Original Article

Left Main Coronary Artery Disease: traditional risk factors in a study from northwest of Iran

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Abstract

Background & Aims: Significant left main coronary artery disease (LMCAD) is found in 3 to 6 percent of all patients who undergo coronary arteriography. LMCAD usually requires an emergent surgery that has a higher rate of mortality and complications. The risk factors of left main involvement in previous studies are controversial. The aim of this study was to determine the traditional risk factors for left main coronary artery disease.

Materials & Methods: From March 2014 to March 2016, data of all patients with isolated primary on-pump Coronary artery bypass graft (CABG) in the Seyed-al-Shohada cardiovascular center were collected. Coronary artery disease major risk factors and echocardiography and coronary angiography data's were recorded.

Results: OF 895 patients that underwent CABG during a two year period, 145 cases (16.2%) were in left main (LM) group and 750 cases (83.8%) were in Non-left main group. The mean age for patients in LM group was 59.8 ±8.7 years and it was 60.5±10 in NON LM group. The prevalence of male gender (84.1 vs. 71.2%), dyslipidemia (46.9% vs. 24.9%) and smoking (61.4% vs. 45.3%) were more common in LM group. The prevalence of diabetes (42.1% vs. 36.9%), hypertension (49.7% vs. 54%), Family history of CAD (24.1% vs. 18.4%) and mean BMI (26.1 vs. 26.8) were not significantly different between two groups.

***Conclusion*:** This study showed that age differences did not exist between patients with LMCAD in and without LMCAD. However, the frequency of male sex, Dyslipidemia and Smoking were significantly higher in the LM group. Valvular heart diseases were less common in patients with LMCAD.

Keywords: Left main coronary artery disease, coronary risk factors, Coronary artery bypass grafting, coronary angiography.

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Introduction

Significant left main coronary artery disease (LMCAD) is found in 3 to 6 percent of all patients who undergo coronary arteriography. It is associated with multi vessel coronary artery disease about 70 percent of CAD patients (1, 2,3).

Occlusion of left main coronary artery compromises flow to at least 75 percent of the left ventricle, unless it

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is protected by collateral flow or a patent bypass graft to either the left anterior descending coronary artery or circumflex artery. Without revascularization, three-year survival is as low as 37 percent and the benefit of revascularization was greatest in high-risk patients with greater than 75 percent left main stenosis and/or left ventricular dysfunction(4).

Coronary artery bypass surgery is considered as the gold standard treatment for unprotected left main coronary artery disease (ULMCAD) (5), but PCI for LMCAD might be an alternative to CABG surgery in patients with significant comorbidities increasing their surgical risk if the patient is willing to accept the higher incidence of repeating revascularization(6,7).

Prevalence of LMCAD in a study of 10,647 patients who underwent a first isolated CABG, during 1970 to 1999 was 18% (1888 patient) (8).LM usually requires an emergent surgery that has a higher rate of mortality and complications. Surgical mortality in left main disease is 3%, which is in sharp contrast to 1.8% mortality in patients undergoing surgery without LMS (9, 10).

In order to prevent or reduce the incidence of LM disease, it is necessary to determine the dominant coronary artery disease risk factors in these patients. Traditional and well-known coronary risk factors are smoking, dyslipidemia, hypertension, diabetes mellitus, advanced age, family history of CHD, obesity and male gender but whether these risk factors are different between CAD with LMCAD and CAD without LMCAD is controversial in the previous studies (3, 8). The present study was conducted to determine the relationship between coronary artery risk factors and LMCAD.

Materials and Methods

In this retrospective and cross-sectional study, from March 2014 to March 2016, data of all patients with isolated primary on-pump CABG in the Seyed-al-Shohada cardiovascular center were collected. Our heart center is the only referral hospital in West Azerbaijan province with three million population in northwest of Iran. Our study was approved by the ethics committee at Urmia University of Medical Sciences (ir.umsu.rec.1395.263). Coronary artery disease major risk factors including a history of cigarette smoking, dyslipidemia, hypertension, diabetes mellitus, advanced age, family history of CHD, obesity, and male gender were recorded.

The definitions of risk factors were adopted from Society of Thoracic Surgeons (STS) National Cardiac Surgery Database guidelines. Data related to echocardiography and coronary angiography were recorded.

Angiographically significant LMCAD stenosis was defined as percent diameter stenosis of 50% or more of luminal diameter of the left main coronary artery. Quantitative values were compared using t-test for independent variables, and for categorical data, Chi-square and Fisher's exact tests were applied.

