Early post operative assessment of CABG by multi-detector row computed tomography and correlation between calcium score and early graft occlusion after coronary bypass surgery

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Abstract

Objectives : The objective of our study was to assess early post operative patency and anatomy of CABGs using retrospectively ECG gated MDCT and correlation between the amount of calcium scoring and early coronary graft occlusion and also retrospective correlation between Calcium scoring and coronary artery disease .

Material & Method : 65 patients (43 men , 12 women) who underwent CABG in Shahid Rajaii heart hospital were included in this study.

The time interval between the CABG surgery and imaging protocol was less than l month.

We used ECG gated 10 detector CTA (slice thickness 0.6 mm ,rotation 500ms) , for detection the relation between coronary calcium score and early SVG graft occlusion. The threshold of 130 Hounsfield units was set to identify calcifications by Agatston method.

Results and Conclusion : The sensitivity and the specificity of calcification for severe stenosis (>75%) were 85% and 40%, respectively. we did not find any correlation between coronary calcium scoring and early SVG graft occlusion(pv=0.6).

Key words: Coronary artery bypass surgery, calcium score, and multi-detector row computed tomography, saphenous vein graft.

Introduction:

Coronary heart disease (CHD) is one of the main causes of mortality and morbidity in the world. The disease can be asymptomatic until the first event, which may be a fatal myocardial infarction (heart attack). Half of all heart attacks occur in people who have had no prior warning of coronary disease, and almost half will die from the first attack.

Risk scores based on well-known factors such as age, blood pressure, smoking, cholesterol and diabetes have been used to assess risk, but are imperfect: not all high-risk people develop heart disease, and many low-risk people do. Indeed, depending on which cut-off is used to define high risk, most heart attacks occur in low-risk people, because the number of people at low risk is much greater than the number at high risk. There is therefore a need for a better way of identifying those at risk so that they can treat themselves with lifestyle measures, or receive drug therapy such as statins and antihypertensive drugs as appropriate.

Computed tomography (CT) is a form of radiological imaging that can detect calcium deposits in the coronary arteries. This calcification is a marker for CHD, and so CT imaging could be a way of detecting asymptomatic but serious CHD. CT is quick and non-invasive, but does involve a relatively large radiation,

In this study , 1 months after CABG , 12% SVG graft occlusion occurred, with the reasons for most occlusions being technical, we evaluate the correlation of calcium score with graft occlusion after CABGs

Objectives:

The aim of the review was to assess the correlation of CT calcium scoring with coronary artery disease (CAD) in patient undergoing CABGs after coronary

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angiography. The first question was:
Does coronary artery calcification (CAC) correlate with coronary artery disease?
And another was:
Does coronary calcium score correlate with graft occlusion in 1 month after CABGs?

Methods

Study population.A total of 65 patients are included in this study. We selected all of them from among patients that underwent CABGs after angiography.
If no contraindication was present, the patient was asked to participate in the study and if the patient gave informed consent, he/she was included in the study. The local ethics committee had approved the study protocol. All patients underwent computed tomography (CT) angiography 30 day after CABGs. An oral premedication with beta-blocker was attempted in all patients. Contraindications for beta-blocker medication was atrioventricular block >II°, intrinsic HR <50 beats/min and blood pressure at exam <120/80 mm Hg

Multi-detector CT scanning technique; Briefly, a native scan without contrast media was performed by 10 slice MDCT .Coronary calcification was analyzed using Siemens calcium scoring soft ware to determine the total calcium burden of the coronary tree. [Threshold =130HU]
To evaluate graft occlusion, 10 slice MDCT coronary angiography was performed with patient premedicated with Beta-Blocker and Retrospective ECG –gating ,contrast medium was injected with test bolus ,5ml/sec flow rate with 100-120 ml of nonionic contrast media and saline chaser injected through dual injector and images were captured during diastolic phase with curved MIP,MPR and VRT images .

Image quality; The MSCT was performed without complications in all patients; 92% of patients received a beta-blocker regimen before the scan. The mean HR was 6o +/- 8 beats/min.

Native scan and calcium scoring; The assessment of calcifications was successfully performed in all patients. The mean calcium score expressed as total calcium mass in mg. Ca-HA was 309 mg in 65 patients, and the mean calcium score of LAD.LCX, RCA were 153.6, 40.2, and 101.4 respectively.

