Relationship of family history of coronary artery disease and distribution of coronary atherosclerosis

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2010

Acknowledgement

I would like to extend my sincerest thanks and deep appreciation to those who provided me with their hearty support, valuable time, and most importantly their trust.

I am deeply indebted to my professors **Dr-Hussien Rizk, Dr-Mohammed El-Ramly and Dr-Reda Deyab** who suggested the idea of this work, for their sincere help, guidance, keen supervision and valuable remarks that clarified many of the aspects of this study.

I would like to express my deep gratitude to **Dr-Reda Deyab M.D** who gave me a lot of his time, followed closely my work, and gave me his valuable advice useful suggestions and comments which brought out the final points of this research.

I am really grateful to my all professors who taught me cardiology Dr Khaled sorour, Dr Soliman Gharib, Dr Ayman Kaddah, Dr Wafaa El Arousy, Dr Azza Farrag, Dr Mohammed El Guindy, Dr Adel Zaki, Dr. Mohammad Abd-Alkhane, Dr Zenab Ashor, Dr Waled Ammar, Dr Yasser Yazed, to all of them I owe much gratitude and respect.

I wish to acknowledge the lecturers of the cardiology department for their kind assistance. Thanks to all my colleagues, the assistant lecturers and residence of the cardiology department for their encouragement and help.

Finally, My best gratefulness to my father, my mother, my wife, my son, my brothers and my sister for their efforts to make my circumstances as comfortable as possible to accomplish this work and for their encouragement and support throughout the whole work.

I am deeply indebted to all those who have wished me success.

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Contents

Abstract

Objective: In the present study, we attempted to analyze the coronary artery lesion characteristics in patients with and without family history (age less than 55 years in male and less than 66 years in female)

Methods: We prospectively studied clinical risk factors and angiographic characteristics in 50 patients who have positive family history of CAD and Control group (n =50) had no family history of coronary artery disease underwent coronary angiography which were carried out at cardiology department in the faculty of medicine Cairo University. Angiographic features for both groups were collected and both groups were compared for coronary risk factors.

Results: There is highly significance difference between group A and group B in LMA (24% vs. 6%, respectively; P=0.000*), proximal (74% vs. 36%, respectively; P=0.0002*), middle (76% vs. 50%, respectively; P=0.0083*), distal segments (28% vs 12%,respectively; P=0.0093*) and normal coronaries (2% vs 16%, respectively; p=0,0162*). No significant difference was found in single (38% vs 30%, respectively; p=0,095), double (32% vs 32%, respectively; p=1,00) or triple vessels (24% vs 20%, respectively; p=0,063). No significant difference in localization of lesion in LAD (80% vs 72%,respectively; p=0,646), LCX (42% VS 36%, respectively; p=0,631) and RCA (54% vs 48 %, respectively; p= 0,764) in group A and group B.

There are significance difference between subgroup 1 (LM and/or proximal segment) and subgroup 2 (mid and/or distal segment) for both groups (p-value 0.0104* in subgroup 1 and p-value 0.0168* in subgroup 2).

Male sex, cigarette smoking and dyslipidemia were more prevalent in both groups. It showed that neither statistical significance difference of coronary risk factors found between the groups nor the subgroups in terms of hypertension, diabetes mellitus, dyslipidemia, smoking, obesity.

Conclusion: Coronary atherosclerosis was characterized by higher presence LM and proximal lesions in patients with positive family history and middle lesions

in patients without family history. And no significant difference was observed in risk factors of CAD in patients with and without family history of CAD..

Keywords: coronary artery disease, family history, coronary lesion, risk factors.

