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Research Article

To Follow up Of Patients with Coronary Artery Disease with Severe Left Ventricular Systolic Dysfunctin: Novel Approach

Sharad Masudi, Anugrah Nair*, Saritha Shekar

Department of cardiology, Amrita school of Medicine, Amrita institute of medical sciences & research Centre Amrita Vishwa Vidyapeetham University, kochi, kerala, India

ABSTRACT

Coronary Artery Disease (CAD) associated with left ventricular systolic dysfunction is a condition related to poor prognosis. There is a lack of robust evidence in many aspects related to this condition, from definition to treatment. Significant left ventricular systolic dysfunction is defined as an LVEF less than 40%. There is no simple measure of diastolic function. CHF due to diastolic dysfunction may be so common in the elderly because aging itself results in a stiff, poorly relaxing left ventricle. Disease processes add to these aging effects. If you have systolic heart failure, you can have: Shortness of breath. Tiredness, weakness, swelling in feet, ankles, legs, or abdomen, common prescriptions for left ventricular dysfunction are: Diuretics or water pills: Treats swelling of feet and abdomen. Beta-blockers: Slows heart rate and regulates blood pressure. ACE inhibitors, ARB, ARNI: Widen blood vessels. LV systolic dysfunction was defined as an ejection fraction (EF) of less than 40% by echocardiography. The recovery of LV systolic function was defined as recovery of the EF to a level of 40% or greater and a net increase in EF of 10% or greater. In this research paper we are executing statistical analysis, observation and method along with result analysis.

Sources of Data: This review is based on the published academic articles as well as our clinical experience.

Background: Background and aim: The choice of optimal treatment strategy in patients with coronary artery disease (CAD) and severe left ventricular (LV) dysfunction is often difficult. The aim of this study was to compare long-term results of patients with chronic CAD, severe heart failure and a defined scope of myocardial viability treated with coronary revascularization, heart transplantation, or kept on medical therapy.

Materials and Methods: Sequential randomized sampling of patients who meet the inclusion criteria from 2015-18 and who were on regular follow up for at least 2 yrs. were included in the study

Result: There was a trend towards improvement in LV systolic function among patients who underwent revascularization (PTCA & CABG) as compared to medical management, though it was not statistically significant. The patients with CAD with LV dysfunction who received ARNI showed reduction in heart failure repeat hospitalizations. This was seen in patients, irrespective of the management strategy.

Keywords: Large vessel vasculitis; Polymyalgia rheumatic; FDG-PET/CT (A); Imaging procedure etc

INTRODUCTION

The Coronary Artery Disease (CAD) is the largest epidemic of this era and one of the leading causes of death in the world with an increasing prevalence in developing countries [1,2]. In recent years, the incidence and prevalence of coronary artery disease are increasing in younger individuals due to change in their lifestyle, stress, obesity etc.

According to WHO data, CHD (Coronary Heart Disease) was one of the major cause of deaths globally as well as in India in 2004 [3].

***Correspondence to:** Anugrah Nair, Department of cardiology, Amrita school of Medicine, Amrita institute of medical sciences & research Centre Amrita Vishwa Vidyapeetham University, kochi, kerala, India, Tel: 9158633092; E-mail: anugrahnair@hotmail.com

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In a study done in Gupta et al, it was found that unadjusted CHD (coronary heart disease) rates have ranged from 1.6% to 7.4% in rural populations and 1% to 13.2% in urban populations [4].

A 2000 estimate of 9.2 million productive years of lives lost in Indian adults secondary to overall Cardiovascular disease contributes to the economic decline. As CHD (coronary heart disease) rates increase, this estimate increases to 17.9 million by 2030 [5].

Often when coronary artery disease strikes early it is fatal without a warning sign and without adequate time for reparative measures. Therefore, it is extremely important to detect CAD (coronary artery disease) early and there is a need for a non-invasive, sensitive and specific investigation (4,5). Coronary artery Disease is the leading cause of left Ventricular systolic dysfunction which is the hallmark of heart failure with reduced Ejection Fraction [1,4,6,8].

Coronary Revascularization by PCI or CABG, appear to directly target the main pathophysiologic mechanism of Ischemic HF-REF [7-10].

Although surgical revascularization can be an effective therapy in the short term and midterm, little is known about the long-term follow-up. Late death of these patients may be caused by progression of heart failure, ventricular arrhythmias, and myocardial infarction and also by other comorbidities such as diabetes mellitus or chronic renal dysfunction. Patients with Coronary artery disease and advanced left ventricular dysfunction have a poor prognosis, when treated medically they have limited survival and usually die of cardiac causes [11,12].

BLOOD SUPPLY OF THE HEART

The myocardium is supplied with oxygen-rich blood through the coronary arteries, the left anterior descending coronary artery (LAD), and the left circumflex

Coronary artery (LCX) and the Right Coronary Artery (RCA).The la-corona or the royal crown is the term used for coronary arteries [23].

The right and left coronary arteries together form an oblique inverted vascular crown. The LCA supplies to larger volume of the myocardium as compared to Right coronary artery. The LCA is also more variable than its right counterpart in origin, distribution, branching pattern and luminal size.

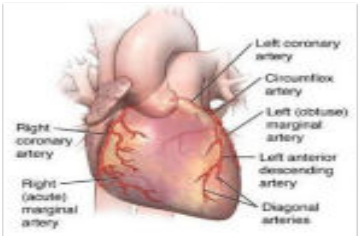


Figure 1: Coronary Artery Anatomy and Course of Different Coronary Arteries, Also Marked Are Common Areas of Arterial Narrowing.

The term "normal coronary anatomy" refers to the structures that are habitually observed. The term "anomaly" is used for variations that occur in less than 1% of the general population [24]. The coronary arteries are the first vessels that branch from the aorta, normally originating below the junction between the bulbs and the ascending aorta, that is, at the sinotubular junction.

