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Acute and Long Term Outcomes of Coronary Intervention in Unprotected Left Main Lesions

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Introduction: Significant left main coronary artery stenosis jeopardizes the entire myocardium of the left ventricle and has the worst prognosis of any form of coronary artery disease. Coronary-artery bypass grafting (CABG) has been considered as the standard therapeutic approach for such patients. There are limited data on the safety and effectiveness of percutaneous coronary intervention (PCI) in patients with unprotected left main coronary artery disease. In this study we have reported our experience on early, intermediate and long term results of LMC intervention.

Materials and Methods: From Dec. 2007 to Mar. 2012, PCI with drug eluted stent (DES) or in some cases by a bare stent was performed on de-novo lesions of unprotected left main coronary artery in 50 patients. The inclusion criteria were: patients having refused CABG but with favorable anatomy for stenting; patients with poor general condition or comorbidity whom were refused by the cardiac surgeon and emergent patients for whom CABG was not accessible.

Results: The angiographic and procedural success rate was 100%. Four patients died, two because of severe heart failure, the third due to noncardiac etiology, and the fourth due to probable stent thrombosis. We have one target lesion revascularization (TLR=2%) and no reinfarction was occurred.

Conclusion: Routine DES implantation in unprotected left main disease seems a feasible and safe method with favorable outcomes.

Introduction:

The range of left main coronary artery (LMCA) disease in patients for whom coronary angiography is performed is from 2.5% to 10% (1,2). On the basis of current guidelines, coronary artery bypass graft (CABG) is recommended to improve survival in patients with significant LMCA stenosis (>50%) class1; level of evidence (LOE): and percutaneous coronary intervention (PCI) is an alternative to CABG for improving survival in selected stable patients with significant (>50%) stenosis, class IIa, level of evidence (LOE): B. (7) Unprotected LMCA intervention (UPLMI) with drug eluted stent (DES) has been recently reported as being feasible and having favorable outcomes. (3-6) However, in practice, there is no consensus on the best treatment strategy (PCI or CABG) for different types of LMCA disease among cardiologists and yet most patients with LMCA disease are referred for CABG. In our country we do

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not have any reports on UPLMI, thus we decided to report our own experience about early and long term outcome of UPLMI.

Materials and Methods:

In a retrospective and cross-sectional study conducted from Dec. 2007 to Mar. 2012, PCI with DES or in some cases with a bare metal stent was performed on de-novo lesions of ULMCA in 50 patients.The inclusion criteria were: patients having refused CABG but with favorable anatomy for stenting; patients with poor general condition or comorbidity whom were refused by the cardiac surgeon and emergent patients for whom CABG was not accessible. Unprotected LMCA stenosis was defined as >50% in diameter stenosis with no patent graft on the left anterior descending artery (LAD) or the left circumflex artery (LCX). The decision making for whether doing PCI or CABG is based on its surgical risk and/or the patient's preference. Some of the studied patients underwent primary intervention for acute myocardial infarction (AMI). All patients were prepared with dual antiplatelet therapy before the procedures and heparin (70–100 U/kg) was administrated during the procedure. The post-stenting regimen included aspirin and clopidogrel or ticlopedine for at least 3 months for the bare metal stent (BMS) and 12 months for the DES cases.The choice between DES and BMSwas depended on the economic state of the patient and the availability of the stent. All PCI procedures were done with the femoral approach. Procedural success was defined as achieving a final stenosis diameter of <20%, without any major periprocedural complications (death, MI, or repeated revascularization during hospitalization). Follow-up angiography was recommended after a period of 6 to 12 months, after the intervention or in case the patient developed recurrent angina chest pain.Q-MI was defined as a new pathological Q-wave on ECG with an increase in the creatine kinase-MB (CK-MB) level above the upper normal limit. An increase of CK-MB or troponin I (TPI) more than the upper normal limit without a new pathological Q-wave on electrocardiography (ECG) was defined as non-Q-MI. Target lesion revascularization (TLR) was defined as any revascularization performed for any new or recurrent lesion within 5 mm of the stent edges. Target vessel revascularization (TVR) was defined as any reintervention or surgical bypass of any segment of target vessel. Stent thrombosis was determined as acute, subacute, late, and very late if the event occurred within 24 h, 30 days, <1 year, or >1 year, respectively, after theprocedure. Major adverse cardiac events (MACE) were defined as death, Q- and non-Q-MI, or TLR. Death was attributed to cardiac death unless proven otherwise.

Results:

The study subjects were 50 patients (29 males and 21 females), that had inclusion criteria for whom unprotected LMCA intervention was done.Mean age of the patients was 64.8±10.7 years. The mean body mass index (BMI) was 25 ± 3.8. Non-insulin dependent diabetes mellitus (NIDDM) was detected in 28%of the patients, insulin dependent diabetes mellitus (IDDM) in 8%, and previous MI in 30%. The baseline characteristics are listed in Table 1.Most of the patients had LM and single vessel disease (40%), whereas LMCA bifurcation involvement was common (54%). The LM diameter was 3.6±0.36mm.The mean syntax score was27.47±8.20 and the mean euro score was 4.5±2.3. Table2 has summarized the procedural characteristics of the studied cases. All the procedural success rate was 100%. The LMCA lesions were treated with either BMS (35%) or DES

(65%).The mean stent size was 3.6±0.36 mm and the length was 14±7 mm. The overall clinical outcomes are presented in table 3.

