Carotid Artery Involvement in Patients Undergoing Coronary Angiography with Diabetes Mellitus

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Abstract

Background: Carotid artery disease would be high in patients having coronary artery disease with diabetes mellitus. **Objective:** The purpose of the present study was to see frequency, pattern and severity of carotid artery disease among patients with IHD and diabetes mellitus. **Methodology:** This case-control study was conducted in Department of Cardiology, UCC, BSMMU from July, 2007 to June 2009. Total 100 patients were included in this study. Of them 50 patients were coronary artery disease with diabetes mellitus and another 50 patients were coronary artery disease without diabetes mellitus. Both group were underwent coronary and carotid angiography. Coronary artery stenosis is assessed by different scoring system and carotid artery stenosis are categorized as mild (< 50% stenosis) moderate (50-69% stenosis) and critical (>_ 70% stenosis). Moderate and critical stenosis was considered as significant carotid artery disease. Morphological character of the lesion was also assessed. **Results:** The mean age was found 57.48 years with 6.04 standard deviation (SD) in DM and 55.64 years with 6.34 standard deviation in NDM group and also 56.56 years with 6.49 standard deviation in the whole study population. the indications of CAG were Post MI evaluation, unstable angina, stable angina, chest pain evaluation and positive ETT were 42.0%, 20.0%, 18.0%, 10.0% and 10.0% in DM group and 32.0%, 28.0%, 20.0%, 8.0% and 12.0 in NDM group respectively. LAD was the commonest artery involved (86.0%), followed by RCA (82.0%), LCX (68.0%) and LM (6.0%) in DM study subjects. Among the NDM LAD artery involved (76.0%), followed by RCA (72.0%), LCX (64.0%) and LM (4.0%) in NDM study subjects. **Conclusion:** In conclusion, patients of coronary artery disease with diabetic mellitus are having higher frequency and severity of Carotid artery disease than non-diabetic coronary artery disease patients. *[Journal of National Institute of Neurosciences Bangladesh, January 2023;9(1):30-34]*

Keywords: Carotid artery involvement; coronary angiography; diabetes mellitus

Introduction

Carotid artery involvement in patients with coronary artery disease (CAD) is expected[1]. Patients with carotid artery disease and CAD form a high-risk group and controversy still exists regarding their optimal management. These patients are at risk of major neurological events in the peri and post-operative period of interventional procedure[2]. Hence, preoperative and pre-interventional diagnosis and management of carotid artery disease is important. Surgical endarterectomy has been shown to be superior to medical management in the treatment of critical carotid artery disease[3]. Recently, carotid artery stenting has proved to be a feasible, safe and effective alternative method of treatment for carotid artery disease. The results of carotid artery interventions are comparable to carotid endarterectomy, both on periprocedural and on late follow-up[4].

Atherosclerotic carotid artery disease is associated with

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atherosclerotic CAD[5]. Coronary artery disease is high in DM. But there is no direct study regarding carotid artery disease in diabetes mellitus in our country. So, if we can establish the correlation between the two then we can take measure for prevention and treatment of carotid artery disease in diabetes mellitus[6].

The prevalence of carotid artery disease in patients with CAD and its clinical implications have not been adequately studied in the Bangladeshi population. Few studies had been conducted in our country regarding relation with CAD and atherosclerotic carotid artery stenosis by non-invasive method but not by carotid arteriography[7]. Hence, this study was planned to determine the extent and pattern of carotid artery disease in patients of coronary artery disease with diabetes mellitus.

Methodology

Study Settings and Population: This case-control study was conducted in Department of Cardiology, UCC, BSMMU from July, 2007 to June 2009. Total 100 patients were included in this study. Of them 50 patients were coronary artery disease with diabetes mellitus and another 50 patients were coronary artery disease without diabetes mellitus. Inclusion Criteria were Patients suffering from IHD with diabetes mellitus and undergoing CAG will be taken as cases. Both sexes were included. Any age of patients suffering from IHD with DM and undergoing CAG. Exclusion criteria were patients undergoing CAG without IHD with diabetes mellitus, Patients having previous CVA and TIA or Patients previously underwent carotid endarterectomy or angioplasty or stenting. Patients previously underwent CABG or angioplasty.