The coronary orifices are located in the center of the corresponding aortic sinuses and slightly above the free margin of the cusp. Each of the coronary arteries branches off from the aortic wall at a different angle: the right coronary artery usually at 90°, and the left coronary artery at a slightly lower angle [25].

The coronary arteries are vessels located in the epicedium, although they may penetrate into the myocardium for part of their route. The pericardial vessels finally penetrate into the myocardium and then act as resistance or distribution vessels. Here they form a dense network which is usually connected to the venous circulation via the cardiac capillaries and occasionally with the cardiac cavities termed as the arterio-cameral connections.

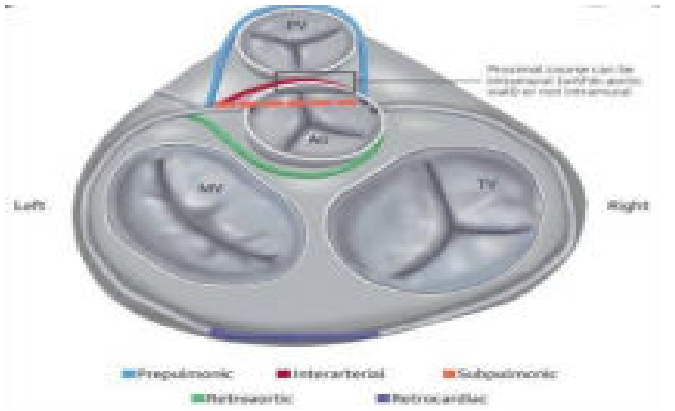


Figure 2: Interarterial Coronary Connections LEFT CORONARY ARTERY.

LEFT CORONARY ARTERY

The left coronary artery commonly originates in a single orifice situated at the level of the left aortic sinus. Its length is variable, though it is not usually more than a few millimeters [19-22]. From its origin, it passes behind the outlet of the right ventricle and below the left appendage. Normally, the left coronary artery bifurcates into the anterior interventricular artery and circumflex artery. The anterior interventricular artery is also known as the anterior coronary artery of Vieussens, the descending anterior coronary artery, or the anterior division of the left coronary artery [30]. It originates in the retropulmonary portion of the left coronary artery, passes above the interventricular groove, adopting an S shape, and in most cases reaches the apex on the right hand side. It occasionally continues through the posterior interventricular groove, where it is known as Mouchet's posterior recurrent interventricular artery. The circumflex artery or the

posterior division of the left coronary artery varies more in terms of its length and distribution. From its beginning, it passes below the left appendage and continues above the left atrioventricular groove, occasionally reaching the diaphragmatic surface. During its course it may reach the left atrium and the posterior atrioventricular groove; in this case it passes below the coronary sinus [19-22].

RIGHT CORONARY ARTERY

The right coronary artery arises from a single orifice in the right aortic sinus. In the first millimetres it is submerged in the adipose tissue of the epicardium below the right atrial appendage (the Rindfleisch fold) [31]. It passes above the right atrioventricular groove, and commonly reaches the posterior interventricular groove, frequently passing above the crux cordis.

According to American heart association, coronary artery segments are divided as follows [32].

- Right coronary artery.
- Left main coronary artery
- Left coronary artery
- Left circumflex artery

The Posterior Descending Artery (PDA) is also known as the posterior interventricular artery because it runs along the posterior interventricular sulcus to the apex of the heart. It is at the apex where it meets the left anterior descending artery that is traveling along the anterior surface of the heart. The posterior descending artery is responsible for supplying the posterior third of the interventricular septum, including the posterior and inferior wall of the left ventricle [35,36]. The vessel originates from either the right coronary artery (right dominant - 70 to 80%), left circumflex artery (left dominant - 5 to 10%), or both (codominant - 10 to 20%).

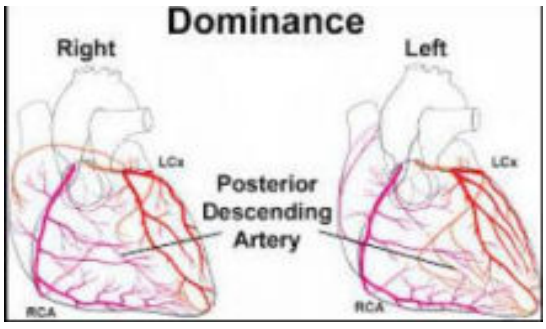


Figure 3: Heart Dominance.

EPIDEMIOLOGY OF ACUTE CORONARY ARTERY DISEASE IN INDIA

In the Indian subcontinent and low and middle income countries cardiovascular diseases account for 78% of all deaths [41]. Among Indians studies shows that these diseases occur a decade earlier as compared to the populations in the rest of the world , another fact of cardiac diseases including ACS which differs from other nations among the Indian population is that it affects productive age 35–65 as shown by studies [53-55]. India has the highest burden of ACS in the world exists [42]. The CREATE registry, the largest data from Indian patients with ACS has provided contemporary data on 20,468 patients from 89 centers from 10 regions and 50 cities in India and CREATE registry, the largest data from Indian patients with, has shown that the pattern of ACS among Indians is much different from that of the Western populations and that patients with ACS have a higher rate of STEMI (61%) than do patients in high income countries (15-25%) [43].

The changing patterns of risk factors for Coronary artery disease With rapid urbanization, mechanization of transport, and increase sedentary jobs there has also been a dramatic rise in risk factors for ACS [44].

Jernigan and colleagues in 2010 studied the changing patterns in health behaviors and risk factors related to cardiac disease in the west and found that from 1995–1996 there was increase in the prevalence of diabetes, obesity ,Hypertension, smoking, sedentary behavior and in 2006, 79% of the population had at least 1 of the risk factors, and 46% had 2 or more.

FACTORS INFLUENCING CORONARY ARTERY DISEASE

The risk of major cardiovascular complications and death is dependent on acute and pre-existing risk factors. The high risk factors and markers of outcome are as follows

- Age - In India about 50% of the CHD-related deaths occur in people younger than 70 years compared with 22% in the West. Age-standardized cardiovascular diseases death rates (per 100,000) disease also tends to be more aggressive and manifests at a younger age and more in females
- Rhythm disturbances: bundle branch block, ventricular fibrillation, cardiac arrest
- Signs of heart failure
- Glucose derangement in the form of elevated glycosylated haemoglobin and diabetes mellitus
- Renal dysfunction
- Elevated inflammatory markers - C reactive protein , interleukin-6

MINOR RISK FACTORS

- Literacy rate - the disease was more among the illiterate
- Socioeconomic Status - high socioeconomic status is protective

THE NEWER MARKERS FOR CARDIAC DISEASE

Coronary Artery Calcium Score (CAC)

- Carotid Intima-Media Thickness
- Lipoprotein-A
- Myeloperoxidase
- F2-Isoprostanes

Vitamin D

- Ankle-Brachial Index

PATHOPHYSIOLOGY OF CORONARY ARTERY DISEASE (CAD)

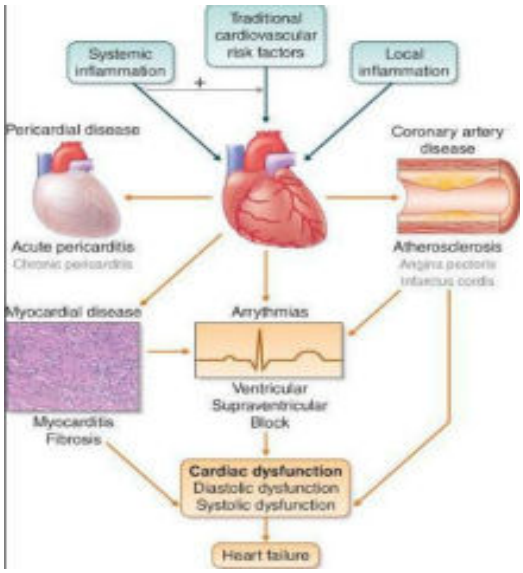


Figure 5: Manifestation and the Clinical Spectrum of Coronary Artery Disease.

AIM AND OBJECTIVES

Primary

The Primary objective of the study was to determine the Mortality due to cardiac related causes

Secondary

THE SECONDARY OBJECTIVE OF THE STUDY WERE TO DETERMINE

- Hospitalization rates which are secondary to Heart Failure
- Any Arrhythmic Events during the study period
- Improvement in LV systolic Function assessed by 2D Echo.
- Any non-cardiac related Mortality

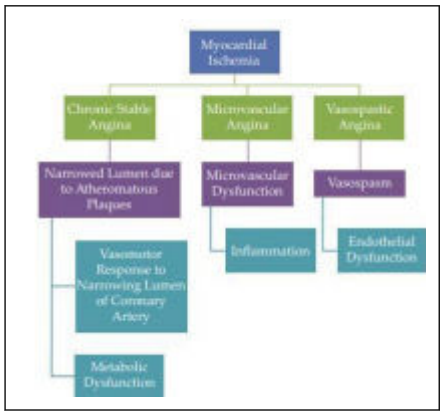
Cardio embolic Stroke events

To find the association of the parameters between the three management strategies

CLINICAL MANIFESTATIONS

It can have various clinical manifestations, including stable angina, acute coronary syndrome, and sudden cardiac death.65

GROWING POINTS



AREAS TIMELY FOR DEVELOPING RESEARCH

Larger prospective studies are needed to validate the superiority of F-18 FDG PET/CT imaging over conventional anatomic imaging modalities. There are various medical and revascularization strategies that can be done in the treatment of patients with coronary artery disease when acute coronary syndrome arises. Revascularization mortalities include percutaneous coronary int ervention and coronary artery bypass grafting All patients who have a acute coronary syndrome initially require a good.

Medical therapy in order to

- reduced symptoms
- Stop the disease progression.
- prevent occurrence of new cardiovascular events
- To reduce the mortality rate.

REVIEW OF LITERATURE, ROL

THE CONTRIBUTION OF INFLAMMATION IN CEREBROVASCULAR EVENTS

In the year 1983 on a population of 651 cases that were treated medically (420) or undergone surgical intervention (231) with a severe LVSDF with severe abnormalities in the myocardial motion wall., the study concluded that the most surgical advantage was seen in those cases who had an EF less than 0.26 who, with a 5 year survival in them being 63% with surgery and 43% with medical management. They also stated that even if the LVEF is low the patients with CAD benefit by surgery [2]. In the year 1988 on a population of 710 cases with severe LVSDF that were treated 301 patients treated surgically and rest medically, of which, 232 had CABG; 17 had LV surgery; and 52, both procedures, between the two treatment groups, overall surgical survival at 3 years after treatment was 86%, and medical survival was 68%. Long-term surgical survival benefits appeared greatest in patients with the most severe left ventricular

dysfunction, most extensive coronary artery disease, and most severe angina symptoms[1].

In a study that was done in the year 1998 on a population of 50 cases with CAD who either received revascularization in the form of CABG or medical therapy stated that there was a 45% better improvement in the survival at end of 4 years in those who had CABG than those in whom only medical treatment was used, they also noted that the improvement was more in the severity and incidence of angina attacks and the symptoms of cardiac failure. 40% of morality [3].

In a study that was done in the year 2001 on a population of 2,431 cases with CAD, 454 assigned in random, who either received revascularization in the form of CABG in 232 cases or PCI 222 cases stated that one month survival, six months and at thirty six months in the CABG group was 95%, 90% and 79 percent respectively and in the PCI group was 94%, 97% and 80% respectively [4].

In a study that was done in the year 2002 on a population of 117 cases with CAD who either received revascularization in the form of CABG in 69 or PCI in 48 cases, stated that CABG was noted more in the younger population with the mean age being 62 pears as compared to PCI the mean age being 67 years with a difference between the two groups being 5 years. They also noted that those who had CABG had lesser previous bypasses or PCI , had a higher number of vessels that were vascularized with more than 85% of the vessels being completely vascularized as compared to 48% in the PCI with a significant statistical significance with p value less than 0.0001. In terms of mortality and morbidity at the end of 30 days both were same. The study also noted that there was a significant statistical significance in the 3 year survival with 73% in those who had CABG and 67% those who had PCI p<0.0001, and target vessel revascularization–free survival [5].

In the year 2003 on a population of 764 patients aged between the ages of 50 years and 89 years of either sex with the aim to determine the severity of LVSF impairment, they stated that the male population was twice susceptible to have a LVSF impairment, with the male to female ratio being 7.6% to 2.6%. Heart failure in males was as follows in the various age groups revealed the least in the age between 50 and 59 years and gradual increments as the age advanced. Asymptomatic LVSF impairment was seen in 44.0% of all cases of systolic dysfunction in the male population and only 9.1% in the female population [6].

In the year 2005 on a population of 315 cases of CAD with a mean age of 68.8 years had 57% males & stated that LVSDF was seen in 23.1% and severe LVSDF was seen in 10.7%. 57 cases (18.1%) had severe CAD lesions on CAG & severe LV dysfunction on echo was seen in 39.7%. Age, dyslipidemia, angina and reduced ejection fraction were predictors of CAD, the study concluded that left ventricular systolic dysfunction correlated independently with the presence of coronary artery disease [7].

In the year 2004, from the city of New York on a population of 396 cases for a follow up of 35 months stated that the mortality, survival free of angina, were better in the CABG groups in those with severe LVSDF of less than 35% [8].

In the year 2004, from the city of Alberta in Canada on 7841 patients who had isolated CABG and compared in those with severe LVSDF of less than 30 % , with moderate LVSDF of 50- 30 % and normal LVSDF of more than 50 % stated that the mortality related of surgery was higher in the patients group with severe LVSDF (4.6%) compared with moderate LVSDF and normal LVSDF groups (3.4% and 1.9%, respectively, P<0.001). At 5 years, survival was 77.7% for severe LVSDF patients compared with 85.5% and 91.2% for moderate LVSDF and normal LVSDF patients, respectively (P<0.001). After controlling for other independent variables, the adjusted hazard ratio for death was 1.98 (95% CI, 1.49 to 2.62) for severe LVSDF relative normal LVSDF. The mortality rate at 1 year was significantly lower for Low EF patients who underwent CABG than it was for non revascularized severe LVSDF Jehangir Appoo patients (risk adjusted odds ratio, 0.36; 95% CI, 0.24 to 0.55) Of patients who received drug-eluting stents, 28.4% underwent repeat PCI (e.g., stenting or balloon angioplasty) and 2.2% underwent CABG within 18 months. The respective rates for patients undergoing CABG were 5.1% and 0.1%; both differences are statistically significant (P<0.001) [8].

In the year 2007 on 220 patients with severe LVSDF ≤35%who underwent revascularization with either coronary stent implantation or CABG, mean follow up was 15 ± 9 months. 8% deaths occurred in the DES group and 11% in the CABG group .The 30 days mortality was significantly greater in patients undergoing CABG than DES (five patients in the CABG vs. only one patient in DES group, P = 0.04). at 6 months [9].

In the year 2008 on patients with severe LVSDF ≤35%stated that when compared with a drug-eluting stent, CABG was associated with lower 18-month rates of death or myocardial infarction both for patients with three-vessel disease and for patients with two-vessel disease [10].

In the year 2011 on 138 with severe LVSDF a median follow-up of 59 months, there were 51 (37%) deaths; 25 (37%) in those assigned to the conservative strategy, and 26 (38%) in those assigned to the invasive strategy, 13 (29%) of whom had been revascularized [11].

In the year 2011 on comparing DES WITH CABG for patients with multi-vessel disease and severely compromised ventricular function stated that CABG was superior in terms of Mortality, major adverse cardiac or cerebrovascular events [12].

In the year 2011 on a total of 1212 patients with an ejection fraction of 35% or less and coronary artery disease amenable to CABG were randomly assigned to medical therapy alone (602 patients) or medical therapy plus CABG (610 patients), The primary outcome that is the rate of death from any cause occurred in 244 patients (41%) in the medical-therapy group and 218 (36%) in the CABG group (hazard ratio with CABG, 0.86; 95% confidence interval [CI], 0.72 to 1.04; P=0.12). A total of 201 patients (33%) in the medical therapy group and 168 (28%) in the CABG group died from an adjudicated cardiovascular cause (hazard ratio with CABG, 0.81; 95% CI, 0.66 to 1.00; P=0.05). Death from any cause or hospitalization

for cardiovascular causes occurred in 411 patients (68%) in the medical-therapy group and 351 (58%) in the CABG group (hazard ratio with CABG, 0.74; 95% CI, 0.64 to 0.85; P<0.001); by the end of the follow-up period (median, 56 months), 100 patients in the medical therapy group (17%) underwent CABG, and 555 patients in the CABG group (91%) underwent CABG [13].

In the year 2014 identified 3,584 patients with 3-vessel and/or left main disease of 15,939 patients undergoing first myocardial revascularization enrolled in the CREDO-Kyoto PCI/CABG Registry Cohort-2. Of them, 2,676 patients had preserved LV systolic function, defined as an LV ejection fraction (LVEF) of >50% and 908 had impaired LV systolic function (LVEF≤50%). In patients with preserved LV function, 5- year outcomes were not different between PCI and CABG [14].

Regarding propensity score-adjusted risk of all-cause and cardiac deaths; in contrast, in patients with impaired.

In the year 2015 on 42 patients with LMCA disease (more than 50% stenosis by visual estimation) and systolic LV dysfunction (LVEF less than 40%) who underwent PCI and 171 patients who underwent CABG, found that the CABG group included more patients with triple-vessel disease (P<0.001) and the PCI group included more patients with myocardial infarction (MI) (P=0.002). The rates of target vessel revascularization were significantly higher in the group that received PCI than in the group that [15].

In the year 2016, from the city of New York on a population of 1441 patients with moderate (70%) or severe (30%) MR, a significant history of hypertension (59%), diabetes (28%), symptomatic heart failure (83%), and CAD (52%) was observed. Past revascularization in 26% was noted. At 1 year, 1094 (75%) patients were treated medically. Percutaneous coronary intervention was performed in 114 patients, coronary artery bypass graft (CABG) surgery in 82, CABG and MV surgery in 96, and MV surgery alone in 55 patients. Among patients with CAD, compared with medical therapy alone, the treatment strategies of CABG surgery [hazard ratio (HR) 0.56, 95% confidence interval (CI) 0.42– 0.76] and CABG with MV surgery (HR 0.58, 95% CI 0.44– 0.78) were associated with long-term, event-free survival benefit. Percutaneous intervention treatment produced a borderline result (HR 0.78, 95% CI 0.61–1.00). However, the relationship with isolated MV surgery did not achieve statistical significance (HR 0.64, 95% CI 0.33–1.27, P = 0.202) [16].

In the year 2016, from the city of Durham, New York on a population of 4616 who had fulfilled the study criteria and had severe left ventricular systolic dysfunction ; 1,351 (29%) of the cases had undergone PCI with DES and 3,265 (71%) cases had undergone only CABG. They stated that on a short term analysis there was a favourable outcome in those who had undergone PCI with a 95% lesser incidence of stroke and no significant difference [17].

In the year 2017 stated that in those with LVSDF and CAD has a very bad prognosis which is still poorer when the viability of the myocardium is less. Their evaluation revealed that for by various diagnostic methods it is possible to identify those who can benefit from revascularization measures and also to stratify them based on prognosis. They concluded that revascularization measures are more beneficial and should be used in those with advanced CAD as they are likely to have a benefit and improve the prognosis and the quality of life [18].

In the year 2017, from the city of , Milan, Italy on a population of 16 191 that included 21 studies that had fulfilled the study criteria and had severe left ventricular systolic dysfunction less than 40% they stated that Compared with medical treatment, there was a substantial decrease in the rate of mortality with CABG (HR 0.66;P<0.001),PCI(HR 0.73confidence P<0.001) and survival benefit (HR 0.82; P<0.001) [19].

Defined the prevalence of mild (possible) systolic dysfunction as LVEF <35% with an overall prevalence of 7.7%, in which 77% were asymptomatic; stated that patients with LVEF 31–35% may be cardio logically healthy,, the Glasgow MONICA (monitoring of trends and determinants in cardiovascular disease) study found a prevalence of 4% in men and 2% in women 16 with LVEF <30% as the cut off. In the study the prevalence of systolic dysfunction was similar to ours in comparable age groups (45–74 years): 5.4–6.4% in men and 2.4–4.8% in women. MONICA (monitoring of trends and determinants in cardiovascular disease) study found a prevalence of 4% in men and 2% in women16 with LVEF <30% as the cut off In the first two of the cited studies, the age of the study population was comparable with our sample [20].

Stated that the prevalence of LV systolic dysfunction when LVEF <40% was chosen as the cut off value. In the Rotterdam study, 17 the prevalence of systolic dysfunction was found to be 6% in men and 2% in women when LV fractional shortening of <25% was used as the cut point (corresponding to LVEF < 42.5%) [21].

On 52 patients initially hospitalized with CHF and intact LV function (ejection fraction ≥45%) were followed for 7 years. Mean age when initially identified was 71± 11 years (range 36 to 96), and average LV ejection fraction was 61 ± 11%. CHF was graded by a clinic radiographic index, with a mean of 7.0 ± 2.3 (range 3 to 12, 13 indicates worst CHF). A third heart sound was present in 19 patients (37%), and 17 (33%) had presented with acute pulmonary edema. Principal cardiovascular diagnoses were coronary artery disease in 27 (52%), hypertensive heart disease in 16 (31%) and restrictive cardiomyopathy in 7 (13%). At 7 years, cardiovascular mortality was 46% (24 of 52), and non-cardiovascular mortality was 10% (5 of 52). Survival was not correlated with age, principal diagnosis, third heart sound, pulmonary edema at presentation, LV ejection fraction, or presence or degree of LV diastolic dysfunction. Cardiovascular morbidity, consisting of nonfatal recurrent CHF, myocardial infarction, unstable angina or other cardiovascular events occurred in 29% (15 of 52). Combined cardiovascular mortality and morbidity was 75% (39 of 52). In patients with CHF, intact LV systolic function does not confer the same favorable prognosis it defines in other clinical situations. For such patients, the risk of future cardiovascular events is high, a

finding that should be considered when designing therapeutic strategies in this group [22].

In a cohort of 379 patients with LVEF 0.35 or less who underwent CABG during a 4-year period, found renal dysfunction with serum creatinine level of 1.5 mg/dL or greater as the strongest independent predictor of mortality during a midterm follow-up [23].

Reported the 10-year outcomes on 302 consecutive patients with left ventricular (LV) dysfunction defined as a LV ejection fraction (LVEF) of 0.35 or less, who underwent isolated coronary artery bypass grafting (CABG). This is one of the first studies that have up to a 15- year longitudinal examination on 98% of its patients. In addition, long-term echocardiographic data were used to objectively assess the improvement in cardiac function in these patients [24].

In a study had evaluated six hundred and eleven cases of coronary artery disease divided to receive either revascularization procedures or optimal medical therapy as per the standard guidelines , 203 , 205 and 203 cases underwent CABG, CAG or medical therapy respectively. no significant difference in survival between OMT and revascularization (OMT 69%, CABG 75%, PCI 75%, P=0.09) at 10-year follow-up, despite difference in rates of myocardial infarction and repeat revascularization. The myocardial infarction rates were 10.3%, CABG, 13.3% PCI, and 20.7% MT (P<0.010). Angina free rates were 64% CABG, 59% PCI, and 43% MT (P<0.001) [25].

