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EVALUATION OF THE MOST COMMON LOCATION OF BIFURCATION LESION, PREFERRED BIFURCATION STENTING TECHNIQUE AND PREDOMINANT MEDINA CLASSIFICATION SUBTYPES.

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Abstract

Background: Coronary bifurcation lesions a subset of complex coronary artery disease where atherosclerotic plaque develops at the division of a main vessel and its side branch. These lesions pose significant challenges in PCI because of risk of complications such as restenosis, side branch occlusion, and stent failure. Bifurcation lesions account for approximately 20% of all PCI cases, making their effective management crucial in interventional cardiology. Various classification systems exist to categorize bifurcation lesions, with the Medina classification being the most widely used. This system evaluates stenosis in the proximal part of the main artery, the distal division of the primary branch, and the side vessel helping guide treatment decisions. Among different treatment approaches, provisional stenting is often preferred due to its simplicity and lower risk of complications in contrast to a more intricate structure. 2 stent techniques. Even so, in certain cases, CABG also the recommended option.

Methods: This cross sectional descriptive study was Carried out at Lady Reading Hospital, Peshawar, with a sample size of 196 patients, calculated using OpenEpi. Data were obtained using a well- designed questionnaire., focusing on the location of bifurcation lesions, preferred treatment strategy, and Medina classification subtypes. The study analyzed bifurcation lesions across major coronary arteries and their branches, including Left Main with LAD and CIRC, LAD with Diagonal, LCX with OM, and RCA with PDA and PLV.

Results: The total frequency of bifurcation lesions in the Left Main with LAD and CIRC was 25 (12.8% of total participants). Among these, 4% had stenosis of 40%-50%, 8% had 50%-60%, 48% had 70%-80%, and 40% had 80%-90%. Bifurcation lesions involving the LAD with Diagonal had a total frequency of 69 (35.2% of total cases). Among these, 7.2% had stenosis in the 40%-50% range, 21.7% in 50%-60%, 27.5% in 70%-80%, and the majority (43.7%) exhibited stenosis ranging from 80%-90%. The most common bifurcation lesion was located at the LCX with the OM branch.

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The provisional stenting technique emerged the preferred approach among interventional cardiologists. Referral to CABG was the most frequent category, with 115 cases (58.7%). The predominant Medina classification subtype was 1,1,1, indicating significant disease in both primary branch and the secondary branch..

Conclusion: This study identifies LCX with OM as the most frequent location of Bifurcated plaque formations, with Provisional single-stent technique being the preferred technique. The Medina 1,1,1 subtype was predominant, reflecting the complexity of disease at these sites. These findings emphasize the importance of tailored strategies to improve outcomes in PCI for bifurcation lesions.

INTRODUCTION

Coronary bifurcation lesions (CBLs) represent one of the most complex and frequently encountered subsets of coronary artery disease (CAD) encountered during percutaneous coronary intervention (PCI). A bifurcation lesion is defined anatomically as a stenotic plaque involving the segment where a main vessel (MV) divides into a side branch (SB) (European Bifurcation Club classification) and poses unique challenges in revascularization due to the involvement of two luminal pathways and the need to preserve blood flow in both. The management of these lesions carries technical difficulties that are associated with lower procedural success and higher rates of adverse events compared with non-bifurcation lesions (European Bifurcation Club classification explained; Medina classification, 0,1).

A bifurcation lesion is typically described using the Medina classification, a simple and widely accepted system that assigns a binary value (0 or 1) to the proximal main branch (PM), distal main branch (DM), and side branch (SB) based on whether significant stenosis (>50%) is present in each segment (Medina classification system) (EuroIntervention review). For example, a lesion classified as 1,1,1 indicates significant disease in all three segments, whereas 1,1,0 indicates disease in the proximal and distal main vessel with sparing of the side branch. This classification

is clinically useful because it helps determine lesion complexity, guides stenting strategy, and predicts outcomes following PCI (Medina classification explanation; EuroIntervention review). True bifurcation lesions — where both SB and MV are significantly narrowed — include subtypes such as 1,1,1, 1,0,1, and 0,1,1 (Terminology from bifurcation literature) and are important because they typically require more complex intervention strategies and carry a higher risk of adverse events compared with non-true bifurcations (Medina classification outcomes research) (PMC).

