

# Diagnostic Capabilities of 64 Slice CT Coronography Compared to Classic in Coronary Disease Detection

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## Original paper

### ABSTRACT

**Introduction:** Cardiovascular disease, among which the most common is coronary disease of the hearth are the main cause of death at middle aged persons in the majority of European countries. Percent of cardiovascular disease in overall mortality among our population is even more than 50%. Up to 55 years of live myocardial infarction is by 5-6 times more common among men, and up to age of 75 years that difference decreases to 2.5 times. **Goal:** The goal of this study is to

determine the diagnostic value of 64 slices computerized tomography in detection of coronary disease compared to classic, invasive coronography. **Material and methods:** Study included 50 patients, of both genders, at average age of 60 years. Patients underwent CT coronography as well as classic coronography. **Results:** Our research prove that the sensitivity of MSCT coronography 92% with positive predictive value of 86%. Mayor difference was in the analysis of CX artery in the evaluation of significant and non-significant stenosis in application of these two methods. During the

analysis of LAD and RCA artery there was no statistically significant difference in findings of these two methods. **Conclusion:** CT coronography is non-invasive, comfortable and reliable method in coronary disease diagnostics. Thanks to its high sensitivity and PPV it enables reliable exclusion of coronary disease and takes significant place in a cardiovascular diseases diagnostic algorithm.

**Key words:** coronography, CT coronography, coronary diseases.

## 1. INTRODUCTION

Cardiovascular disease, among which the most common is coronary disease of the hearth are the main cause of death at middle aged persons in the majority of European countries. Percent of cardiovascular disease in overall mortality among our population is even more than 50%. Up to 55 years of live myocardial infarction is by 5-6 times more common among men, and up to age of 75 years that difference decreases to 2.5 times.

Approximately each year 4.5 from 1000 visits to a doctor are due to chest pain. More than 2 million of conventional angiographies are performed in Europe and around 1.7 million in USA each year.

Patients with chest pain with suspicion on coronary disease usually underwent conventional coronography in order to set definite diagnosis. Convectional angiography represents golden standard in the diagnosis of occlusive changes in coronary arteries. At the same time the diagnosed change can be treated.

However, it is an invasive procedure which requires hospitalization of the patient, larger dose of irradiation and additional cost to health care funds (1, 2).

CT coronography is excellent non-invasive method for early detection of coronary disease. This method enables determination of arteries anatomic position, presence of calcifications, localization and degree of occlusion in stents and grafts. Compared to conventional coronography it is non-invasive and acceptable for patients without complications. The examination last for short period of time and it is performed on an outpatient basis. This method enables analysis of all physical features of the blood vessel wall and plaques. It can be used of exclusion of coronary disease in case of nonspecific chest pain, as a screening method for patients with angina like chest pain, in case of asymptomatic patients under high risk for cardiovascular diseases and for patients with nonspecific findings during the stress test. Examination can have its value in early diagnosis

and significant economic justification (2, 3).

## 2. GOAL

The goal of this study is to determine the diagnostic value of 64 slices computerized tomography in detection of coronary disease compared to classic, invasive coronography.

## 3. MATERIAL AND METHODS

50 patients with suspected coronary disease underwent examination on a CT machine. The examination was performed on a 64 slices Siemens, dual source machine (0,6mm collimation, 330 msec/rotation). The patient was placed in a supine position with raised hands. Ba large diameter needle 18-20 gouge was applied nonionic, iodine contrast agent in concentration of 1 ml/kg of patient's body mass. Scanning field was from the tracheal branch to the base of the hearth. Determination of the optimal imaging time was done by bolus method. At the work station after the scanning was performed data processing and reconstruction

of coronary arteries in Circulation software by application of MIP, MPR, CURVED MPR, VRT reconstruction.

Invasive coronography was performed on a Siemens machine by Seldinger method with application of nonionic, iodine contrast agent with automatic syringe, Acist.

**3.1. STATISTICAL ANALYSIS**

Data analysis was performed by ANOVA test, and for the comparison of data was used Student's paired samples t test. The level of significance was p=0.05.

**4. RESULTS**

The study included 50 patients, of which 41 male, and 9 female. Analysis of the sample age structure was determined that the mean age is 60.64±9.66 years. ANOVA indicated that there is no statistically significant difference in relation to gender, F=0.532; p=0.469. (Fig 1,2,3,4).