Study Procedure: Both group were underwent coronary and carotid angiography. Coronary artery stenosis were assessed by different scoring system and carotid artery stenosis are categorized as mild (< 50% stenosis) moderate (50-69% stenosis) and critical (>_ 70% stenosis). Moderate and critical stenosis was considered as significant carotid artery disease. Morphological character of the lesion were also assessed. Coronary angiography was done in all pateints through femoral approach by modified Seldinger technique. Left and right Judkins' catheter were used to perform coronary angiography. Ionic/nonionic dye was used. Multiple angled views with cranial and caudal angulation were taken to separate branches of left anterior descending (LAD). Left circumflex (LCx) and right coronary arteries. Left ventricular angiography was done in right anterior oblique (RAO) view in all

patients and left ventricular ejection fraction and left ventricular end-diastolic pressure (LVEDP) was measured in both the groups. Carotid arteriography was performed selective and non¬selective method by Hunter head or right Judkin's catheter in standard AP, lateral and oblique views.

Statistical Analysis: The collected data were checked and coded manually and then entered into computer. The numerical data obtained from the study were analyzed and significance of difference was estimated by using the statistical methods. Data were expressed in frequency, percentage, mean and standard deviation as applicable. Comparison between groups was done by unpaired student's t test, chi-square test, and test as applicable. Analysis of data was done by using computer based SPSS program (version 11.5). Probability less than 0.05 was considered as significant.

Ethical Consideration: All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the Ethics Review Committee of Local Institute. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and analyzed using the coding system.

Results

The mean age was found 57.48 years with 6.04 standard deviation (SD) in DM and 55.64 years with 6.34 standard deviation in NDM group and also 56.56 years with 6.49 standard deviation in the whole study population. The value of unpaired t-test was 0.158 and it was insignificant (p>0.05). Therefore there was no age difference in both groups (Table 1).

Table 1: Age Distribution of the Study Subjects

Age Group	Group		P value
	Case	**Control**	
<50 years	2(4.0%)	4(8.0%)	
50 - 59 years	27(54.0%)	26(52.0%)	
>59	21(42.0%)	20(40.0%)	0.131
Total	**50(100.0%)**	**50(100.0%)**	
Mean±SD	57.48±6.04	55.64±6.34	0.158

Table 2 showed that the indications of CAG werePost MI evaluation, unstable angina, stable angina, chest pain evaluation and positive ETT were 42.0%, 20.0%,

18.0%, 10.0% and 10.0% in DM group and 32.0%, 28.0%, 20.0%, 8.0% and 12.0 in NDM group respectively.

Table 2: Distribution of subjects by IHD status (n=100)

Indication for CAG	Group		P value
	Case	Control	
Stable angina	9(18.0%)	10(20.0%)	
Unstable angina	10(20.0%)	14(28.0%)	
POST-MI evaluation	21(42.0%)	16(32.0%)	0.000
Chest pain evaluation	5(10.0%)	4(8.0%)	
Positive ETT	5(10.0%)	6(12.0%)	
Total	**50(100.0%)**	**50(100.0%)**	

Table 3 showed that LAD was the commonest artery involved (86.0%), followed by RCA (82.0%), LCX (68.0%) and LM (6.0%) in DM study subjects. Among the NDM LAD artery involved (76.0%), followed by RCA (72.0%), LCX (64.0%) and LM (4.0%) in NDM study subjects.

Table 3: Comparison of Individual Vessel Involvement in Case And Control (n=100)

Name of vessel	Group		P value
	Case	Control	
LM	3	2	
LAD	43	38	0.021
LCX	34	32	
RCA	41	36	

It observed that out of 100 study subjects ultimately found 67 (60.9%) had complex coronary lesion in DM and 43(39.1%) were in NDM. Similarly 86(52.4%) found the simple coronary lesion in DM and 78(47.5%) were in NDM group. Z test was done between two proportions in complex coronary lesion where z= 3.345 (p<0.001) which was highly significant, Z test was done between two proportions in simple coronary lesion where z= 0.593 (p>0.05) which was insignificant and Z test was done between two proportions in total coronary lesion where z= 3.993 (p<0.001) which was highly significant (Table 4).

