Case 15077

Eurorad

Unstable angina during myocardial perfusion scintigraphy

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Section: Cardiovascular
Area of Interest: Cardiovascular system Nuclear medicine
Procedure: Diagnostic procedure
Imaging Technique: SPECT
Imaging Technique: Catheter arteriography
Special Focus: Acute Ischaemia / Infarction Case Type: Clinical Cases
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Patient: 80 years, male

Clinical History:

A 80-year-old male patient with coronary artery disease (CAD), stable angina, post 3 myocardial infarctions, percutaneous coronary intervention and stenting of left anterior descending artery (LAD) 6 and 7 segments (2009) underwent myocardial perfusion scintigraphy for risk stratification and prognosis assessment.
Imaging Findings:

One-day stress, rest protocol was performed with 350 and 700 MBq 99mTc-sestamibi. Adenosine was used for stress testing. No symptoms followed. ST depression up to 1 mm in II, III, aVF was observed. After a rest injection the patient felt weakness, heart palpitation. ECG showed ST deviation in V1, V2 and 1 mm depression in V5, V6 in comparison to stress test ECG. No typical angina symptoms were observed.
The stress and rest myocardial perfusion imaging demonstrated a reversible perfusion defect in the inferior wall – moderate ischaemia; reverse perfusion in the apex and the anterior wall - unstable angina was suspected. The patient was immediately consulted by a cardiologist. The laboratory test showed elevated troponin levels (105, 4 ng/l). Coronary angiography was performed and showed diffuse changes in right coronary artery and critical stenosis in LAD‘s 8 segment and circumflex artery‘s 12 segment. The patient was assigned coronary artery bypass grafting.
Discussion:

Stress myocardial perfusion imaging (MPI) is important in the diagnosis and risk stratification of CAD [1]. Patients with angina have a high probability of myocardial ischaemia and are expected to have a high rate of future cardiac events. It is not known whether stress MPI can permit further classification of these patients into high and low-risk categories and thereby guide in the selection of patients who require invasive procedures [1]. Rest MPI is a useful technique for screening patients with no previous history of ischaemic heart disease presenting at the emergency department with chest pain suggestive of angina who have normal or inconclusive ECG findings [2]. It has a negative predictive value ranging between 99-100% and is useful in risk stratification and prognosis [3]. Limitations of rest MPI include the inability to distinguish ischaemia from an old infarct as recognition of ischaemia requires follow-up imaging in a pain-free state to evaluate for resolution of the defect [4].
Reverse perfusion (RP) pattern is observed when myocardial MIBI washout is increased after the sub-acute phase

or after revascularisation, especially in patients with acute myocardial infarction as well as patients with coronary spastic angina; this phenomenon may reflect a salvaged myocardium [5-7]. However, RP is a poor predictor of flow limiting CAD, and does not correlate with stenosis location in those with significant lesions [8]. It was also implied that RP may be related to artifacts of various origins [9].
A review of clinical trials indicates that adenosine perfusion studies provide high sensitivity and specificity (80-90%) for identifying CAD. Adenosine stress test is a safe procedure [10]. It has a number of well-documented predictable minor side effects reflecting its mode of activity, such as arrhythmias, transient atrioventricular nodal block of differing degrees, hypotension [11]. A severe complication rate is 1.2 per 10000 tests [12]. Only one myocardial infarction during adenosine stress test has been reported [13].
Diseased arteries have reduced coronary flow reserve with limited ability to vasodilate and accordingly exhibit a reduced response to adenosine relative to healthy vessels. Most of the total increased blood to the myocardium comes from increased blood flow through healthy vessels [14]. As tracer uptake is proportional to blood flow, this results in a relative hypoperfusion in territories supplied by diseased vessels and the subsequent heterogeneous perfusion pattern on the stress images. Although ischaemia is inferred from this appearance, the incidence of true ischaemia is low [15].
Differential Diagnosis List: Unstable angina, Myocardial Infarction, MPI artifacts

Final Diagnosis: Unstable angina

References:

