

Original Research Article

TO COMPARE THE CLINICAL OUTCOMES OF NON-OSTIAL AND OSTIAL LAD LESIONS IN PATIENTS HAVING ACUTE AWM I UNDERGOING PPCI

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ABSTRACT

Background: Globally, one of the leading causes of mortality and morbidity include cardiovascular diseases (CVD). Plaque disruption results in acute thrombotic coronary events, which leads to occlusion of blood flow to a portion of the myocardium. Acute anterior wall myocardial infarction (AWMI) is a critical condition among these presentations. This leads to high mortality and morbidity. The management of ST-elevation myocardial infarction (STEMI) is important. The standard care of STEMI is PPCI compared to thrombolytic therapy. It is because PPCI gives high clinical outcomes. Ostial LAD lesions have unique hemodynamic and anatomical characteristics which is why they represent a distinct subgroup of LAD lesions. The objective is to compare the clinical outcomes of non-ostial and ostial LAD lesions in patients having acute AWM I undergoing PPCI. Study design is Cross-sectional study. This study was conducted at People's University of Medical and Health sciences for women Nawabshah from May 2024 to May 2025.

Materials and Methods: This study is a cross-sectional analysis which was conducted on patients having acute AWM I and presented in the emergency department of the hospital. The diagnosis was confirmed based on their ECG and cardiac bio markers. All of the participants underwent primary percutaneous coronary intervention (PPCI) for a left anterior descending (LAD) artery culprit lesion. Participants were aged from 18 years and above. SPSS version 26 was used to analyse the data. Age, ejection fraction, BMI etc were the continuous variables while lesion type, gender, diabetes etc were the categorical variables. Chi-square test, Mann-Whitney U test, and t-test was conducted.

Results: There were a total of 400 individuals involved in this research. Participants were aged from 18 years and above. The mean age was 54.9 years. The majority of the participants were male, representing 80% of the population (n=320). There were a total of 288 patients who had a non-ostial LAD culprit lesion. The remaining 112 patients had an ostial LAD artery culprit lesion. The most prevalent factor in all the patients was hypertension.

Conclusion: Ostial LAD culprit lesions in patients with acute AWM I shows higher risk associated with increased procedural complexity, longer hospital stays, and increased mortality.

Keywords: mortality, morbidity, acute thrombotic coronary events, on transient collateral circulation

INTRODUCTION

Globally, one of the leading causes of mortality and morbidity include cardiovascular diseases (CVD).^[1] Plaque disruption results in acute thrombotic coronary events, which leads to occlusion of blood flow to a portion of the myocardium.^[2] There are various levels of the coronary arterial system on which these events can occur.^[3] The levels range from small vessel occlusions (relying on transient collateral circulation) to large vessel disruptions (normal physiological flow capacity).^[4] Acute anterior wall myocardial infarction (AWMI) is a critical condition among these presentations.^[5] This leads to high mortality and morbidity. The management of ST-elevation myocardial infarction (STEMI) is important. The standard care of STEMI is PPCI compared to thrombolytic therapy. It is because PPCI gives high clinical outcomes.^[6]

Ostial LAD lesions have unique hemodynamic and anatomical characteristics which is why they represent a distinct subgroup of LAD lesions.^[7] Due to the extensive myocardial area at risk, high morbidity and mortality is linked with these lesions. As ostial LAD lesions are very close to the left circumflex (LCx) and left main (LM) arteries, testing it with primary PCI becomes difficult.^[8] Due to complex anatomy, it can lead to more complicated procedures, larger thrombus burden, and higher risk of no-reflow. Research related to intravascular ultrasound (IVUS) have observed that the lesions in the ostial LAD are often not fully covered by stents.^[9] This increases the chances of in-stent restenosis and stent thrombosis. Therefore, there may be worse clinical outcomes in patients with ostial LAD lesions as compared to those with non-ostial lesions.^[10]

It is important to understand the unique procedural and clinical challenges of ostial LAD lesions as it helps in improving patient outcomes and treatment approaches.^[11] Even though there are many international studies conducted on this topic, there is still very limited data from Pakistan about this topic.

