

ORIGINAL ARTICLE

# Clinical Outcomes of Unprotected Left Main Stem Stenting: An Observational Single-Centre Study.

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## Abstract

**Objective:** Percutaneous coronary intervention (PCI) with drug-eluting stents (DES) has become a common treatment approach for patients with unprotected left main stem (LMS) disease. This procedure involves the use of stents to open up blockages in the left main coronary artery, a critical vessel that supplies blood to a large portion of the heart. This study aims to know the clinical outcomes of percutaneous intervention (PCI) with drug eluting stents (DES) in patients with unprotected left main stem disease.

**Methodology:** This single-centre, prospective, observational study was conducted on 133 patients, who underwent PCI using DES to an unprotected LMS at Kuwait teaching Hospital Peshawar, between 2018 to 2022. Patients were followed in OPD and clinics or they were traced through calls at monthly and yearly intervals, after the procedure. A team, which comprised of a cardiac interventionist and a cardiac surgeon, scrutinised patients for the eligibility of either procedure. Ethical Committee approval was granted by the Institutional Ethics committee.

**Results:** At 1month follow up, the composite end point occurred in 13 (11.58%) patients, whereas individual secondary end points including death from all-cause mortality was reported in 5 (4.7%), stroke in 1 (0.9 %), MI in 4 (3.73 %) and repeat vascularisation in 3 (2.25%) patients. The annual incidence of composite end point occurred in 27.58%patients, whereas individual secondary end points including death from all-cause mortality was reported in 10 (8.27%), stroke in 3 (2.25 %), MI in 09 (6.76%) and repeat vascularisation in 11 (10.3%) patients.

**Conclusion:** PCI to LMS can be performed safely in centres having no cardiac surgery backup and newer imaging modalities with results comparable to the centres having the luxury of such facilities, provided that operators are skilled enough with sufficient expertise and knowledge.

## Keywords

Percutaneous Coronary Intervention, Drug-Eluting Stents, Left Main Stem, Stening.

## Introduction

Left main stem is classified as 'Protected' when the left coronary system is having a patent bypass graft, whereas lack of prior feature renders LMCA as unprotected<sup>1</sup>. In patients undergoing coronary angiography, about 3-5% of them are found to have Left main stem stenosis<sup>2</sup>. As the LMCA supplies blood to around 75% of the myocardium, hence, with a stenosis of 50% or more, the heart can be deemed to serious abnormalities in heart rhythm, impaired functions of left side of the heart and shock which may be fatal<sup>3</sup>.

Narrowing of the unprotected left main coronary artery (ULMCA) is a potentially life threatening situation, and thus, early revascularization strategy is the corner stone of management in such scenarios. The preferred method for revascularization, as endorsed by both the European and American guidelines, in ULMCA is CABG; specifically in cases with an elevated SYNTAX score, yet, percutaneous cardiac procedures are considered in people with low to intermediate syntax score<sup>4</sup>.

With improvement in quality of stents, expertise in intervention approaches and the use of anticoagulant drugs with time, the role of stenting in narrowed left Main Stem (LMS) has expanded from being restricted to life saving cases, to intermediate and lower risk group of patients, however, so far, Coronary Artery Bypass Grafting (CABG) modality of treatment in multi-vessel and LMS disease is well established with long-term follow-up care, yet, data in a long run from trials comparing CABG and PCI is still limited<sup>5</sup>.

Although, there are several studies present related to the performing interventions and its results in ULMCA disease, still there is deficient data on mid and long-term outcomes in Pakistani population. This prospective study was done to investigate the outcomes within the hospital and in the long run, in patients who encountered an stenting in an unprotected left main coronary artery.

## Methodology

This single-centre, prospective, observational study was conducted on 133 patients, who underwent PCI using DES to an unprotected LMS at Kuwait teaching Hospital Peshawar, between 2018 to 2022. The study population enrolled patients who have been through ULMCA stenting. Patients were followed in OPD and clinics or they were traced through calls at monthly and yearly intervals, after the procedure. Baseline clinical, angiographic and procedural details were obtained from the computer software having patient's records, OPD/clinic visits and telephonic source. A team, which comprised of a cardiac interventionist and a cardiac surgeon, scrutinised patients for the eligibility of either procedure. Ethical Committee approval was granted by the Institutional Ethics committee.