A. Elhendy, A.F.L. Schinkel, R.T. Van Domburg et al. (2005) Risk stratification of patients with angina pectoris by stress 99mTc-tetrofosmin myocardial perfusion imaging. J Nucl Med 46(12):2003–8 (PMID:16330563)
Jimenez-Hoyuela Garcia JM, Robledo Carmona J, Martinez Del Valle Torres MD, Ortega Lozano S, Delgado Garcia A, Gomez Doblas JJ. (2007) Utility of myocardial perfusion scintigraphy in the emergency department for evaluation of patients with chest pain. Rev Esp Med Nucl 26(2):69–76 (PMID:17386233)
Harrison SD, Harrison MA, Duvall WL. (2012) Stress Myocardial Perfusion Imaging in the Emergency Department - New Techniques for Speed and Diagnostic Accuracy. Curr Cardiol Rev 8(2):116–22 (PMID:22708910)
Kontos MC, Diercks DB, Kirk JD. (2010) Emergency Department and Office-Based Evaluation of Patients With Chest Pain. Mayo Clin Proc 85(3):284–99 (PMID:20194155)
Ono S, Takeishi Y, Yamaguchi H, Abe S, Tachibana H, Sato T, et al. (2003) Enhanced regional washout of technetium-99m-sestamibi in patients with coronary spastic angina. Ann Nucl Med 17(5):393–8 (PMID:12971638)
Sugihara H, Nakagawa T, Yamashita E, Kinoshita N, Ito K, Azuma A, et al. (1999) Reverse redistribution of Tc-99m-tetrofosmin in patients with acute myocardial infarction. Ann Nucl Med 13(1):43–7 (PMID:10202947)
Tanaka R, Nakamura T, Chiba S, Ono T, Yoshitani T, Miyamoto A, et al. (2006) Clinical implication of reverse redistribution on 99mTc-sestamibi images for evaluating ischemic heart disease. Ann Nucl Med 20(5):349–56 (PMID: 16878707)
Smith EJ, Hussain A, Manoharan M, Testa HJ, Curzen NP. (2004) A Reverse Perfusion Pattern During Technetium-99m Stress Myocardial Perfusion Imaging Does Not Predict Flow Limiting Coronary Artery Disease. Int J Cardiovasc Imaging 20(4):321–6
Schillaci O, Tavolozza M, Di Biagio D, Lacanfora A, Chiaravalloti A, Palombo E, et al. (2013) Reverse perfusion pattern in myocardial spect with 99mTc-SestaMIBI. J Med Life 6(3):349–54 (PMID:24146698)
Iskandrian AS. (1994) Adenosine Myocardial Perfusion Imaging. J Nucl Med 35(4):734–7 (PMID:8151404)
Cerqueira MD, Verani MS, Schwaiger M, et al. (1994) Safety profile of adenosine stress perfusion imaging: results from the adenoscan multicentre trial registry. J Am Coll Cardiol 23:384–9 (PMID:8294691)
Henzlova MJ, Duvall WL, Einstein AJ, Travin MI, Verberne HJ. (2016) ASNC imaging guidelines for SPECT nuclear cardiology procedures: Stress, protocols, and tracers. J Nucl Cardiol 23(3):606–39 (PMID:26914678)
Polad JE, Wilson LM. (2002) Myocardial infarction during adenosine stress test. Heart 87(2):E2 (PMID:11796565)
Feldman RL, Nichols WW, Pepine CJ, et al. (1981) Acute effects of intravenous dipyridamole on regional coronary

hemodynamics and metabolism. Circulation 64:333–44 (PMID: 7249300)
Fenster MS, Feldman MD, Camarano G et al. (1997) Correlation of adenosine thallium-201 perfusion patterns with markers for inducible ischemia. Am Heart J 133:406–12 (PMID: 9124161)

