

CAROTID ARTERY DISEASE IN TYPE 2 DIABETES PATIENTS

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ABSTRACT

The prevalence of carotid artery disease in non insulin dependent diabetic patients (type 2 diabetes) was assessed by 2D Colour Triplex Scanning in 300 consecutive patients. The prevalence was found to be 18% for carotid artery disease (atherosclerotic lesions). This incidence rate of carotid artery disease tallies with that reported by other workers from India. None of the patients had external carotid artery involvement. Multivariate regression analysis showed that the odds ratio was 6 fold in patients above the age of 55 and 5 fold in patients with diabetes of more than 15 years duration.

KEY WORDS: Type 2 diabetes; Carotid artery disease.

INTRODUCTION:

Patients with diabetes mellitus are at increased risk of morbidity and mortality from macrovascular disease manifesting as coronary artery disease (CAD), cerebrovascular accident (CVA) and peripheral vascular disease (PVD). Increased frequency of dyslipidemia, hyperglycemia, obesity, hypertension and associated nephropathy may contribute to accelerated atherogenesis in diabetic patients. Recent introduction of 2 D Doppler duplex or Triplex Scanning proved that this is a better method for delineating the atherosclerotic plaques with or without calcification, the severity of obstruction, the intimal and medial thickness and the anatomical site of involvement [1]. However the gold standard diagnostic tool is contrast angiography. Digital subtraction angiography (DSA), CT and MRI angiography have provided better anatomical resolution. Atherosclerotic plaques and carotid vessel stenosis are reported to be independent predictors of cerebrovascular events[2]. Many studies have also established strong correlation of peripheral vascular disease (PVD) to carotid artery stenosis, CAD and increased risk of death in addition to neuropathy, nephropathy, proliferative retinopathy, hypertension and dyslipidemia.

Using this sensitive 2D Doppler Triplex Scanning, we prospectively studied the carotid circulation of type 2 diabetes patients and the results are summarised in this publication.

MATERIALS AND METHODS

300 consecutive NIDDM patients were selected for this study. In addition to 2D Colour Doppler Triplex Scanning, detailed laboratory investigations including fasting blood glucose, post prandial blood glucose, HbA_{1c}, lipid profile, ECG, microalbuminuria (in non proteinuric patients), was done in all cases. 7.5 MHZ transducer specific for colour doppler imaging for carotid arteries was used. Multivariate logistic regression analysis was done to assess whether there was any significant correlation between the risk ratio and duration of the disease as well as the age of the patient.

RESULTS

Table I shows the prevalence of atherosclerotic lesions (increased wall thickness with stenosis and plaques) in the carotid arteries. The extracranial course of internal carotid is very short in the neck and hence it is difficult to be visualised. Females had a higher prevalence of carotid vessel disease (CVD) (n=90; CVD=22; 24%) as compared to males (n=210; CVD=33; 16%) (Table 1). None of the patients had external carotid artery involvement. Table 2 shows the duration of diabetes and atherosclerotic changes in the carotid vessels. There is a strong positive correlation between the duration of the disease and the incidence of CVD. Table 3 relates the age of the patient and CVD and this also shows a strong positive

Table 1 : Prevalence of Carotid Vessel Disease

Patients	Total No.	*Carotid Artery No.	Involvement %
Males	210	33	(16%)
Females	90	22	(24%)
Total	300	55	(18%)

* 29 patients (53%) had involvement of both common carotids

Table 2 : Duration of Diabetes and Carotid Artery Disease

Duration	No. of patients	Carotid Involvement%
Upto 5 yrs.	117	13 (12%)
6 - 10	92	14 (15%)
11 - 15	60	12 (20%)
15 yrs.	31	16 (52%)

Table 3 : Age And Carotid Artery Disease

Duration	No. of patients	No. with Carotid Involvement
Below 40 yrs.	38	3 (8%)
41 - 50	118	7 (6%)
51 - 60	96	23 (24%)
61 - 70	40	17 (42%)
70 yrs	8	5 (62%)
Total	300	

Table 4 : CVD and its Link with Diabetic Complications

Complication	Patients with each complication	
	No.	%
Nephropathy (Microalbuminuria, Macroalbuminurea, or Renal Failure)	49	(89)
Hypertension	32	(58)
Retinopathy	14	(25)
CAD	4	(7)
Elevated LDL (> 150mg%)	29	(53)
Hypertriglyceridemia (>200mg%)	13	(23)

* Total number of patients with complications 55.

correlation with increasing age. Multivariate logistic regression analysis showed that the risk for carotid artery disease is 5 fold in patients with diabetes of more than 15 years duration (95% CI 2.0-17.1 p= 0.0003) as compared to those with less than 5 years duration and 6 fold (95% CI 2.1-16.8 p= 0.0007) in patients above the age of 55 as compared to those below 45 years.

The prevalence of associated complications in patients with CVD are given in Table 4. Elevated LDL was more prevalent than elevated triglycerides in CVD patients. The most common complications seen in patients with CVD are nephropathy, hypertension and hyperlipidemia.

DISCUSSION

This study proves that 2D Triplex Scanning is a

sensitive and specific method of detecting carotid artery disease in type 2 diabetes patients. As reported by others [3], it is well known that the duration of diabetes and the age of the patients had a positive correlation with the incidence of macrovascular disease in type 2 diabetic patients and multivariate logistic regression analysis of patients in this study also confirmed these findings.

When one considers the associated complications, there is a higher incidence of nephropathy (89%) and hypertension (58%) in type 2 diabetes patients with carotid artery disease. The difference in the prevalence of nephropathy in type 2 diabetes patients with CVD and without CVD was significant (89% and 65% p 0.004). This data thus suggests that if CVD is diagnosed in a type 2 diabetic patient, one should investigate the patient especially for nephropathy.

It has been recently reported that carotid artery disease like coronary artery disease is more related to lipoprotein (a) levels rather than increased cholesterol levels [4]. Our study also shows the same. Hypertriglyceridemia was not associated with macrovascular events in our study.

Besides the age of the patient and duration of the disease, previous publications have also showed a positive association of CVD with serum cholesterol, systolic blood pressure, serum creatinine, smoking and ischemic heart disease [5]. In a recent study (CUP study) [5] in 152 type 2 diabetes patients, the carotid intimal medial thickness was significantly higher in diabetic patients as compared to non diabetics (20% vs. 1%).

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