Across large registries and clinical studies, the Medina 1,1,1 and 1,1,0 subtypes consistently emerge as the most common CBL patterns encountered during PCI procedures. In a multicenter registry involving over 4,000 CBL procedures, Medina 1,1,1 accounted for 35.5% of bifurcation lesions and Medina 1,1,0 comprised 26.8%, whereas the least common subtype was 0,0,1 at just 3.5% (large registry data) (PMC). Similarly, data from other cohort analyses indicate that certain bifurcations — notably those involving the left anterior descending artery (LAD) and diagonal branches — predominate, reflecting the higher disease burden typically seen in this region due to its large myocardial territory and shear stress patterns (LAD predilection literature) (www.elsevier.com).

Anatomical location is another crucial factor in bifurcation lesion evaluation. The LAD and its diagonal branches are frequently implicated in bifurcation disease, likely due to hemodynamic forces and atherosclerotic plaque predilection. For example, in a retrospective analysis of bifurcation PCI cases, lesions involving the LAD/diagonal junction accounted for a majority of cases, and these lesions were often found in the proximal segments of the coronary tree (LAD predominance study) (Springer Link). In addition, involvement of the left circumflex artery (LCx) and left main (LM) coronary artery bifurcations, although less frequent than LAD lesions, pose significant clinical challenges due to the large myocardial territories they supply and the high risk associated with procedural complications (LM bifurcation review) (MDPI).

The choice of stenting technique in CBLs remains a pivotal determinant of procedural success and long-term outcomes. Historically, the provisional single-stent technique — where a single

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stent is deployed in the main vessel with optional treatment of the side branch only if necessary — has been the most commonly applied strategy. This approach is often preferred for non-true bifurcation lesions (e.g., Medina 1,0,0 or 0,1,0) because it simplifies the procedure, minimizes device implantation, and lowers the risk of SB compromise (practice patterns article) (HMP Global Learning Network). In contrast, planned two-stent techniques are frequently employed for true bifurcation lesions or when the side branch supplies a large myocardial territory or exhibits significant ostial disease. Among the two-stent techniques, double-kissing (DK) crush, culotte, T-stenting and TAP (T-and-protrusion) are the most widely used, with DK-crush often preferred for more complex bifurcations due to favorable procedural outcomes and relatively consistent drug-eluting stent coverage of both MV and SB ostia (bifurcationTechnique patterns) (HMP Global Learning Network).

The clinical implications of selecting the appropriate strategy are substantial. For example, true bifurcation lesions (such as Medina 1,1,1) often necessitate two-stent techniques, which, while providing improved SB patency, are associated with longer procedural times, higher contrast load, and potentially more complex follow-up (Medina 1,1,1 outcomes) (PMC). Provisional stenting remains dominant for less complex lesions, offering an effective balance between procedural simplicity and clinical efficacy, particularly when SB compromise is minimal or predictable (practice patterns article) (HMP Global Learning Network).

Despite advances in device technology and procedural techniques, CBLs continue to be associated with higher rates of target lesion failure (TLF), repeat revascularization, and adverse clinical events compared with non-bifurcation lesions. Subtypes such as Medina 1,1,1 and even the rare 0,0,1 have been linked with increased risk of TLF at one year, highlighting the prognostic importance of lesion distribution and classification (Medina subtype outcomes) (PMC). Moreover, the evolution of intracoronary imaging (such as intravascular ultrasound or optical coherence tomography) has further refined procedural planning and optimization of stent deployment in

bifurcation settings, potentially enhancing outcomes through improved lesion sizing and stent apposition.

In summary, coronary bifurcation lesions represent a significant proportion of contemporary PCI cases and require rigorous evaluation of lesion location, classification, and intervention strategy to optimize patient outcomes. The Medina classification system provides a practical framework for categorizing lesion complexity, with Medina 1,1,1 and 1,1,0 being the most prevalent subtypes. Intervention strategies vary from provisional single stenting for less complex lesions to advanced two-stent techniques, particularly in true bifurcation disease. Understanding these patterns — including common anatomical locations and the relative performance of stenting strategies — is essential for enhancing procedural success and reducing long-term adverse events in patients undergoing bifurcation PCI.

LITERATURE REVIEW

Coronary artery disease (CAD) remains one of the leading causes of morbidity and mortality worldwide and represents a substantial global health and economic burden. It is responsible for approximately 17.8 million deaths annually and continues to be a primary cause of disability and healthcare expenditure globally (World Health Organization [WHO], 2023). CAD primarily results from atherosclerotic plaque formation within the coronary arteries, leading to progressive luminal narrowing, impaired myocardial perfusion, and clinical manifestations such as stable angina, myocardial infarction, and sudden cardiac death (Zimarino et al., 2019).

The development and progression of CAD are influenced by both non-modifiable and modifiable risk factors. Non-modifiable factors include age, sex, and genetic predisposition, while modifiable factors encompass smoking, hypertension, diabetes mellitus, dyslipidemia, obesity, physical inactivity, and unhealthy dietary habits (Framingham Heart Study, 2023). Large cohort studies such as the Framingham Heart Study and FINRISK have demonstrated that smoking and hypertension are among the strongest contributors to cardiovascular mortality, while diabetes

and hyperlipidemia significantly increase the risk of adverse cardiovascular outcomes (CDC, 2023; WHO, 2023).

Atherosclerosis is a chronic inflammatory process characterized by endothelial dysfunction, lipid deposition, foam cell formation, and fibrous cap development. Over time, plaques may either remain stable or become vulnerable to rupture, leading to thrombus formation and acute coronary syndromes (ACS) such as ST-elevation myocardial infarction (STEMI) or non-ST-elevation myocardial infarction (NSTEMI) (Stone et al., 2016). Hemodynamically significant coronary stenosis typically produces symptoms when luminal narrowing exceeds 70%, whereas plaque rupture may occur even in less obstructive lesions (Zimarino et al., 2019).

Coronary bifurcation lesions (CBLs) represent a complex and clinically significant subset of CAD and account for a considerable proportion of percutaneous coronary interventions (PCI). These lesions most frequently occur in regions such as the left main coronary artery (LMCA) and the left anterior descending artery (LAD) due to unique anatomical and hemodynamic characteristics (Kornowski et al., 2000). Alterations in endothelial shear stress (ESS) play a central role in plaque localization at bifurcation sites. Areas exposed to low or oscillatory ESS, particularly the lateral walls of bifurcations and side branch ostia, are more susceptible to atherosclerosis, while regions such as the carina are relatively protected (Zimarino et al., 2019).

The Medina classification is the most widely used system for categorizing coronary bifurcation lesions because of its simplicity and reproducibility. It classifies lesions based on the presence or absence of significant stenosis in the proximal main vessel, distal main vessel, and side branch (Medina et al., 2006). Studies have shown that Medina subtypes 1.1.1 and 1.1.0 are the most prevalent and are associated with higher rates of target lesion failure, repeat revascularization, and adverse clinical outcomes compared to simpler lesion patterns (Cutlip et al., 2007).

Percutaneous coronary intervention is the preferred revascularization strategy for most bifurcation lesions. Current guidelines recommend a provisional single-stent strategy as the default approach, reserving complex two-stent techniques for anatomically challenging lesions

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(Stone et al., 2016). Several bifurcation stenting techniques, including T-stenting, culotte, crush, and double-kissing (DK) crush, have been developed to address lesion complexity. Among these, the DK crush technique has demonstrated superior outcomes in reducing major adverse cardiac events (MACEs), stent thrombosis, and target lesion revascularization, particularly in complex bifurcation lesions (Vassilev et al., 2018).

Intracoronary imaging modalities such as intravascular ultrasound (IVUS) and optical coherence tomography (OCT) play an essential role in optimizing PCI outcomes in bifurcation lesions. IVUS is commonly preferred for large vessels such as the LMCA, while OCT offers superior resolution for evaluating stent expansion, strut apposition, and guidewire position, thereby enhancing procedural accuracy and long-term outcomes (Zimarino et al., 2019).

In summary, CAD remains a major cause of global mortality, with coronary bifurcation lesions posing unique diagnostic and therapeutic challenges. Understanding the anatomical distribution of bifurcation lesions, predominant Medina classification subtypes, and optimal stenting strategies—supported by advanced intracoronary imaging—remains critical for improving procedural success and patient outcomes following PCI.

MATERIAL AND METHODOLOGY

This cross-sectional descriptive study was performed at LRH Advanced care hospital to assess the most common location of bifurcation lesions, preferred bifurcation stenting techniques, and the predominant Medina classification subtypes. This research aimed to contribute valuable insights to clinical practices in interventional cardiology.

3.1 Study Setting and Duration:

the study was performed in the Cardiology Department of LRH tertiary care hospital. The data collection process spanned over [Six months almost], ensuring comprehensive coverage of cases

within the defined period. The institution was chosen due to its high patient influx and well-established interventional cardiology facilities.

