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This is to certify that Ms Aisyah Elliyanti from Indonesia participated in the **IAEA International Conference on Integrated Medical Imaging in Cardiovascular Diseases (IMIC 2013)** which was held in **Vienna, Austria** from 30 September to 4 October 2013.

This event is equivalent to 26 CME Credits awarded under UEMS/EACCME Guidelines.





A Discordance Results Between Myocardial Perfusion Imaging with Coronary Angiography : A Case Report

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Introduction:

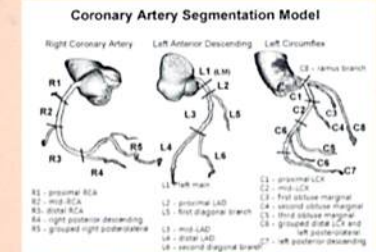
Coronary artery disease cause major death rate in Indonesia. The diagnosis established by electrocardiogram(ECG), cardiac ultrasound, treadmill exercise test, myocardial perfusion imaging (MPI), and coronary angiography. MPI is a non-invasive cardiac examination and has been proved to be a useful clinical tool for the diagnosis, treatment monitoring, and prognosis of coronary artery disease. It identifies areas of relatively reduced myocardial blood flow associated to ischemia or scar by administrated a radiopharmaceutical intravenously for blood flow distribution in myocardium delineation.

Case Presentation :

A 50 year-old man with cardiomyopathy and bronchitis disease, was refered to Dr. HasanSadikin Hospital for myocardial perfusion imaging. He smoked one box of cigarette a day and quit a year before came to the hospital, furthermore he had family history of heart disease. Blood test results showed; heamoglobin:13,5gr/dL, BBS: 17/37 mm/hour, blood sugar level: 89mg/dl, total cholesterol and triglyceride level: 230mg/dl, 157 mg/dl respectively. Na⁺ and K⁺ concentrations: 47 and 4.4 respectively. ECG result was ST depression with horizontal and descend ST slope at V6,II,III,aVR and aVF. Echocardiography showed dilated CMP, Mod MR, Mild TR, EF 30%. We performed a perfusion imaging using ^{99m}Tc-tetrofosmin with stress-rest test protocol. Initial blood pressure was 90/70mmHg and heart rate 121/min. Patient complained an exhausted at stage III and stress test which was using ergo-cycle was stopped. Heart rate was 138/min (81% of target HR), blood pressure 100/70 mmHg. Perfusion imaging on stress showed cardiac dilatation and severe blood flow reduction at anterior and inferior walls, septum, apex, antero-lateral and infero-lateral segments which refer to LAD and RCA artery territories. The rest perfusion imaging showed partial reversible perfusion to those areas. Patient asked for more investigation at hospital in Singapore and he underwent a coronary angiography test. The test showed 50% stenosis at PLAD. The question came related to disagreement between perfusion imaging and coronary angiography results.



A.



B.

Figure 1 : Coronary angiography results reveal stenosis at PLAD 50% (A) coronary artery anatomy (B)

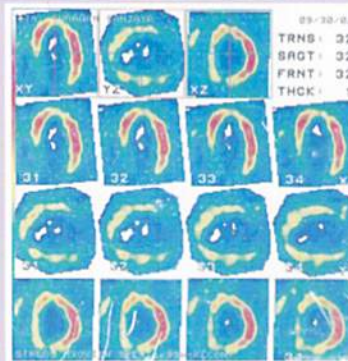


Figure 2 : MPI results reveal severe blood flow reduction at anterior and inferior walls, which refer to LAD and RCA artery territories

Discussion :

MPI shows perfusion and functional status of heart. Interaction between vessels and myocardial related to oxygen consumption and blood vessel velocity. This interaction is different between transmural layer. Effect of contraction on coronary arteries was higher at inner than outer myocardium layer. On the other hand, oxygen consumption is higher at inner than outer myocardium layer. Patients who had no infarct history, on coronary arteries disease, the perfusion will be normal during rest, and the blood vessels velocity on distal of stenosis was managed by auto-regulation, and during exercise the blood vessels velocity reduce significantly because of micro-vascular have been dilated maximally during the rest.

Angiography shows normal about 10-20% of acute or chronic ischemia patients, and it gives information an anatomical status such as luminal stenosis level of coronary arteries.

Conclusion:

There is some fundamental difference between MPI with coronary angiography but the image modalities are complementary to each other in clinical practice. Coronary angiography remains the gold standard for detecting clinically significant coronary atherosclerotic disease on the other hand MPI for evaluated luminal stenosis effect on myocardium. The micro-vascular disturbance should be consider as one condition caused a discordant between coronary angiography and MPI result.