Different therapeutic proportion of patients undergone coronary angiography in the era of development in MSCT

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Abstract
Objective To study the different therapeutic proportion of the patient populations undergone coronary angiography (CAG) in the era of development in multislice spiral computed tomography (MSCT).

Methods Two hundred and fifty-four consecutive patients (mean age 59.24±10.65), who underwent CAG at Daxing hospital from February 2007 through October 2007, were enrolled. 160 patients were male and 94 were female. By evaluating from the coronary angiogram, the patients were not diagnosed to have coronary heart disease (CHD) with less than 50% diameter stenosis of coronary artery; the patients to have CHD with more than or equal to 50% stenosis of coronary artery; the patients were performed the procedure of percutaneous coronary intervention (PCI) with more than or equal to 70% stenosis; the patients were proposed to have coronary aortic bypass graft (CABG) surgery with left main coronary artery lesions or diffuse triple coronary artery Lesions.

Results In the two hundred and fifty-four consecutive patients, 59 patients (23.2%) had not been diagnosed to have CHD; 195 (76.8%) to have CHD, of these patients with CHD, 49 patients (19.3%) were not indicated for PCI (including the patients receiving follow-up coronary angiography after stenting), 81 (31.9%) had been performed the procedure of stent implantation, 57 (22.4%) proposed to have CABG, 8 (3.1%) the procedure of PCI had not been successful, or had not been performed because of patients opposing to this therapy.

Conclusion Multislice spiral computed tomography can be applied as a non-invasive screening tool to exclude the presence of CHD, to increase the positive proportion of the populations with CHD in all patients receiving coronary angiography, to avoid the use of CAG in a subset of patients (J Geriatr Cardiol 2008; 5:).

Key Words Coronary heart disease; Multislice spiral computed tomography; Coronary angiography

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Invasive coronary angiography (CAG) is the “gold” standard for the assessment of coronary artery stenoses, it become a widely accepted tool for the examination of patients with suspected CAD in clinical practice. Although the associated risk for serious complications is small, the inconvenience for the patient and economic deliberations have strengthened the search for a non-invasive alternative. Current multi-slice spiral computed tomography (MSCT) scanners provide promising results in the assessment of CAD, which has enabled direct visualization of the lesions of the coronary arteries, and the high negative predictive value suggests an important role of CT coronary angiography for reliably excluding CAD in patients with an equivocal clinical presentation, who may currently undergo a cost-extensive CAG. Catheterization could be avoided in the patient populations with a low preexercise test probability of CAD, so the positive proportion of CHD has increased in the population of the patients receiving coronary angiography. This study is to examine the different therapeutic proportion of the patient populations undergone CAG in the era of development in MSCT, which determined by evaluation of coronary angiogram.

PATIENTS and METHODS

Patient selection
From February 2007 through October 2007, two hundred and fifty-four consecutive patients (mean age 59.24±10.65) underwent coronary angiography were enrolled in the current study in Daxing hospital, of them 160 patients were male and 94 were female. The general laboratory test were examined in all patients after admission, including blood and urine routine test, serum biochemical test, chest X-ray check, electrocardiography (ECG), ultrasonic cardiography (UCG), ultrasonography for liver and kidney, dynamic electrocardiography (DCE), multislice spiral computed tomography (MSCT, GE Inc). All patients were indicated for CAG by the symptoms and the results of all non-invasive
examination, written informed consent of CAG was obtained from all patients and their family members. The exclusion criteria included severe heart dysfunction, severe cardiac arrhythmia, patients with psychopathic diseases, severe other organ diseases apart from heart, known hemorrhagic diathesis, serum creatinine $>3$ mg/dl, patients with STEMI received primary percutaneous coronary intervention. By evaluation of the 64-detector row MSCT angiogram and other non-invasive examination, forty two patients (16.5%) were not diagnosed to CHD, two hundred and twelve patients (83.5%) were diagnosed to CHD, of them 27.2% (69/254) patients with acute myocardial infarction, 9.9% (25/254) with old myocardial infarction, 59.8% (152/254) with hypertension, 25.6% (65/254) with diabetes mellitus.

**Diagnoses and selection of therapeutics by CAG**

The INNOVA 3100 equipment (GE Healthcare, Milwaukee, WI, USA) was used for CAG, coronary angiography were performed according to standard techniques and multiple views were stored on a CD-ROM. The therapeutic strategy was determined by evaluation of the coronary angiogram, patients were not diagnosed to have coronary heart disease (CHD) with less than 50% diameter stenosis of coronary artery; the patients to have CHD with more than or equal to 50% stenosis in any vessel of coronary arteries; the patients were performed the procedure of percutaneous coronary intervention (PCI) with more than or equal to 70% stenosis; the patients were proposed to have coronary aortic bypass graft (CABG) surgery with left main coronary artery lesions or diffuse triple coronary artery lesions, and which combined with clinical data.