Figure 1

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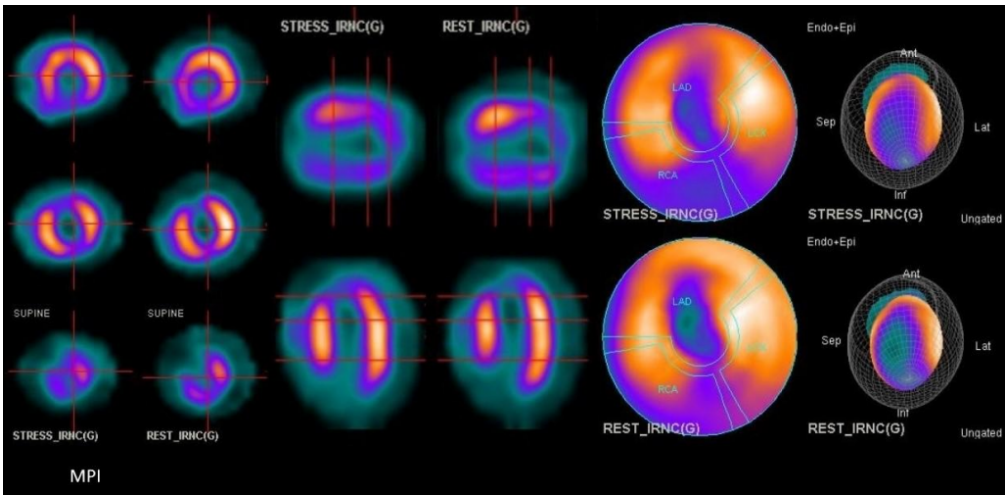

Description: The stress and rest imaging demonstrates perfusion defects which were large of severe intensity in anterior and inferior walls. In rest images perfusion was moderately worse in the anterior wall of the LV. **Origin:** Department of radiology and nuclear medicine, Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania

Figure 2

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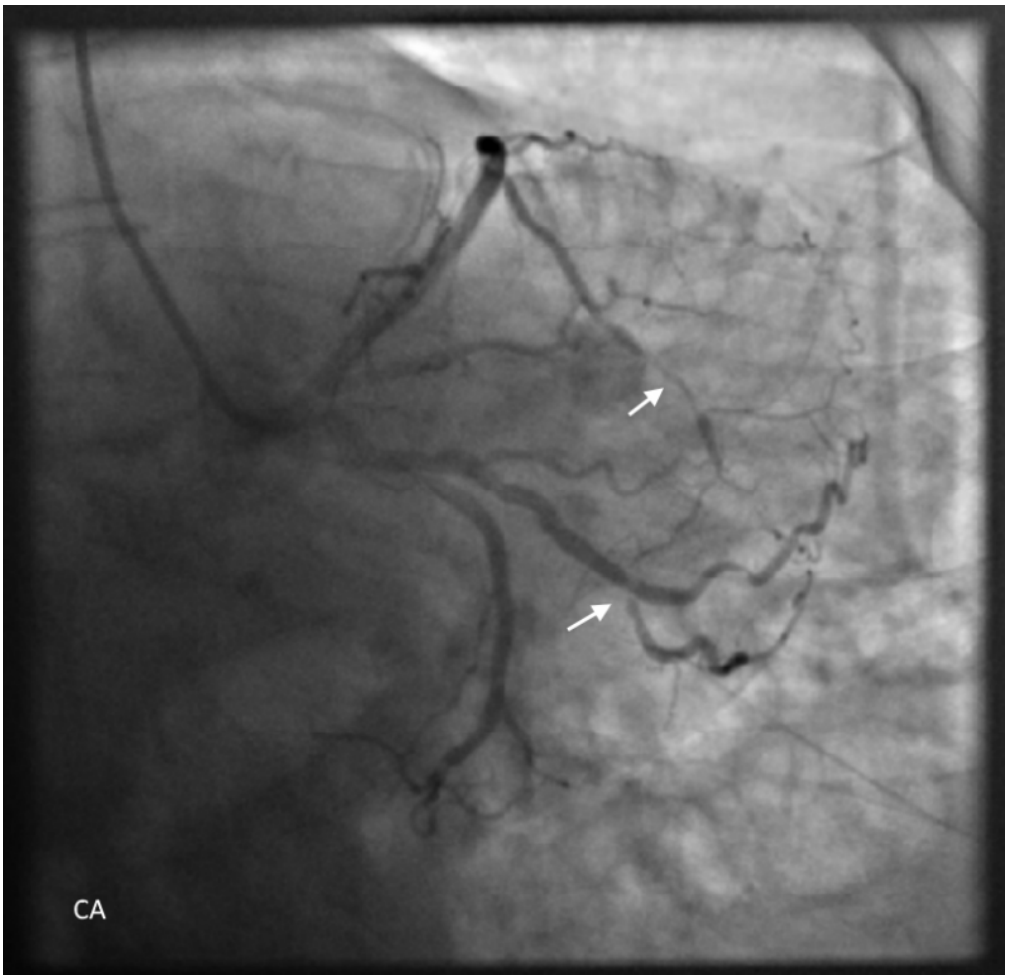

