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Original Article

Incidence, predictors, clinical profile, management and outcome of patients with isolated left main coronary artery ostial disease

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ABSTRACT

Objectives: Isolated left main coronary artery (LMCA) ostial disease is a rare variant of LMCA disease. Earlier studies on this disease are limited by small number of patients enrolled. The aim of the present study was to analyze the incidence, risk factors, clinical profile and long term outcome of patients with isolated LMCA ostial disease. **Methods:** 15,553 patients who underwent coronary angiogram in a single tertiary care cardiac hospital were analyzed for LMCA disease. 351(2.2%) patients were found to have significant LMCA disease out of which 28(0.18%) had isolated LMCA ostial disease. These 28 patients were compared with 323 non-ostial and non-isolated LMCA disease patients. **Results:** The mean age of isolated LMCA ostial disease group was significantly less than the other group. ($p=0.009$). Females were more affected than males ($p=0.008$). They also had low incidence of coronary risk factors (especially dyslipidemia, $p=0.04$). They tend to present more with stable angina and less with myocardial infarction. They had higher ejection fraction and normal regional wall motion ($p=0.04$). There was no mortality difference between two groups at the end of 1 year ($p=0.234$). **Conclusion:** In one of the largest studies done in these patients, we found that isolated LMCA ostial disease is more common in middle aged females with few coronary risk factors. These patients also had a better ejection fraction and normal regional wall motion compared to patients with non-ostial and non-isolated LMCA disease. The clinical and angiographic profile of these patients suggests that they may represent a distinct clinical entity.

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Introduction

Left main coronary artery (LMCA) disease remains an important risk factor for increased mortality and morbidity at all stages of diagnosis and treatment of coronary artery disease. Significant LMCA stenosis was found in 2.5–17.5% of patients undergoing cardiac catheterization in various clinical presentations.^{1–5} LMCA narrowing mostly occurs beyond the ostium in the mid-portion or at the bifurcation, where it can extend to both major branches.^{6,7}

The incidence of isolated coronary ostial stenosis has varied between 0.13% and 2.7%.^{8,9} In the majority of cases there is coexisting disease in multiple coronary vessels. Isolated LMCA ostial stenosis is a rare condition.^{7,10} Its incidence has been reported to be between 0.05%–0.88% in various studies.^{6,8,11,12} It is more commonly reported in women, usually before menopause. Atherosclerosis has been considered its most likely cause.^{8,13,14} Other rare causes of ostial stenosis include fibromuscular dysplasia,¹² syphilitic aortitis,^{15,16} Takayasu arteritis,^{17–19} aortic valve disease²⁰ and iatrogenic causes, such as mediastinal irradiation,²¹ cardiac surgery^{22–24} or percutaneous interventions.²⁵ In general the natural history of the isolated LMCA ostial disease is poor.²⁶ Early recognition and appropriate treatment will alter the unfavourable natural course of the disease. Majority of the earlier studies done on isolated LMCA ostial disease are limited by small number of patients enrolled.^{6–8,10} The aim of the present study was to analyze the incidence, risk factors, demographics,

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clinical profile and long term outcome of patients with isolated LMCA ostial disease.

2. Methods

2.1. Patient selection

In this retrospective study the database of cardiac catheterization laboratory in a single tertiary care cardiac hospital was reviewed to identify patients with LMCA disease. Out of 15,553 patients who underwent conventional coronary angiogram for various reasons between January 2011 to June 2012, 351 (2.2%) were found to have significant LMCA disease. Among these 351 patients, 28 (0.18%) were found to have isolated LMCA ostial disease. The diagnosis of isolated LMCA ostial disease was based on following 2 criteria. 1) Lesion of $\geq 50\%$ diameter stenosis of left main coronary ostium. 2) The remaining major coronary arteries and their branches exhibited in multiple projections, a patent lumen without any evidence of atherosclerotic plaques.

Patients were divided into 2 groups- patients with isolated LMCA ostial disease and patients with Non-ostial LMCA disease. A detailed review of all patients according to their medical records was performed. All patients were analyzed for demographic data, risk factors, clinical profile, treatment and 1 year mortality. Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg and/or on antihypertensive treatment. Diabetes mellitus was described as fasting plasma glucose ≥ 126 mg/dl and/or on antidiabetic drugs. Dyslipidemia was defined as total cholesterol >200 mg/dl and/or LDL cholesterol >160 mg/dl without risk factors and >100 mg/dl with risk factors, HDL <40 mg/dl or on anti hyperlipidemic drugs.²⁷ Family history (first-degree relatives age <55 years in men and <65 years in women), smoking (current smoker or quit less than 30 days before), and obesity (body mass index >30 kg/cm²)²⁸ were also noted. Acute myocardial infarction (MI) was defined as chest pain lasting ≥ 20 min and satisfying the World Health Organization criteria of acute MI. Trans-thoracic echocardiogram was used to measure LV ejection fraction and assess regional wall motion abnormalities.

