Original Research Article

Effect of Pre Operative Risk Stratification on 6 Minute Walk Distance after Phase 1 Cardiac Rehabilitation: A Pilot Study

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ABSTRACT

Background: Cardiovascular disease (CVD) is the major health issue in India. The surgical management becomes the choice of treatment; CABG is emerging as a most common surgical procedure following which physiotherapy rehabilitation has major role in improving quality of life in patient. Pre-operative risk stratification can be a important factor to be checked while prescribing exercises post-operatively. Therefore, our aim was to find out the effect preoperative risk stratification on 6 minute walk distance after phase1 Cardiac Rehabilitation along with checking the effect of phase 1 Cardiac Rehabilitation on functional capacity in low, moderate & high risk patients after CABG.

Methodology: An observational study was conducted at the District-based Cardiac Care Unit in Tertiary Hospital, Ahmednagar. Total 12 subjects were included in this study those who were planned for CABG. The patients were divided before surgery according to the risk stratification criteria into three groups, i.e. low risk, moderate risk and high risk. Subjects were explained about the study in details in language they understand. Consent was obtained from subjects. After surgery, regular phase 1 Cardiac rehabilitation protocol was given to the patients and 6-minute walk distance data was taken on day 7th.

Result: Data analysis was done using SPSS software version 16.0. Kruskal-Wallis non parametric test was used for analysis between the groups low (group 1), moderate (group 2) & high risk (group 3). Results showed that there was no statistical difference was observed between the groups in 6-minute walk distance as p-value was > 0.05.

Conclusion: This study concluded that there is no effect of pre operative risk stratification on 6 minute walk distance after phase 1 Cardiac Rehabilitation.

Keywords: Risk Stratification, Phase 1 Cardiac Rehabilitation, Six Minute Walk Distance.

INTRODUCTION

Cardiovascular disease (CVD) is the major health issue in India. It is the commonest cause of mortality and morbidity in India. It causes around 25% deaths. Coronary artery disease (CAD) is the primary and most common cause of death worldwide. CAD can be managed in the early stages by dietary and lifestyle modification, lipid-lowering agents, blood pressure monitoring, glycemic control, and antiplatelet agents. As the disease progresses, these measures are not sufficient to maintain a satisfactory quality of life. It is mandatory to resolve the root cause of the disease to stop its progression. Therefore the surgical management becomes the choice of treatment. Coronary angioplasty and

Coronary artery bypass grafting (CABG) are the surgical procedures for management of the CVD. [1]

CABG surgery is the most commonly studied of all surgical procedures, probably due to frequency with which it is performed, and the fact that it relates to coronary heart disease, the most common cause of death. [1] Therefore, it is necessary for risk stratification before surgery to know the patients' health status by knowing the severity of illness. To obtain beneficial effects and ensure safety during physical exercises, it is necessary that they are prescribed correctly. For each individual, it is necessary to know the patient's level of risk, and for this purpose, cardiac risk stratification becomes important to prescribe the appropriate exercise intensity after cardiac surgeries. [2]

According to the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), following is the criteria for risk stratification:

1) Low risk: Left Ventricular Ejection Fraction (EF $\geq$ 50%), Uncomplicated MI, CABG, angioplasty, Functional capacity $\geq$ 6 MET's 3 or more weeks after the clinical event, No ST segment elevation.

2) Intermediate risk: Mild to moderately depressed LV function (EF 31-49%), Functional capacity < 5-6 METs 3 or more weeks after clinical event, Exercise induced ST segment depression of 1-2 mm.