Table 1: Baseline characteristics of the study population

	Patient (=50)
Age (years)	64.8±10.7 mean±SD
Men	29 (58%)
BMI	25 ±3.8 mean±SD
Smoker	6 (12%)
Hypertension (▫ 140/90 mmHg)	51.5±(6.26%) mean±SD
Hyperlipidemia	28 (56%)
NIDDM	14 (28%)
IDDM	4(10%)
Chronic renal insufficiency	2 (4%)
Previous MI	15 (30%)
Previous PCI	11 (22%)
Unstable angina pectoris	23 (46%)
LVEF before PCI	45.3% ± (9.3%) mean±SD
LVEF after PCI	25 (50%)

BMI: body mass index,
NIDDM: noninsulindependentdiabetesmellitus,
IDDM: insulindependentdiabetesmellitus,
PCI: percutaneous coronary intervention,
LVEF: left ventricular ejection fraction

Seven patients (14%) had two stent in the left main coronary artery.The number of stents in each patient was 2.32± 1.05. There was a significant difference between the ejection fraction (EF) before (45.3±9.3) and after UPLMI (51.5±6.25) ($p<0.001$). No mortalities occurred during the surgical procedure. The patients were followed-up for 379±309 days ranging between 30 and 1440 days. For twenty one (41%) patients angiography was done in the follow up period .There was a period of 19.14±12.2 months between PCI and second angiography. Three cardiac deaths occurred (6%) on the 3rd and 4th post-procedural days, and one other death took place due to non-cardiovascular etiology (2%) two years later. There was 1 TLR. Hence the TLR rate was 2%. In total the Major adverse cardiac effect(MACE) rate was therefore 6%.

Table2:Angiographic characteristics of the study population

Stenotic vessel	
Left main coronary only	3(6%)
Left main coronary and 1 vessel	20(40%)
Left main coronary and 2 vessel	17(34%)
Left main coronary and 3 vessel	9(18%)
Right coronary artery involvement	15(30%)
Location of left main stenosis	
Ostium or mid Shaft or both	20(40%)
Bifurcation	27(54%)
LM size	3.6 ± (0.36)
Lesion length (mm)	14 ± 7

LM:Left main

Discussion:

Clinical outcomes after ULMCI have been shown to vary according to the clinical and angiographic features.(3–5). In-hospital mortality was 0–4% in the literature (6). In meliga et al study 358 patient who underwent PCI with DES for ULMC were selected and all patients had a minimum follow up of 3 year .Technical success rate was 100%.Procedural success was 89.6%. Cardiac death occurred in 9.2%.TLR and TVR occurred in 5.8%, 14.2% respectively (10). In xue mingwu

and et al study 55 consecutive patients with >50% diameter stenosis of LMCA undergoing PCI were analyzed. The procedural success rate was 98%.There were no in-hospital deaths. The clinical follow-up time was 867±410 days (range 20–1715). Eighteen patients (29%) experienced major adverse

Table3:Cumulative clinical outcomes and angiographic follow-up results

Variable	
Angiography follow-up	18(36%)
In-hospital outcomes	
Death	3 (%6)
Cardiac death (%)	3(6%)
MI (%)	(0%)
TVR (%)	1 (2%)
TLR (%)	1(2%)
MACE (%)	3(6%)
Long term outcomes	
Follow-up (days)	379±309
Death (%)	4(8%)
Cardiac death (%)	3(6%)
MI (%)	0
TVR (%)	1(2%)
TLR (%)	1(2%)
MACE (%)	3(6%)

TVR: Target Vessel Revascularization;
TLR: Target Lesion Revascularization;
MACE :Major Adverse Effect

cardiac events, including 3 (5%) deaths, 4 (7%) myocardial infarctions, and 12 (21.8%) target lesion revascularizations (TLR) during follow-up.(9) In Wie - Syun HU and et al study 122 patients who received coronary stenting for ULMCA diseases were included. During the follow-up period of 45 ± 35 months (range: 1–137 months) cardiovascular and total mortality were 20% (24 patients), and 25% (31 patients), respectively. Only lower left ventricular ejection fraction (LVEF) could predict both cardiovascular mortality and total mortality. Lower LVEF and small stent size could predict the composite endpoint, including target vessel revascularization and total mortality (11). In our study 50 patients who received Coronary stenting for ULMCA diseases were included. Procedural success was 100%.During the follow-up period of 379±309 days ranging between 30 and 1440 daysno in-hospital mortality was seen in our patients, but there were 3 early deaths indicating that the high risk nature of unprotected LMCA PCI should be concerned and discussed thoroughly with the patients and surgeons prior to intervention. The TLR rates after the ULMCI ranged between 2 and 38%, depending on the lesion complexity (9). Despite the complex characteristics of our study, the TLR was 2%.

Conclusion:

Our report added to the existing evidence that PCI with stenting may be an acceptable therapeutic option for patients with unprotected LMCA stenosis.

Study limitations:

UPLMCA intervention in this study was not randomized with CABG because this procedure is in evolution and it's too soon for randomization, as compared to established technique, such as CABG.

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Conflict of Interests:

The authors have no conflict of interests.

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