

Title: Assessment of vulnerable atherosclerotic plaques in coronary arteries using somatostatin receptor scintigraphy (SRS) and head-to-head comparison with myocardial perfusion scintigraphy (MPI): A paradigm under construction

Category: Heart Failure and Cardiomyopathies

Abstract

Introduction: Activated macrophages can lead to cardiac events by rupturing the vulnerable atherosclerotic plaques. It has been shown that activated macrophages express somatostatin receptor-2 (SSTR-2), therefore, we aimed first, to detect atherosclerotic plaques by *somatostatin receptor scintigraphy* (SRS) using $99m\text{Tc}$ -Octreotide SPECT which bind to somatostatin receptor 2, and second, comparison of SRS with myocardial perfusion scintigraphy (MPI) using $99m\text{Tc}$ -MIBI SPECT and angiography in detection of atherosclerotic plaques.

Materials and methods: 737 patients with suspicious coronary artery disease who referred to the Nuclear Medicine Department for MPI were participated in this prospective controlled trial, 52 of them representing the final study cohort, performed additional SRS. The SRS analysis was done according to severity of uptakes (mild, moderate, severe) into five cardiac regions (apex, anterior, inferior, septal, lateral). The MPI defects were also reported according the above segments. According to the standard cardiovascular guideline, the angiography was performed during 1 month after SRS. The coronary arteries in all modalities divided into three main arteries inducing LAD, RCA, and LCX. Statistical analysis of all modalities was performed for three main coronary arteries separately and compared.

Results: In 17 out of 52 patients who underwent coronary angiography, 11 female and 6 male aged from 28 to 84 (54.83 ± 19.7) years old, had been shown remarkable uptake on cardiac SRS. The SRS and angiography in the LAD territory was concordant in 13/17 patients while only 7/17 cases were concordant between MPI and angiography. In RCA territory, the SRS and angiography were concordant in 14/17 cases while MPI and angiography were 11/17 cases. In LCX territory, SRS and angiography were concordant in 13/17 cases while MPI and angiography were 6/17 cases. In all 35 remaining patients who had not been performed coronary angiography based upon cardiovascular profile, cardiac event was not showed over follow up period of 2-9 months (5.52 ± 2.71), and interestingly they didn't depicted remarkable uptake on SRS. An example of such cases is presented (Figure 1).

Conclusion: $99m\text{Tc}$ -octreotide uptake was more concordant relative to $99m\text{Tc}$ -MIBI SPECT findings with coronary plaques, suggesting a potential role for $99m\text{Tc}$ -octreotide in the evaluation of atherosclerosis. In addition, coronary uptake may provide a molecular guide for the representation of coronary atherosclerotic lesions. Specific regional uptake is warranted to be ascertained by histology.

Figure 1 . Myocardial perfusion imaging (MPI) at rest in a 51-year-old man in upper row images. Short axis, vertical and horizontal slices in the top rows showing severe decreased uptake in the inferior and inferoseptal walls. Cardiac SRS in the same patient in lower row images. Short axis, vertical and horizontal slices in the lower rows showing focal uptakes in the septal and inferior segments suggesting vulnerable plaques. The coronary angiography showed a cut off RCA and 80% stenosis in diagonal branch.