STUDY POPULATION: Patients presenting to Amrita institute of medical sciences.

STUDY DESCRIPTION: Study design-Hospital based cohort study (Both Retrospective and Prospective observational study).

INCLUSION CRITERIA: Coronary Artery Disease diagnosed by ECG showing ST elevation, T wave inversion with positive troponin, or ECHO showing new RWMA with Severe Left Ventricular Systolic Dysfunction with Ejection Fraction <35% at presentation and who are on regular follow up for at least 2 yrs. were included in the study.

EXCLUSION CRITERIA: Dilated cardiomyopathy with severe LV Systolic dysfunction. Patients of LV dysfunction with angiographic ally documented normal coronary arteries.

SAMPLE SIZE: Sequential randomized sampling of patients who meet the inclusion criteria from 2014-17 and who were on regular follow up for at least 2 yrs were included in the study.

RESEARCH METHODOLOGY: All the subjects included in the study were followed up for minimum of 2 years and maximum for 5 years for the primary and secondary objectives Immediate In hospital assessment ECG, 2D Echo and Cardiac Biomarkers (CK-MB, Trop T) for Establishment of Diagnosis of CAD

- 2D Echo to assess the LV Function
- Mode of Revascularization for CAD

FOLLOW-UP

After hospital discharge, clinical follow-up is performed with visits from the hospital electronic data base TO.

Document

- Mortality due to cardiac and Non cardiac related causes
- Hospitalization rates secondary to Heart failure
- 2D Echocardiography on follow up- To asses LV systolic Function

Arrhythmic Events

- Study duration (including data collection period) 2 years.
- IHD: "definite IHD" was a (1) discharge diagnosis of myocardial infarction (MI) or self-reported MI and the following ECG changes: Q waves in two or more contiguous leads or T wave inversion · 3 mm in two or more contiguous leads or left bundle branch block or (3) angina pectoris (AP) discharge diagnosis/coronary artery disease (CAD) discharge diagnosis/self-reported exceptional chest pains and ST.

Statistical Analysis by Spss Simulation Tool

Statistical analysis was performed using IBM SPSS version 20.0 software. Categorical variables were expressed using frequency and percentage. Numerical variables were presented using mean and standard deviation. Chi-square test was used to test the statistical significance of the association of all Demographic and clinical parameters between management groups. A p-value of <0.05 is considered to be statistically significant.

Sample Size Estimation

Based on the Mortality rate due to cardiac related causes (40%) observed in earlier publication [1]. And with 95% confidence & 20% allowable error the minimum sample size comes to 145 but we will include 300 patients in our present study.

SIMULATION RESULT AND DISCUSSION

Age Distribution

Depressions >1 mm in two or more contiguous leads

Hypertension: "definite hypertension" was (1) self-reported hypertension and blood pressure more than 140 mm hg systolic or 90 mmhg diastolic or antihypertensive medication or (2) blood pressure exceeding 140/90 mm hg and current treatment or (3) blood pressure exceeding 161 mmhg systolic or 112 mm hg diastolic.

Diabetes: "definite diabetes" was (1) self-reported diabetes and antidiabetic treatment or (2) random blood glucose >11.1 mmol/l or (3) haemoglobin a1c >7.5%.

Systolic heart failure: was defined according to the european society of cardiology criteria: symptoms of heart failure

(dyspnoea or ankle swelling) and objective evidence of lv systolic dysfunction (lvef <40%).

"Heart failure with preserved systolic function" was defined by (1) dyspnoea and (a) lvh or (b) aortic/mitral dysfunction or (c) dilated left ventricle and lvef >50%.

"Dilated left ventricle" was defined as >97.5th percentile of the healthy population (no history of cardiovascular disease, no diabetes mellitus, no copd, blood pressure <140/90 mm hg, and normal ecg) in each sex.

"History of heart failure" was self-reported diagnosed hf or admission for hf or pulmonary congestion or hf discharge diagnosis.

Table 1: Distibution of age.

Age Distribution	Frequency	Percent
40-50	36	12
51-60	69	23
61-70	127	42.3
71-80	57	19
81-90	8	2.7
>90	3	1
Total	300	100

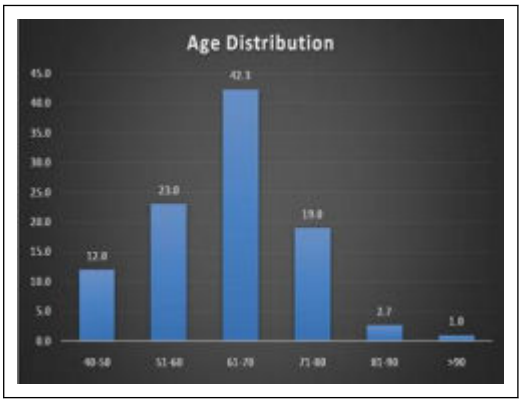


Figure 6: Distibution of age.

The above table and graph show the distibution of age in the subjects in the study only 3.7 percent were more than 80 years of age the rest were less than 80 years of age, the most common age group was between the ages of 61-70 years of age with 127 cases (42.3%). Followed by 51-60 years of age with 69 cases (23%), 40-50 years of age with 36 cases (12%), 71-80 years of age with 57 cases (19%). In our study 213 cases (77%) of the sample had diabetes mellitus.

Table 2: Distribution of gender.

