Original Article

DOI: 10.29054/APMC/19.661

Association of Coronary Artery Dominance and Heart Failure in Patients with Inferior Wall Myocardial Infarction

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ABSTRACT

Objective: To determine the association between coronary artery dominance and heart failure in patients with inferior wall myocardial infarction (IWMI). **Study Design:** Prospective cohort study. **Settings:** Emergency, Punjab institute of Cardiology, Lahore. **Duration:** 24-03-2017 to 23-09-2017. **Methodology:** The cases of both gender and age 18 to 60 years were enrolled that had acute IWMI. Heart failure was defined as ejection fraction < 40% determined by echocardiography. These cases then underwent angiography to look for dominant artery involved. **Results:** In this study there were total 227 patients with mean age of 45.07±8.17 years. There were 118 (51.98%) males and 109(48.02%) females. Heart failure was observed in 63 patients in which 16 were from left circumflex (LCX) dominant artery and 47 were from right coronary artery (RCA) dominant artery, similarly in cases with no heart failure 42 had LCX as dominant artery and 122 had RCA as dominant artery with p= 0.97. **Conclusion:** There is no significant association observed between the coronary artery dominance and heart failure in patients with IWMI.

Keywords: IWMI, Heart failure, Dominant vessel.

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Submitted for Publication: 23-07-2019 *Accepted for Publication: 16-08-2019*

Citation: Manan HA, Sadiq Z, Hameed A, Khawaja A, Malik MA, Asghar S. Association of Coronary Artery Dominance and Heart Failure in Patients With IWMI. APMC 2019;13(3):197-200.

INTRODUCTION

Heart failure (HF) is a major cause of morbidity and mortality in patients with cardiovascular diseases.[1,2] The developing countries suffer more secondary to poor preventive strategies and constraint of resources for proper prompt management.[3,4]

Primary coronary angiography or thrombolytic therapy has changed the epidemiology of complications in patients with myocardial infarction.[3-5] Primary coronary angiography for acute myocardial infarction helps reduce the burden of complications after the event. We have to give thrombolytic therapy to patients with myocardial infarction as circumstances permits so.[6]

Inferior wall myocardial infarction is common presentation in the tertiary care hospitals. It has variable blood supply and can impact the management as well the outcomes in the study subjects depending upon the dominant artery type. Coronary artery supply for inferior wall is either through right coronary artery (RCA) (80%) or left circumflex artery (LCX) (16%).[7] The supplying artery is labeled as dominant vessel.[8] Severity of complications vary with dominance of either artery secondary to physiological mechanisms.[8,9]

There is no local study available association between coronary artery dominance and heart failure in patients with inferior wall myocardial infarction. That's why current study was planned to determine the association between coronary artery dominance and heart failure in patients with inferior wall myocardial infarction.

Objective: To determine the association between coronary artery dominance and heart failure in patients with inferior wall myocardial infarction.

METHODOLOGY

Study Design: Prospective cohort study.

Settings: Emergency Department, Punjab institute of Cardiology, Lahore Pakistan

Duration: 24-03-2017 to 23-09-2017.

Inclusion Criteria: In this study the cases of either gender and age 18 to 60 years were included. The cases were selected that had acute IWMI with heart failure where IWMI was diagnosed on the basis of chest pain lasting for 30 minutes or more and ST-T changes in two or more out of lead II, III or aVF along with positive cardiac troponin t test and heart failure was defined as ejection fraction < 40% determined by echocardiography.

Exclusion Criteria: The cases with end stage renal or liver failure were excluded. The cases with severe hemodynamic instability were also excluded from this study.

Methods: Coronary artery dominance was determined by angiography showing which artery supplied inferior wall of heart (RCA or left circumflex artery) the supplying vessel was labeled as dominant vessel.

Statistical Analysis: Data analysis was done on software Statistical Package for the Social Sciences (SPSS) version 21. Chi Square test was applied to determine the level of significance. and P value < 0.05 was considered statistically significant.

RESULTS

In this study there were total 227 patients with mean age of 45.07±8.17 years as shown in table 1.

Table 1: Study variables (n= 227)

Variables	Mean ± SD	Range
Age	45.07±8.17	18-60
BMI	26.13±3.29	21-34

Heart failure was observed in 63 patients in which 16 were from LCX dominant artery and 47 were from RCA dominant artery, similarly in cases with no heart failure 42 had LCX as dominant artery and 122 had RCA as dominant artery as in table 2.