Therefore, this study was conducted to compare the clinical outcomes of non-ostial and ostial LAD lesions in patients having acute AWMI undergoing PPCI.

MATERIALS AND METHODS

This study is a cross-sectional analysis which was conducted on patients having acute AWMI and presented in the emergency department of the hospital. The diagnosis was confirmed based on their ECG and cardiac bio markers. All of the participants underwent primary percutaneous coronary intervention (PPCI) for a left anterior descending (LAD) artery culprit lesion. Participants were aged from 18 years and above. The Ethical Review Committee approved this research. Participants were informed about this study and their written consent was obtained from them or their legal guardians.

Exclusion criteria:

Patients who had a history of any cardiac surgeries or coronary artery bypass grafting were not a part of this study. Moreover, those individuals who were diagnosed with cardiomyopathy were also excluded. Lastly, those with concomitant valvular heart disease were also not a part of this study.

The researchers gathered all the information prospectively. The information included patients' clinical history, demographics, angiographic results, ECG findings, and in-hospital outcomes such as major adverse cardiovascular events (MACE). Heart failure, stent thrombosis, death, stroke, and recurrent MI are the events included in MACE. Consecutive sampling, independent angiographic reviews, and strict inclusion criteria was used to reduce bias. SPSS version 21 was used to analyse the data. Age, ejection fraction, BMI etc were the continuous variables while lesion type, gender, diabetes etc were the categorical variables. Chi-square test, Mann-Whitney U test, and t-test was conducted. A p-value of less than 0.05 was considered significant.

RESULTS

Table 1

Characteristics	Ostial LAD (n=112)		Non-Ostial LAD (n=288)	
	N	%	N	%
Gender				
Male	82	73.2	238	82.6
Female	30	26.8	50	17.4
Killip Class				
I	53	47.3	198	68.7
II	35	31.2	78	27.1
III	13	11.6	6	2.1
IV	11	9.9	6	2.1
Intubation	25	22.3	13	4.5
Risk factors				
Tobacco Chewer	19	16.9	46	15.9
Smoking	35	31.3	100	34.7
Family History of IHD	24	21.4	45	15.6
Hypertension	92	82.1	246	85.1
Diabetes	42	37.5	78	27.1

Dyslipidemia	6	5.3	22	7.6
Mean values + SD				
Age (yrs)	54.1 ± 10.6		55.2 ± 7.6	
Systolic BP	123.3 ± 16.2		131.5 ± 12.8	
Duration of symptoms (hrs)	4.9 ± 1.8		4.3 ± 1.3	
Total Ischemic Time (hrs)	7.1 ± 2.1		6.8 ± 1.5	

[Table 2] compares the procedure characteristics of the study population.

Table 2

Procedure Characteristics	Ostial LAD (n=112)		Non-Ostial LAD (n=288)	
	N	%	N	%
Access				
Femoral	36	32.1	44	15.2
Radial	72	64.3	222	77.1
Switch over	4	3.6	22	7.7
Number of vessels involved				
Single	58	51.7	126	43.7
Two	36	32.1	118	40.9
Three	18	16.2	44	15.4
Collateral Grade				
0	81	72.3	262	90.9
1	9	8.1	9	3.1
2	14	12.5	12	4.1
3	8	7.1	5	1.9
Thrombus Grade				
0	0	0	2	0.6
1	6	5.3	17	6.1
2	5	4.4	29	10.1
3	10	8.9	47	16.3
4	7	6.4	25	8.6
5	84	75.0	168	58.3
TIMI flow pre-procedure				
0	90	80.3	176	61.1
I	2	1.7	13	4.6
II	17	15.1	77	26.7
III	3	2.9	22	7.6
Slow-flow phenomenon	54	48.2	54	18.7
Stent Technique				
Pre-Ballooning	91	81.2	205	71.1
Direct Stenting	21	18.8	83	28.9
Final TIMI flow achieved				
0	6	6.1	5	1.8
I	2	1.7	3	1.1
II	12	10.7	7	2.4
III	92	82.1	273	94.7
Post-dilation (NC Balloon)	84	75.0	222	77.1
Thrombus Aspiration (Export)	63	56.2	72	25.0
Procedural complication				
Table Death	6	5.3	4	1.3
On Table CPR	4	3.5	4	1.3
LAD perforation	0	0	1	0.3
Slow flow phenomenon	19	16.9	19	7.0
Wire induced distal perforation	0	0	1	0.3
Dextrocardiac	0	0	1	0.3
VT/VF	2	2.0	0	0
None	81	72.3	258	89.5
Myocardial Blush Grade				
0	7	6.2	6	2.3
I	7	6.2	1	0.3
II	38	34.1	76	26.3
III	60	53.5	205	71.1