Results:

Demographics and clinical manifestation of patients shown in (figure-1) and (table-1) and percentage of coronary vessel calcium scoring is shown in (Table-2),we found that 76% of patients with moderate to sever coronary calcification had significant coronary artery disease(.75% stenosis).(Table -6)

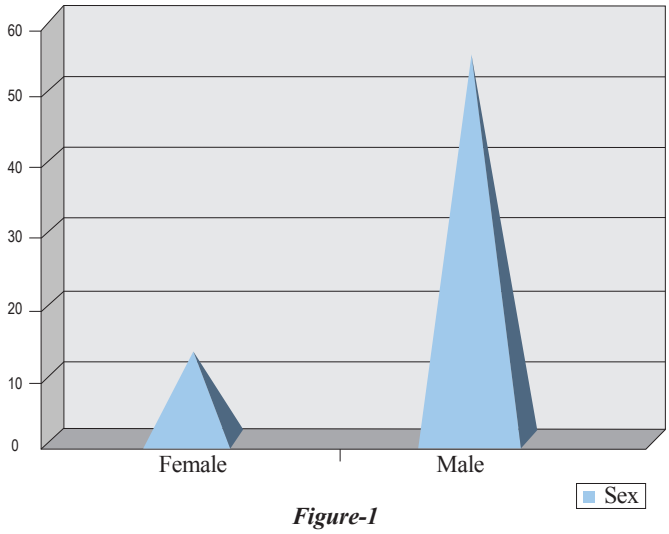

Figure-1

*Table 1. Baseline Characteristics and Laboratory Findings.**	
Characteristic	
Demographic characteristics	
Age — yr	57.9
Female sex	12
Clinical characteristics	
TYPICAL CHEST PAIN	47
ATYPICAL CHEST PAIN	12
NONANGINAL CHEST PAIN	5
DYSPNEA	8
CHEST PAIN+ DYSPNEA	6
Cardiac risk factors — no. (%)	
HYPERLIPEDEMIA (HISTORY)	39
HYPERTENSION	26
Diabetes	23
Smoking	34%
Hypercholesterolemia(LAB TEST)	
Hypertriglyceridemia (LAB TEST)	45%
Familial history	7%
2RF	26
3RF	10
4RF	2

Table 1

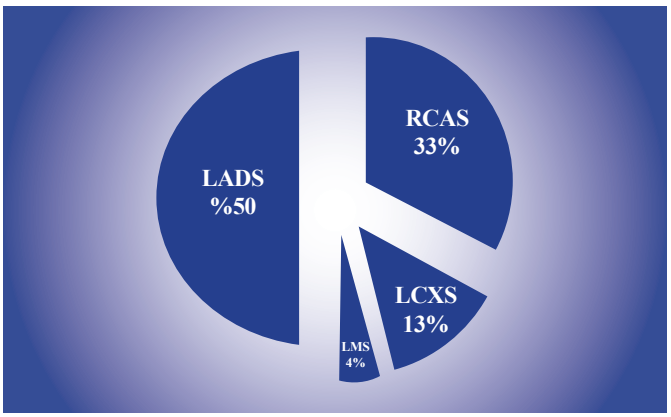

Figure-2; *percentage of coronary vessel calcium score in 65 patients 1 month after CABGs*

In 65 patient in this study from total of 204 SVG graft %13 occlusion occurred after 30 days (OM;60%, RCA;9% DIAGONAL;27% ,PDA;9%)that we don't find any correlation between moderate to sever calcification and early graft occlusion after CABGs(pv =0.6)