Description: Coronary angiography image shows critical stenosis in LAD‘s 8 segment and RCX‘s 12 segment (arrows). **Origin:** Department of radiology and nuclear medicine, Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania

Figure 3

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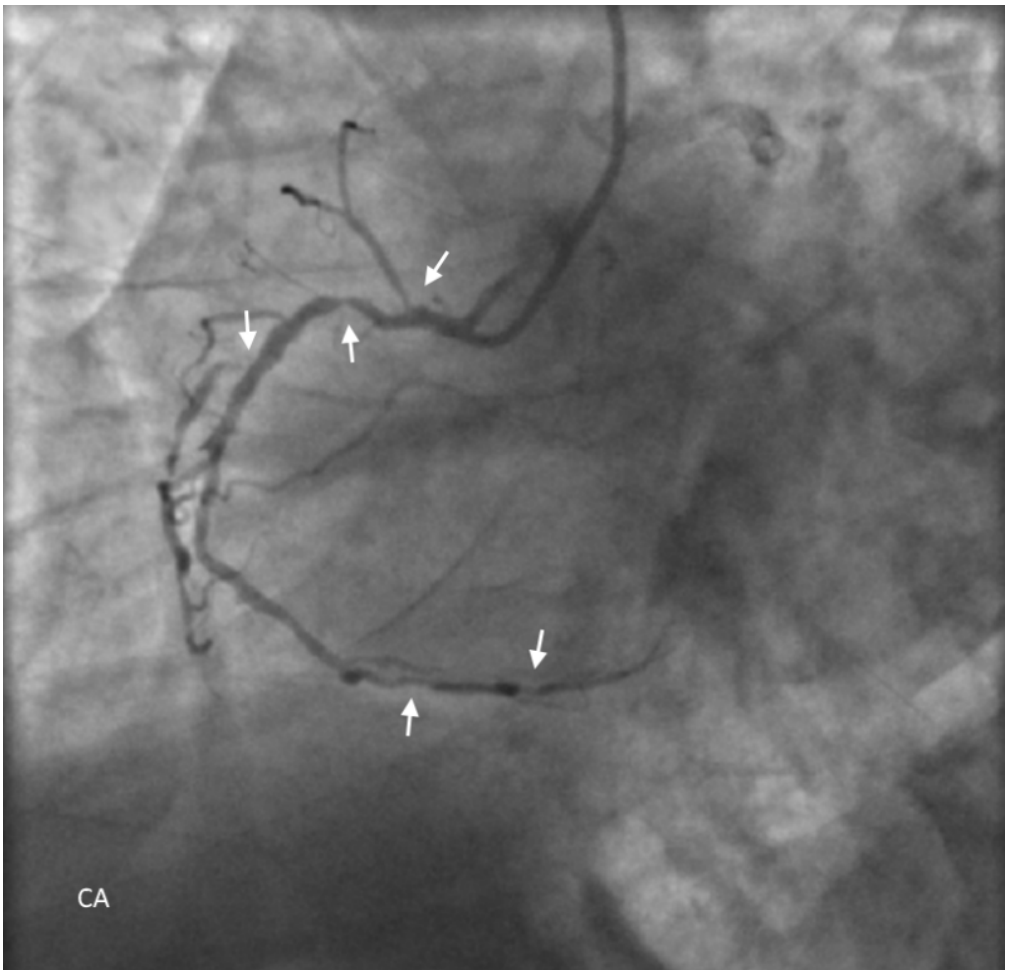

Description: Coronary angiography image shows diffuse subocclusive stenoses in RCA (arrows).

Origin: Department of radiology and nuclear medicine, Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania