

## ORIGINAL ARTICLES

## A MULTI SLICE COMPUTED TOMOGRAPHY CORONARY ANGIOGRAPHIC STUDY OF CORONARY ARTERY DISEASE IN SOLDIERS WITH CHEST PAIN

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## ABSTRACT

**Objective:** The study is sought to highlight the role and results of MSCT angiography in scenario of acute chest pain to determine or exclude significant coronary artery disease in patients who do not have high risk features for significant coronary disease.

**Study Design:** Descriptive study.

**Place and Duration:** Computed topography department, Armed Forces Institute of Cardiology, National Institute of Heart Diseases Rawalpindi from September 2013 to December 2013.

**Patients and Methods:** A total of 150 patients (soldiers) who were referred to this hospital with chest pain and who did not have high risk features were evaluated by multi slice computed coronary angiography.

**Results:** One hundred and fifty patients who reported to this hospital with chest pain were evaluated by multi slice computed tomography (MSCT) angiography. Their age ranged from 20 to 53 years. Cases studied were those having low probability of coronary artery disease. Patients having high probability of coronary disease, acute coronary syndrome or definite coronary artery disease were excluded from this study and were evaluated by conventional coronary angiography, 114 (76%) patients showed normal coronary arteries. 6 (4%) had subcritical coronary disease, 5 (3.33%) had only minor irregularity in coronary arteries, 4 (2.66%) had significant coronary artery disease that necessitated coronary angiogram. 16 (10.66%) cases had muscle bridge in left anterior descending artery. One (0.66%) patient had patent graft after coronary artery bypass graft surgery. Three (2%) patient's had patent stents in coronary arteries. While 1(0.66%) patient had aberrant origin of coronary artery. There were no side effects observed during study.

**Conclusion:** Patients presenting with chest pain with low risk features can be studied conveniently with MSCT angiography. Prevalence of significant coronary artery disease is low. MSCT angiography is a very useful, convenient and safe tool to screen low risk patients to rule out presence of significant coronary artery disease.

**Keywords:** Coronary angiography, MSCT angiography

## INTRODUCTION

Coronary artery disease is a major cause of morbidity and mortality in general population. Although members of armed forces represent a relatively young, active and fit section of population, yet changed life styles and stress and strain of modern life has taken its toll on armed forces personnel also. Significant numbers of soldiers suffer from coronary artery disease. Referral to military hospitals with chest pain syndrome is quite common. It is absolutely

imperative to exclude any possibility of coronary artery disease in soldiers as they have to perform duties in far flung areas, high altitudes and operational areas from where evacuation is difficult and time consuming. Coronary angiography is gold standard in evaluation of coronary artery disease. However it is invasive, labor and cost intensive and carries a small but definite procedure related morbidity and mortality risk. Multi slice computed tomography coronary angiography is an effective and convenient tool to determine presence and extent of coronary artery disease in low to moderate risk patients of chest pain syndromes<sup>1,2</sup>. We have described our experience of MSCT angiography in persons of armed forces referred to AFIC-NIHD with low to moderate risk of chest pain.

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## PATIENTS AND METHODS

We took 150 cases of acute chest pain that reported to AFIC-NIHD and underwent MSCT coronary angiography and studied the prevalence of significant coronary artery disease in them. It is noteworthy that these cases were having low to intermediate possibility of coronary artery disease. The cases which had significant ECG changes, raised cardiac enzymes, and features showing high probability of severe coronary artery disease or acute coronary syndrome were taken to catheterization laboratory for invasive coronary angiography and were not included in the study. Eligibility criteria included 1) history of chest pain or angina equivalent symptoms and 2) a prediction of low risk of myocardial infarction and/or complication. Exclusion criteria included 1) known coronary artery disease; 2) ECG diagnostic of acute myocardial infarction or ischemia, significant Q waves, ST segment deviations  $>0.5$  mm); 3) elevated serum biomarkers including troponin T or creatine kinase- MB on initial and 4 hour testing; 4) contraindication to iodinated contrast agents; 5) atrial fibrillation or markedly irregular rhythm; 6) renal insufficiency (creatinine  $> 1.5$ mg/dl); 7) contrast administration within past 48 hours; 8) failure to give informed consent. The MSCT coronary angiography was performed according to following protocol. Patients were asked to fast for at least 6 hours. Intravenous line was established with 18 G IV cannula. Patients were given tab metoprolol 25 mg orally or 5 to 10 mg IV if heart rate was more than 80 per minute. Nitroglycerin 0.5 mg was given sublingually 1 minute before image acquisition. Imaging was performed on a 128- slice MSCT scanner (Siemens Medical Systems, Germany). An initial non enhanced electrocardiogram gated scan was acquired for calcium scoring. A contrast enhanced scan was obtained with 60 to 80 ml of contrast (Iopamiro, Braccos. p.a, Milano, Italy) injected through an antecubital vein at 5 ml/s followed by a 60 ml saline chaser. Electrocardiogram-gated data sets were

reconstructed automatically at 70% of R-R cycle length, with additional reconstructions as needed. The MSCT scans were analyzed accordingly by a single observer.

