

A review of ECG changes and coronary angiographic findings in patient underwent angiography

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Abstract

Introduction: Chest pain is one of the important clinical presentation in coronary artery disease. Patient with or without symptoms irrespective of electrocardiogram changes may or may not have significant coronary angiography changes. Whatever changes are seen on ECG findings may not be the actual lesion seen in coronary angiography. **Objective:** To determine whether significant electrocardiogram changes is associated with strong involvement of coronary angiography morphology changes. **Material and Methods:** A cross sectional study was carried out for the period of one Year in Department of Cardiology, Bharati Vidyapeeth Medical College and Hospital, Sangli. 100 patients above 20 years of age, symptomatic patient, asymptomatic patient with electrocardiogram changes, patients who are willfully opting for coronary angiography were included in the study. Patients with previously diagnosed ischemic heart disease and underwent PTCA or CABG are excluded. Coronary angiography either from femoral or radial artery was done. The patients were divided into three groups depending on ST segment elevation or depression. Coronary angiography either from femoral or radial artery was done. The results of coronary angiography were carefully interpreted. Statistical analysis was done using Microsoft excel and necessary STATISTICAL ANALYSIS SOFTWARE was used where necessary. **Results:** Majority of patients were in age group 51-60 years (34%) with male predominant. In clinical presentation, majority of patients presented with chest pain (96%). The majority of patients presented with single vessel occlusion (36%). 15% of patients were having normal coronary angiography. The association between ECG findings and coronary occlusion was not statistically significant. **Conclusion:** It was concluded that patient with significant ECG change had more extensive coronary artery involvement than the patients with less significant ECG change.

Keywords: Electrocardiogram, coronary angiography.

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Received Date: 01/10/2014 Accepted Date: 14/10/2014

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 15 October 2014

INTRODUCTION

Chest pain is one of the important clinical presentation in coronary artery disease.¹ It may or may not be associated with dyspnoea on exertion. Patients with new or severe chest pain are at increased risk of cardiac death and

nonfatal ischaemic events. An estimation of risk is useful in selection of site of care and selection of therapy. Therefore, an assessment of likelihood of coronary artery disease (CAD) is starting point of determination of prognosis of patients presenting with chest pain. The five most important factors that relate to experiencing an episode of ischaemia due to CAD are nature of symptoms, prior history of CAD, age, sex and, number of traditional risk factors present for CAD.² Patients who present with dynamic ECG changes are thought to have high likelihood of CAD.² However, some of these patients do not have chest pain suggestive of angina and still may have dynamic ECG changes. The detailed analysis of electrocardiography may give insights to any electrical and mechanical complications (diagnosis), the site of occlusion and coronary anatomy (topography), and

predict short and long-term outcome (prognosis).² 12 lead electrocardiogram is considered as an essential part of the diagnosis and initial evaluation of the patient with coronary artery disease. But only electrocardiogram and clinical symptoms may not give appropriate morphologic changes in coronary arteries. Patient with or without symptoms irrespective of electrocardiogram changes may or may not have significant coronary angiography changes. Whatever changes are seen on ECG findings may not be the actual lesion seen in coronary angiography. Even asymptomatic patients with ECG changes on routine evaluation may show coronary lesion patients having severe chest pain with or without ECG changes may have normal coronaries. Electrocardiogram reflects the physiology of the myocardium during ischemia, while Coronary angiography identifies vessel anatomy. Therefore now a day's Coronary angiography is considered as a gold standard investigation in diagnosis of coronary artery disease. The present study provides a systematic prospective correlation of electrocardiogram changes with symptoms and coronary angiographic profile and try to find out prediction of severity of coronary artery involvement from electrocardiogram changes.

OBJECTIVE

To determine whether significant electrocardiogram changes is associated with strong involvement of coronary angiography morphology changes.

MATERIAL AND METHODS

A cross sectional study was carried out for the period of one Year from October 2013 to September 2014. The study was done in Department of Cardiology, Bharati Vidyapeeth Medical College and Hospital, Sangli. Patient above 20 years of age, symptomatic patient with or without electrocardiogram ST-T changes, asymptomatic patient with electrocardiogram changes, patients who are willfully opting for coronary angiography were included in the study. Patients with previously diagnosed ischemic heart disease and underwent PTCA or CABG are excluded. The Ethical clearance from college ethical committee was taken. After inclusion, the patients were properly interviewed; meticulous history taking and physical examination were performed. The standard 12 lead electrocardiogram with 25 mm per sec speed with 10 mv standardization was recorded for every patient. The patients were divided into three groups.

- **Group 1:** Comprised ST segment elevation of 1mm and /or marked T wave inversion with or without chest pain

- **Group 2:** Comprised patients with ST segment depression less than 1mm or T wave inversion with or without chest pain.
- **Group 3:** Patient with normal ECG with chest pain.

Coronary angiography either from femoral or radial artery was done. The results of coronary angiography were carefully interpreted. Statistical analysis was done using Microsoft excel and necessary STATISTICAL ANALYSIS SOFTWARE was used where necessary.