3) High risk: Severely depressed LV function EF $\leq$ 30%, Complex ventricular arrhythmia, Reduction in systolic BP of > 15 mm hg, MI complicated by CHF, Cardiogenic shock, Marked exercise induced ST segment depression (> 2mm). [3] Cardiac Rehabilitation is safe and effective, resulting in multiple significant patient benefits, including improvements in mortality, morbidity, functional capacity, return to work, control of risk factors, and quality of life. [4-8] The aims of Cardiac Rehabilitation are to improve functional capacity of the patients and relieve their symptoms caused due to physical activity

and further lead to reduction in quality of life. Phase 1 is the inpatient period, which may last from a few hours to days or weeks. It is mostly aims at risk assessment, evaluation and early mobilization to prevent consequences of bed rest.

The exercises given in phase 1 are of low MET's because the functional capacity of patient is relatively low after cardiac surgery in initial days. It is useful for the patients to evaluate the endurance by before giving exercise. 6 minute walk test is most commonly used test to assess the endurance. It is a good indicator for comparing the functional capacities pre and post operatively.

Cardiac Rehabilitation is important for gaining that functional capacity again, as there is a poor functional status postoperatively. Irrespective of preoperative severity of the disease, the patients after the CABG procedure receives the same physiotherapy exercise protocol of phase 1 Cardiac Rehabilitation in any risk group. Therefore, this study aims at finding out the to see if there is any need for changing the post operative exercise protocol according to the pre operative degree of severity of patient.

METHODOLOGY AND PROCEDURE

An observational study was conducted in a district tertiary cardiac centre. Patients were enrolled from a tertiary hospital. Ethical clearance was obtained by the government institutional committee. Subjects were selected by purposive sampling method and those who were meeting the inclusion criteria were recruited for the study. Inclusion Criteria was 1) Patients diagnosed with CAD and planned for CABG 2) Patients underwent Cardiac surgeries with a mediastinal approach 3) Age 40-70 4) Both male and female. Exclusion criteria 1) Patients who developed complications during surgery 2) Patients diagnosed with any neuromuscular and musculoskeletal condition. Written informed consent was obtained from all the patients.

Preoperative demographic data was collected and patients were assessed for risk factors like LVEF, functional capacity following risk stratification by the criteria of AACVPR thereby dividing them into three groups: group 1 (low risk), group 2 (moderate risk) and group 3 (high risk). Patients then underwent CABG surgery. Patients were given phase 1 cardiac rehabilitation exercise protocol which included activities like incentive spirometry, ankle toe pumps, splinted coughing techniques, active cycle of breathing technique and mobilization which were of 5-6 MET's. All patients were given a same treatment protocol of phase 1 cardiac rehabilitation. On post operative day 7th, the functional capacity was assessed by using 6 MWT.

Statistical analysis:

Statistical data were analysed by using **Instat Software**. Data were presented in the forms of Mean and standard deviation. Comparing the baseline characteristics [Table no.1] between the sample populations, data were not normally distributed hence non-parametric tests were used for statistical analysis. Kruskal-Wallis test is non-parametric statistical test was used for intergroup analysis between Group A, Group B and Group C. Statistical p-value ≤ 0.05 was considered statistically significant.

Fig. 1 six minute walk test on 7th post operative day

RESULT

Table no. 1 showing baseline characteristics distribution between three groups A, B & C

	Group A (low risk) Mean ±SD	Group B (moderate risk) Mean ±SD	Group C (High Risk) Mean ±SD
Age in years	62.25 ±5.5	65.5 ± 6.13	57 ±15.01
BMI in kg/m^2	24.075 ±2.13	24.225 ±1.50	21.9 ±1.86
Vital parameters			
HR in bpm	78 ±10.55	77.5 ±19	72.5 ±15.86
RR in cpm	20.25±5.67	19.5 ±3.87	17.25 ±3.59
SBP in mmHg	122.5 ±9.57	132.25 ±16.13	116.75 ±13.99
DBP in mmHg	80±14.14	77 ±7.74	73.25 ±12.69
SpO$_2$ in %	98 ±1.41	98.5 ±1.29	99.25 ±0.5

[Where, SD= standard Deviation, BMI= body mass index, HR= heart rate, RR= respiratory rate, SBP= systolic blood pressure, DBP= Diastolic blood Pressure, SpO$_2$= Oxygen saturation at tissue level]

Table no. 2: Showing Result after statistical analyses between 3 groups for 6-minute walk distance by Kruskal-Wallis test (non-parametric test)

	6MWD		
	Group A	Group B	Group C
Mean ± SD	115±7.07	106.25±13.76	102.5±8.66
SEM	3.53	6.88	4.33
KW statistics	2.99		
P value	0.22		

minute walk distance. Hence statistically significant difference was not found.

