavriluke A, Peddinghaus L, Jain D. Unusual photopenic area in the abdomen on myocardial perfusion imaging. *J Nucl Cardiol* 2006;13(4):e6-8.
- Kanadasi M, Cayli M, Demirtas M. [Pericarditis: review]. *Turkiye Klinikleri J Med Sci* 2005;25(5):693-705.
- Shabetai R. Pericardial effusion: haemodynamic spectrum. *Heart* 2004;90(3):255-6.
- Tajik J. Echocardiography in pericardial effusion. *Am J Med* 1977;63(1):29-40.
- Feigenbaum H. Echocardiographic diagnosis of pericardial effusion. *Am J Cardiol* 1970;26(5):475-9.
- Chong HH, Plotnick GD. Pericardial effusion and tamponade: evaluation, imaging modalities, and management. *Compr Ther* 1995;21(7):378-85.
- Askew JW, Christenson SD. Abnormalities on cardiac planar projection and tomographic images: focus on pericardial effusions. *Int J Cardiol* 2008;127(2):266-8.
- Herzog E, Krasnow N, DePuey G. Diagnosis of pericardial effusion and its effects on ventricular function using gated Tc-99m sestamibi perfusion SPECT. *Clin Nucl Med* 1998;23(6):361-4.
- Spieth ME, Schmitz SL, Tak T. Incidental massive pericardial effusion diagnosed by myocardial perfusion imaging. *Clin Med Res* 2003;1(2):141-4.