RESULTS

Table 1: Distribution according to Age and sex

Age Group (Years)	Male	Female	Total
21-30	02	00	02
31-40	05	01	06
41-50	07	07	14
51-60	25	09	34
61-70	22	09	31
71-80	11	02	13
Total	72	28	100

As per table 1, majority of patients were in age group 51-60 years (34%) followed by 61-70 years (31%). Male patients were predominant in all age group

Table 2: Distribution according to Clinical Characteristics of Patients

Clinical Characteristics	No. of Patients*
Chest Pain	96
Sweating	63
Dyspnea on exertion	41
Palpitation	11
Breathlessness	09

(*Multiple response present)

The table 2 describes clinical presentation, majority of patients presented with chest pain (96%) followed by sweating (63%), dyspnea on exertion (41%), palpitation (11%) and breathlessness (9%).

Table 3: ECG characteristics and Extent of Coronary Artery involved of Patients

Variable	Group	No. of Patients (%)
Chest Pain	Group I (n=65)	65 (100)
	Group II (n=19)	17 (89.48)
	Group III (n=16)	14 (87.50)
Extent of Coronary Artery involved	SVD	36
	DVD	23
	TVD	26
	Normal Coronary	15
	Total	100

In group I all 65 (100%) patients were clinically presented with chest pain. Among group III, 14 (87.5%) patients also presented with chest pain. The majority of patients presented with single vessel occlusion (36%). 15% of patients were having normal coronary angiography.

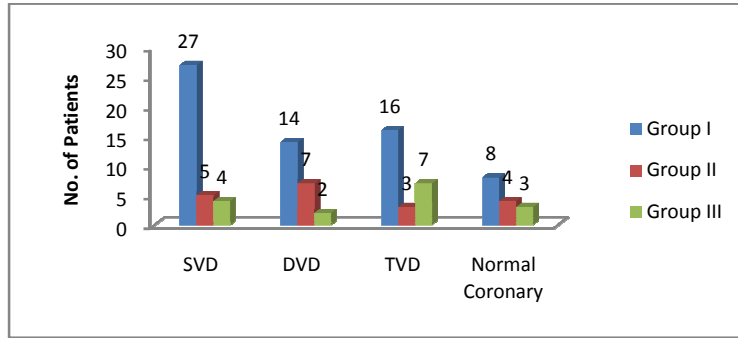


Figure 1: Distribution according to coronary artery disease

In the figure above, it was observed that in Group I SVD was more common 27 (41.35%) among the patients.

Table 5: Correlation of ECG findings and Coronary Characteristics

Group	CAG <50% (%)	CAG >50% (%)	Total (%)
Group I	10 (66.67)	47 (67.14)	57 (67.05)
Group II	02 (13.33)	13 (18.57)	15 (17.65)
Group III	03 (20.00)	10 (14.29)	13 (15.30)
Total	15 (100)	70 (100)	85 (100)

($\chi^2=0.46$ d. f=2 p=0.79 Not significant)

67.14% of patients in Group I with extensive ECG involvement showed coronary occlusion >50%. The association between ECG findings and coronary occlusion was not statistically significant. ($\chi^2=0.46$ with $p>0.05$ not significant)

DISCUSSION

The present study was a hospital based cross sectional study conducted for a period of one in Bharati Vidyapeeth Medical College and Hospital, Sangli. A total of 100 patients above 20 years satisfying inclusion criteria during study period were included in the study. In the present study majority of patients were in age group 51-60 years (34%) followed by 61-70 years (31%). Male patients were predominant in all age group. The similar findings were seen in the study done by Dangus *et al.*³ Haque *et al.*⁴ and Siddique *et al.*⁵. The disease is very common in westernized population affecting the majority of adults over the age of 60 years. It is also rising in developing countries. The clinical presentation, majority of patients presented with chest pain (96%) followed by sweating (63%), dyspnoea on exertion (41%), palpitation (11%) and breathlessness (9%). Similarly, Nourjah P.⁶ observed that chest pain was the main symptom of coronary artery disease and accounts for nearly eight million annual emergency department visits and represents the second most common complaint in emergency department. In group I all patients were clinically presented with chest pain. Among group III, 14 (87.5%) patients also presented with chest pain. Brush *et*

*al*⁷ showed that life-threatening complications are 23 times more likely in those with a positive ECG with heart diseases. Coronary angiogram was done in all patients and extent of involvement and type of lesion was noted. It was observed that majority of patients presented with single vessel occlusion (36%) followed by triple vessel occlusion (26%). 15% of patients were having normal coronary angiography. It was also observed that in Group I, SVD was more common 27 (41.35%) among the patients. It was found that patients with significant ECG changes showed more extensive coronary artery involvement. 67.14% of patients in Group I with extensive ECG involvement showed coronary occlusion >50%. Patients with less significant ECG changes also showed less extensive coronary artery involvement. The association between ECG findings and coronary occlusion was not statistically significant. ($\chi^2=0.46$ with $p>0.05$ not significant). This finding is consistent with De Servi *et al.*⁸ who showed a larger number of patients with unstable angina showing ST segment change had multi-vessel disease. The ECG remains the most immediately accessible and widely used diagnostic tool for guiding emergent treatment strategies. Coronary angiography as a mode of epidemiologic investigation has the major advantage of measuring anatomically defined atherosclerotic lesions.

CONCLUSION

Thus we concluded that patient with significant ECG changes had more extensive coronary artery involvement than the patients with less significant ECG change. ECG was previously considered as gold standard to diagnose Coronary artery disease. The normal ECG may show extensive coronary artery disease on angiography. Hence, coronary angiography is now gold standard investigation for coronary artery disease.

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Source of Support: None Declared
Conflict of Interest: None Declared