THE INCIDENCE OF ARRYTHMIAS IN PATIENTS UNDERGOING EXERCISE TREADMILL TEST

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SUMMARY

Background: Although a silent ischemic ECG response to treadmill exercise in clinically healthy population is associated with an increase likelihood of future coronary events i.e angina pectoris, myocardial infarction or cardiac death, Patients with documented coronary artery disease have a greater susceptibility to sudden death if they demonstrate ventricular arrythmias.

Objective: To determine the significance of arrythmias during exercise testing in suspected coronary artery disease patients and in noncoronary artery disease group.

Method: We analyzed 1500 consecutive patients retrospectively for exercise induced arrythmias who presented to us from Nov 1998 to Nov 1999.Bruce and Modified Bruce Protocol were used all arrythmias recorded were included in the study as supra ventricular arrythmia, ventricular eg PVC, Premature Ventricular Contraction VT, Ventricular Tachycardia, and Heart Block Result were analyzed as per protocol.

Results: Of 1500 that were analyzed 906 (60.4%) were negative for ischemia included 21 patients with negative stress test and previuos history of myocardial infarction 511(34.06%) were positive for exercise induced ischemia 83(5.53%) cases were inconclusive. During exercise and post exercise recovery phase 1237(82.4%) had no arrythmias, irrespective of the fact whether stress test was positive or negative for ischemia. Sub analysis for arrhythmia showed exercise induced arrhythmias in 264 (17.6%) patients and in 1237 (82.4%) had no arrhythmia patients with positive ETT or with previous history of MI showed arrhythmia's in 163 (26.5%) while. (10.42%) patients with positive stress test showed arrythmias required further evaluation whearas 146 (89.57%) were considered benign and 452 (73.49%) showed no arrhythmia. The group with negative ETT 885 (59%) with no previous cardiac history showed arrhythmia's in 101 (11.41%) patients and 784 (88.58%) showed no arrhythmia's.

Conclusion: We conclude that exercise induced arrythmias are more common in patients with suspected and established coronary artery disease having positive stress test.

Keywords: Arrythmias, Ventricular Tachycadia, Supraventricular Tachycardia PVC, Premature Ventricular Contraction APC, Atrial Premature Contraction.

INTRODUCTION

In substantial number of patients the first presentation of Coronary artery disease is sudden death or myocardial infarction with a significant number being fatal .Efforts are being made for a long time to detect such patients exercise testing is most popular Screening test for identifying those patients having coronary artery disease who may be at risk for future events .Ventricular arrythmias occurring at rest or routine daily activities have been implicated as a risk factor for future coronary artery disease or sudden death. Patients with previous history of myocardial infarction have a greater susceptibility to sudden death if they demonstrate ventricular arrythmias on resting electrocardiogram. However the incidence of ventricular arrythmias during 12 lead ECG is very

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low and majority of patients prone to have future coronary events are not identified in this manner 24 hrs Holter monitoring is time consuming and costly. Alternative method has been exercise stress testing, This test is more sensitive early after myocardial infarction but the controversy exist also about the clinical and prognostic significance of exercise induced ventricular arrythmias late after myocardial infarction. It is well recognized that exercise induced ventricular arrythmias can identify a subset of patients at higher risk of sudden death the role of myocardial ischemia and appearance of ventricular arrythmias is not completely understood. Ventricular arrythmias during exercise did not appear to be related to exercise duration, heart rate, maximal work capacity, left ventricular end diastolic pressure, ejection fraction or extent of coronary artery lesion. Even when the evidence of coronary artery disease is obvious e.g Myocardial infarction exercise test cannot influence the diagnosis of existing coronary artery disease the exercise testing may alter functional class through risk stratification, This testing remains helpful to identify high risk subsets of patients who are likely to have their survival improvement with coronary artery bypass grafting or coronary angioplasty. Inpatients with suspected coronary artery disease and no history of myocardial infarction stress testing may be helpful not only to identify those at high risk of future myocardial infarction but also those who may be at risk of sudden death.

METHOD

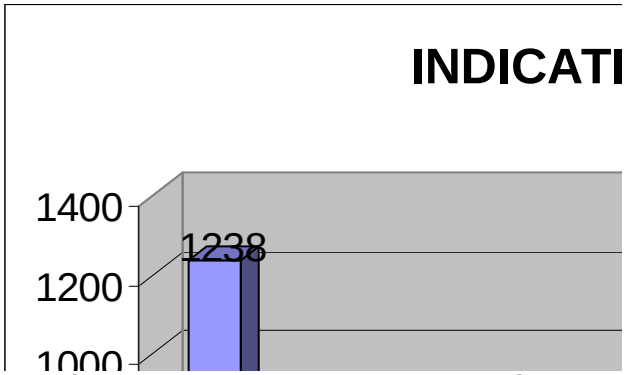
All patients are tested on Bruce and modified Bruce protocol, with initial speed of 2.7km/hr and 10% of grade on standard Bruce than gradually increases work load with 2% increment in grade on each stage and treadmill speed increased from 2.7,4.0,5.4,6.7, and 8.0 km/hr. Analysis was done according to standerd rules for ST segments as Minnesota Cod Criteria i.e >1 mm ST segment depression horizontal or downslop after J point in three consecutive beats were interpreted as positive and the slow upslop >1 mm depression with duration of 80msec was also considered as positive. Exercise induced 1 mm ST elevation in NON Q WAVE leads for 80msec in three consecutive leads considered as positive. The exercise duration (minutes) and the achieved percentage of age adjusted maximal heart rate per minute as predicted by formula (220-age) were also recorded. 85% of age predicted heart rate was cut off for prediction of end results. Inconclusive stress test was considered on those patients who could not achieve the minimum heart rate of 85% with out showing ST changes.