3.2 Study Population:

The study targeted patients who underwent (PCI) involving bifurcation lesions. Inclusion criteria were patients [patient of all ages were included, Those who presented with coronary artery bifurcation lesions identified via angiography].[Exclusion criteria included patients who have in stent restenosis, bifurcation lesion with CTO ,and Those who were contraindicated to anticoagulant and antiplatelet therapy]

3.3 Sample Size Calculation:

The sample size was determined utilizing the Open Epi statistical online tool to achieve statistical significance and precision. A sample size of 196 participants was determined based on [confidence level (95%) expected prevalence (16%) and margin of error (5%)used for calculation]. This size was chosen to provide a robust analysis of bifurcation lesion characteristics and preferred stenting methods.

3.4 Sampling Technique:

A consecutive sampling method was employed, where every eligible patient meeting the inclusion criteria during the data collection period was included until the target sample size was reached. This approach facilitated comprehensive data collection without the risk of selection bias inherent to random sampling.

3.5 Data Collection Method:

Data were collected through a well designed questionnaire specifically designed for this study. The questionnaire included sections on demographic information, clinical characteristics,

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angiographic findings, and procedural details. Key data points recorded were the location of bifurcation lesions, stenting techniques used, and Medina classification subtypes observed.

3.6 Ethical Considerations:

Ethical approval was obtained from the LRH ethical review board. Informed consent was secured from all participants prior to their inclusion in the study. Participants were assured of their confidentiality, and data were anonymized to maintain privacy.

3.7 Data Management and Analysis:

The collected data were compiled and reviewed for completeness and accuracy before being entered into a secure database. Statistical analysis was conducted using [mention the statistical software used, e.g., SPSS, R], with descriptive statistics used to summarize patient demographics, lesion characteristics, stenting techniques, and Medina classification subtypes. Frequencies and percentages were calculated for categorical variables, and results were presented in tabular and graphical forms to facilitate interpretation.

4. RESULTS

4.1 Result:

This was Descriptive Cross Sectional study with 196 total participants. The mean age of all the participant were 60.4 [minimum, 40 years] and [maximum 50 years] with standard deviation of 9.14 years, shown in Fig 4.1.

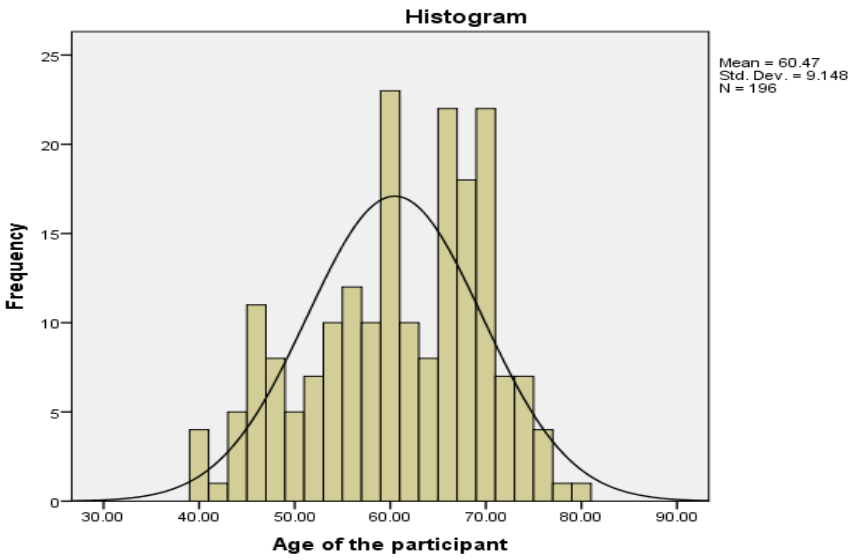

Fig4.1 Age of the participants

The Base line characteristics includes gender, smoking status and comorbidities. Among all the participants 64.8% [n=127] were male while 35.2% [n=69] were female. In terms of smoking status, 35.2% [n=70] were smokers while 64.3% [n=126] were nonsmokers. The most common comorbidity was hypertension 49.5 %, followed by diabetes at 29% [n=57]. Other includes Chronic kidney disease 4.6% [n=9] and hyperlipidemia 14.8% [n=29] as shown in Table 4.1

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Table 4.1: Base line Characteristics of the study participants

S.no	Variable		Frequency	Percentage
1	Gender	Male	127	64.8
		Female	69	35.2
2	Smoking Status	Yes	70	35.7
		No	126	64.3
3	comorbidities	Hypertension	97	49.5
		Diabetes	57	29.1
		Chronic kidney disease	9	4.6
		Hyperlipidemia	29	14.8
		Other	4	2.0

