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Original Article

Severity of coronary artery disease in type 2 diabetes mellitus: Does the timing matter?

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ABSTRACT

Aim: The aim of our study was to compare the angiographic changes in 53 nondiabetic patients, 54 type 2 diabetic patients of less than 5 years of duration, 41 patients with 5–10 years of diabetes, and 27 with more than 10 years of diabetic duration.
Methods: In this cross-sectional study, 175 patients, who underwent coronary angiogram for the evaluation of the coronary artery disease (CAD), were recruited. Based on the angiographic findings, syntax score, vessel score, and coronary collaterals grading were analyzed. The biochemical analysis was done by using the auto analyzer.
Results: A significant increase in the mean syntax score ($p = 0.019$), vessel score ($p = 0.007$), and coronary collateral grade ($p = 0.008$) was observed in the patients with 5–10 years of diabetes when compared to those with less than 5 years of diabetic duration. There was no significant difference in the mean syntax score ($p = 0.979$), vessel score ($p = 0.299$), and collateral grade ($p = 0.842$) between the patients with 5–10 years and more than 10 years of diabetes. The difference in the mean syntax score ($p = 0.791$), vessel score ($p = 0.098$), and collateral grade ($p = 0.661$) between the nondiabetic and the patients with less than 5 years of diabetes was not significant.

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Conclusion: A significant structural change in the coronary arteries was found among the patients with 5–10 years of diabetes.

1. Introduction

The prevalence of coronary artery disease (CAD) in diabetes is not only high, but also characterized by severe disease. The prevalence of CAD in the diabetic population ranges from 9.5% to 55%,[1,2] whereas in the general population, it is reported to be 1.6–4.1%.[3,4]

There are various conventional risk factors that are known to be accounted for CAD in both diabetics and nondiabetics. But in spite of controlling the conventional risk factors, the burden of CAD is high in the diabetics when compared to the nondiabetic counterparts. When the diabetic patients have the CAD, typically they have more severe disease, with more number of arteries involved, and the higher prevalence of left main stem disease.[5–8]

The diabetes being a heterogeneous disease,[9] the extent of CAD is not uniform across the diabetic population. A meta-analysis of four studies, namely Action to Control Cardiovascular Risk in Diabetes (ACCORD), Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation (ADVANCE), United Kingdom Prospective Diabetes Study (UKPDS), and Veterans Affairs Diabetes Trial (VADT), have shown that the macrovascular complications differ with respect to the diabetes duration.[10]

A large number of analytical scores such as gensini, syntax, extent, and vessel scores have been developed to quantify the severity of the coronary atherosclerosis.[11] The severity is said to be a prognostic factor for patients with CAD, which has been proven in several long-term clinical studies.[11] The studies using these analytical scores have shown that the severity of CAD is high in diabetes when compared to the nondiabetic population.[11] The utility of these scores is not only restricted to know the progression of atherosclerosis but also plays an important role in deciding the mode of coronary interventions.

Since there can be a variation in the CAD outcomes among the diabetic population of different time intervals, we wanted to look for the structural changes in coronary arteries with respect to the different time intervals of type 2 diabetes mellitus. If we are able to identify the CAD changes in a specific time frame of diabetes, it would help us in better management and prevention of the CAD among the diabetic population.

Ideally, longitudinal study has to be carried out in order to find out the structural changes in the coronary arteries with respect to the different time intervals of type 2 diabetes mellitus, but due to the practical inconvenience, a cross-sectional study was designed to compare the severity of the CAD, number of vessels involved in the lesion, coronary collateral grade, and urine microalbumin levels in nondiabetic population, in diabetic population with less than 5 years, in 5–10 years, and more than 10 years of diabetes duration.

2. Methods

This was a cross-sectional study of 175 patients who underwent coronary angiogram for the evaluation of CAD at a tertiary care hospital from February 2013 to December 2013. The patients were recruited in the study after obtaining an informed consent. In order to maintain the homogeneity among the groups and to minimize the effect of confounders, the age of the study population was restricted to 45–65 years. The patients were further grouped into diabetics and nondiabetics based on the diagnostic criteria recommended by the American diabetes association.[12] The patients with congenital heart disease, valvular heart disease, and those with significant thyroid, renal dysfunction were excluded from the study. The study was conducted after obtaining the approval from institutional human ethics committee.

The fasting blood sugar, fasting lipid profile and glycated hemoglobin levels and urine microalbumin were measured at the time of admission. The biochemical analysis was done by using the auto analyzer Hitachi P800. The coefficient of variation was $<2\%$ and $<5\%$ for intra- and inter-batch assay, respectively, in all the cases. The presence of coronary collaterals was visualized and identified after the coronary angiography and it was defined as Rentrop score ≥ 1.[13] The number of vessels involved in the lesion were assessed by vessel score.[14] Only those vessels with 70% stenosis or greater reduction in luminal diameter were considered to be significant. The left main artery stenosis was scored as single vessel disease. The number of vessels involved in the lesion ranged from 0 to 3. The severity and the extent of the CAD were assessed by the syntax score,[15] which is a web-based algorithm consisting sequential and interactive self-guided questions. The syntax score, vessel score, presence of coronary collaterals and the grading were carried out by a cardiologist, who was blind to other parameters.

2.1. *Statistical analysis*

The data were represented as mean $\pm$ standard deviation. The Analysis of Variance (ANOVA) was performed in order to identify the differences in the mean syntax score, vessel score, coronary collaterals and urine microalbumin between the groups. The post-hoc analysis was done assuming the equality of variances. The least square difference (LSD) post-hoc test was performed to find out the significant differences in the mean syntax score, vessel score, coronary collateral grading, and microalbumin levels between the nondiabetic, diabetes with less than 5 years duration, 5–10 years of diabetes, and more than 10 years of diabetic duration. p value <0.05 was considered to be significant. The data were analyzed using the statistical package for social sciences (SPSS) version 16 (SPSS, Chicago, IL, USA).