2.2. Coronary angiogram

Selective coronary angiography was performed using Judkin's catheters via the femoral route in all patients. Left anterior oblique, right anterior oblique and anterior caudal views were recorded in every patient. Ostial lesion was defined as a proximally significant stenosis up to 3 mm from the coronary origin.⁹ Non-ostial lesion was defined as significant stenosis distal to 3 mm from the coronary origin.⁹ Any subtle change in pressure waveform as the catheter engaged the ostium of LMCA was carefully noted. To exclude the possibility of catheter induced spasm, intracoronary nitroglycerin 200 mcg was routinely administered to all patients when stenosis was visualized and performed a coronary angiogram 2 min later and measured the extent of the stenosis. Patients were classified as having 1, 2 or 3 vessel disease, based on the presence of $\geq 50\%$ diameter stenosis in the major three coronary arteries.¹⁰ The coronary angiograms were reviewed by four experienced operators who reached agreement on the identification of any obstructive lesion within coronary vessels.

Patients with coronary ostial stenosis secondary to syphilitic aortitis, takayasu aortitis, aortic valve disease and iatrogenic causes were excluded from the study after taking detailed history and doing appropriate investigations. Ethical committee clearance was taken before conducting the study. Informed consent was taken from all patients. Mean follow up was 1 year and 100% complete. It

was at regular intervals with clinical visits or telephone interviews. No angiographic follow up was done.

3. Statistics

Categorical variables were compared using the chi square test and the Fisher exact test, as appropriate. Continuous variables were analyzed using two-tailed *t*-test or Mann–Whitney *U* test. Patient characteristic variables were expressed as means \pm standard deviation and percentages. Only factors significant in univariate testing were included in the multivariate model. Multivariate logistic regression analysis was used to determine significant factors associated with isolated LMCA ostial disease. A two tailed *p*-value less than 0.05 was used to indicate statistical significance. Statistical analysis was performed using SPSS statistical software (version 16.0, SPSS Inc., Chicago, Illinois).

4. Results

4.1. Demographics

Out of total 15,553 patients who underwent coronary angiogram 351 (2.2%) were diagnosed to have significant LMCA disease. Among these 351 patients 28 (0.18%) were found to have isolated LMCA ostial disease. The baseline clinical demographics of these patients are given in Table 1. The mean age of patients with isolated LMCA ostial disease was significantly less than the patients with non-ostial LMCA disease. (50.46 ± 13.2 years vs. 59.45 ± 10.0 years, $p < 0.0001$). Out of 28 patients with isolated LMCA ostial disease 15 (53.57%) were females compared to 62 (19.19%) of 323 with non-ostial disease ($p < 0.0001$) indicating significant proportion of patients with isolated LMCA ostial disease were females.

4.2. Risk factors

Univariate analysis showed that coronary risk factors like hypertension, dyslipidemia, diabetes and past history of coronary artery disease (CAD) were significantly less in patients with isolated LMCA ostial disease compared to patients with non-ostial LMCA disease. In multivariate analysis dyslipidemia was found to be significantly associated with the latter group ($p = 0.04$). There was no significant difference between the groups with respect to other risk factors like smoking, obesity, peripheral vascular disease and family history of CAD.

4.3. Clinical profile

There was no significant difference between the groups with respect to presentation like stable angina ($P = 0.263$), unstable angina ($p = 0.478$), Non ST elevation myocardial infarction ($p = 0.577$) or ST elevation myocardial infarction ($p = 0.327$), though patients with isolated LMCA ostial disease tend to present more with stable angina and less with myocardial infarction.

Patients with isolated LMCA ostial disease had a significantly more ejection fraction (55.86% vs. 51.71% , $p = 0.010$) and normal regional wall motion ($p = 0.002$) in univariate analysis. In multivariate analysis, isolated LMCA ostial disease had significantly higher normal regional wall motion ($p = 0.04$). They also had a lower creatinine levels ($p = 0.004$) when compared to non-ostial LMCA disease group in univariate analysis.

4.4. Coronary angiography

Dampening of the pressure recordings during cannulation of the left coronary ostium was reported in all 28 patients. All patients underwent cardiac catheterization without any major

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