Gender	Frequency	Percentage
Male	269	89.7
Female	31	10.3
Total	300	100.0

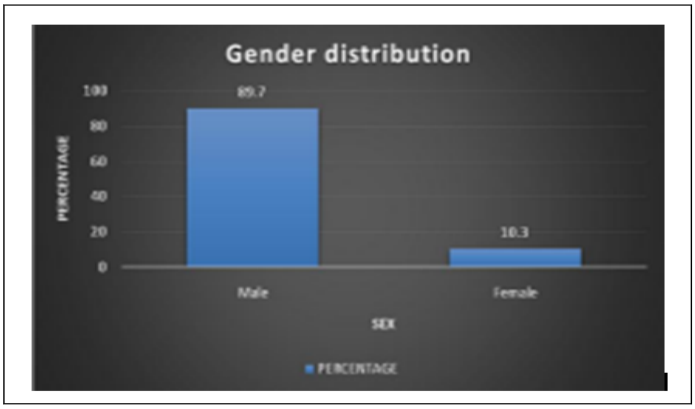


Figure 7: Distribution of gender.

Table 3: Distribution of Hypertension.

Hypertension	Frequency	Percent
Absent	129	43
Present	171	57
Total	300	100

Table 4: Distribution of diabetes Mellitus.

Diabetes Mellitus	Frequency	Percent
Absent	69	23
Present	231	77
Total	300	100

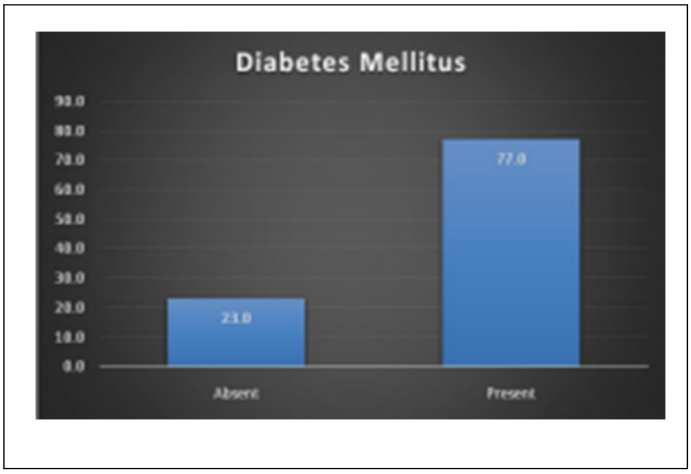


Figure 8: Distribution of diabetes mellitus.

Table 5: Distribution of Chronic Kidney Disease.

Stage	Frequency	Percent
Stage 1	46	15.3
Stage 2	93	31
Stage 3	113	37.7
Stage 4	42	14
Stage 5	6	2
Total	300	100

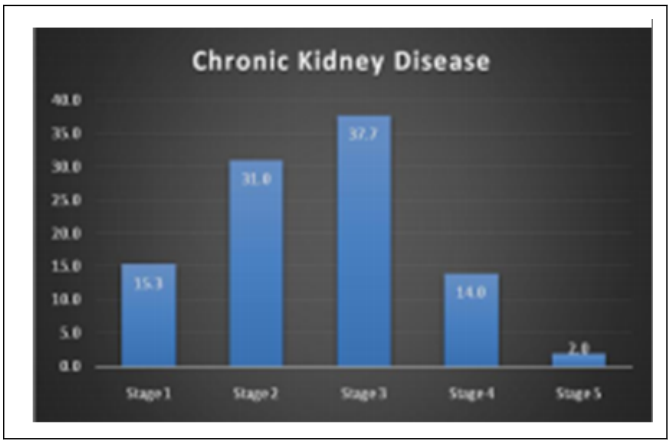


Figure 9: Distribution of Chronic Kidney Disease.

In our study the majority of the sample were in CKD stage 3 113 cases (37.7%) followed by stage 2 93 cases (31%), Stage 4 Chronic Kidney Disease was seen in 42 cases (14.0%) and Stage 5 Chronic Kidney Disease was seen in 6 cases (2%).

Table 6: Coronary Angiogram.

Stage	Frequency	percent
Single vessel disease	62	20.7
Double vessel disease	82	27.3
Triple vessel disease	156	52
Total	300	100

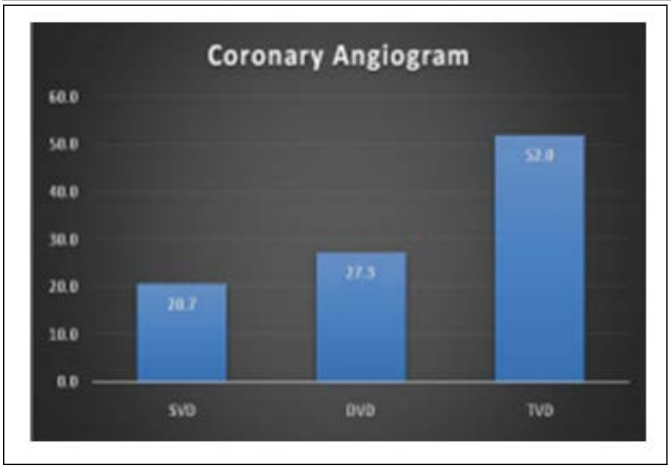


Figure 10: Coronary Angiogram.

In our study 62 (20.7%) cases had single vessel disease, 82 cases (27.3%) had double vessel disease cases and 156 cases (52%) had triple vessel disease

Table 7: Distribution of Management Groups.

Groups	Frequen cy	Percent
Medical	101	33.7
PTCA	104	34.7
CABG	95	31.7
Total	300	100

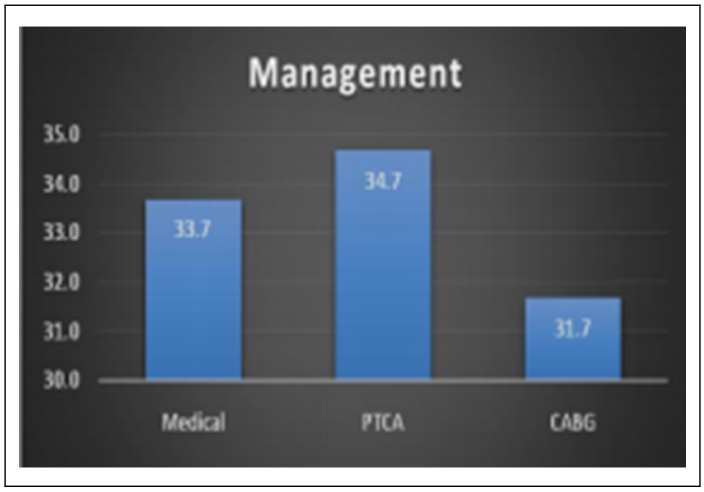


Figure 11: Distribution of Management Groups.