List of selected abbreviation and acronyms

ACSs : acute coronary syndromes

CAD : coronary artery disease

LMD : left main coronary artery disease

LMA : left mai artery

MI : myocardial infarction

FH : family history

LCX : left circumflec

RCA : right coronary artery

LDA : left descending artery

CHD : coronary heart disease

IMT : intima-media thickness

LDL : low density lipoprotein

HDL : high density lipoprotein

TG : triglyceride

VLDL : very low density lipoprotein

CAC : coronary artery calcium

DM : diabetes mellitus

HTN : hypertensioin

ACE : angiotensin-converting enzyme,

MTHFR : methylenetetrahydrofolate reductase

MMPs : matrix metalloproteinases

ABI : ankle brachial index

HRT : hormone replacement therapy

EBCT : electron beam computed tomography

CCA : Common carotid artery

ALP : atherogenic lipoprotein phenotype

BMI : body mass index

CRP : C-reactive protein

PDA : posterior descending artery

Introduction

Cardiovascular diseases are one of the leading causes of death in all over the world. Although it is regarded as a disease of advanced age, coronary artery disease (CAD) has high prevalence and higher cardiac mortality in patients with family history.[1] Many global risk assessment approaches are available for clinicians including Framingham risk score. [2]

In the worldwide INTERHEART study of patients from 52 countries, nine potentially modifiable factors accounted for over 90 percent of the population attributable risk of a first MI. these included smoking, dyslipidemia, hypertension, family history, diabetes, hypertension, abdominal obesity, psychosocial factors, lack of daily consumption of fruits and vegetables. [3]

Topographic distribution of atherosclerotic lesions in coronary arteries has been investigated in several studies, However, there is limited data about coronary lesion distribution in patients with family history, and no knowledge about the relation between familial risk and coronary lesion distribution. [4,5]

The German researchers have found that heart disease of the left main coronary artery is often an inherited condition that clusters in families. The researchers concluded these findings have important clinical implications as it would be possible to set up more intensive screening and prevention strategies for people known to come from

families where other members had left main coronary artery disease (LMD). They also found that in families where two or more siblings were already suffering from heart disease, if one had left main coronary artery disease (LMD), the other affected siblings were over three times more likely to suffer an LMD-related recurrence. [6]

Fischer *et al.*'s concluded that the presence of LMD in an index patient confers a three-fold increased risk of LMD in a sibling.[7] Alternative explanations include the development of lesions especially in the proximal coronary tree. [8]

In this cross-sectional case-control study, we will evaluate the relation of the coronary artery lesion topography with familial risk in patients with coronary artery disease.

Aim of the work

The aim of this study is to determine if familial risk of coronary artery disease has more tendencies to affect the left main or proximal coronary arteries

Review of literature

The familial risk of CAD and myocardial infarction

A familial predisposition is assumed when a myocardial infarction is diagnosed by a male first degree relative before the 55th year of life or a female first degree relative before the 65th year of life.[1,2]

In the setting of a large epidemiological survey 35% of all patients with CAD fulfilled the criteria for a positive family history of the disease. This high prevalence underscores the quantitative significance of this risk factor.[9]

The Framingham Heart Study demonstrated that a positive family history of a parent or a sibling is a risk factor for CAD. Moreover, the familial risk was found to be greater the lower the age at first manifestation of disease was in the affected family members.[10] The analysis of a genealogical data bank from Utah (USA), in which data from more than 2.2 million persons were collected over the past 100 years, revealed a significantly raised risk of myocardial infarction even when second degree relatives were affected before the 65th year of life.[11] The associated relative increase in risk of myocardial infarction is lower than for first degree relatives, but again not explained by traditional risk factors. [11]

Individuals with a positive FH may also be more susceptible to the deleterious effects of the traditional risk factors and may have greater atherosclerosis risk through smoking or dyslipidemia than individuals with similar risk factor exposure but without a family history.[12]

A positive parental history for myocardial infarction (MI) is a strong cardiovascular risk factor.[13,14] The predictive value of a positive family history may be even higher for siblings of MI patients.[13,14]

Several studies have suggested that individuals with a FH of premature CHD in a sibling might be at higher risk than those with parental history only.[15,16] The ability to confirm this association, however, has been limited because prior reports assessing the role of FH of premature CHD with atherosclerosis have mainly focused on any familial history, without distinguishing the separate effects of parental and sibling history. (Fig. 1).