Patients with Stable angina pectoris (CABG refused by surgeons/patients), and unstable angina, Non ST elevation myocardial infarction, ST elevation myocardial infarction with narrowing of more than 70% in the LM coronary branch of aorta were included in the study. While, patients with severe co-morbidities having an anticipated life of less than 1 year and previous history Coronary bypass surgery were excluded.

Aspirin and clopidogrel was given as a loading dose to all patients undergoing the procedure, apart from those who were already taking anti platelets regularly. PCI was carried out by utilizing only drug-eluting stents. Disease in distal part of LM at bifurcation were secured with one or two-stent techniques and kissing balloon technique was done when two stents strategy was opted or at the will of interventionist, when using a single-stent strategy. IABP was kept standby for emergency purposes during the procedure. Recommended dose of Dual antiplatelet agents were prescribed for a minimum of 12 months after LM PCI.

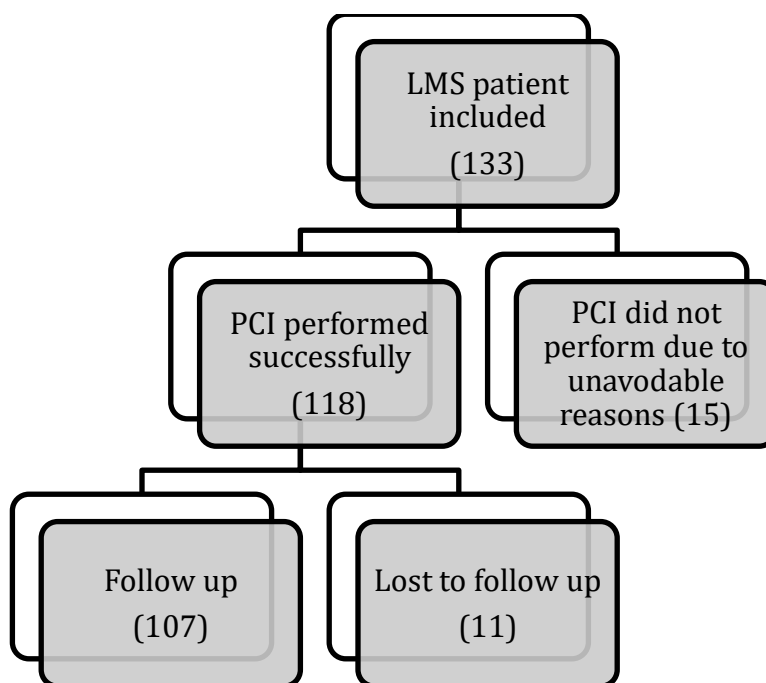
The study was structured to see, if PCI was superior or equal to CABG in terms of MACE happening at 1 month and year, respectively. The primary end point was the composite of myocardial infarction, stroke, repeat revascularization and death.

Secondary endpoints encompassed individual components of the composite outcome, cardiac death, stroke or any repeat revascularization.

## Results

Variables are showed as numbers and percentages and were analyzed using SPSS version 22. 133 LM-

PCI patients with a mean age of 59 +/- 12 were recruited in this analysis. Out of these male population was 55.14 %, 16.82% were diabetic, whereas 31.77 % were hypertensive and 28.97% were smokers. Apart from this 63.55 % of the patient had SIHD, while 29.9 % patients had ACS, depicted as baseline demographic variables in table 1.



**Figure 1: Flow Diagram of the Study**

**Table 1: Demographics of patients.**

Variables	Numbers (N=107)
Age	59 ± 12
	N (%)
Male	59 (55.14)
Diabetes Mellitus	18 (16.82)
Hypertension	34 (31.77)
Hyperlipidemia	21 (19.62)
Family History	18 (16.82)
Smokers	31 (28.97)
Stable Ischemic Heart Disease	68 (63.55)
ST-Elevation Myocardial Infarction (STEMI)	11 (10.28)
Non-ST Elevation Myocardial Infarction (NSTEMI)	21 (19.62)

Moreover, 26.2 % of patients were having LM-SVCAD, whereas LM-DVCAD was present in 33.6% and LM-TVCAD was present in 40.2 % patients, as shown in table 2.

