

Executive Summary

The Clinical Usefulness and Cost-effectiveness of CT Coronary Angiography for the Diagnosis of Ischemic Heart Disease in Patients with Chest Pain

Deaths and medical expenses due to coronary artery diseases are increasing every year. Chest pain is an important symptom of coronary artery diseases, but may occur from various causes and differential diagnosis cannot be made easily with symptoms only. Coronary angiography(CAG) is the gold standard for making a definite diagnosis for coronary artery diseases and enables both diagnosis and treatment together. However, it is an invasive procedure and there are risks of vessel injury or death during the procedure. In addition, hospitalization is required and the procedure cost is expensive. Thus, many non-invasive differential diagnosis methods are being performed including CT coronary angiography(CTCA), myocardial SPECT, stress electrocardiogram(ECG) for patients with chest pain before implementing CAG. Medical expenses for these non-invasive tests are increasing, but there is a lack of studies on whether the procedure selection is suitable or which test is the most appropriate for specific subjects. In this study, the accuracy and economic evaluations of non-invasive diagnosis methods for coronary artery diseases were analyzed using retrospective medical records of patients who visited the cardiology outpatient clinic with chest pain.

A retrospective cohort study was performed on new patients who have not received any diagnosis of coronary artery disease or treatment before among those over 30 years of age who visited the cardiology outpatient clinic between 2006 to 2008 in a single medical institution. Among 4,743 patients selected, 2,485 patients received more than one of the following non-invasive tests: CTCA, myocardial

SPECT, and stress ECG for differential diagnosis. CTCA was performed in 635 patients(25.6%), myocardial SPECT in 997 patients(40.1%), and Stress ECG in 853 patients(34.3%). Patients who received two or more tests at the same time on their first visit were excluded.

Among the 2,485 patients, 592(23.8%) received CAG. Since CAG was not performed in all patients, the comparison of test accuracy was calculated by correcting referral bias to CAG depending on non-invasive test results based on the Bayes Theorem. Accuracy of diagnosing coronary artery stenosis was the highest in CTCA. The positive likelihood ratio was 14.14, while the negative likelihood ratio was 0.45. This was followed by myocardial SPECT and stress ECG.

Cost-effective analysis(CEA) was performed among patients with intermediate risk with pre-test likelihood of 10-90 who were subjects for non-invasive tests for two alternatives: CCTA and SPECT. The model was analyzed by using diagnosis accuracy and QALY. The method using diagnosis accuracy was a model that used the number of patients accurately diagnosed among 1,000 persons as the effect, and reflecting only the medical expenses for tests as the cost. CTCA appeared to be more effective and even less expensive than myocardial SPECT proposed to be the best alternative. In the model using QALY, the QALY was calculated using questionnaires for each case among general population during 1 year of analysis period after the non-invasive test. Expenses for 1 year after the first test were calculated through analysis of Health Insurance Review & Assessment Service claim data. CTCA showed more efficacy and less cost than myocardial SPECT. Sensitivity analysis was performed among patients with a pre-test positive likelihood of 25-75 considering uninsured benefits, and results were the same.

In conclusion, the accuracy of diagnosing coronary artery stenosis was the highest in CTCA, followed by myocardial SPECT and stress ECG. CEA between CTCA and myocardial SPECT indicated that CTCA was the cost-effective test. Since this study was based on a

retrospective medical record data from a single medical institution, a study using large-scale, multi-institutional, prospective data should be performed in order to generalize study results.