



## Frequency, Severity, and Management of Left Main Disease in Acute Coronary Syndrome in Sulaimani Cardiac Hospital

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### Abstract

**Background and objectives:** Approximately 6% of acute coronary syndrome patients undergoing coronary angiography are found to have obstructive left main coronary artery disease. Significant left main stem stenosis, defined as a lesion occupying more than 50% of the vessel diameter. The current study aims to determine the frequency and severity of left main disease among acute coronary syndrome patients and evaluate the management strategies for left main disease.

**Methods:** This prospective case series study included over 200 acute coronary syndrome patients systematically selected during hospitalization at Sulaimani Cardiac Hospital over one year from June 1, 2023, to June 1, 2024. The patient was diagnosed as myocardial infarction, coronary angiography was done, diseased vessels recorded and SYNTAX score measured. Sampling method based on convenience.

**Results:** The incidence of left main disease among the 200 patients was 17%. Left main disease was more prevalent in ST elevation myocardial infarction patients compared to non-ST elevation myocardial infarction patients. Out of 34 patients with left main disease, 25 of them were male and 9 patients were female. Patients with triple vessel disease involving the left main had higher Syntax scores (>32). 67% of left main patients were referred for urgent coronary artery bypass graft surgery.

**Conclusion:** This study highlights the significant burden of left main disease in acute coronary syndrome patients. Coronary artery bypass graft surgery remains the preferred treatment for significant left main stenosis.

**Keywords:** Acute myocardial infarction, Coronary artery bypass graft surgery, Left main disease, Percutaneous coronary intervention

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## Introduction

One of the main causes of death in the US and, more crucially, globally is coronary heart disease (CHD).<sup>1</sup> Unstable angina (UA), acute ST-elevation myocardial infarction (STEMI), and acute non-ST-elevation myocardial infarction (NSTEMI) are the three elements that make up acute coronary in about 6% of ACS patients undergoing coronary angiography.<sup>2</sup> Severe LM stenosis can therefore result in potentially fatal consequences.<sup>3</sup> Clinical outcomes for patients with significant LMCA disease are inferior to those with non-LMCA disease, even though LMCA disease is the most common type of obstructive CAD.<sup>4</sup> From asymptomatic to sudden death, LMCA symptoms can vary greatly.<sup>5</sup> Patients undergoing coronary angiography often experience uncertainty and anxiety regarding the diagnosis and treatment plan due to significant LMCA disease.<sup>6</sup> The degree and anatomic complexity of the CAD must be carefully taken into account when determining the best course of treatment for LMCA patients.<sup>7</sup> According to recent guidelines, based on early randomized trials, coronary artery bypass graft surgery should be used in patients with unprotected LM disease.<sup>8-10</sup> However, recent data suggests that percutaneous coronary intervention (PCI) may be a safe and useful alternative to surgical revascularization in certain patients.<sup>11-15</sup> Our aims in this study is to determine the frequency and severity of left main disease among acute coronary syndrome patients and evaluate the management strategies for left main disease.

## Patients and methods

This prospective and observational study was conducted at Sulaimani Cardiac Hospital over one year from June 1, 2023, to June 1, 2024. The study included over 200 ACS patients systematically selected through direct patient interviews and follow-up during hospitalization using a non-

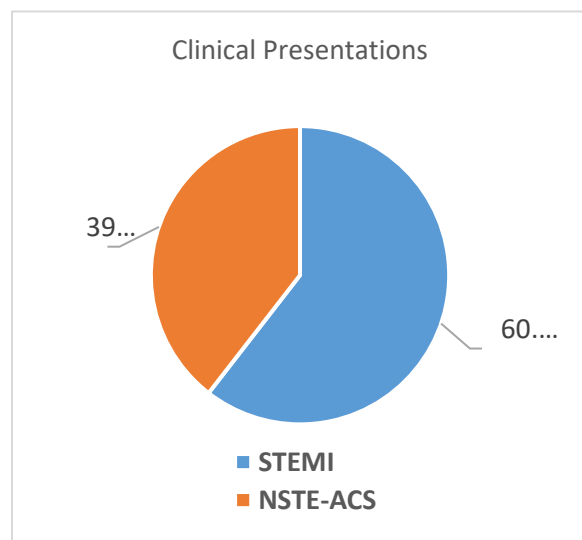
probability sampling method based on convenience. Inclusion criteria included patients with first-onset acute myocardial infarction (AMI) admitted to Sulaimani Cardiac Hospital, regardless of age or gender, presenting with ischemic chest pain and ST-segment elevation/changes. Exclusion criteria are not specified in the provided text. Daily patient examinations focused on risk factors for AMI, including hypertension, diabetes mellitus, smoking, and previous ischemic heart disease (IHD). In the study complete history of presenting symptoms were taken, cardiovascular system examination was done and ECG with bedside echocardiography were performed, in those patients where the diagnosis of ACS was not straight forward, we sent cardiac biomarkers like troponin level. During coronary angiography, the diseased vessels were recorded including left main artery and associated vessel lesions, the significance of left main stenosis were measured in the catheterization laboratory by two interventional cardiologists. Patient enrolment started after getting ethical approval letters/ research protocol approval from Ethical Committee/Directorate of Sulaimani and Kurdistan Higher Council of Medical Specialties with code 1569 on September 2, 2023. Data analysis was performed using SPSS version 24. Descriptive statistics were presented as mean  $\pm$  SD and frequencies as percentages. Chi-square tests were used for categorical variables, and independent t-tests were compared to means. Statistical significance was set at  $p \leq 0.05$ , with results presented in tables and/or graphs.

