

## EPIDEMIOLOGICAL, CLINICAL, AND ANGIOGRAPHIC PROFILE OF PATIENTS WITH LEFT MAIN CORONARY ARTERY STENOSIS

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### Abstract

**Objective:** To study Demographic profile, clinical manifestations, and angiographic profile of Left Main Coronary Disease in the Hadoti region of Rajasthan, India. **Methods:** An observational cross-sectional study was conducted on 74 patients with Left main coronary artery disease patients. Patients were taken for coronary angiograms for chronic stable angina and acute coronary syndromes. Patients having left main coronary stenosis in coronary angiogram were included in this study. The data about demography, vital parameters, x-ray, electrocardiogram, and 2D-echocardiogram were collected and analyzed. **Results:** Most of the patients were between the age group of 50 to 60 years (43.2%). Majority of patients were males (71.6%). The most common presentation was unstable angina (48.6%) followed by chronic stable angina (21.6), ST-segment elevation myocardial infarction (18.9%), and non-ST segment myocardial infarction (10.8%). 59.5% of patients were diabetic, 52.7% were hypertensive, 39.2% were smokers and 32.4% were having dyslipidemia. Total of 24 patients had ST elevation in the electrocardiogram and 31 were having diffuse ST-T changes. 13 patients were having cardiogenic pulmonary edema. 5 patients had ostial LMCA involvement, 7 had mid-shaft involvement and the majority 62 patients had distal LMCA involvement. 4 patients had isolated LMCA disease, 6 with coexistent single vessel disease, 13 with double vessel disease. Most of patients had coexistent triple vessel disease (51 patients out of 74). One third of patients had obstructive LMCA disease. **Conclusion:** LMCA involvement is seen in 8.6% of total coronary angiograms. Only one-third of cases had obstructive LMCA disease. Most of the cases are associated with triple vessel disease and distal LMCA is the most common site involved.

## INTRODUCTION

Angiographically patients with the left main coronary disease with luminal diameter stenosis of  $\geq 50\%$  are classified as having significant obstructive left main disease. Those with luminal diameter stenosis of  $\leq 50\%$  are classified as having nonobstructive left main disease.<sup>[1]</sup>

On the basis of anatomy, Left main coronary artery is divided into 3 parts: ostium, mid-shaft and distal portion.<sup>[2]</sup> Distal portion of left main coronary artery is involved the most. Distal bifurcation lesions are more common than non-bifurcation lesions.<sup>[3]</sup>

Left main coronary artery disease is a highly dangerous condition requiring urgent intervention. It is associated with high morbidity and mortality.<sup>[4]</sup> Compared with non-LMCA disease, left main coronary disease is associated with a poorer

prognosis than other obstructive coronary artery diseases.<sup>[5]</sup> The overall incidence of left main coronary artery disease is around 4 to 9 percent of all patients referred for coronary angiography.<sup>[4]</sup> Clinical presentation of left main coronary artery disease varies from asymptomatic to sudden death.<sup>[5]</sup> The most common presentation is non-ST segment elevation acute coronary syndrome followed by stable angina and ST-segment elevation myocardial infarction.<sup>[6]</sup> The aim of this study to evaluate the demographic profile, clinical manifestations, and angiographic profile of Left Main Coronary Disease in the Hadoti region of Rajasthan, India.

## MATERIALS AND METHODS

We conducted this observational cross-sectional study in Department of Cardiology, Government

medical college, Kota during year 2023. Patients enrolled in study included patients undergoing coronary angiography for acute coronary syndrome and chronic stable angina. Patients having cardiomyopathies, valvular heart disease, and congenital heart disease were excluded from this study.

### **Study Methodology**

Detailed history was taken for each patient and physical examination was done.

Before coronary angiography, all patients were evaluated for routine blood tests which include complete blood count, blood urea, serum creatinine, serum electrolytes, electrocardiogram, and chest skiagram and 2-D echocardiography by Philips Affiniti 50C Echo machine.

Coronary angiography was performed by expert interventional cardiologists by either femoral or radial access in Cath lab with help of Philips FD10/FD 20 c-arm machine.

To measure the diameter stenosis of coronary arteries, quantitative coronary angiography was used. All patients in whom significant left main coronary artery stenosis was present, either isolated or with other coronary involvement, were included in this study.

