



RESEARCH ARTICLE

Is There Any Relationship between ABO Blood Groups and Coronary Ectasia?

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Abstract

Background: Coronary artery ectasia (CAE) is known as dilations of coronary vessels which are 1.5 times greater than the adjacent healthy segment and it is known to be variant of atherosclerosis. Previous reports have shown that the ABO blood groups are associated with atherosclerosis. In this study, it was investigated whether coronary artery ectasia is related to genetically transmitted ABO blood groups.

Methods: This retrospective study involved 620 subjects who underwent coronary angiography in our center from 2015 to 2018. The control group of the study consisted of 310 patients whose coronary arteries were angiographically normal. Three hundred and ten patients who had ectasia in at least one of the coronary arteries were selected as the patient group. ABO blood groups were determined in two groups using standard agglutination techniques. Blood groups were compared between the patients and the control group.

Results: There were no significant differences between the two groups in terms of blood groups frequency ($P > 0.05$, for all).

Conclusion: Even though multiple studies showed an association of cardiovascular diseases and ABO blood groups, no association was determined between CAE and any blood groups in this study.

Keywords

Coronary artery ectasia, ABO blood groups

List of Abbreviations

CAE: Coronary Artery Ectasia; CAD: Coronary Artery Diseases; HDL-C: High Density Lipoprotein Cholesterol; LDL-C: Low Density Lipoprotein Cholesterol; TG: Triglycerides; TC: Total Cholesterol; STEMI: ST Segment Elevation Myocardial Infarction; vWF: von Willebrand Factor

Introduction

Coronary artery ectasia (CAE) is a coronary artery pathology defined by coronary artery dilatation of > 1.5 times a normal segment [1]. The incidence of this disease is between 0.3% and 5% [2,3]. The etiopathogenesis of CAE is not fully known. However, connective tissue diseases, atherosclerosis, congenital abnormalities and inflammatory tissue diseases are assumed to play a role in the etiology of this disease [4,5]. Fifty percent of CAE cases have been associated with atherosclerosis [6,7]. In addition, CAE is associated with risks of death and myocardial infarction. There are many risk factors for atherosclerosis, including increased age, male gender, hypertension, ethnicity, hyperlipidemia, smoking, emotional stress, lack of physical activity, obesity, metabolic syndrome and insulin resistance. Atherosclerotic diseases are increasing in East European and Asian countries as well as the other developing countries.

ABO blood group antigens are glycoproteins and glycolipids located on the surface of many circulating cells as well as in saliva and body fluids [8]. Recent years, ABO blood groups have been documented to be associated with many diseases, including coronary artery diseases (CAD) [9-11]. ABO blood groups are genetically transported through chromosome 9 [12,13]. In this study, it was investigated whether ABO blood groups were associated with CAE.

Materials and Methods

Study population

The study was designed retrospectively and it was

performed on patients who were admitted to our clinic between February 2015 and November 2018 and who underwent coronary angiography. Angiography images were retrospectively evaluated from medical records. Three hundred and ten CAE patients were consented for this study. Three hundred and ten subjects who have normal coronary arteries were selected as control group. Laboratory and clinical characteristics of patients such as age, gender, diabetes mellitus, blood pressure, smoking, height, weight, ABO blood groups, lipid profiles were obtained from the medical records. Echocardiography data were obtained from medical records. Patients with chronic heart failure, chronic kidney disease, severe heart valve disease, chronic lung disease, systemic rheumatic or inflammatory tissue disease, chronic liver disease, hematological disease and chronic infection were excluded from the study. Approval was obtained by ethics committee for this retrospective study and achieved based on the Declaration of Helsinki.

Coronary angiography

Coronary angiography was done using the standard Judkins technique. Coronary angiography was performed on the left and right oblique planes using caudal and cranial angles. For CAE quantitation and validity, two independent blinded clinicians were examined the coronary angiography. The patients who had a atherosclerotic plaque with > 25% stenosis were excluded from the study.

Laboratory parameters

Peripheral venous blood was taken in our clinic before coronary angiography. The ABO blood groups were

performed with a hemagglutination test (Biotest, Germany). High density lipoprotein cholesterol (HDL-C), triglycerides (TG), Low density lipoprotein cholesterol (LDL-C) and total cholesterol (TC) were analyzed using Architect C16000 auto analyzer (Abbott Labs Inc).

Statistical analysis

For all analyses, SPSS for Windows was used (version 22.0 software, Chicago, IL, USA). And variables were given as mean \pm SD. Categorical variables were given as percentage. For numerical variables, statistical analyses were made with independent samples using t-test/Mann-Whitney U-test. For categorical variables, Fisher's exact test or χ^2 -test was used. A p-value of < 0.05 was determined to be significant.