## Results

In this study, we recorded all acute myocardial infarction cases that were selected for angiography and divided them into ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI).

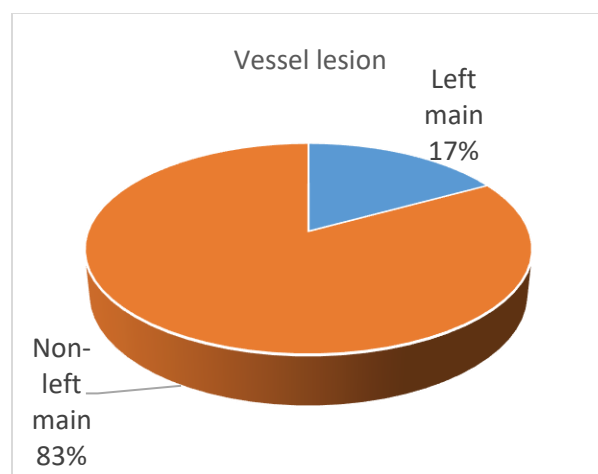


The incidence of each type is shown in the Figure (1).



**Figure (1):** The incidence of STEMI and NSTEMI-ACS in the chart.

The incidence of left main (LM) disease among the total 200 patients was 17%. Comparing STEMI to NSTEMI, the incidence of left main disease was more common among STEMI patients, as shown in the Figure (2) and Table (1).



**Figure (2):** The Incidence of left main disease in the chart.

**Table (1):** Clinical presentation and vessel lesion distribution among the study population.

Clinical Presentation	Left Main	Non-Left Main	Total	p-value
STEMI	18	103	121	0.32
NSTEMI	16	63	79	
Total	34	166	200	

Among the 200 patients involved in this study, we found that only 1% of patients under the age of 45 had left the main disease. The percentage was the same (8%) for patients aged 45-65 years and those above 65 years. Regarding gender, the incidence of left main disease was more common in male patients, with 25 cases recorded compared to 9 cases in female patients, as shown in Table (2).

**Table (2):** Incidence of left main disease by age and gender.

Age/Gender	Left Main	Non-Left Main	Total	p-value
Age < 45	2	15	17	0.08
Age 45-65 Years	16	105	121	
Age > 65 Years	16	46	62	
Male	25	109	134	0.37
Female	9	57	66	
Total	34	166	200	

When analyzing the role of risk factors, we found that the incidence of left main disease was higher among hypertensive and diabetic patients, while it was less common among smokers. The presence of hyperlipidemia, atrial fibrillation (AF), cerebrovascular accident (CVA), prior myocardial infarction (MI), chronic kidney disease (CKD), and family history of ischemic heart disease (IHD) did not significantly increase the incidence of left main disease in our study. These findings are summarized in Table (3).



**Table (3):** Incidence of left main disease by risk factors.

Risk Factors		Left main	Non- left main	Total
Hypertension (HT)	Yes	21	89	110
	No	13	77	90
Smoking	Yes	13	60	73
	No	21	106	127
Diabetes Mellitus (DM)	Yes	18	53	71
	No	16	113	129
Family History	Yes	0	2	2
	No	34	164	198
AF	Yes	1	2	3
	No	33	164	197
CKD	Yes	0	4	4
	No	34	162	196
Hyperlipidaemia	Yes	1	11	12
	No	33	155	188
Heart Failure (HF)	Yes	0	10	10
	No	34	156	190
Prior MI	Yes	0	9	9
	No	34	157	191
Prior CABG	Yes	0	2	2
	No	34	164	198
Prior PCI	Yes	2	13	15
	No	32	163	185
Stroke	Yes	0	2	2
	No	34	164	198
Total	34	166	200	

We divided the cases with the LM disease based on the number of vessels involved, categorizing them as Solitary plus LM, Double plus LM, and Triple plus LM, and calculated the Syntax score based on the Syntax II score. The analysis revealed that more vessels involved with LM were associated with a higher Syntax Score. For example, among the 19 cases of triple plus LM disease, 15 received a Syntax score > 32, which was statistically significant, as shown in Table (4).