### **Statistical Analysis**

A preset proforma was used for data collection. Continuous variables are represented as mean value  $\pm$  standard deviation or as median. Categorical variables are represented as absolute number and percentages which were presented as frequency tables and charts. Statistical analyses were carried out by SPSS version 26.0 windows software.

## **RESULTS**

A total of 908 coronary angiographies were performed during the study duration. 42 patients were excluded from the study based on exclusion criteria. 12 patients did not consent for study. Out of total 854 angiograms eligible for study, 74 patients had LMCA disease. This shows that in patients undergoing coronary angiography, around 8.6% of patients had LMCA disease.

**Demographic characteristics:** The mean age of presentation is 58.46 years with the most affected age group being 50-60 years of age. Males constituted 53 (71.6%) and females were 25 (28.4%).

**Risk factors:** 59.5% of patients had diabetes. 52.7% were hypertensive. 39.2% of patients were smokers and 32.4 % of patients had dyslipidemia.

**Clinical Presentation:** Most of the patients presented with unstable angina (48.6%) followed by stable angina (21.6%), ST elevation myocardial infarction (18.9%) and non-ST elevation myocardial infarction (10.8%).

### **INVESTIGATIONS**

**Electrocardiogram:** Out of 74 patients with LMCA disease, 24 patients (32.4%) had ST elevation in lead avR. All these 24 patients had obstructive coronary artery disease. Along with ST elevation in lead avR,

5 patients had ST elevation in leads V1 to V6, lead I, and avL. This could be due to predominant anterior myocardial infarction. 31 patients had diffuse ST-T changes (like ST depression  $>1$ mm and/or T – inversion). Out of these 31 patients, 29 patients presented with non-ST elevated acute coronary syndrome in the form of either unstable angina or non-ST elevated myocardial infarction. Rest 2 patients presented with chronic stable angina. Rest 19 patients had normal ECG.

**X-Ray:** Out of 74 patients, 13 patients had chest x-ray suggestive of pulmonary edema. All these patients had cardiomegaly with raised cardiothoracic ratio of more than 0.5. Out of these 13 patients with cardiogenic pulmonary edema, 7 presented with ST-elevation myocardial infarction, 4 with unstable angina and the rest 2 with non-ST elevation myocardial infarction.

Out of 14 patients with ST-elevation myocardial infarction, all 14 had regional wall motion abnormalities (RWMA). 12 patients had RWMA confined to LAD territory. 2 patients had RWMA involving LAD and LCX territory. 4 patients with NSTEMI and 7 patients with unstable angina showed hypokinesia of LAD and/or LCX territories. Out of 25 patients with obstructive LMCA disease, 19 patients had RWMA.

Out of 47 patients, 5 had ostial lesions comprising 6.8 % of the total. 7 patients had mid-shaft lesions (9.4%). Rest 62 patients had distal LMCA involvement comprising 83.8% of total cases. Out of 62 patients with Distal LMCA involvement 49 patients had bifurcation lesions. (66.2% of total LMCA disease patients and 79% of distal LMCA disease patients.)

Out of these 49 patients with distal bifurcation lesions, 27 had involvement of both LAD and LCX ostium. In 14 patients only LAD ostium was involved. Rest 8 had LCX involvement.

### **Coronary artery involvement pattern (n=74)**

Out of the total, 5.4% of patients had isolated LMCA involvement. 8.1% had coexistent Single vessel disease, and 17.6% of patients had coexistent double vessel disease. Rest 51 patients (69.9%) had the presence of coexistent triple vessel disease.

### **LMCA lumen involvement (n=74)**

Out of the total of 74 patients, 25 had obstructive left main coronary artery disease. Out of these 25 patients with obstructive LMCA disease, 17 patients had distal bifurcation LMCA involvement. 5 had distal non-bifurcation LMCA involvement. Rest 3 patients with obstructive LMCA disease had mid-shaft involvement.

Out of 49 patients with non-obstructive lesions, 32 patients had distal bifurcation LMCA disease. 8 patients had distal non-bifurcation LMCA disease, 4 had mid-shaft and the rest 5 patients had ostial involvement.