Results

Of 895 patients that underwent CABG during a two year period, 145 cases (16.2%) were in LM (with left main involvement) group and 750 cases (83.8%) were in Non LM (without left main involvement) group. The mean age for patients in LM group was 59.8 ±8.7 years and it was 60.5±10.2 in Non LM group (p=0.49). Forty nine patients(33.8%) in LM group and 182 patients(24.3%) in Non LM group were under 55 years. Eighty two patients (56.5%) in LM group and 443 patients (59%) in Non LM group were in the 55-70 years age group. Fourteen patients (9.7%) in LM group and 125 patients (16.7%) in Non LM group were older than 70 years (p= 0.01).

Prevalence of coronary risk factors in all patients was; old age(>60 years) in 48.9%, gender(male) in 73.3%, dyslipidaemia in 28.5%, diabetes mellitus in

37.8%, hypertension in 53.3%,smoking in 47.9%, FH(family history of CHD) in 19.3%, BMI (body mass index)>25 in 61.1%. Hypertension, diabetes mellitus, hypercholesterolemia and obesity were higher in females, but smoking and positive Family history were higher in males. The prevalence of diabetes mellitus, Dyslipidemia and obesity were more common in under 55 year's age group. Comparison of Coronary Risk Factors and BMI in two groups of study are shown in Table 1, 2. Mean BMI in LM group and Non LM group was 26.1 and 26.8, respectively.

Table 1. Association between LMCAD and the coronary risk factors

	LMCAD stenosis (n = 145)	No LMCAD stenosis (n = 750)	P value
Old age(>60years)	69(47.6%)	388(51.7%)	0.2
Gender(male)	122(84.1%)	534(71.2%)	0.01
Dyslipidemia	68(46.9%)	187(24.9%)	0.001
Diabetes mellitus	61(42.1%)	277(36.9%)	0.14
Hypertension	72(49.7%)	405(54%)	0.19
Smoking	89(61.4%)	340(45.3%)	0.001
positive Family history	35(24.1%)	138(18.4%)	0.07
BMI>25	93(64.1%)	454(60.5%)	0.23

Table 2. Association between LMCAD and BMI

	LMCAD stenosis (n = 145)	No LMCAD stenosis (n = 750)	P value
BMI<18.5	0/145(0%)	19/750 (2.5%)	0.06
BMI 18.5-25	52/145(35.9%)	277/750 (37%)	0.39
BMI 25-30	72/145 (49.6%)	241/750 (32.1%)	0.001
BMI 30-35	21/145 (14.5%)	179/750 (23.9%)	0.24
BMI > 35	0/145 (0%)	34/750 (4.5%)	0.005

Single vessel disease in LM group was more common. Ejection fraction (EF) more than 45% in LM group and EF less than 45% in Non LM group were dominant ($p<0.05$).Moderate mitral regurgitation (MR), moderate aortic insufficiency(AI) and moderate tricuspid regurgitation(TR) were less common in LM group. Comparison of echocardiography and coronary angiography findings in two groups of study are shown in Table 3, 4, and 5.

Table 3. Association between LMCAD and the number of involved vessels

	Single vessel	Two vessels	Three vessels
LMCAD stenosis	21/145 (14.5%)	19/145 (13.1%)	105/145 (72.4%)
NoLMCAD stenosis	33/750 (4.4%)	139/750 (18.5%)	578/750 (77.1%)
P value	0.001	0.07	0.13

Table 4. Association between LMCAD and the EF

	EF<30%	EF 30-45%	EF 45-60%	EF>60%
LMCAD stenosis	2/145(1.4%)	33/145 (22.7%)	109/145 (75.2%)	1/145 (0.7%)
No LMCAD stenosis	53/750(7%)	296/750 (39.5%)	365/750 (48.5%)	36/750 (4.8%)
P value	0.01	0.001	0.004	0.01

Table 5. Association between LMCAD and valvular heart disease

	LMCAD stenosis (n = 145)	No LMCAD stenosis (n = 750)	P value
Moderate MR	9/145(6.2%)	179/750(23.9%)	0.001
Moderate AI	2/145 (1.4%)	24/750 (3.2%)	0.008
Moderate TR	7/145 (4.8%)	64/750 (8.5%)	0.008
Moderate PI	0/145 (0%)	2/750 (0.25%)	0.7
Moderate to severe LVH	20/145 (13.8%)	124/750 (16.5%)	0.24

Discussion

Left main coronary artery disease (LMCAD) is the highest-risk lesion type of ischemic heart disease, and has traditionally been an indication for CABG (11).