**Statistical analysis**

SPSS11.5 statistical software was used for Statistical analysis, continuous variables were expressed as mean±standard deviation, categorical variables were expressed as proportions, P value<0.05 was considered statistically significant. The proportion of different therapeutic strategy of the population of the patients undergone coronary angiography was obtained.

**Results**

Two hundred and fifty-four consecutive patients were undergone coronary angiography, by evaluation of the coronary angiogram, of these patients 59 patients (23.2%) had not been diagnosed to have CHD; in one patient the CAG was performed before radiofrequency catheter ablation of supraventricular tachycardia, in four patients the CAG were before implantation of cardiac pacemaker for sick sinus syndrome; 195 (76.8%) to have CHD (Table 1), of these patients with CHD, 49 patients (19.3%) were not indicated for PCI (including the patients receiving follow-up coronary angiography after stenting), 81 (31.9%) had been performed the procedure of stent implantation, 57 (22.4%) proposed to have CABG, 8 (3.1%) the procedure of PCI had not been successful, or had not been performed because of patients opposing to this therapy (Table 2).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>The positive proportion of the population of patients undergone CAG</th>
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<tr>
<td>Diagnoses by judging from CAG</td>
<td>The positive proportion</td>
</tr>
<tr>
<td>No CHD</td>
<td>59 patients (23.2%)</td>
</tr>
<tr>
<td>CHD</td>
<td>195 patients (76.8%)</td>
</tr>
<tr>
<td>Patients total</td>
<td>254 patients (100%)</td>
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</tbody>
</table>

**Discussion**

Invasive coronary angiography (ICA) is the accepted reference standard for the assessment of coronary artery stenoses because of its unprecedented temporal and spatial resolution and the ability to perform therapeutic interventions in the same session. But only one third of patients undergone CAG had performed PCI in clinical practise, and in most patients CAG was used for diagnosis of coronary artery disease and evaluation of the stenosis severity of it’s lesions, the invasiveness for the patients and economic deliberations of CAG have strengthened the search for a non-invasive alternative for diagnosis. CAG is for the ultimate examination of coronary artery disease.

MSCT can provide more information for evaluating CAD and will be more suitable in the clinical setting, for example, the “decision-making” cardiac catheterization as further evaluation, the patient (lesion) – tailored percutaneous coronary intervention (stent implantation, atherectomy, etc) in some case. It is a technique with a high diagnostic accuracy in the detection of significant coronary stenoses.
in patients with atypical pain or stable angina and low to intermediate risk. Given the high negative predictive value, MSCT-CA may become an ideal screening tool to exclude the presence of critical coronary disease; for patients with proven CHD, CAG was the first choice for assessment of significant coronary stenoses, moreover for the procedure of PCI. The clinical application of MSCT-CA render it change that the proportion of the patient populations undergone coronary angiography, the positive proportion of the patient populations with CHD increased, and avoid the use of CAG in a subset of patients, especially the population of patients without CHD and who not needed for performance of PCI.

Reported by Leschka et al and Raff et al, the negative predictive value of MSCT-CA for evaluation of coronary artery disease were 99% and 98% respectively. It become a alternative for conventional coronary angiography (CAG) on patients characterised by a low prevalence of disease, therefore the positive proportion of the patients with CHD increased in the populations undergone coronary angiography. In our study, two hundred and fifty-four consecutive patients were undergone coronary angiography, of these patients only 59 patients (23.2%) had not been diagnosed to have CHD, 195 (76.8%) to have CHD, 49 patients (19.3%) were not indicated for the procedure of PCI, 81 (31.9%) had been performed the procedure of stent implantation, 57 (22.4%) proposed to have CABG, 8 (3.1%) the procedure of PCI had not been successful, or had not been performed because of patients opposing to this therapy. It is obvious that the proportion of the patient populations undergone diagnostic performance of CAG were decreased, and those for invasive interventional therapeutics were increased. However for accuracy of 64-slice CT for assessing haemodynamically significant stenoses of the coronary arteries in comparison with CAG, two major limitations for reliable assessment of all coronary segments: motion artifacts and severe coronary calcifications. Motion artifacts can be caused by severe heart motion, image quality was decreased with higher heart rates. False-positive lesions can be caused by severe calcifications, in that beam hardening artifacts with a decrease in lumen visualization.

Although this is a observation study, which has certain limitation, but it indicated that the importance of non-invasive examination was increased with MSCT-CA for detecting coronary artery disease, and coronary plaques quantitatively, and it is reasonable for screening purposes and for assessment of coronary stenoses that would be potential targets of revascularization therapy, to increase the positive proportion of the populations with CHD in all patients receiving coronary angiography, to avoid the use of CAG in a subset of patients. The preliminary results of this study indicated that the positive proportion was 78.13%, further studies in larger patient cohorts are needed to validate the presented data.

**Reference**