**Table 2: Angiographic Characteristics.**

	N (%)
LMS ostium disease	32 (29.9)
LMS Shaft disease	12 (11.2)
LMS Distal Disease	63 (58.9)
SVCAD	28 (26.2)
DVCAD	36 (33.6)
TVCAD	43 (40.2)

Among them provisional stenting technique was performed in 58.9 % patients, while in 41.1% patients' bifurcation stenting strategy was opted, as displayed in table 3.

**Table 3: Bifurcation Technique.**

Types	N (%)
Provisional	63 (58.9)
DK crush	20 (18.7)
Mini crush	12 (11.2)
Culotte	12 (11.2)

At 1month follow up, composite end point occurred in 13 (11.58%) patients, whereas individual secondary end points including death from all-cause mortality was reported in 5 (4.7%), stroke in 01 (0.9 %), MI in 04 (3.73 %) and repeat vascularization in 3 (2.25%), as shown in table 4.

**Table 4: Follow up at 1 month.**

Outcomes	Numbers	Percentage
Myocardial infarctions	4	3.73
Repeat Revascularization	3	2.25
Stroke	1	0.9
Death	5	4.7

The annual incidence of composite end point occurred in 27.58%patients, whereas individual secondary end points including death from all-cause mortality was reported in 10 (8.27%), stroke in 03 (2.25 %), MI in 09 (6.76%) and repeat vascularization in 11 (10.3%), as shown in table 5.

**Table 5: Follow up at 12 months.**

Outcomes	Numbers	Percentage
Myocardial infarctions	9	6.76
Repeat Revascularization	11	10.3
Stroke	4	3.73
Death	10	8.27

## Discussion

Over time, improvements in bifurcation methods and stent quality have allowed us to intervene in LMS disease. In patients with substantial ULMCA

stenosis, various studies have shown that PCI to ULMCA with DES is efficacious with favourable in-hospital and in long run results[6].In addition, patients with left main stenosis now have better

results due to improved operator expertise, superior physiological assessment and imaging modalities[7].

Historically, CABG was used to treat left main disease. However, the analysis of the SYNTAX[8], PRECOMBAT[9], and COMPARE[10] studies has shown that stenting can be a feasible choice for individuals who have intermediate anatomic complexity[6]. The incidences of MACE and all-cause mortality between the PCI and CABG groups were not statistically different according to the ten-year PRECOMBAT[11] study data. Similar findings were made with the COMPARE trial's subgroup of patients with low or intermediate SYNTAX scores, which showed no statistically gross variation between both the PCI and CABG arms[12].

The major insight of this study is that, our non-surgical centre's unprotected LMS PCI achieved high success rates and positive clinical results. In general, percutaneous intervention with off-site surgical backup is routinely performed and has comparable results to PCI with on-site surgical cover[13]. Interestingly, 43% of all PCI procedures in the UK from 2017 to 2018 were completed in non-surgical facilities. Similarly, during the past 20 years, the UK's rate of urgent transfers for emergent CABG in patients receiving PCI has reduced dramatically, from 2.6 to 0.05%[14]. Driven by published findings from clinical trials, recent advancements in PCI technology, and operator expertise, the approach of percutaneous coronary intervention has been expanded to encompass LMS PCI, which has led to an increased success rate and safety profile[15].

No MI or in-hospital fatalities were observed in 86 patients who received PCI with DES to LMS in real-world research conducted in India by Ray et al[16]. MACE events were documented in 27.58% of patients at 1 year follow-up, including 10.27% of patients who died. The two variations between the current and the modern-world studies were that the sample size was small and STEMI patients were included, whereas they were not in the previous studies.

Overall, our results point to the feasibility, safety, and efficacy of unprotected LMS PCI at skilled nonsurgical centers.

There are a few restrictions on this study. Our data are not the outcomes of a randomised, controlled study; rather, they are determined by one-centre clinical experience and retrospective results. Due to the small patient population, statistical discrepancies between the various patient groups might have gone unnoticed. Various stent brands were used, which might have had an impact on the restenosis rate. Non availability of latest imaging technologies like IVUS and OCT along with in-hospital surgical backup were also among our major limitations

## Conclusion

PCI to LMS can be performed safely in centres having no cardiac surgery backup and newer imaging modalities with results comparable to the centres having the luxury of such facilities, provided that operators are skilled enough with sufficient expertise and knowledge.

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