In this study, we analyzed bifurcation lesions across major coronary arteries and their branches, including the Left Main with LAD and CIRC, LAD with Diagonal, LCX with OM, and RCA with PDA and PLV. The findings were categorized based on the frequency of bifurcation lesions and the degree of stenosis, classified into ranges of 40%–50%, 50%–60%, 70%–80%, and 80%–90%. The highest frequency of bifurcation lesions was observed in the LCX with OM, with a total of 72 cases, comprising 36.7% of the total participants. Among these, 8.3% of lesions showed stenosis between 40%–50%, 12.5% between 50%–60%, 44.4% between 70%–80%, and 34.7% in the 80%–90% range. The second most common site of bifurcation lesions was the LAD with Diagonal, with a frequency of 69 cases, representing 35.2% of the total participants. Of these, 7.2% of lesions exhibited stenosis in the 40%–50% range, 21.7% in the 50%–60% range, 27.5% in the 70%–80% range, and 43.7% in the 80%–90% range. Bifurcation lesions in the RCA with PDA and PLV were found in 30 participants, making up 15.3% of the total cases.

Notably, no lesions were observed in the 40%–50% range, while 13% of lesions showed stenosis between 50%–60%, 46.6% between 70%–80%, and 40% in the 80%–90% range. The Left Main with LAD and CIRC showed the lowest frequency of bifurcation lesions, with 25 cases, accounting for 12.8% of the total participants. Among these, 4% of lesions exhibited stenosis in the 40%–50% range, 8% in the 50%–60% range, 48% in the 70%–80% range, and 40% in the 80%–90% range.

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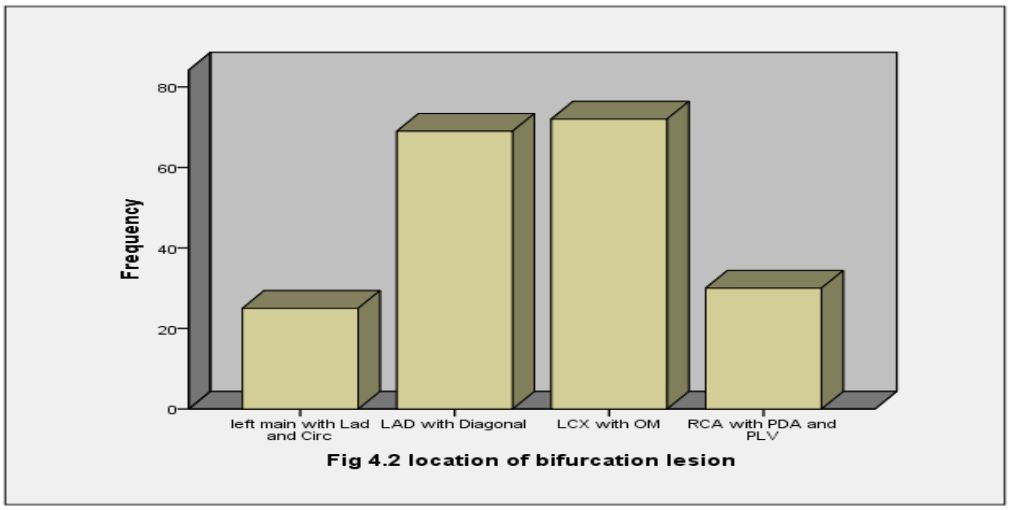

Figure 4.2: Location of Bifurcation lesion and Degree of stenosis

The distribution of bifurcation lesions was analyzed using the Medina classification system. Among the 196 cases evaluated, the most predominant subtype was [1,1,1], observed in 148 cases (75.5%). This was followed by subtype [0,1,1], noted in 22 cases (11.2%), and [1,1,0], present in 21 cases (10.7%). Less commonly, subtype [0,0,1] was identified in 4 cases (2.0%), while the least frequent subtype was [0,1,0], occurring in only 1 case (0.5%) as show in Fig 4.3 In addition bifurcation lesions were classified based on the MEDINA classification i.e. Left Main with LAD and CIRC, LAD with Diagonal, LCX with OM, and RCA with PDA and PLV. The MEDINA classification describes the involvement of proximal, distal, and side branches, represented by codes such as (0,1,0), (0,0,1), (0,1,1), (1,1,0) and (1,1,1).

