Coronary Angiographic Profile in Patients With Equivocal Stress Test.

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ABSTRACT

Background

Exercise tolerance test (ETT) is a well-known available and affordable noninvasive investigation for evaluation of CAD. But equivocal result create dilemma in their treatment strategy. Objective of the present study was to find the different angiographic pattern among the equivocal ETT patients.

Methods

This is an observational study was done at, Ibrahim Cardiac Hospital & Research Institute from January 2018 to September 2018. 44 patients with equivocal ETT findings undergoing coronary angiogram were included. Clinical & angiographic findings were statistically analyzed.

Results

During study period 1888 individuals were underwent ETT. Among them 308 (16.31%) patients had equivocal ETT. Only 44 (14.3%) of them underwent CAG. Male & female were equal. Angiographic study revealed 75% patients had normal & non-critical coronary arteries, significant single & double vessel involvements were 18.8% &6.82% respectively. There were no patients who had triple vessel disease.

Conclusion

Obstructive CAD was found in one in five "equivocal" ETT. Severe Triple vessel disease or Left main CAD diseases were not found in CAG findings of "equivocal" ETT patients.

Keywords

Coronary angiography; Equivocal Exercise test; coronary artery disease

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of morbidity and mortality [1]. The exercise treadmill test (ETT) commonly the first-line investigation in troponin-negative chest pain suspected of having coronary artery disease (CAD). It is perhaps the most cost-efficient, least invasive and readily available method.[2] The overall sensitivity has ranged from 60% to 70% with a specificity of 85%

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[3].Test results are "positive," "negative," "equivocal" or "inconclusive". The sensitivity and specificity of ETT varies considerably. In asymptomatic patient with predisposing factors for CADs can be diagnosed with an abnormal TMT by> 90% accuracy.[4] Though in a high-risk patient abnormal TMT is highly predictive of a coronary heart disease with more than 90% accuracy but a relatively normal or inconclusive TMT may not reflect the absence of significant disease in a person with the same risk factors. Regarding equivocal test it makes confusion, often leading to more invasive and costly tests such as coronary angiography. That's why it is important to know the real disease status of this patients with equivocal ETT findings.

METHOD

This is an observational prospective study was done at Ibrahim Cardiac Hospital & Research Institute from January 2018 to September 2018. During study period 1888 individuals were undergone ETT. Among them 308 (16.31%) patients had equivocal ETT and only 44(14.3%) patients with equivocal test were undergone CAG. Clinical & angiographic findings were statistically analyzed.

INCLUSION CRITERIA

Adult (> 18 years) patients with equivocal stress test who underwent CAG within the study period in the department of cardiology in ICHRI.

EXCLUSION CRITERIA

Prior Acute Coronary Syndrome,

Prior PCI or CABG

STUDY ASSESSMENT

Equivocal ETT:

In the ACC/AHA guidelines, there are no set criteria for equivocal ECG changes. In this study, equivocal ETT was defined as results that are indeterminate and includes (i) positive ECG with reduced specificity due to baseline ECG abnormalities; (ii) positive ECG with reduced specificity due to rapid recovery of ECG changes; (iii) atypical chest pain and inappropriate dyspnea despite negative ECG findings, and (iv) clinically significant rhythm disturbances (any sustained arrhythmia including development of bundle branch blocks, atrio-ventricular blocks), (v) ST-segment changes not meeting criteria for a positive ETT.

Invasive coronary angiography (cag):

CAG which is used as a gold standard for the diagnosis of CAD. Selected patients then underwent CAG (GE and Phillips X-ray system) using the standard procedure. Multiple views were taken and the cine images were then assessed by the experienced cardiologists. All the lesions were then grouped as follows:

Baseline characteristic	Number of patients	Percentage
Age (years)		
21-30	3	6.8
31-40	4	9.1
41-49	11	25.0
50-60	19	43.2
61-70	6	13.6
71-80	1	2.3
Sex		
Male	22	50
Female	22	50
BMI		
18.5-24.9	9	20.5
25.0-29.9	24	54.5
30.0-34.9	11	25.0
Diabetic Mellitus	20	45.5
Hypertension	34	77.3
Dyslipidemia	24	54.5
Family H/O CAD	10	22.7
Smoker	5	11.4

plaquing; <50%; 50-70%; and >70% stenosis. We considered lesion with >50% stenosis as significant lesion.