Results

No significant differences were determined for the groups for age, gender, body mass index, systolic and diastolic blood pressure and echocardiographic findings ($p > 0.05$, for all) (Table 1). Smoking and presence of diabetes mellitus were higher in CAE group than the control group ($p = 0.015$, $p = 0.011$ respectively) (Table 1). LDL-C, TG, and TC were elevated in CAE group when compared to the controls ($p < 0.001$, for all) (Table 2). HDL-C were higher in control group than the CAE group ($p < 0.001$) (Table 2). The frequencies of ABO blood groups in the study groups are shown in Table 3. The frequencies of ABO blood groups were similar between the two groups ($p > 0.05$, for all).

Discussion

According to this study, CEA were not associated

Table 1: The baseline characteristics and echocardiographic findings of groups.

	CAE group (n = 310)	Control group (n = 310)	P value
Age (years)	53.2 \pm 6.5	50.3 \pm 7.3	0.863
Gender, male n %	243 (78.3)	250 (80.6)	0.667
BMI (kg/m ²)	26.9 \pm 2.6	25.7 \pm 3.0	0.130
Diabetes mellitus n (%)	49 (15.8)	20 (6.4)	0.011
Smoking n (%)	128 (41.2)	86 (27.7)	0.015
Systolic BP (mmHg)	127.1 \pm 6.5	125.3 \pm 10.3	0.072
Diastolic BP (mmHg)	73.1 \pm 5.6	72.5 \pm 5.3	0.388
LVEF (%)	60.7 \pm 3.1	60.9 \pm 3.4	0.639

BMI: Body Mass Index; BP: Blood Pressure; LVEF: Left Ventricle Ejection Fraction.

Table 2: The laboratory findings of groups.

	CAE group	Control group	P value
LDL-C	136.0 \pm 32.1	82.2 \pm 20.0	< 0.001
HDL-C	37.6 \pm 10.6	42.5 \pm 10.4	< 0.001
TC	212.2 \pm 34.5	146.6 \pm 22.9	< 0.001
TG	166.2 \pm 72.2	131.7 \pm 60.9	< 0.001

HDL-C: High Density Lipoprotein; LDL-C: Low Density Lipoprotein Cholesterol; TC: Total Cholesterol; TG: Triglyceride.

Table 3: The frequencies of ABO blood types of groups.

	CAE group	Control group	P value
	(n = 310)	(n = 310)	
A, n %	92 (29.6)	81 (26.1)	0.135
B, n %	85 (27.4)	89 (28.7)	0.465
AB, n %	68 (21.9)	64 (20.6)	0.498
O, n %	65 (20.9)	76 (24.5)	0.228

with any blood group. This study is the first study in the literature to investigate the relationship between ABO blood groups and CAE. CAE is based an over-expansive and exaggerated remodeling process [14]. The etiopathogenesis of CAE is not fully known. However, connective tissue diseases, atherosclerosis, congenital abnormalities and inflammatory tissue diseases are assumed to play a role in the etiology of this disease [4,5]. A reduction in collagen synthesis or augmented degradation may lead to CAE [15]. Although the specific pathophysiological mechanism of CAE still remains unclear, some autopsy series showed progressive atherosclerotic changes in segments with ectasia [16]. In this study, it was investigated whether CAE, a variant of atherosclerosis, is associated with any blood group. The ABO gene are located on chromosome 9q34 and ABO blood groups are genetically transmitted [13]. Several studies have shown that ABO blood groups were associated with atherosclerotic diseases and thrombosis [17,18]. However, there are conflicting results in the literature. In one study, no relationship between ABO blood groups and CAD was shown [19]. In addition, another study showed that ABO blood groups distributions were similar in patient with CAD [20]. However, a recent study showed that infarct and the no-reflow were greater for non-O blood groups in patients with ST Segment Elevation Myocardial Infarction (STEMI) [21]. Similarly, according to results of another study, an association between ABO blood groups and spontaneous recanalization was shown in STEMI [22]. Moreover, in previous reports, researchers stated that non-O blood groups had high von Willebrand factor (vWF) levels, which increased vascular thrombosis and increased risk of atherosclerosis [23,24]. Although recent some studies have shown a correlation between atherosclerosis and ABO blood groups, in this study no relationship was observed for the ABO blood groups and CAE which is a variation of atherosclerosis. In addition, a recent study showed that vWF and plasminogen activator inhibitor-1 were higher in CEA subjects [25]. Gill, et al. reported that O blood group had vWF levels in the plasma that were 25-35% lower than the other blood groups [23]. However, in this study, no relationship was observed between CAE and any non-O blood groups which have high plasma von Willebrand factor level.

The main limitations of this study are that its single-centered design and inadequate the number of patients.

In conclusion; although some studies showed that a relationship between ABO blood groups and CAD, in the present study no relationship was observed between CAE and ABO blood groups. However, large scale, multi-centered studies that correlate ABO genotypes with hemostatic markers are required for association between ABO blood groups and CAE. This study is the first study in the literature on this issue and I hope that this study will be a beginning point for studies in the future on this issue.

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