The bifurcation lesions based on the Medina classification revealed the highest frequency in the LCX with OM region, which accounted for 36.7% of the total cases. Among these, 77.8% (56 lesions) were classified as (1,1, 1), followed by 13.9% (10 lesions) as (0,1,1), and 8.3% (6 lesions) as (1,1,0). No lesions were recorded in the (0,0,1) category.

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The LAD with Diagonal region ranked second, representing 35.2% of the total cases. The majority of lesions, 75.4% (52 lesions), were classified as (1,1,1), followed by 10.1% (7 lesions) as (1,1,0), 8.7% (6 lesions) as (0,1,1), and 5.8% (4 lesions) as (0,0,1).

The RCA with PDA and PLV accounted for 15.3% of the total bifurcation lesions. Of these, 66.7% (20 lesions) were classified as (1,1,1), 20% (6 lesions) as (0,1,1), and 3.3% (1 lesion) as (0,0,1).

The lowest frequency of bifurcation lesions was observed in the Left Main with LAD and CIRC region, comprising 12.8% of the total cases. Among these, 80% (20 lesions) were classified as (1,1,1) and 20% (5 lesions) as (1,1,0). No lesions were observed in the (0,1,1) and (0,0,1) categories as shown in **Table: 4.2 and 4.3.**

Table 4.2 Location of Bifurcation Lesion based on Medina classification

Location of lesion	Type of lesion based on MEDINA classification					Total
	0,1,0	0,0,1	0,1,1	1,1,0	1,1,1	
Left Main with LAD and Circ	0	0	0	5	20	25
LAD with Diagonal	0	4	6	7	52	69
LCX with OM	0	0	10	6	56	72
RCA with PDA and PLV	1	0	6	3	20	30
Total	1	4	22	21	148	196

S.no	Variable	Frequency	%	Degree of Stenosis in Main Vessel	Frequency Of Stenosis in Main Vessel	Lesion Percentage
1.	Left Main with LAD and CIRC	25	12.8%	40% – 50%	1	4%
				50% – 60%	2	8%
				70% -80%	12	48%
				80% - 90%	10	40%
2	LAD with Diagonal	69	35.2%	40% – 50%	5	7.2%
				50% – 60%	15	21.7%
				70% -80%	19	27.5%
				80% - 90%	30	43.7%
3	LCX with OM	72	36.7%	40% – 50%	6	8.3%
				50% – 60%	9	12.5%
				70% -80%	32	44.4%
				80% - 90%	25	34.7%
4	RCA with PDA and PLV	30	15.3%	40% – 50%	0	0%
				50% – 60%	4	13%
				70% -80%	14	46.6%
				80% - 90%	12	40%

In addition we also analyzed the types of stents used in patients with bifurcation lesions and assessed the post-procedure TIMI flow in the main vessels. The stent types were categorized into (DES) and (BMS), along with cases referred for (CABG). The TIMI flow was evaluated in three categories: TIMI 2, TIMI3 and TIMI 4.

A total of 77 patients (39.3%) were treated with Drug-Eluting Stents. Among these patients, one (1.3%) achieved TIMI 2 flow, representing 5% of the total DES-treated cases. In contrast, 79 patients (98.7%) attained TIMI 3 flow, which accounted for 40.3% of the total. No treatment achieved TIMI 4 flow. The majority of patients treated with DES achieved TIMI 3 flow, indicating successful restoration of optimal blood flow. There were no patients (0%) treated with Bare-Metal Stents in this study. This suggests that the use of BMS was either avoided or unsuitable in the management of bifurcation lesions. A total of 119 patients (60.7%) were referred for CABG, indicating the complexity or severity of their coronary lesions. however, Drug-Eluting Stents were

the primary stent choice when stenting was performed, with the majority of patients achieving optimal TIMI 3 flow shown in **Table 4.3**

Table 4.3 Type of Stent used and Post Procedure TIMI Flow

S.no	variables	Frequency	Percentage	TIMI flow in Main vessel	Frequency	Percentage
1	DES stent	77	39.3%	TIMI 2	1	5%
				TIMI 3	79	40.3%
				TIMI 4	0	0 %
2	BMS stent	0	0%			
3	Referred to CABG	119	60.7%			

In this study we also assessed the frequency, percentage, and complications associated with various bifurcation stenting techniques during coronary intervention. The stenting techniques included Provisional Stenting, Double Kissing (DK), TAP Stenting, Jailed Semi-Kissing Balloon Technique (JSK BT), Culottes Stenting, referrals to CABG and other techniques. The complications evaluated were side branch occlusion, coronary dissection, and the absence of complications.