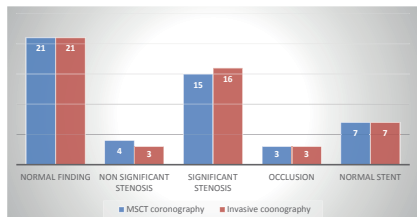


Figure 1. Analysis of LAD (left anterior descending artery) by MSCT and invasive coronography

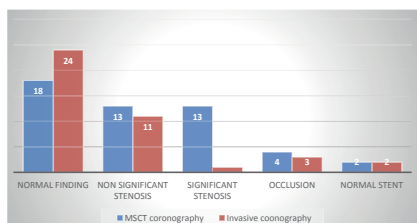


Figure 2. Analysis of CX by MSCT and invasive coronography

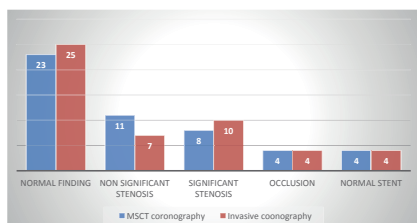


Figure 3. Analysis of RCA by MSCT and invasive coronography

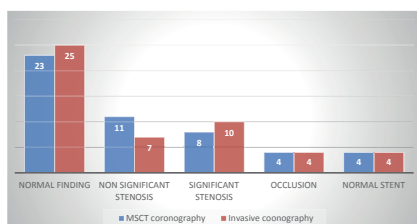


Figure 4. Confirmation of pathological findings by MSCT coronography

	N	Mean	SD	SEM	95% Confidence Interval for Mean		Mini	Maxi
					Lower Bound	Upper Bound		
Male	41	60.17	9.55	1.49	57.15	63.18	40.00	77.00
Female	9	62.77	10.44	3.48	54.74	70.81	40.00	74.00
Total	50	60.64	9.66	1.36	57.89	63.38	40.00	77.00

Table 1. Gender and age structure of the sample

Paired samples Student's t test determined that there is no statistically significant difference in coronography finding of LAD by applying MSCT and invasive coronography, t=-0.784; DF=49; p=0.438. (Table 1).

Paired sample Student's t test showed statistically significant difference in CX finding by application of MSCT and invasive coronography. By MSCT coronography from the baseline sample 1/8 patients had normal finding, while invasive coronography indicated normal finding in 24 patients, non-significant stenosis, significant stenosis and occlusion was more present in case of MSCT coronography, t=2.852; df=49; p=0.006.

Analysis of RCA state by MSCT and invasive coronography, by paired sample t test, determined that there is no statistically significant difference in obtained results, so the values of these two diagnostic methods did not differs, t=-0.109; df=49; p=0.228.

From the total number of patients included in this study, by MSCT coronography application in 46 cases was detected pathological finding, and by application of invasive coronography in 41 cases. Sensitivity of MSCT coronography is 92% and positive predictive value was 86%.

**5. DISCUSSION**

Cardiovascular diseases in the world today are the leading cause of morbidity and mortality. In order to prevent this, or decrease, it is necessary to in due time detect and adequately treat these disorders by non-invasive diagnostic procedures. MSCT coronography represents method of choice in diagnosis of atherosclerotic changes in coronary arteries by non-invasive approach. The goal of this study was to test the diagnostic accuracy of MSCT coronography compared to standard coronography (Figure 5-11).

Our study showed that the sensitivity of MSCT is 92%, with the posi-

tive predictive value of 86%. Major differences occurred in the analysis of the CX artery in the evaluation of significant and non-significant stenosis by application of these two methods.

Data from the available literature indicate that there is no difference in

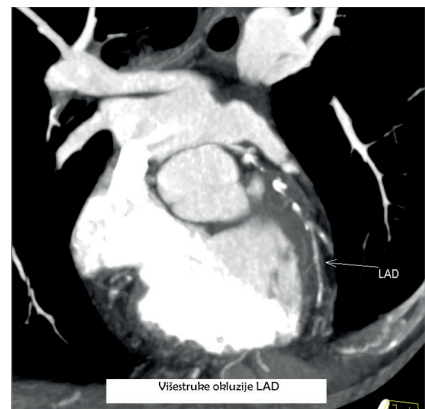


Figure 5. Occlusion of LAD..



Figure 6. Occlusion of RCA.



Figure 7. Subocclusion of RCA