Exercise test may provokes repetitive ventricular premature beats in most patients with history of sustained ventricular tachyarrythmia and in such patients approx 10 - 15% shows arrhythmia only during exercise testing. The need for AV sequential pacing in selected patients particularly with congenital AV block may be established in those patients who show low heart rate despite exercise and those who developed symptomatic rapid junctional rhythm may also be identified for DDD device which can be suppressed by using DDD devices.

Exercise testing is useful in the assessment of patients with ventricular arrhythmia's and has an adjunctive role along with ambulatory monitoring and electrophysiological studies.

Data was collected on a uniform performa and retrospective analysis was done on 1500 consecutive patients from NOV 1998 to NOV 1999.All patients were included irrespective of indications The patients included were with chest pain palpitation pain in left or right arm , choking sensation ,chest heaviness and other symptoms that could be suspected for cardiac problems ,Post myocardial infarction risk stratification patients were also included .No case was excluded. (Table 1)

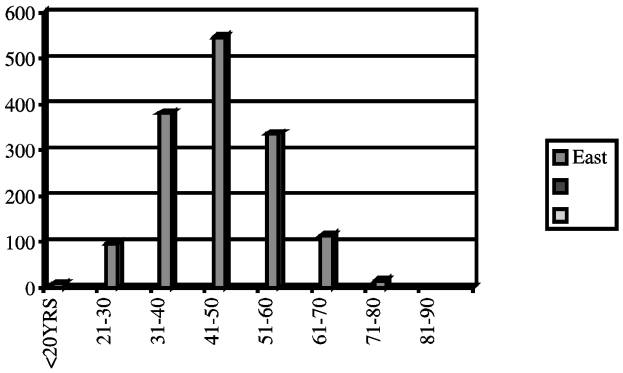
Table 1



CP = Chest Pain, PTCA = Percutaneous transtumiral coronary Angio Plasty.

Patients with positive ETT was grouped separately as against -ve ETT .Patients with positive ETT and ST changes (suspected Coronary artery disease) along with those with history of myocardial infarction (established coronary artery disease) were grouped together in group A the rest of the patients with negative ETT and with no previous history of ischemic heart disease were grouped in group B (Non coronary artery disease group) These includes 1136 Males (75.73%) and 364 Females (24.26) the age of these patients varied from 19 to 90 years. (Table 2)

Table 2
AGE GROUP DATA OF ALL 1500 PATIENTS



Out of 1500 patients 174 (11.6%)were inpatients and 1326 (88.45) were out patients, the referrals by cardiologists were 1092 (72.8%) and whereas 341 (22.73%) referred by general physician (Table 3). Of these 1238 (82.53%) patients were for chest pain evaluation and 71 (4.73%) for post infract assessment and 191 for other reasons.(Table 1)

Table - 3

MALES	1136	75.73%
FEMALE	364	24.26%
INPATIENTS	174	11.6%
OUTPATIENTS	1326	88.4%
REFERRED BY CARDIOLOGISTS	1092	72.8%
PHYSICIANS	341	22.73%
OTHERS	67	4.46%

RESULT

A total of 511 (34.06%) cases were positive for execise induced ischemia ,906 (60.48%) cases were negative for exercise induced ischemia whereas 83 (5.57%) were found to have an inconclusive stress test. A total of 615 patients (41%) (patients with positive stress test and with history of myocardial infarction) were included in Group A .855 patients with negative stress test and no history of myocardial infarction were included in group B.

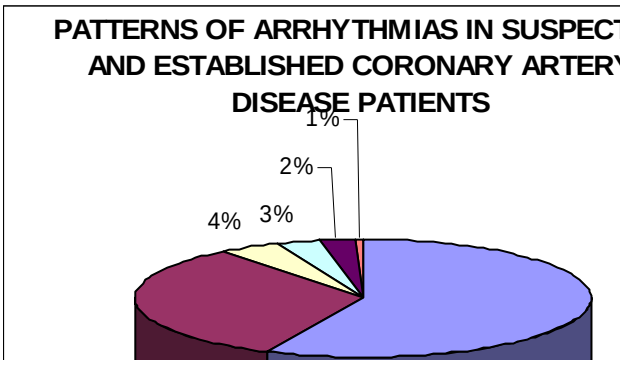
In group A 163 (26.5%)patients showed various exercise induced arrythmias 17 (10.42%) of these had serious or life threatening arrythmias .And 146(89.58%) of this group of patients had benign arrythmias (table 6).