Provisional Stenting was the most frequently used technique among the stenting strategies, with 43 cases (21.9%). Complications included side branch occlusion in 3 cases (7%), coronary dissection in 7 cases (16.3%), and 33 cases (76.7%) were free of complications.

Double Kissing (DK) Stenting accounted for 13 cases (6.6%). Side branch occlusion occurred in 3 cases (23.1%), and no coronary dissection was reported. Ten cases (76.9%) showed no complications. TAP Stenting was used in 9 cases (4.6%). There was 1 case (11.1%) of side branch occlusion, 2 cases (22.2%) of coronary dissection, and 6 cases (66.7%) without complications. Jailed Semi-Kissing Balloon Technique (JSK BT) was applied in 6 cases (3.1%). There were no cases of side branch occlusion, while coronary dissection was reported in 1 case (16.7%). Five cases (83.3%) had no complications. Culottes Stenting was performed in 9 cases (4.6%). Side branch occlusion occurred in 2 cases (22.2%), and 7 cases (77.8%) experienced no complications. Referral to CABG

was the most frequent category overall, with 115 cases (58.7%). Other Techniques were done in only 1 case (0.5%), which resulted in side branch occlusion as show in **Table 4.4.**

Table 4.4 Bifurcation stenting techniques and their complication during procedure

Bifurcation Stenting Techniques	Frequency	%	Any complication during procedure			Total
			Side branch occlusion	Coronary Dissection	No complication	
1)Provisional Stenting	43	21.9%	3	7	33	43
2)Double kissing	13	6.6%	3	0	10	13
3)Tap stenting	9	4.6%	1	2	6	9
4)JSk BT	6	3.1%	0	1	5	6
5)Culotte stenting	9	4.6%	0	2	7	9
6)Refer to CABG	115	58.7%	1	6	108	115
7)Other technique	1	5%	0	1	0	1
Total	196	100%	8	19	169	196

For the assessment between two categorical variables location of bifurcation lesion which is (LAD with diagonal and LCX with obtuse marginal mainly and Type of lesion based on MEDINA classification which is (1,1,1 and 1,1,0) applied chi-square test Continuity Correction, Likelihood Ratio and Fisher's Exact Test. Phi and Cramer's V test also used to assess the strength and direction of association between these two variables, which is statistically significant (ρ=0.027), (Phi and Cramer's V 0 .433 and 0.250 respectively), as shown in Figure 4.3

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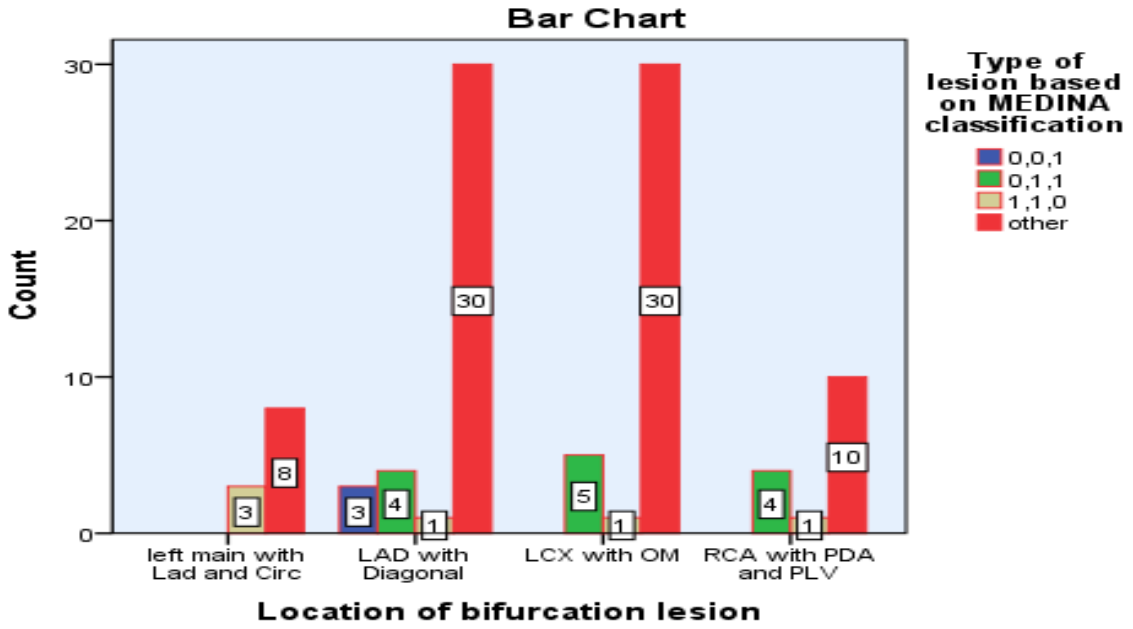