Table 2: Comparison of heart failure with dominant artery

		Dominant artery		Total	p-value
		LCX	RCA		
Heart Failure	Yes	16	47	63	0.974
	No	42	122	164	
Total		58	169	227	

On stratification of data there was statistically insignificant difference found between age, gender, BMI and smoking with dominant artery. (Table 3)

Table 3: Comparison of heart failure with dominant artery stratified for effect modifiers

		Heart Failure	Dominant artery		Total	p-value
			LCX	RCA		
Age (years)	≤ 40	Yes	6	19	25	0.405
		No	11	56	67	
	> 40	Yes	10	28	38	0.521
		No	31	66	97	
Gender	Male	Yes	12	22	34	0.259
		No	21	63	84	
	Female	Yes	4	25	29	0.172
		No	21	59	80	
Smoking	Yes	Yes	5	20	25	0.864
		No	19	69	88	
	No	Yes	11	27	37	0.885
		No	23	53	76	
BMI	>30kg/m²	Yes	8	22	30	0.753
		No	27	64	91	
	≤30kg/m²	Yes	8	25	33	0.669
		No	15	58	73	

There were 118 (51.98%) males and 109(48.02%) females with male to female ratio of the patients was 1.08:1 as in figure I.

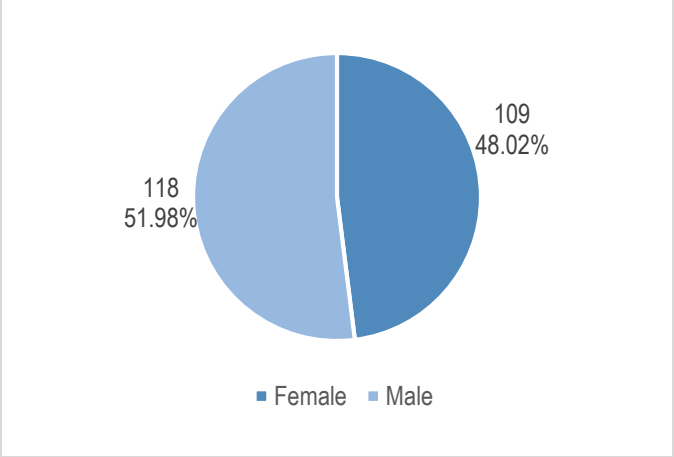

Figure 1: Frequency distribution of gender

DISCUSSION

Cardiovascular disorders are on the rise in the recent era due to increase in the co morbid conditions and can result in various atherosclerotic changes leading to ischemia. ACS is not devoid of complications and heart failure is one important concern. The data in the past has shown that the dominant artery involved has a direct impact on various in hospital and long-term outcomes.[10,11]

This present prospective cohort study was carried out at Emergency Department, Punjab institute of Cardiology, Lahore to the association between coronary artery dominance and heart failure in patients with IWMI.

The prognostic outcome between anterior and inferior wall MI has been extensively investigated. In co-dominance (balanced) circulation, however, the branches that run to the interventricular septum originate both from the RCA and LCX. The rate of co-dominance in the general population is around 4%. Limited information exists about similar comparison between inferior wall MI caused by RCA and LCX occlusion.[12,13]

A study by Bahram Sohrabi et al.,[10] resulted that RCA and LCX arteries were occluded in 97 (64.7%) and 53 (35.3%) of patients, respectively. Two groups were similar in baseline characteristics except multiple-vessel disease was more prevalent with LCX occlusion (p= 0.008). There was a higher cardiac enzyme release (p< 0.001), more significant mitral regurgitation (p= 0.015), and lower left ventricular ejection fraction (p= 0.01) in patients with LCX occlusion. Multivariate analysis showed cTn-I release, occurrence of mitral regurgitation, and lower left ventricular ejection fraction as independent factors leading to poor outcome.

Nienhuis et al.,[14] showed more favorable short and long-term clinical outcomes for inferior compared to anterior MI. The extent of myocardial damage in acute left anterior descending artery occlusion is commonly larger than in either acute RCA or LCX artery occlusion simply because it perfuses a larger myocardial territory.

Yip et al.,[15] have previously shown that patients with inferior wall MI caused by dominant LCX occlusion had an unfavorable clinical outcome. Chen et al.,[17] have shown that the 30-day prognostic outcome was less favorable in LCX- compared to RCA-related inferior STEMI undergoing primary PCI.

Rasoul et al recently also reported that inferior wall MI that is LCX related suffers a poorer prognostic outcome compared with the RCA-related one.[16] Interestingly, while the prognostic outcome of AIW-STEMI has been fully discussed in previous studies,[17-19] the difference in prognostic impact between RCA-related and LCX-related AIW-STEMI has seldom been mentioned.[20-21]

CONCLUSION

There is no significant association observed between the coronary artery dominance and heart failure in patients with IWMI.

CONFLICT OF INTREST

There is no conflict of interest in this study.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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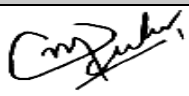
Dr. Hafiz Abdul Manan Senior Registrar, Cardiology Punjab Institute of Cardiology, Lahore	Data collection	
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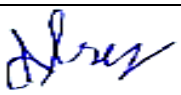
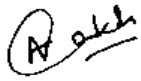
Dr. Ali Hameed Senior Registrar, Cardiology Punjab Institute of Cardiology, Lahore	Literature review	
Dr. Ali Khawaja Senior Registrar, Cardiology Punjab Institute of Cardiology, Lahore	Data collection & Formatting	
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