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LEFT MAIN STEM PERCUTANEOUS CORONARY INTERVENTION OUTCOMES: AN EXPERENCE AT CHAUDHRY PERVEZ ELAHI INSTITUTE OF CARDIOLOGY MULTAN

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Contribution
KJ conceived the idea and designed the study. Data collection and manuscript writing was done by KJ, NA, MAKS, TA, IF, and JZ. All the authors contributed equally to the submitted manuscript.

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ABSTRACT

Objective: To determine the frequency of outcomes of left main stem percutaneous coronary intervention.

Methodology: After approval from the local ethical committee a descriptive study was conducted in Ch Parvez Elahi Institute of Cardiology Multan from January 2015 to June 2019. This study included 34 patients with unprotected left main stem (LMS) requiring percutaneous coronary intervention as decided in heart team meeting. Follow up data was taken during hospital stay and at 3 months after the index procedure for major adverse cardiac events MACE that were defined as death, myocardial infarction, repeat revascularization and stent thrombosis.

Results: Mean age of the patient was 56.8 ±6.6. Males were 30 (88.2%) and females 4 (11.8%). Death was observed in 3 (8.8%), MI in 2 (5.88%), stent thrombosis 2 (5.88%) and repeat revascularization in 1 (2.98%). Composite of all was seen 8 (23.5%)

Conclusion: Left main stem PCI is associated with favorable clinical outcomes in patients having less complex disease and high surgical risk. The local experience is encouraging and at par with existing data.

Keywords: left main stem, percutaneous coronary intervention

INTRODUCTION

Left main coronary artery disease (LMCAD) is a high risk coronary anatomy because of its supply of blood to left ventricle which ranges between 75% and 100%. This area of distribution of blood depends upon dominance of blood supply system either right or left. The blood supply of 84% of left ventricle myocardium is from left main stem (LMS) in case of left coronary dominance.[1] The percentage of significant LMS stenosis is 5-7% in patients who underwent coronary angiography.[2] LMCAD management is in most cases involve a discussion between heart valve team because of complexity of the disease. LMCAD is most commonly found in patients having multiple coronary artery disease risk factors and refractory anginal symptoms on treatment. Because of its high ischemic burden, current guideline recommendations are to revascularize the patient having ≥50% stenosis of the LMCAD which is considered significant.[3]

For coronary artery disease revascularization coronary artery bypass graft surgery and percutaneous coronary intervention are primary methods of revascularization. Currently Coronary artery bypass grafting (CABG) has been the gold standard for the treatment of LMCAD patients having low surgical risk and complex LMCAD. However, best strategy for the patient depends upon multiple factors including operative risk, completeness of revascularization achieved and long term outcomes after the procedure.[4,5] But there is evolution of research for the right strategy for revascularization. PCI is increasingly used to treat LMS and considered an alternative to surgery in patients with high surgical risk and high scores in surgical risk predictor scoring systems. However clinical outcomes are not similar in all cases, so one size does not fit all. Results can vary according to LM lesion site and its complications and many other factors. Just in case disease is limited to LM ostial and shaft segments than the outcomes are less bad as compared to the distal LM bifurcation disease. PCI in later case due to increased procedural complexity is associated with less favorable outcomes.

For distal left main disease involving bifurcation, surgery is most favored. PCI when selected usually take elective two stent strategy. There are a number of factors considered in selecting optimum two stent strategy which include LM anatomy and operator expertise. Currently DK crush is found to have better long term results.[6] Syntax score is a grading tool for determining the complexity of CAD which is used by physicians to help guide the treatment strategy. Lower the score, more the disease is considered suitable for PCI. According to the recent American and European revascularization guidelines, a physician's choice to decide PCI or CABG for LMCAD treatment is influenced by various factors. It depends upon the patient's own choice, co morbid conditions, the complexity of their disease, anatomical and surgical risk scores.

PCI is being done for the ostial, mid shaft and distal bifurcation sites. The use of intra aortic balloon pump (IABP) is reserved for the very high risk patients only and is decreasing because of more use of impella device.[7]

With the background of evolving research and experiences for LMCAD PCI, the current descriptive study was conducted to assess the outcomes of PCI on left main stenting among patients at 3-month follow-up at Chaudhary Pervez Elahi Institute of Cardiology Multan (CPEIC).

METHODOLOGY

After approval from the local ethical committee a descriptive study was conducted in Ch Parvez Elahi Institute of Cardiology Multan from January 2015 to June 2019. This study included all the patients with unprotected left main stem (LMS) requiring percutaneous coronary intervention.