Study suggests that within the limits of self-reporting of FH, a sibling history is more strongly associated with atherosclerosis than a parental history of premature CHD. Current guidelines count a positive family history for CHD as an additional risk factor that physicians should use to determine the intensity of LDL-lowering therapy. They believe it is reasonable to consider selective noninvasive quantification of subclinical atherosclerosis among middle-aged adults with a FH of premature CHD to help determine

the appropriate aggressiveness of risk factor modifications in those classified as being at low or intermediate risk for CHD events.[17]

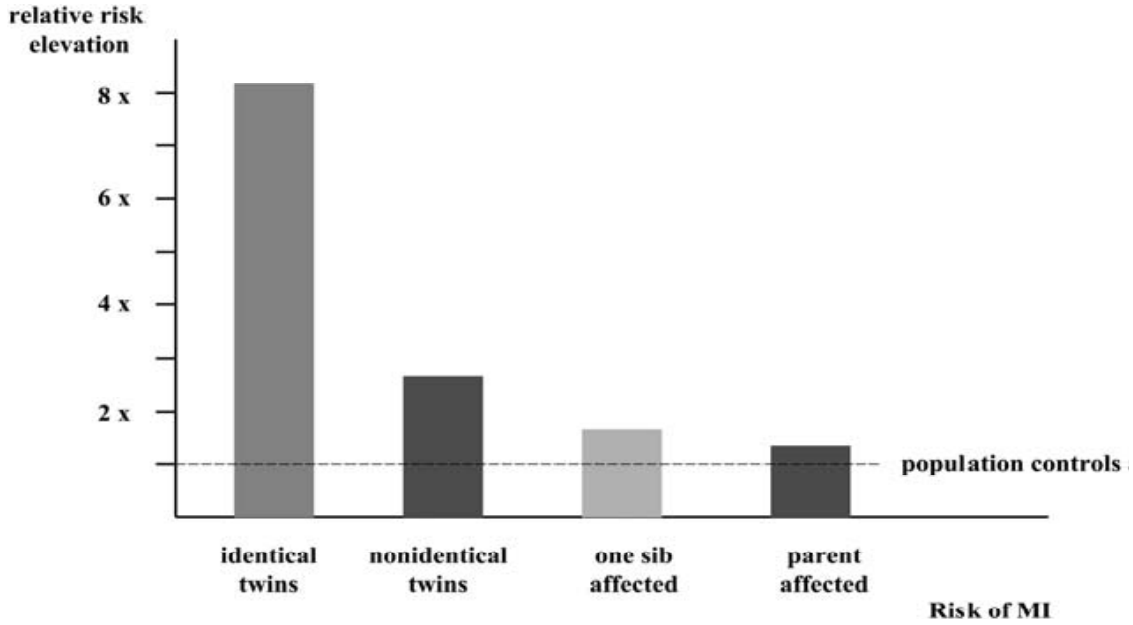

Fig. 1

The relative increase in risk of myocardial infarction/CAD is shown in relation to different familial susceptibilities. The risk for identical and nonidentical twins is based on the hypothesis that the partner twin had died of myocardial infarction at an age of 55 years

Wang et al [18] recently demonstrated a higher burden of subclinical atherosclerosis as assessed by carotid intimal thickness (IMT) In individuals with a parental history of premature CHD. Clarifying the association with subclinical atherosclerosis also may have clinical implications because many asymptomatic adults with a positive FH may benefit from subclinical disease screening to determine aggressiveness of primary preventive therapies.[19] Moreover, A recent study has demonstrated that a FH of premature CHD in first-degree relatives was independently associated with the presence of coronary artery calcium (CAC) in both men and women.[20]

In the CARDIA study, the younger the patient at the diagnosis of myocardial infarction, the greater the heritable component in his disease. Because this component appear to be mostly mediated by familial hyperlipidemias, hypertension, diabetes mellitus and obesity and The CARDIA study showed that these associations between parental disease and risk factors in their adult children probably reflect the impact of both environmental and genetic factors.[21].

Young adult with a family history of early myocardial infarction had lower plasma levels of HDLc, Apo AI, and LpAI. In young men, the best predictor of family history of early MI was the LpAI plasma level. Whereas in young women, it was the HDLc plasma level. [22]

.Heritability of left main disease

It was recently demonstrated that the heritability estimates of CAD depend on the pattern of coronary morphology. Particularly, left main disease and proximal coronary stenoses were observed to carry a high risk for reoccurrence in affected sibling pairs (Fig. 2).[23] A highly significant heritability was found for ostial and proximal coronary stenoses, whereas a distal involvement did not show any heritability.