Table 4: Comparison of Morphological Character of Coronary Lesion (n=100)

Character	Group		P value
	Case	Control	
Simple	86	78	
Complex	67	43	0.001
Total	**173**	**121**	

Discussion

The study was conducted in Department of Cardiology, BSMMU, Dhaka, from July 2003 to June 2005. This study included 100 patients. Among them 50 patients had coronary artery disease with DM and another 50 patients had coronary artery disease without DM. The aim of the study was to evaluate the magnitude of carotid artery disease in diabetic and non-diabetic patients.

The mean age was found 57.48 years with 6.04 standard deviation (SD) in DM and 55.64 years with 6.34 standard deviation in NDM group and also 56.56 years with 6.49 standard deviation in the whole study population. The value of unpaired t-test was 0.158 and it was insignificant (p>0.05). Therefore there was no age difference in both groups.

We studied our cases on the basis of vessel involvement. Single vessel involvement was 25 percent, double vessels involvement was 37 percent and triple vessel involvement was 31 percent. This study is more or less similar with the another studies[8-10], where they found single vessel, involvement 15 percent, double vessel involvement 38 percent and triple vessel involvement 40 percent. We studied our cases on the basis of vessel involvement. LAD was the commonest artery involvement 86%. LCX 68%, RCA 82% in DM study subjects. Among NDM, LAD was 76%, LCX 64%, RCA 72% respectively. A similar result was reported by Akanda et al[11] from NICVD. The involvement were LAD 88.7%, LCX 52.6% and RCA 78.07%.

In the assessment of severity of the coronary artery disease it was observed that the mean coronary vessel score (Sullivan and Marwick, 1990) was 2.4 with standard deviation 0.67 and the minimum and maximum score was 1 and 4 respectively in DM. Similarly in NDM the mean coronary vessel score was 2.0 with standard deviation 0.57 and the minimum and maximum score was 1 and 4 respectively.

The morphological character out of 100 study subjects ultimately found that 67 (60.9%) had complex coronary lesion in DM and 43(39.1%) were in NDM. Similarly 86(52.4%) were0 found the simple coronary lesion in DM and 78(47.5%) were in NDM group. Z test was done between two proportions in complex coronary lesion where z= 3.345 (p<0.001) which was highly significant, Z test was done between two proportions in simple coronary lesion where z= 0.593 (p>0.05) which was insignificant and Z test was done between two proportions in total coronary lesion where z= 3.993 (p<0.001) which was highly significant.

In carotid angiography it was found that the critical lesion in carotid was 5, moderate 13 and mild 11 in DM group whereas in NDM group the critical lesion in carotid was 2, moderate 7 and mild 6. The difference was statistically significant ($p<0.05$) in DM compared to NDM in chi¬-square test ($p=0.004$). A similar result was reported by Rath et al[12] from India where they found carotid involvement 18%. The Morphological character of lesion it was observed that out of 100 study subjects 10 had complex carotid lesion in DM and 4 in NDM. Similarly 8 found the simple coronary lesion in DM and 5 were in NDM group. Z test was done between two proportions in complex coronary lesion where z= 6.864 ($p<0.001$) which was highly significant, Z test was done between two proportions in simple carotid lesion where z= 3.66 ($p<0.001$) which was highly significant and Z test was done between two proportions in total carotid lesion where z= 5.36 ($p<0.001$) which was highly significant.

Conclusion

In conclusion, patients of coronary artery disease with diabetic mellitus are having higher frequency and severity of Carotid artery disease than non-diabetic coronary artery disease patients. In this study carotid angiography in patients having coronary artery disease with diabetic mellitus revealed significant carotid artery disease than non-diabetic coronary artery disease patients. Diabetes mellitus has significant association with carotid artery disease.

Data Availability
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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