Table 4.3Location of Bifurcation lesion and Degree of stenosis

DISCUSSION

Our findings demonstrate that the most common location of bifurcation lesions is the (LCX) involving the obtuse marginal (OM) branch. This is consistent with the anatomical significance of the LCX and its branches, which are prone to atherosclerotic involvement due to hemodynamic stress and angulation.The highest frequency of bifurcation lesion was observed in LCX with OM, with a frequency of 72 of comprising of 36.7%. Among these 8.3% had a stenosis of 40-50%,while12.5 were in 50-60%range and a large proportion of,44.4%had a stenosis in main vessel between 70-80%. An international study conducted by the Department of Cardiology at Norfolk and Norwich University Hospital NHS Foundation Trust andNorwich Medical School, Bob Champion Research and Education, University of East Anglia, United Kingdom, found that the LAD artery, along with its diagonal branches, accounted for the majority of treated lesions. (63.4%) ,with 25.3% accounting for LCX with OM and 8% were of RCA with PDA and PLV .So our study found that most common here is LCX with OM and if we go towards internationally there is LAD with diagnoal involved mainly. Provisional stenting emerged as the preferred technique in our

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study, aligning with international guidelines that advocate for this method as the default strategy for most bifurcation lesions. The European Bifurcation Club (EBC) consensus document (2018) emphasizes the simplicity and effectiveness of provisional stenting, reserving complex two-stent techniques for select cases with true bifurcation lesions or significant side branch involvement. Our findings are consistent with studies by Ferenc . (2015) and Chen. (2020), which reported a high success rate and favorable outcomes with provisional stenting. However, the preference for this technique may vary in regions where operator experience or lesion complexity necessitates alternative approaches.

The predominant Medina classification subtype identified in our study was 1,1,1, indicating significant disease involvement in both the MV and SB. This finding is consistent with the pathophysiology of bifurcation lesions, where plaque distribution commonly affects all three segments. A similar distribution was reported in the BBC ONE trial (2011), where 1,1,1 lesions accounted for a substantial proportion of cases. Our results also resonate with data from Hildick-Smith et al. (2016), highlighting the challenges associated with this lesion type and the need for meticulous planning and execution during PCI.

When compared to international studies, the findings of our research is going against in most common location of bifurcation lesion objective and align or equal to with provisional stenting technique employed mainly for bifurcation lesion also align with Medina classification with 1,1,1.

The results of this study emphasize the need for tailored strategies in managing bifurcation lesions, considering the local population's anatomical and clinical characteristics. Our findings support the adoption of international guidelines while underscoring the importance of training and experience in optimizing outcomes for complex bifurcation lesions.

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Study limitation:

Limited Sample Size:

The relatively small sample size (196 patients) may restrict the generalizability of the findings to a broader population. Larger, multicentre studies are needed to confirm these results.

Lack of Advanced Imaging Modalities:

The absence of (IVUS) and (OCT) at our center limited our ability to obtain detailed imaging of bifurcation lesions, which could have provided more precise assessments of plaque distribution and stent placement.

Single-Center Design:

This study was conducted at a single tertiary care hospital, which may not reflect the practices and outcomes of other centres with different patient demographics and resources.

Potential Operator Bias:

As the study relied on operator-dependent decision-making for stenting techniques, there may have been variability in the choice and application of strategies, potentially influencing the outcomes.

Limited Follow-Up:

Due to the cross-sectional nature of this study, long-term follow-up on clinical outcomes was not feasible, limiting the ability to assess the durability and effectiveness of the preferred bifurcation stenting techniques.

Conclusion

This study highlights the LCX-OM as the most common bifurcation lesion location, provisional stenting as the preferred technique, and most preferred strategy is CABG ,and Medina subtype 1,1,1 as the predominant classification. These findings are in line with international studies and underscore the importance of evidence-based practices tailored to local contexts. Further research is recommended to explore long-term prognosis and refine management strategies for bifurcation lesions.

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