Prevalence of Significant LMCAD is 3 to 10% in patients undergoing coronary angiography (12). Isolated and pure LMCAD is less than 1% in patients undergoing catheterization (3,13).Its prevalence in patients undergoing first isolated CABG is 4-18%(8, 14). In our study, the prevalence of LMCAD in all the patients undergoing first isolated CABG, was 16.2% and consistent with previous studies.

In a study, the proportion of all CABG patients with LMCAD increased from 7% during the 1970s to 26% in 1999 and during the study period, the average age of patients with LMCAD undergoing CABG increased nine years(8). The mean age for patients with LMCA stenosis was 55-69 years in different studies (15, 16). Association between advanced age and the presence of LMCAD is equivocal, while in some studies age is considered a coronary risk factor for LMCAD (8, 17), it is not true in most of the studies (3, 15). In our study and in LM group, patients under 55 years old were more common and patients older than 70 years were less common. This shows that mean age of patients was not different in two groups, but younger patients were more common in LM group.

Male gender is considered as a coronary risk factor for LMCAD with more than 70% prevalence. The percentage of male patients is higher in some studies (9), but in other studies it is not different between two groups (16, 17). Only in one study, the percentage of male patients is lower (48% vs. 69%) in patients with LMCAD (13). Although isolated LMCAD is more common in females (3, 13).

The role of diabetes, hypertension, dyslipidemia and Smoking as risk factors for LMCAD are controversial with prevalence of 13.6-61%, 22-72%, 30-82.5% and 13-55%, respectively in various studies. The prevalence of diabetes, hypertension, dyslipidemia and Smoking is not different between two groups in some studies (3,13,15). The prevalence of diabetes (17,18), dyslipidemia (8,19), smoking(18,20) is higher in some studies. In one study, the prevalence of hypertension,

dyslipidemia, and smoking in patients with LMCAD is less common (21).

The prevalence of family history of CAD is 12-47% in different studies. While it is not evaluated in several studies, the prevalence of CAD is not different in the two groups in rest of the studies (3, 13, 15, 21).

The prevalence of obesity is 20-39% in various studies. In most studies, it is not different in the two groups (8, 20). In one study, the prevalence of obesity in LMCAD patients is less common (14). This study suggests that obese patients are more likely to be referred for CABG in earlier stages of coronary involvement. In our study, overweight LMCAD patients (BMI: 25-30) and patients with obesity (BMI >30) in Non LM group were more common, although mean BMI in two groups was 26.1 and 26.8, respectively.

Overall, the patients in LM group were more likely to be male with dyslipidemia and cigarette smoking habits.

About number of obstructed coronary vessels, Anders Jo¨nsson et al. showed that three-vessel disease in LMCAD patients was more common(69.7% vs 26.6%).In another study, the prevalence of three-vessel disease in LMCAD patients in CABG group was 60.9% and 15.8 in PCI group(22). In our study, three-vessel disease was not different between two groups.

We found that majority of the patients with significant LMCAD had ejection fraction 45-60%.This is consistent with previously published literature (16,22).Jean-François Légaré et al. revealed that one of the independent predictors of poor outcome for CABG surgery among patients with LMCAD was ejection fraction of less than 40% (23).Anders Jo¨nsson et al. and Eduard Claver et al. showed that mean Left ventricular ejection fraction of LMCAD patients was less than Non LMCA patients (8,17). In another study, the prevalence of patients with LMCAD with ejection fraction of less than 30% was 14.5% (9).In our study, the number of patients with ejection fraction of less than 30% was significantly low in LMCAD group(1.45 vs. 7%).

About concomitant moderate valvular heart diseases, the mitral regurgitation, aortic insufficiency and tricuspid regurgitation were more common in LM group, but pulmonary regurgitation (PI) and moderate to severe left ventricular hypertrophy (LVH) were not different between two groups. The lower incidence rate of valve problems and low EF in LMCAD patients can be due to the early diagnosis of the disease.

Conclusions

This study showed that age differences did not exist between patients with LMCAD and patients without LMCAD. The frequency of male sex, dyslipidemia and smoking were significantly higher in the LM group. The prevalence of diabetes, hypertension, family history of CAD and high mean BMI was not different between two groups. Valvular heart diseases such as MR, AI and TR were less common in patients with LMCAD.

Conflict of interest statement:

The authors have no conflict of interest to disclose.

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