A Comparative Study of Coronary Angiographic (CAG) Findings Between Diabetic and Nondiabetic Patients

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Abstract

Patients with diabetes mellitus have a higher prevalence of atherosclerotic heart disease and a higher incidence of myocardial infarction than the general population. Diabetic patients also have several hematologic, metabolic abnormalities not present in their nondiabetic counterparts that may predispose them to formation of morphologically complex plaques.

Percutaneous coronary angiography (CAG) was performed in 120 consecutive patients with suggestive of ischaemic chest pain. The population consisted of 45 (37.50%) diabetic and 75 (62.50%) nondiabetic patients. We observed positive angiographic lesion among both groups comparing site & number of vessel(s) involvement also average percentage of stenosis. The presence of coronary risk factors was not significantly different between the two populations. Total positive angiographic lesion was 79 (65.83%) in both groups. Among the Diabetes mellitus patients positive CAG finding 37 (82.22%). The recognized lesions were single vessel disease (SVD) 10 (27.02%), double vessel disease (DVD) 15 (40.54%), triple vessel disease (TV) 12 (32.43%), diffuse lesions 4 (10.80%) and average vessel stenosis 83.63%. On the other hand, total positive angiographic lesion was 42 (56%) in nondiabetic group; among them single vessel disease (SVD) 14 (33.33%), double vessel disease (DVD) 17 (40.47%), triple vessel disease (TVD) 11 (26.19%), no diffuse lesions was found and average vessel stenosis was 78.03%.

The results of the angiographic finding suggest that diabetic patients have a higher incidence of coronary heart disease (CHD), DVD, TVD, diffuse lesion & marked stenosis of coronary vessel than nondiabetic patient. This increased frequency of complex lesion morphology is more difficult to treat by definitive intervention like percutaneous transluminal coronary angioplasty (PTCA) & coronary artery bypass graft (CABG).

Introduction

Diabetes mellitus (DM) is a well-established risk factor for development of coronary artery disease (CAD). Coronary atherosclerosis is not only more prevalent in diabetic patients but also more severe. The reported prevalence of coronary artery disease in diabetic patients ranges from 9.5% to 55%. Whereas prevalence of 1.6% to 4.1% have been observed in the general population.

Incidence of heart diseases & ischaemic heart mortality was shown to be 4 times higher in people with Type-2 DM. Type -1 DM was seen to be associated with at least a 10 fold increase as compared with people without diabetes. In people with DM 40%, 15%, 10% death occur due to ischaemic heart disease (IHD), other heart diseases & cerebrovascular disease (CVD) respectively. Several in vivo and postmortem studies have shown that diabetic patients have more diffuse and severe coronary artery disease than the general population. In addition, the relative risk of myocardial infarction (MI) is greater in diabetic patients than in the normal population. The cause of this difference in the diabetic population is not well understood. But it is suggested that diabetic patients have several hematologic, and metabolic abnormalities not present in their nondiabetic counterparts that may predispose them to formation of more complex plague. To date, very few studies, have attempted to explain these differences between diabetic and nondiabetic patients in our country. Thus this prospective cross-sectional study was designed to find out the morphological pattern of coronary lesion in patient with diabetes mellitus and to compare with nondiabetic patients in a peripheral teaching Institute of Bangladesh.

Materials and Methods

120 cases of males and females, who presented in the department of Cardiology, North east Medical college Hospital (NEMCH), Sylhet, from January 2013 to June 2013, were included in this study. Involved patients were selected on the basis of inclusion and exclusion criteria as mentioned below. The study was approved by the review committee of the Medical College.
1. Study population

1.a. Inclusion criteria
All patients clinically diagnosed or documented to have CAD, who required coronary angiography (CAG) was taken as study population. Informed consent was taken from all patients.

1. b. The grouping of study population
The study population was divided into two groups as follows
- The study group I
  Patients presented with features of ischaemic heart disease (IHD) & having DM (DM group)
- The study group II
  Patients presented with features of ischaemic heart disease (IHD) but without DM (non DM group)

1.c. Criteria’s for diagnosis of DM
Patient who fulfilled the diagnostic criteria for DM recommended by The World health organization (WHO) in 2000 AD16 as below, with or without other cardiovascular risk factors (e.g. smoking, hyperlipidaemia)

- Patient complaints of symptoms suggestive of DM (polyuria, polydipsia, wt loss) with one of the following.
  1. Fasting plasma glucose  7.0 mmol/L (126mg/dl)
  2. Random plasma glucose (or 2 hrs after an ideal OGTT) 11.1 mmol/L (200mg/dl)
     (In asymptomatic patient two samples are required to confirm the diagnosis)

1.d. Criteria’s for diagnosis of non DM cases
Patient do not meet the above WHO criteria’s for confirm the diagnosis of DM, with or without other cardiovascular risk factor (e.g. smoking, hyperlipidaemiae).