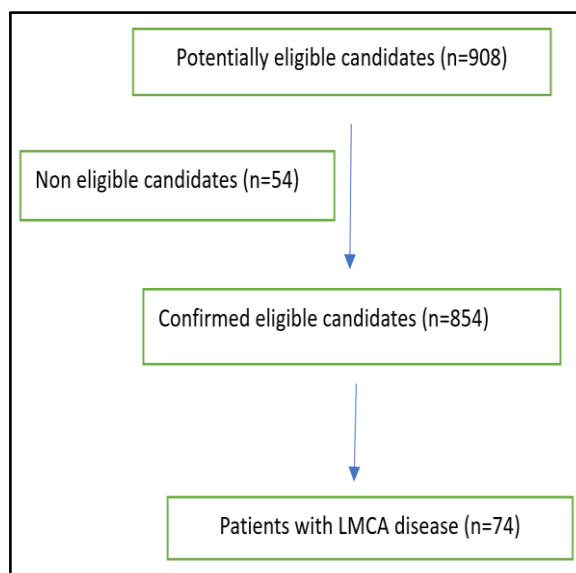
In view of risk factors; out of 29 smokers, 11 had obstructive LMCA Disease while the rest of 14 patients with obstructive LMCA disease were non-smokers. This suggests that smokers had more no. of

obstructive LMCA disease (37.9%) compared with non-smokers (31.1%). Out of 39 hypertensive patients, 12 had obstructive type of disease which is about 30.7% and rest 13 patient had no history of hypertension (37.1%). Among diabetics, 14 patients had obstructive LMCA disease out of 44 patients which constitutes 31.8%. Among non-diabetics, 11 patients had obstructive LMCA disease out of 30 patients (36.7%).

#### Treatment and outcomes

No major complications were observed in any of the 74 patients after coronary angiography. One patient developed fever after coronary angiography, but he was managed conservatively. No mortality was observed in our patients.

Coronary artery bypass graft was advised to all patients with significant LMCA disease. Patients with non-obstructive lesions were treated according to coexistent vessel involvement. Total 66 patients out of 74 patients were referred for CABG and the rest 8 patients were advised for coronary angioplasty.



**Table 1: Demographic characteristics of patients with LMCA disease.**

	No. of LMCA Patients (N=74)	Percentage
<b>Age Group</b>		
<40 years	1	1.4
40 – 50 years	12	16.2
50 – 60 years	32	43.2
>60 years	29	39.2
<b>Gender</b>		
Male	53	71.6
Female	21	28.4

**Table 2: Risk factors in patients with LMCA disease**

	No. of LMCA Patients (N=74)	Percentage
Diabetes	44	59.5
Hypertension	39	52.7
Smoking	29	39.2
Dyslipidemia	24	32.4

**Table 3: Clinical presentation of patients with LMCA disease**

	No. of LMCA Patients (N=74)	Percentage
Chronic stable angina	16	21.6
NSTEMI	8	10.8
Unstable angina	36	48.6
STEMI	14	18.9

**Table 4: Echocardiography showing Ejection fraction of patients with LMCA disease**

Ejection Fraction	No. of LMCA Patients (N=74)	Percentage
>60%	8	10.8%
45-60%	50	67.5%
30-45%	12	16.2%
<30%	4	5.5%

**Table 5: Angiographic profile of patients with LMCA disease. (n=74)**

	No. of LMCA Patients (N=74)	Percentage
<b>Route</b>		
Femoral	4	5.5%
Radial	70	94.5%
<b>Lesions</b>		
Ostial lesions	5	6.8
Mid shaft lesions	7	9.4
Distal–non bifurcation lesions	13	17.6
Distal–bifurcation lesions(total)	49	66.2
Distal–bifurcation lesions (involving both LAD and LCX)	27	36.4% of total (43.5% of distal)
Distal–bifurcation lesions (Only LAD involvement)	17	23% of total (27.4% of distal)

<b>Distal–bifurcation lesions (only LCX involvement)</b>	8	10.8% of total (16.1 % of distal)
<b>Coronary artery involvement pattern</b>		
<b>Isolated LMCA</b>	4	5.4%
<b>Single vessel disease</b>	6	8.1%
<b>Double vessel disease</b>	13	17.6%
<b>Triple vessel disease</b>	51	69.9%
<b>LMCA lumen involvement</b>		
<b>Obstructive LMCA disease</b>	25	33.8%
<b>Non-obstructive LMCA disease</b>	49	66.2%

## DISCUSSION

In our study, the mean age of presentation was 58.4 years. It is in accordance with other studies showing mean age ranged between 53 to 66 years.<sup>[7,8]</sup> Timo Mäkikallio et al<sup>[7]</sup> conducted a study in which the mean age of presentation was 66.2 years. In a study done by Cohen MV et al<sup>[8]</sup> mean age of presentation was found to be 53.4 years. In the present study, Patients were between the ages of 38 to 82 years but most cases were between the age of 50 to 60 years.