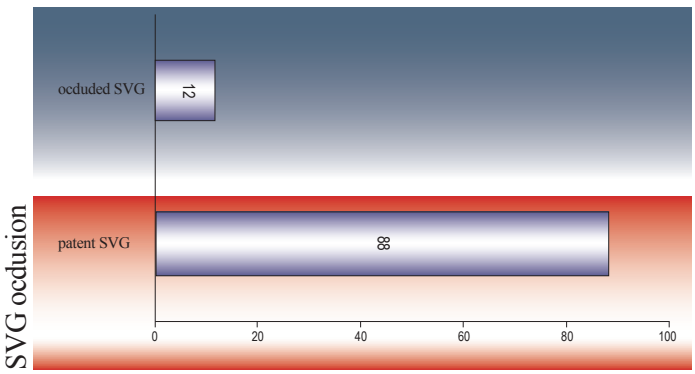

Figure-3 *percentage of vessel occlusion*

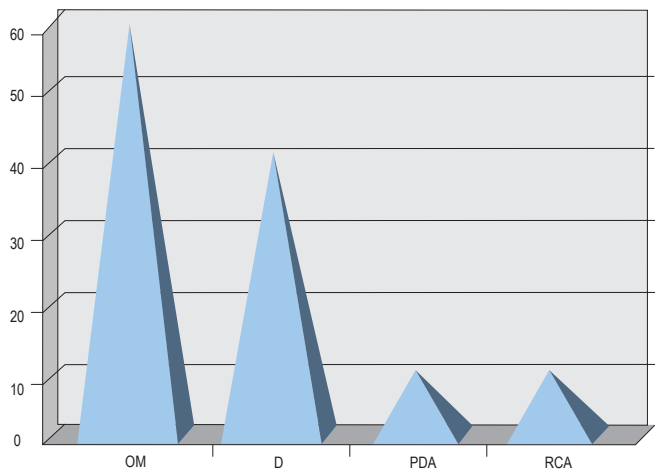

Figure-4 *percentage of vessel occlusion according to each vessel*

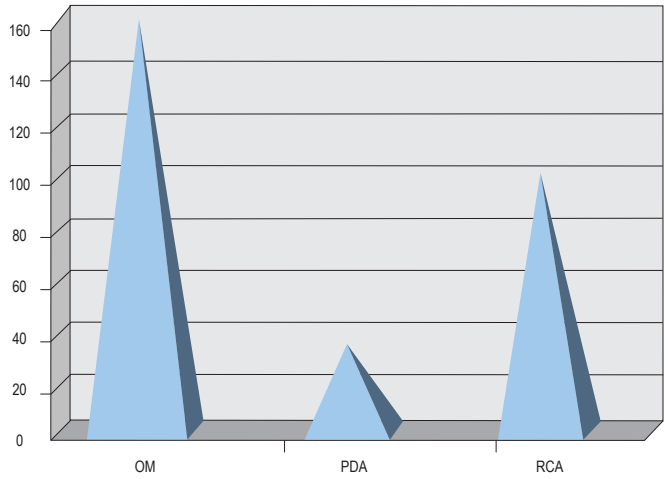

Figure -5 *amounts of calcium score in coronary artery tree*

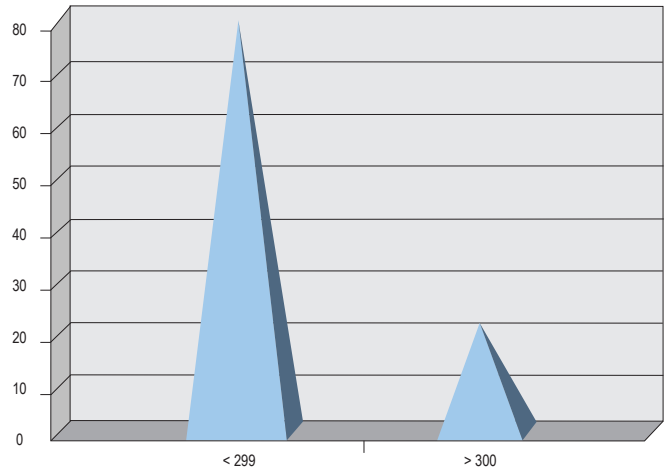

Figure-6 *correlation of moderate to sever coronary calcification with coronary artery disease*

Discussion:

CT examination of the coronary arteries can detect calcification indicative of arterial disease that correlate with cardiac event .But the most important findings of this study are that no correlation is between calcium score and early graft occlusion, and the most prevalent reason of graft occlusion is technical .

References:

1. *Zipes,libby et al: brunwald heart disease,a text book of cardiovascular medicine, elsevier,saunders, boston massochosette,7th edition 2005 p;355-370,1057-1075*

U.J.SCHOEPF: MULTIDETECTOR-ROW CT OF THE THORAX ,Springer ,2006 P;309-325