**Table (4):** Syntax score distribution among left main disease patients.

Involvement	Syntax Score 22-32	Syntax Score >32	Total	p-value
Solitary and LM	5	0	5	0.006
Double and LM	2	7	9	
Triple and LM	4	15	19	
Just LM	0	1	1	
Total	11	23	34	





Regarding the severity of the left main lesion, we divided the cases into significant (>50% vessel diameter stenosis) and non-significant (<50%), the angiography of the patients was assessed by two interventional cardiologists. We found that 18 out of 34 patients with left main disease had stenosis >50%, while 16 had stenosis <50%, as shown in Table (5).

**Table (5):** Severity of left main coronary artery occlusion.

Occlusion Severity	Number of Patients	Percentage
> 50%	18	53%
< 50%	16	47%

The management of unprotected left main disease in this study depended on the severity of the lesion and the number of vessels involved. Of the 34 patients with left main disease, 23 were referred for urgent CABG surgery, while 11 were selected for PCI for LM and culprit lesions in other vessels, as shown in Table (6).

**Table (6):** Management of left main disease based on occlusion severity.

Management	Significant Occlusion (>50%)	Non-Significant Occlusion (<50%)	Total	p-value
PCI	5	6	11	0.005
CABG	13	10	23	
Total	18	16	34	

## Discussion

The present study provides significant insights into the frequency, severity, and management of left main (LM) disease in patients presenting with acute coronary syndrome (ACS) at Sulaimani Cardiac Hospital. In our cohort of 200 ACS patients, the incidence of LM disease was 17%. This is consistent with previous studies that report LM disease in 5-7% of ACS patients undergoing coronary angiography.<sup>16, 17</sup> notably, we observed a higher incidence of

LM disease among STEMI patients compared to NSTEMI patients, suggesting that LM disease might present more acutely in the context of STEMI. This aligns with the known pathophysiology where LM obstruction can lead to extensive myocardial ischemia and severe clinical manifestations.<sup>18</sup> Our analysis revealed that LM disease was more prevalent in male patients (25 cases) compared to female patients (9 cases). This gender disparity in LM disease prevalence has been documented in the literature, potentially due to differences in risk factor profiles and hormonal influences.<sup>19</sup> Age-wise, the incidence of LM disease was relatively uniform across different age groups, which could indicate that LM disease is a critical condition that affects a broad age spectrum in the ACS population. Hypertension and diabetes mellitus were significantly associated with the occurrence of LM disease in our study. These findings corroborate the established role of these risk factors in the development of coronary artery disease.<sup>20</sup> Conversely, smoking, did not show a significant association with LM disease in our study. The absence of a significant association between other comorbidities such as hyperlipidemia, AF, CKD, and a family history of IHD and LM disease suggests that LM disease may have a distinct pathophysiological basis compared to other forms of CAD.<sup>21</sup> The severity of LM disease, defined by >50% stenosis, was observed in 53% of patients with LM involvement. This high prevalence of significant stenosis highlights the critical nature of LM disease. The Syntax score analysis indicated that patients with triple vessel disease involving the LM had higher Syntax scores (>32), reflecting greater anatomical complexity and a higher burden of disease.<sup>17</sup> The management of LM disease in our study was primarily driven by the severity of stenosis and the extent of the disease. Among patients with significant LM stenosis, the majority (13







out of 18) were referred for urgent coronary artery bypass graft (CABG) surgery, which remains the gold standard treatment for unprotected LM disease.<sup>16</sup> However, percutaneous coronary intervention (PCI) was performed in 11 patients, particularly those with non-significant stenosis or when CABG was contraindicated. This reflects the evolving role of PCI as a viable alternative in selected patients, supported by advancements in stent technology and procedural techniques.<sup>22</sup> Our findings are consistent with existing literature that underscores the complexity and high-risk nature of LM disease. Studies have shown that CABG provides superior long-term outcomes in patients with significant LM stenosis, while PCI offers a less invasive option with shorter recovery times.<sup>17, 23</sup>

## Conclusion

Our study highlights the significant burden of LM disease in ACS patients and underscores the need for prompt and appropriate management. The findings support the continued use of CABG as the preferred treatment for significant LM stenosis, while PCI remains a valuable option in specific clinical scenarios.

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## Conflict of interest:

Declared none.

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