[Table 3] compares the in-hospital outcomes of the study population.

Table 3

In-Hospital Outcomes	Ostial LAD (n=112)		Non-Ostial LAD (n=288)	
	N	%	N	%
Mitral regurgitation				
Mild	33	29.6	62	21.6
Moderate	6	5.3	6	2.1
None	73	65.1	220	76.3

In-hospital MACE				
CVA	4	3.5	4	1.3
Myocardial infarction	21	18.7	12	4.1
Cardiogenic shock	23	20.5	13	4.5
Heart failure	45	40.2	65	22.5
Stent thrombosis	15	13.3	22	7.6
Arrhythmias	52	46.4	78	27.1
All-cause mortality	19	16.9	9	3.1
Duration of hospital stay (days)				
1	59	52.6	183	63.5
2	37	33.3	91	31.8
3	6	5.3	9	3.1
4	7	6.2	4	1.3
5	3	2.6	1	0.3

There were a total of 400 individuals involved in this research. Participants were aged from 18 years and above. The mean age was 54.9 years for the total population. The majority of the participants were male, representing 80% of the population (n=320). There were a total of 288 patients who had a non-ostial LAD culprit lesion. The remaining 112 patients had an ostial LAD artery culprit lesion. [Table 1] compares the clinical characteristics of patients with non-ostial and ostial LAD culprit lesions.

DISCUSSION

This research was conducted to highlight the procedural and clinical challenges of ostial LAD artery culprit lesions in individuals having acute AWMi and undergoing PPCI. The outcomes show how critical is the role of lesion location in determining procedural complexity, patient outcomes, and in-hospital mortality and morbidity.^[12,13] A higher-risk clinical profile was shown in patients with ostial LAD lesions. It was shown that the rate of Killip class (III to IV) was increased in individuals with ostial LAD lesions. These findings were similar to the study of Brener et al., who observed that proximal LAD lesions in patients with acute AWMi had higher risk as compared to distal LAD lesions.^[14] These outcomes show that early risk stratification is important and the targeted therapeutic interventions should be implemented timely.

Our study also observed the prevalence of comorbidities which were more prevalent in the ostial group, especially diabetes mellitus and male gender. These findings were similar to the findings of Shrivastav et al.^[15] However, these results were different from the results of Darabian et al.^[16] Darabian et al. identified a higher number of females as a risk factor for ostial lesions. This shows demographic differences in both studies.

Our study shows that procedural complexity was higher in the ostial LAD group. It was due to the increased use of femoral access, intra-aortic balloon pumps, temporary pacemakers, and aspiration thrombectomy. According to Chauhan R et al., there was a strong positive correlation between the slow-flow/no-reflow phenomenon and high thrombus

burden, with ostial LAD culprit lesions being particularly susceptible.^[17] These findings are also similar with the findings of Alidoosti et al.^[18]

By comparing both the groups, it was clearly observed that the ostial LAD group had worse in-hospital outcomes as compared to the non-ostial LAD lesions. It included longer hospital stays, higher rates of MACE, and higher mortality. It was also observed that the rate of heart failure and cardiogenic shock was also higher in the ostial group, making the outcomes poor. These findings are similar to the findings of Bhatti et al.^[19] Moreover, the incidence of stent thrombosis was higher in the ostial LAD group which was similar to the observations of Yun et al.^[20]

CONCLUSION

Ostial LAD culprit lesions in patients with acute AWMi shows higher risk associated with increased procedural complexity, longer hospital stays, and increased mortality.

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