Ventricular tachycardia ,Supraventricular Tachycardia, atrial fibrillation and Heart block requiring further evaluation and management were considered as serious arrythmias.

Atrial premature contractions, Premature ventricular contraction were considered as benign arrythmias not requiring any intervention.

Serious arrythmias were occured in 17 (10.42 %) of total Group A Patients .In Group B which consist of 885 patients i.e 59 % of total, 101 (11.41%)patients showed exercise induced arrythmias .All these arrythmias were classified as benign. (Table 4).

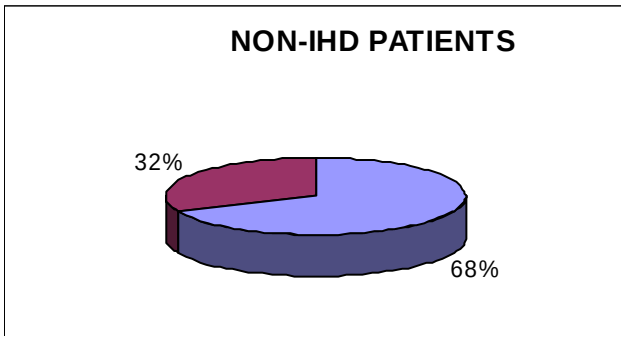
Table 4



PVCs = Premature Ventricular Contraction, APCs = Atrial Premature Ventricular Contraction.

Of 163 (26.5%) patients who had arrythmias out of a total of 615 in group A, 93 (57.57%) had PVCs ,53 (32.57%) had APCs .7(4.29%) had Ventricular tachycardia and 5 (3.06%) had SVTs .4 (2.45%) had heart block of various degrees and 01 (0.61%) had Atrial fibrillation. (Table 5).

Table 5



PVCs = Premature Ventricular Contraction, APCs = Atrial Premature Ventricular Contraction, VT = Ventricular Tachycardia, SVT = Supra Ventricular Tachycardia, HB = Heart Block, A.Fib. = Atrial Fibrillation.

Table -6

SUSPECTED AND KNOWN IHD PATIENTS(GroupA) 615 (41%)		NON -IHD PATIENTS (Group B) 885 (59%)	
ARRYTHMIAS	163 (26.5%)	ARRYTHMIAS	101 (11.41%)
SERIOUS ARRYTHMIAS	17(10.42%)	ALL HAD BENIGN ARRYTHMIAS	
BENIGN ARRYTHMIAS	146 (89 .57%)		
NO ARRYTHMIAS	452 (73.49%)	NO ARRYTHMIAS	784 (88.58%)

DISCUSSION

This study dealt with the incidence of exercise induced ventricular arrythmias in clinically normal subjects and patients with suspected ischemic heart disease, The mechanism of exercise induced arrythmias probably differ in patients with suspected coronary artery disease and in normal subjects the results of this study tend to support such as an assumption. Jelinek and Lown reported on the incidence of exercise induced ventricular arrythmias in 282 patients with documented coronary artery disease they found 24.5 % incidence rate in patients who experienced angina with positive ETT on HR <130/min whearas in our study arrythmias were found in 26.5% which was slightly higher than Lowns study, The major difference was seen in comparasion to Lown study when we compared the two groups having nagative ETT. Our study showed that only 11.41% showed arrythmias whearase in their group 41.7% had arrythmias. This difference was seen probably because most of our patients was sent for evaluation of chest pain whearas their patients included a specific group of policemen who were prone to having arrythmias even at rest.Almost all the patients in this group had negative stress test for ischemia.

Marieb et al analyzed 383 patients for clinical relevance of exercise induced Ventricular arrythmias in suspected coronary artery disease. In their study which was a long term followup 42% showed exercise induced ventricular arrythmias. On 4 to 8 years follow up this group showed higher tendency towards revascularization procedures. Out of 162 patients 89 had adverse cardiac events and 41 had sudden death.

CONCLUSION

Exercise induced arrythmias appear to be much more common in patients with definite or suspected ischemic heart disease patient's compare to those who do not have ischemic heart disease. We conclude that exercise induced arrythmias provide prognostic information and also identify those patients who are at higher risk of coronary events.

Exercise induced serious arrhythmia's VT, SVT, A Fib, Atrial Fibrillation Heart Block, LBBB are almost exclusively seen in-patients with ischemic heart disease.

This study further confirms the safety of stress testing for its use in screening for ischemic heart disease and early diagnosis of life threatening arrhythmias.

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