Table no 2 showed that, by comparing mean and SD between Group A, Group B and Group C we obtained p value 0.22 for the 6
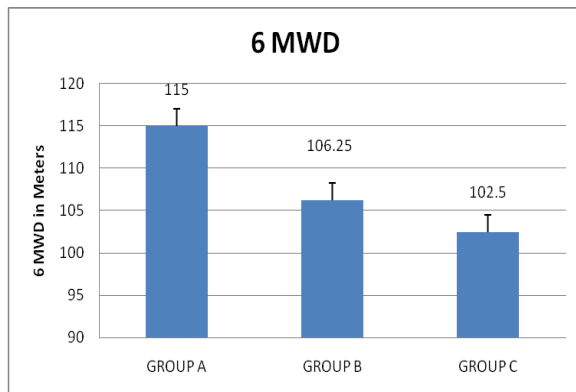
Fig. no. 2: Showing graphical presentation showing a comparison of 6 min walk distance between 3 groups

Table no 2 and Figure 2 showed that, though there is no such statistically significant difference found in 6 minute walk distance travelled by sample population in Group A, Group B and Group C. But there was clinically significant difference found in 6 minute walk distance comparing between Group A, Group B and Group C.

DISCUSSION

Cardiovascular Disease is the global issue of mortality and morbidity. Cardiovascular disease affects Indian population at least a decade earlier as compared to that of the other countries. Coronary artery disease is the commonest disease in CVD and is the leading cause of the death and disability. CABG is the most common surgery chooses for the management of the CAD thereby reducing death rate of India.

6 minute walk test is a sub maximal type of exercise, which usually is a symptom limited test which has been proven to be reliable and valid in CABG patients. In our study it was administered on POD 7. The distance was measured and difference was calculated for intergroup analysis and was found to be statistically non significant.

However during the administration, clinically, the high risk (group 3) patients reported more symptoms like increased perception of breathlessness along with them requiring several bouts of rest periods while performing the test. Whereas, the low & moderate risk (group 1& 2) patients seen

performing the test with shorter span of time and with less complains of breaks.

ZieliNska D (2013) et al [9] similarly, their studies reviewed, the role of 6MWT in cardiology, cardiac surgery, and rehabilitation. The results of their study did not prove the relation between the six-minute walk distance and adverse events after CABG. The predictive power of the distance walked for death in Heart Failure patients undergoing cardiac surgery was not found. It is not yet proved if the change in the six-minute walk distance is associated with prognosis. Therefore the predictive power of six-minute walk distance for death in HF patients undergoing cardiac surgery remains unclear.

Similarly in our study the 6MWT distance was analysed in phase I of CR. According to the AACVPR guidelines, the maximal allowance for activity level in terms of MET in phase I remains confined to 3- 5 MET which includes activities like walking, stair climbing, hall ambulation etc. as a result of which the 6MWT distance shall remain unaltered irrespective of the severity of the disease as the levels of MET aren't sufficient enough to trigger a change in the LVEF as a result of which the endurance associated with the 6MWD remains unaltered.

CONCLUSION

From this study, we concluded that there was no effect seen after pre operative risk stratification on endurance after phase 1 Cardiac Rehabilitation statistically. Therefore there is no effect of pre operative risk stratification on 6 Minute Walk Distance after phase 1 Cardiac Rehabilitation.

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