Table 8: Association of Arni among Management Sub Groups.

Management				
	Medical	PTCA	CAB G	Total
Absent	72(71.3 %)	83(79.8%)	73(76.8 %)	228(76%)
present count	29(28.7 %)	21(20.2%)	22(23.2 %)	72(24%)
Total Count	101	104	95	300

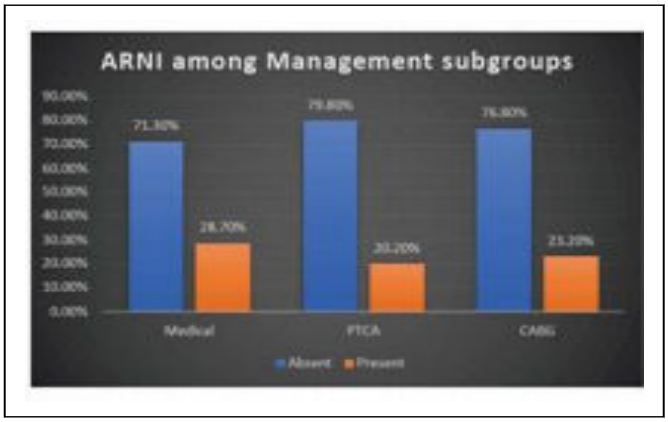


Figure 12: Association of Arni among Management Sub Groups.

LIMITATION AND SUGGESTION

Long term follow up not done

As this study excluded those patients who did not report for follow up for at least 2 yrs., the out of hospital mortality is likely to be under estimated.

According to WHO data, CHD (coronary heart disease) was one of the major cause of deaths globally as well as in India in 2004 [3].

Although surgical revascularization can be an effective therapy in the short term and midterm, little is known about the long-term follow-up. Late mortality of these patients may be caused by progression of heart failure, ventricular arrhythmias, and myocardial infarction, but also by other co morbidities such as diabetes mellitus or chronic renal dysfunction [11].

Cardiovascular diseases are now considered as one of the major cause of mortality in India approximating 25% of all death causes, hence we evaluated various modalities in the management of coronary heart disease. In our study we had a total of 300 patients during the period of study.

COMPARISON OF AGE DISTRIBUTION WITH OTHER STUDIES

Stated that in 315 cases of CAD the mean age was 68.8 years, on 117 cases with CAD the mean age was 62 years as compared to PCI the mean age being 67 years with a difference between the two groups being 5 years.

LV DYSFUNCTION

Alejandro I Pérez Cabezaa stated that severe LV dysfunction on echo was seen in 39.7%. In the present study we had 235 cases(78.3%), 61 cases(20.3)%and 4 cases(1.3)% with an ejection fraction 25-35 percent, 15-24 percent <15 percent respectively at the baseline evaluation.There was a trend towards improvement in EF those who have undergone revascularisation (PTCA,CABG) compared to medical management group though it was not statistically significant.

Patients who were initiated on ARNI had less number of repeat heart failure admissions irrespective of management strategy though it was not statistically significant.

COMPLICATION COMPARISON: OVERALL

In a study that was done by Min SuKim in the year 2015 on 42 patients with LMCA disease the composite rate of death, MI, stroke, or target vessel revascularization at 2 years occurred in 19.5% of the PCI group and 17.4% of the CABG group (adjusted hazard ratio, 1.06; 95% CI, 0.46 to 2.46; P =0.89).

In the present study we had 104 cases that had complications. The percentage of patients who suffered from complications were 34%.

RATE OF DEATH

We had a 10 % mortality seen in 30 cases of the total 300 population. On evaluation we found that in 8.7% died due to cardiac causes and 1.3% died due to non-cardiac causes. In the Medical, PTCA and CABG death due to cardiac causes were 6.9%, 8.7% and 10.5% and due to non-cardiac causes were 2.0% , 1.0%, 1.1%. The difference between the groups was not significant.

DEATH DUE TO CARDIAC CAUSE

Marcelo F. Di Carli et al (75), 40% of morality at the time of follow up were due to cardiac related causes. The above findings are similar to our study.

In our study also we had a higher morality due to cardiac causes. On evaluation of the mortality rate we found that in 8.7% died due to cardiac causes and 1.3% died due to non-cardiac causes and it was not statistically significant between the management groups.

STROKE

In a study that was done by Jung-MinAhn in the year 2011 on comparing PTCA with DES with CABG for patients with multi-vessel disease and severely compromised ventricular function stated that CABG was superior in terms of cerebrovascular events on evaluation of the stroke rate we found that in 40 cases (13.3%)of the total subjects had stroke during the follow up. In the Medical, PTCA and CABG stroke rate was 14.9%, 14.4% and 10%. p value by Chi-Square Tests 0.620 is not significant.

P-value by *Chi-Square* Tests 0.531 not significant.

CONCLUSION AND FUTURE WORK

The primary outcome, all-cause mortality and secondary outcomes did not show any statistically significant difference between the three management strategies.

There was a trend towards improvement in LV systolic function among patients who underwent revascularization (PTCA and CABG) as compared to medical management, though it was not statistically significant.

The patients with CAD with LV dysfunction who received ARNI showed reduction in heart failure repeat hospitalizations. This was seen in patients, irrespective of the management strategy.

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