Ethical Clearance: This research study was approved by ethics committee of Ibrahim Cardiac Hospital & Research Institute, Dhaka, Bangladesh.

RESULT

A total of 1888 patients underwent ETT from JAN. 2018 to SEP. 2018. Normal & positive ETT were found 1350 (71.50%) & 230(12.18%) patients respectably. Whereas equivocal ETT was found 308 (16.31%) . Among equivocal ETT 44 (14.30%) patients were undergone CAG whom were enrolled in the study.

Both males and females were equal in number. Age of most of the patients between 41 years & 60 years (68.18%) . BMI > 25 (79.5%) was the number one risk factor followed by Hypertension (77.3%), dyslipidemia (54.5%), diabetes(45.5%) . (Table :1)

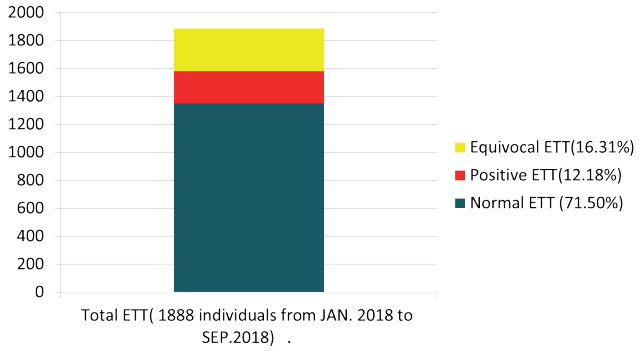

Fig 1 Comparisons of different baseline ECG between normal/non-critical coronary arteries & significant coronary arteries disease.

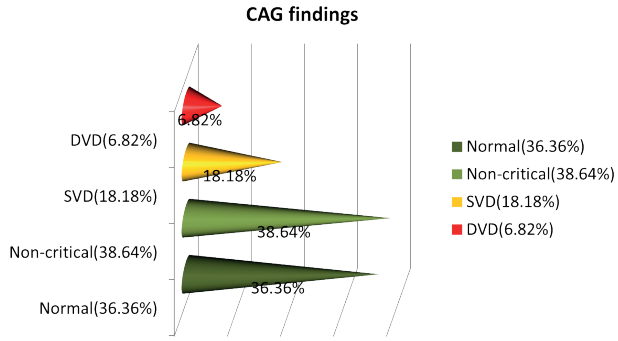

Fig 2: Distribution of coronary artery disease

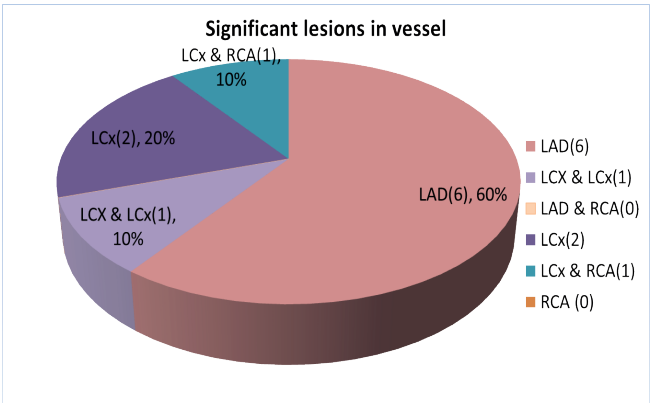

Fig 3: Distribution of Coronary artery involvement

Comparisons of different baseline ECG between normal/ non-critical coronary arteries & significant coronary arteries showed that 2.27% sinus bradycardia have significant coronary arteries disease whereas none in baseline sinus tachycardia. RBBB & non-specific ST changes have 9.09% & 5.82% have significant coronary arteries. CAG finding revealed 36.36% individuals had normal coronary. Non-critical CAD was found 38.64% individuals. 18.18% had SVD, 6.82% had DVD with no person had TVD. Distribution of coronary arteries revealed 36.8% in LAD territory, 6.14% in LCx & 2.40% in RCA. Significant lesions in equivocal ETT reveled territory of LAD (6) 60%, LCx(2) 20% LCX-LCx (1)10% & LCx- RCA(1) 10% . No significant lesions were found LAD- RCA & RCA territories (0) 0%