In the present study, males form 71.6% of total cases whereas females form the rest 28.4% cases which slightly differs from studies conducted by Cohen MV et al<sup>[8]</sup> in which there were 83.5% cases of males and 16.5 % cases of females.

In view of risk factors, in our study diabetes was seen in 59.5%, and Hypertension in 52.7% of individuals. 39.2% of patients were smokers and 32.4% had deranged lipid profiles. Some studies show no change in prevalence in patients with hypertension, diabetes, dyslipidemia, and smoking.<sup>[9-11]</sup> Whereas a study done by Soleimani A. et al<sup>[12]</sup> showed an increased prevalence of diabetes and dyslipidemia in LMCA-diseased patients. Eduard Claver et al<sup>[13]</sup> also demonstrated an increased prevalence of diabetes in LMCA disease.

In our study diabetics had a higher prevalence of non-obstructive LMCA diseased (68.2%). Only 31.8% of patients had obstructive LMCA disease. Most of the cases with hypertension had non-obstructive left main disease (69.3%) compared to obstructive left main disease (30.7%). All patients with a history of smoking were males. 37.9 % of smokers had obstructive LMCA disease and the rest 62.1% had non-obstructive LMCA disease.

The majority of patients presented with unstable angina (48.6%) followed by stable angina (21.6%), ST-segment elevation myocardial infarction (18.9%), and non-ST elevation myocardial infarction (10.8%). Total cases presenting with non-ST elevation acute coronary syndromes were 59.4% which is slightly lower than the study done by Muhammad Yousuf Shaikh et al. suggesting that out of patients with LMCA disease, 71.9% were presenting with NSTEMI-ACS.<sup>[6]</sup>

Out of 25 patients with obstructive LMCA disease, 24 had ST-segment elevation in lead avR suggesting high specificity of ST elevation in avR for critical LMCA disease. 65.9% of patients with NSTEMI-ACS had diffuse ST-T changes. Out of 14 patients with ST-elevation myocardial infarction, 7 had

cardiogenic pulmonary edema suggested by chest x-ray changes. 100 % of patients with ST elevation myocardial infarction had RWMA on 2D-echo whereas 50% of patients with NSTEMI had hypokinesia demonstrated on 2D-Echo. Out of 36 patients with unstable angina, 7 patients had RWMA on echo. Most of the patients (around two-third of total) had ejection fraction in the range of 45 to 60%. This goes well with a study done by Askari et al.<sup>[14]</sup> (2019) in which around 75 % of patients had ejection fraction in this range.

Now coming to coronary angiogram findings, in our study only 4 cases (5.4%) had isolated LMCA involvement. Incidence of coexistent Single vessel, double vessel disease, and triple vessel disease was respectively 8.1%, 17.6%, and 69.9%. Study by Askari et al<sup>[14]</sup> had similar results with 14.5% cases with single vessel disease, 13.1 % with double vessel disease, and 72.4 % with triple vessel disease. In a study by Askari et al<sup>[14]</sup> proportion of patients with single-vessel disease was slightly higher.

In the present study, 6.8% of patients had ostial lesions, 9.4% mid-shaft lesions, and rest 83.8% distal lesions suggesting distal LMCA involvement is more frequent than ostial and mid shaft involvement. Study by Gehani et al.<sup>[15]</sup> shows around 14.7% cases with ostial lesions, 15.7% with mid shaft and rest 69.5% cases with distal LMCA involvement. In our study, distal involvement is higher than study by Gehani et al.<sup>[15]</sup> We did not observe any major specific intra or post procedure complication except for fever in one patient.

## CONCLUSION

In patients undergoing coronary angiogram for chronic stable angina or acute coronary syndrome, the overall incidence of left main coronary artery disease is 8.6%. Majority of patients with obstructive lesions presented with ST-segment myocardial infarction. ST elevation in avR can be considered a common change in obstructive type of disease. STEMI patients had a higher incidence of RWMA followed by NSTEMI and unstable angina. Most of the patients had ejection fraction in 45% to 60% range. Around two third of angiographic lesions are distal type. Distal bifurcation lesions are more common than non-bifurcation lesions. The majority of patients have associated triple vessel disease.