## RESULTS

Patients included soldiers of referred to AFIC-NIHD or transferred to AFIC-NIHD from

**Table-1: Ages and percentages of patients with chest pain.**

Sr. no	Age group	Mean Age	n (%)
1	20- 29 years	24.9 years	21 (14)
2	30-39 years	34.9 years	57 (38)
3	40-49 years	44.2 years	67 (44.66)
4	50-59 years	53.2 years	5 (3.33)

**Table-2: Types of diseases in patients with chest pain.**

Sr. no	Disease	n (%)
1	Normal	114 (76.0)
2	Minor irregularity in coronary artery	5 (3.33)
3	Subcritical coronary disease	6 (4.0)
4	Significant coronary disease (requiring coronary angiography)	4 (2.66)
5	Muscle bridge	16 (10.66)
6	Aberrant coronary artery	1 (0.66)
7	Other (patent stents, patent grafts)	4 (2.66)

different parts of country for evaluation of chest pain. Age ranges from 20 to 53 years. 21 (17%) cases were aged 20 to 29 (mean 24.9) years, 57 (32%) cases were aged 30-39 (mean 34.9) years, 67 (40%) cases were aged 40-49 (mean 44.2) years, and 5 (3%) were aged 50 to 59 (mean 53.2) years table-1. Out of them 114 (76%) persons, coronary arteries were normal, 6 (4%) had subcritical coronary disease, 5 (3.33%) cases had minor coronary disease (i.e. only minor irregularities in coronary arteries), 4 (2.66%) cases had significant coronary disease that necessitated coronary angiography and revascularization table-2. One (0.66%) person had aberrant origin of coronary

artery, 1 (0.66%) patient had patent grafts after coronary artery bypass graft (CABG) surgery, while 3 (2%) patient had patent stents in coronary arteries. An interesting finding was that there were 16 (10.66 %) cases with muscle bridge in left anterior descending artery. There were no major test complications found in any patient.

## DISCUSSION

Many soldiers are referred to emergency department with complaints of chest pain who are otherwise relatively young, have atypical chest pain syndromes, normal resting ECG, normal cardiac markers. They have a low probability of coronary heart disease but a small subset of them does have serious coronary artery disease. MSCT angiography is most suited to exclude significant coronary artery disease in these patients<sup>3-5</sup>. It is safe, sensitive, rapid, convenient and reliable investigation most suited for confirming fitness of soldier before committing them to field duties. Benefits and utility of MSCT coronary angiography have been well studied and validated in different international studies<sup>2,5</sup>. However, MSCT coronary angiography has its limitations. One limitation is its inability to provide physiological data in moderate coronary lesions. Another limitation is its failure to provide accurate images in fast or irregular rhythms. Artifacts or poor quality study may interfere with results accuracy of study. In our study 76% of patients had normal coronary arteries while only 2.66% had significant coronary artery disease that needed a subsequent coronary angiogram. An interesting finding was that about 10% patients had muscle bridge in left anterior descending artery. Safety profile was excellent as none of the patients experienced any side effect.

## CONCLUSION

A large number of soldiers present to cardiac outdoor department or emergency departments with complaints of chest pain. Many of them do not have high risk features of significant coronary artery disease. MSCT angiography can reliably establish or exclude coronary artery disease in target patient population as cause of chest pain. Prevalence of significant coronary disease is low in these patients as in our study only 2.66% of patients had significant coronary disease. MSCT angiography is most suited to screen such population for significant coronary disease. Limitations of study include patients with irregular heart rhythms, allergic tendencies or inability to cooperate during study. It has excellent safety profile and is convenient and sensitive test in patients of low or moderate risk of coronary disease. Its use in graft study cases of coronary artery bypass grafting (CABG) cases is especially unmatched in locating and establishing patency of grafts. However it is not suitable for established cases of acute myocardial infarction or acute coronary syndrome, for which conventional coronary angiography is investigation of choice.

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