DISCUSSION

Exercise stress testing is a non-invasive, safe and affordable screening test for coronary artery disease (CAD). Tread mill test is widely used clinically to assess the ability of an individual to safely tolerate increased physical activity while ECG, hemodynamic, and symptomatic responses are monitored for the development of myocardial ischemia, electrical instability, or other exertion-related abnormalities. Also exercise ECG remains an inexpensive test that has been well validated in the general population, and it can be used as the first diagnostic test for patients with an intermediate risk of having CAD.

In this study we showed that 16.31% % patients had equivocal ETT during study period. Among them three-fourth (75%) individual had normal & non-critical coronary arteries. Jaun Lu et.al. include total 30,710 individual undergone exercise stress test Among them15,446 (50.3%) had normal stress test; 3431 (11.2%) had positive stress test & equivocal/ inconclusive stress test were 11,833 (38.5%)

Most of the patients age between 41 years & 60 years (68.18%). More than 75% patients

were obese & hypertensive. Diabetic patients, smoker & positive family history were less . Comparisons of different baseline ECG between normal/non-critical coronary arteries & significant coronary arteries showed that 2.27% sinus bradycardia have significant coronary

arteries disease whereas none in baseline sinus tachycardia. RBBB & non-specific ST changes have 9.09% & 5.82% have significant coronary arteries. CAG findings of equivocal individual patients had no TVD & LMS involvement. Regarding significant CAD maximum patient had SVD & LAD territory involvement are more.

LIMITATION

An important draw back of the present study was the relatively small sample size.

CONCLUSIONS

About one fourth patient with equivocal ETT had significant CAD. Because of the low sensitivity and all other drawbacks of ETT, inconclusive test should not be considered as normal, should be confirmed by noninvasive & invasive test.

Conflict of interest: None

Author's contributions:

Idea owner of the study: Rahman A

Study design: Rahman A, Rahman MH

Data gathering: *Rahman A*

Writing and submitting manuscript: Rahman A Md. Iqbal MJ

Editing and approval of the final draft: Rahman A, MM Mazumder[4], Hussain M, Siraj KMF, Hasan M, Ali IA, Latif SB

REFERANCE

1. D. Lloyd-Jones, R. Adams, M. Carnethon, G. De Simone, T.B. Ferguson, K. Flegal, et al. Heart disease and stroke statistics–2009 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee Circulation, 2009; **119** (3): pp. 480.
2. Gibbons RJ, Balady GJ, Bricker JT, et al. ACC/AHA 2002 guideline update for exercise testing: a report of the American College of Cardiology/American Heart Association task force on practice guidelines (committee on exercise testing); 2002. [cited 2014 October 20].
3. Detrano R, Gianrossi R, Froelicher V. The diagnostic accuracy of the exercise electrocardiogram: a meta-analysis of 22 years of research. *Prog Cardiovasc Dis.* 1989; **32:173**Exercise
4. Ben-Shlomo Yoav, Brookes Sara, Hickman Matthew, Farmer RDT. Lecture notes. *Epidemiology, evidence-based medicine, and public health*. 2013 [cited 2023 Aug 3]; 238.
5. Juan Lu, Jonathon Stewart, Mohammed Bennamoun, Adrian Goudie, Jason Eshraghian, Abdul Ihdayhid, Frank Sanfilippo, Gary R Small, Benjamin JW Chow, Girish Dwivedi, Deep learning model to predict exercise stress test results: Optimizing the diagnostic test selection strategy and reduce wastage in suspected coronary artery disease patients, Computer Methods and Programs in Biomedicine, 2023; **240**.