CPEIC receives patients from all regions of Pakistan. This study includes 34 patients who presents with myocardial ischemia assessed on symptoms and non invasive stress test results and found to have greater then 50% stenosis of left main coronary artery (LMCA) on angiography. Informed consent was taken from every patient. A heart team meeting was conducted for every case to decide about treatment strategy. Patients whose decision were PCI for LMCAD included in the study. The procedure was performed by experienced Consultant cardiologist. Patients Information regarding study were collected using predesigned

performa comprising of base line data of patient medical history, clinical presentation, interventional procedure data and clinical course during hospital stay.

Follow up data was taken during hospital stay and at 3 months after the index procedure for major adverse cardiac events MACE that were defined as death, myocardial infarction, repeat revascularization and stent thrombosis within 90 days. Patients were prescribed to take lifelong monotherapy with 150mg acetylsalicylic acid in combination with 75mg clopidogrel for at least 6 months in case of receiving a DES. The primary endpoint of this study is clinical safety, defined as a composite of all cause death, myocardial infarction, repeat revascularization and stroke.

Collected data were analyzed using SPSS 18.0. Quantitative variable like age were measured by Mean ± Standard deviation. Qualitative variables like gender, myocardial infarction, stroke, death, in stent restenosis, have been presented as frequency and percentage. Confounding variables like age, gender and PCI outcomes were controlled by stratification.

RESULTS

Mean age of the patient was 56.8 ±6.6. Males were 30 (88.2%) and females 4 (11.8%)

In this study 34 patients were included who went through LMS stenting, out of these, 32 had unprotected LM and 2 had previous history of CABG. At the time of presentation, 23 patients (67.6%) had left main stem disease while 2 patients required stenting as an emergency treatment. other 9 patients presented were suffering through acute coronary syndrome (ACS).

Mean follow-up duration was 88.5±6.5 days. Before proceeding towards PCI cardiothoracic surgeons were consulted for possible CABG requisite. But 32.3% (11 cases) patients were not considered suitable for CABG because these patients were significantly older, had hemodynamic instability, lower SYNTAX and residual SYNTAX scores and had more prevalence of previous PCI and CABG history compared to the other patients. Considering the risk, patients and families preferred LM PCI over CABG in (67.6% cases, 34 patients). Predominantly LM PCI was performed through radial route in 58.8% patients (20 patients), while in 41.4% (14 patients) by femoral route. On the other hand some patients 32.35 % (11 cases) required PCI to other vessels along with LM.

The Baseline characteristics of patients are given in Table 1 and procedural details of PCI are given in Table 2.

Table 1: Baseline characteristics of patients

Baseline characteristic	N (%)
No of patients	34
Age (years)	56.8 ±6.6
Male	30(88.2)
Female	4 (11.8%)
Unprotected LM	32(94.11)
Risk Factors	
Hypertension	29(85.2)
Dyslipedemia	18(52.9)
Diabetes	16(47)
Smoking	25(73.5)
CKD	4(11.7)
LV Dysfunction	18(52.9)
Mean LV EF	46%
Presentation	
STEMI	14(41.1)
Non STEMI	20(58.8)
Angina	25(73.5)
Cardiogenic shock	12(35.2)
Cardiac Arrest	3(8.8)

CKD: Chronic kidney disease; LV dysfunction: EF <40% at the time of PCI; STEMI: ST elevation myocardial infarction; NSTEMI: Non ST elevation myocardial infarction

Table 2: Procedural factors

Factor	Summary
Emergent PCI	2(5.8)
PCI of other vessels along with LM	11(32.5)
Type of Stents	
Drug eluting stents	34(100)
Bare metal stents	0
Covered stent	0
Complications during PCI	
Dissection	13(38.2)
No reflow	1(2.9)
Distal LM PCI	23(67.6)

Ostial LM PCI	7(20.5)
Distal plus Ostium	3(8.8)
PCI Technique	
IVUS	10(29.9)
IABP placement	15(44.1)
TPM placed	7(20.5)
Inotropic support	9(26.4)

Follow up done 90days, showed mortality in 03 patients out of 34 which is 8.8 percent. Although autopsy was not performed in any case but apparently deaths occurred confirmed by telephonic follow up of patients at 90 days. Any of these mortalities did not happen during the mean 4.36 ±2.4 days stay of hospital. Mean age of patient was 56.82±13.3 years. Among 34 patients who were discharged from the hospital, only 2 patients had sub acute stent thrombosis 5.88% during hospital stay and both of them died afterwards. Two patients required repeat vascularization.