1.e. Criteria’s for coronary artery disease (CAD) & Coronary Angiography (CAG)
1. Chronic stable angina pectoris with positive E.T.T (with or without previous MI)
2. Unstable angina pectoris
3. Atypical chest pain with positive E.T.T
4. After acute MI (with or without persistent angina)
5. Asymptomatic patient with noninvasive evidence of myocardial ischaemia (ECG, ECHO)

1.f. Exclusion criteria’s
1. Patient with hypertrophic or dilated cardiomyopathy
2. Patient with valvular heart disease
3. Patient with congenital heart disease

2. Coronary Angiographic (CAG) Procedure
CAG & where needed left ventriculography were done in all patients by standard Jud kin’s technique through femoral approach by modified Seldinger technique using non ionic dye. Multi angled standard views were recorded for analysis. A comprehensive analysis of Coronary Angiogram (CAG) was done, severity & extent of arterial disease were measured by eye estimation. The pre requisites for CAG were followed according to the hospital protocol, then morphological characteristics of lesion was analyzed
a) Positive CAG - taken when coronary artery stenosis 50%
b) Negative CAG - taken when coronary artery stenosis < 50%
c) According to branches of coronary artery involvement - 
   1. single vessel disease (SVD) – one coronary artery involve
   2. double vessel disease (DVD) - two coronary artery involve
   3. triple vessel disease (TVD) -three coronary artery involve
   4. Diffuse lesion – diffusely involved one or more coronary artery

3. Statistical analysis
After processing of all available information, statistical analysis of their significance was done. The patients were grouped into those with & without DM having CAG. All parametric values were expressed as mean & nonparametric values were expressed in percentage (%). The significance of difference between two groups were determined by using unpaired student’s ‘t’ test, Pearson’s chi-square test & ‘z’ test where applicable. ‘P’ value of less than 0.05 was considered to be significant.

Results
Total Number of patients studied - 120

Diagnostic Yield (Sensitivity) of CAG

Fig- 1: Pie chart showing diagnostic yield of CAG among pts with IHD
Distribution of patient

Fig-2: Pie chart showing distribution of patient undergone CAG

Positive angiographic lesion among DM & NonDM group

Fig-3: Bar diagram showing positive angiographic lesion

Pattern of Vessels involvement in DM and Non DM patients. (N = 120 = 100%)

Fig-4: Bar diagram showing pattern of vessels involvement

Percentage of Vessel stenosis in DM and Non DM group

Table-1: shows percentage of vessel stenosis in DM and Non DM group

<table>
<thead>
<tr>
<th>LMCA</th>
<th>DM</th>
<th>Non DM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>81%</td>
<td>70%</td>
</tr>
<tr>
<td>LAD</td>
<td>81.48%</td>
<td>79.41%</td>
</tr>
<tr>
<td>LCX</td>
<td>87.4%</td>
<td>79.55%</td>
</tr>
<tr>
<td>RCA</td>
<td>84.65%</td>
<td>83.15%</td>
</tr>
<tr>
<td>Average</td>
<td>83.63%</td>
<td>78.03%</td>
</tr>
</tbody>
</table>

Fig-5: Bar diagram shows average vessel stenosis in DM and Non DM group

Figure - 6: SVD (left anterior descending artery - LAD)

Figure - 7: SVD (right coronary artery - RCA)
Discussion

Although many of the well established risk factors are described for formation of atherosomatous plaque, glucose intolerance (DM) accounts for a major part of the high incidence of IHD in certain ethnic groups in South Asia. This study demonstrates incidence & difference of coronary heart disease (CHD), DVD, TVD, diffuse lesion among symptomatic diabetic and nondiabetic patient. The prevalence of coronary artery disease (more than 50% diameter stenosis) is more in DM patients (82.22%) compared to their non DM counterparts (56%). Moreno et al found the incidence of thrombus was higher in patients with diabetes than in patients without diabetes (62% versus 40%).

Our study also demonstrates that diabetic patients had a higher prevalence of three-vesseldisease (TVD) (32.43% versus 26.19%) and lower prevalence of single-vesseldisease (SVD) (27.02% versus 33.33%). Jose A, Silva et al found diabetic patients had a higher prevalence of three-vesseldisease (47% versus 31%) and lower prevalence of single-vesseldisease (18% versus 32%) than nondiabetic patients, although these differences were not statistically significant. In one large autopsy study, Waller et al reported that 91% of patients with adult-onset diabetes (type II) had severe (~75%) narrowing of at least one major coronary artery and 81% had severe two- or three-vessel involvement. Our study demonstrates average vessel stenosis 83.63% in DM group as against 78.03% in the non diabetic individuals. Whether or not coronary atherosclerosis is more diffuse in diabetic patients is controversial. In the autopsy study of Waller and coworkers the diabetic patients had more severe stenosis. However, in another autopsy study by Crall and Roberts, more extensive and diffuse coronary artery disease was found in diabetic patients. In our study 10.80% DM patients showed diffuse stenosis which was absent in the non DM group.

This was a small scale study & does not represent the whole CAD population of the region. So, a large scale study is warranted.

References