## REFERENCES

1. El-Menyar AA, Al Suwaidi J, Holmes DR Jr. Left main coronary artery stenosis: state-of-the-art. *Curr Probl Cardiol.* 2007 Mar;32(3):103-93.
2. Farinha JB, Kaplan MA, Harris CN, Dunne EF, Carlisle RA, Kay JH, Brooks S. Disease of the left main coronary artery. Surgical treatment and long-term follow up in 267 patients. *Am J Cardiol* 1978; 42: 124–28.
3. Chikwea J, Kimb M, Goldstone AB, FallahibA. Current diagnosis and management of left main coronary disease. *Eur J Cardiothorac Surg* 2010;38(4):420-30
4. Collet, C., Capodanno, D., Onuma, Y. et al. Left main coronary artery disease: pathophysiology, diagnosis, and treatment. *Nat Rev Cardiol.*2018; 15:321–31.
5. Lee PH, Ahn JM, Chang M, Baek S, Yoon SH, Kang SJ, Lee SW, Kim YH, Lee CW, Park SW, Park DW. Left main coronary artery disease: secular trends in patient characteristics, treatments, and outcomes. *Journal of the American College of Cardiology.* 2016 Sep 13;68(11):1233-46.
6. Shaikh MY, Ahmad M, Rasheed A, Jan DM, Ali M. Left main disease—patient profile. *Pakistan Heart Journal.* 2012;40(1-2).
7. Mäkikallio, T., Holm, N. R., Lindsay, M., Spence, M. S., Erglis, A., Menown, I. B. A., Christiansen, E. H. et al. Percutaneous coronary angioplasty versus coronary artery bypass grafting in treatment of unprotected left main stenosis (NOBLE): a prospective, randomised, open-label, non-inferiority trial. *The Lancet.* 2016; 388 (10061): 2743–52.
8. Cohen MV, Gorlin R. Main left coronary artery disease. Clinical experience from 1964-1974. *Circulation.* 1975 Aug;52(2):275-85.
9. Göl MK, Özsöyler I, ener E, Göksel S, Sarita A, Ta demir O, Bayazit K. Is left main coronary artery stenosis a risk factor for early mortality in coronary artery surgery?. *Journal of cardiac surgery.* 2000;15(3):217-22.
10. Mahajan N, Hollander G, Malik B, Temple B, Thekkoo D, Abrol S, Schulhoff N, Ghosh J, Shani J, Lichstein E. Isolated and significant left main coronary artery disease: demographics, hemodynamics and angiographic features. *Angiology.* 2006 Aug;57(4):464-77.
11. Veeranna V, Pradhan J, Niraj A, Fakhry H, Afonso L. Traditional cardiovascular risk factors and severity of angiographic coronary artery disease in the elderly. *Preventive cardiology.* 2010 Jul;13(3):135-40.
12. Soleimani A, Abbasi A, Kazzazi EH, Hosseini K, Salirifar M, Darabian S, Sadeghian S, Sheikhfathol-Lahi M. Prevalence of left main coronary artery disease among patients with ischemic heart disease: insights from the Tehran Angiography Registry. *Minerva cardioangiologica.* 2009 Apr 1;57(2):175-83
13. Claver, E., Curós, A., López-Ayerbe, J., Serra, J., Mauri, J., Fernández-Nofrerias, E., Valle, V. Clinical Predictors of Left Main Coronary Artery Disease in High-Risk Patients With a First Episode of Non-ST-Segment Elevation Acute Coronary Syndrome. *Revista Española de Cardiología (English Edition).*2006; 59(8): 794–800.
14. Askari B, Mahoori A, Heidari M, Nourinejad F. Left Main Coronary Artery Disease: traditional risk factors in a study from northwest of Iran. *URMIA MEDICAL JOURNAL.* 2019 Jan 10;29(10):719-25.
15. Gehani AA, El-Menyar A, Elgendy I, Abuzaid A, Ahmed E, Haque S. Clinical presentation and cardiovascular risk profiles in patients with left main coronary artery disease in a middle eastern country. *Angiology.* 2013 Apr;64(3):195-99.