Distal LM stenting is a very complex and challenging procedure because it is done to complex LM bifurcation lesion. In this study, 23 patients (67.6%) underwent PCI to distal LMs. Among 9 patients who had ACS distal PCI done in all 9 (10.4%) and one of them underwent TLR later and one of them died. Four (11.76%) patients showed in-stent restenosis (ISR) in left main stent on subsequent angiograms. All patients developing ISR had distal LM stenting with LM-LAD crossover technique applied in two patients and bifurcation stenting done in two patients by mini crush bifurcation technique. All patients developing ISR had DES implanted with a mean diameter of 3.13 ±0.47 mm with post-dilatation performed with a mean balloon size of 3.0 ±0.40 mm.

Table 3: Results and composite end point

(n=34)	Total patients	%
Death	3	8.8%
Myocardial infarction	2	5.88%
Repeat revascularization	1	2.98%
Stroke	0	00
Composite of above (MACC)	6	17.66%

Only one patient suffered from myocardial infarction which is 3 percent of total patient under study. So the rate of composite (death, MI, repeat revascularization, stroke) endpoints was 17.66%. All the remaining patients were angina free.

DISCUSSION

In interventional cardiology, LMCAD PCI is always challenging but growing expertise and newer equipment has made the procedure less complex in many cases. Previously, the older practices were used and not very established because medical therapy was not evolved and established like antiplatlets and technological advancement in invasive procedures for assessment of stenosis severity were absent. First PCI was performed as replacement to CABG in 1980. Although PCI has become a common method in past few years due to 85 to 90 % short term symptomatic relief, still CABG is considered gold standard for LMCAD[8] in many cases. CABG is preferred over PCI like in patients with multi vessel coronary artery disease due to enhanced risk of myocardial infarction during PCI, at the expense of a slightly increased possibility of stroke during CABG consequently.[9] PCI is recommended when an unprotected left main coronary artery is a possibility and CABG is not an appropriate option for patient. PCI is also a preferred option for protected LMCAD as second CABG carries very high mortality.[10-12]

In this study, at the follow up 3 patients were dead which means average mortality rate of 8.8%. Mortality rate is not only dependent on the PCI procedural complexities but also the severity of the patient's illness at the time of presentation. Most of the deaths after percutaneous revascularization were because of cardiac reasons and a smaller proportion of deaths were observed as a result of PCI. There are various factors associated with PCI which cause the deaths in patients for example, advanced age, comorbidities e.g. diabetes, CKD, congestive heart failure, multivessel CAD, high-risk lesions, and the setting of PCI e.g. urgent or emergency procedure, cardiogenic shock. Only one patient died due to stent thrombosis so the rate of PCI related deaths was 2.9%. Acute procedural complications were not very common. In this large tertiary care center that deals with high risk patients, rate of death due to both cardiac and non cardiac reasons is decreasing. In this particular study number of overall deaths related to PCI was low which is very promising. Most of the deaths occurred when patients were discharged from hospital, one patient who died in hospital was in very critical condition with acute MI at the time of presentation.

As mentioned above one patient died due to stent thrombosis, this could be explained that PCI with coronary stenting should not be performed on the patients who are not likely to be able to comply with dual anti platelet therapy (DAPT) for the appropriate duration of treatment based on the type of stent implanted. The risk of stent thrombosis is increased dramatically in patients who prematurely discontinue DAPT and stent thrombosis in turn is associated with death. An important consideration in deciding whether to use PCI is to review patients for the fact that whether they can take long term antiplatlets. DES patients require at least 12 months of DAPT to avoid late stent thrombosis. Outcomes of Percutaneous coronary interventions (PCI) are being improved by drug eluting stents and intensive secondary prevention but repeat revascularization still remains common in these patients.

Syntax trial was a land mark study conducted on LMS PCI and compared it with CABG showed mortality of 4.4% at one year. Comparing to our study, mortality was seenin 3 patients (8.8%). Observed difference could be due to shorter follow up of our patients at 3 month and more complex patient disease pattern in SYNTAX trial. Repeat revascularization in SYNTAX was observed in 13.5% of patients and in our patients, it is only seen in 2 patients (5.88%) which is lower than SYNTAX results.[2] Combined MACC was 17.8% in SYNTAX and 17.66% in our study population mainly driven by death 8.8%.

Both careful patient selection and improvements in PCI technology, techniques, and adjunctive therapies will have a favorable impact in the future. The main limitation to this study is that patients did not have angiographic follow up and short time period during which Major adverse outcomes are observed.

CONCLUSION

Left main stem PCI is associated with favorable clinical outcomes in patients having less complex disease and high surgical risk. The local experience is encouraging and at par with existing data.

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