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Original Research Paper

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EVALUATION OF ASYMPTOMATIC CAROTID ARTERY STENOSIS IN PATIENT OF STROKE

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ABSTRACT

AIMS AND OBJECTIVES To study the presence of carotid artery stenosis in cases presenting with stroke and to correlate the degree of stenosis with clinical profile and risk factors.

Material and Methods: All the cases of cerebrovascular accident were subjected to detail clinical history ,past history of diabetes mellitus, hypertension, previous history of stroke, ischemic heart disease and rhematic heart disease. History was also taken regarding smoking, alcoholism, oral contraceptives, gout and long history of migraine. Thorough physical examination and detailed neurological assessment was made in each cases..

Result: Internal carotid artery stenosis was observed in 64.28% cases of TIA (9 cases), right ICA stenosis predominated over the left in the ratio of 2:1; stenosis was minimal to moderate. No patient had complete ICA occlusion in cases of TIA. So most of the patients of TIA had contralateral ICA stenosis, in the present study as it was expected and it supports the previous studies.

Conclusion: Internal Carotid Artery stenosis was predominantly seen in cases of ischaemic infarction and TIA. There had been good correlation in clinical profile, radiological evidence, hyperlipidemia as a risk and degree of diameter stenosis of internal carotid artery larger studies may be needed to confirm the result.

KEYWORDS : Internal Carotid Artery stenosis ,ischaemic infarction ,TIA, hyperlipidemia

INTRODUCTION:-

Cerebrovascular stroke is the third commonest cause of death in the west after heart disease and cancer. It ranks first in all neurological disease of adults i.e. more than 50% of hospital admission are of cerebrovascular strokes. The origin of the internal carotid artery is the most common site of atherosclerosis and superimposed atherothrombosis that leads to TIA or stoke.

Atherosclerosis in the proximal internal carotid artery is usually most severe in the first 2 cm and arises from the posterior wall, often extending downward into the common carotid artery. A non-stenotic or slightly stenotic carotid lesion in conjunction with a ischaemic stroke or a single prolonged TIA suggests the heart as the source of embolism.There is a strong relationship between the degree of internal carotid artery stenosis and risk of stroke as indicated by the fact that until the degree of stenosis reaches 75-80% the annual risk of stroke is approximately 1%, whereas in cases in which the stenosis increase beyond these levels, the annual stroke rate for ipsilateral ischemic event is 2.5% .

Carotid endarterectomy for prevention of strokes is the recent trend . Stroke is having not only high amount of morbidity but also a large mortality. As India having a large number of patients with cerebrovascular accident and they can't afford CT Scan in every patients, it is important to know the type of stroke, as well as its etiology for prevention. About half of the cerebrovascular strokes are associated with atherosclerotic disease of the internal carotid arteries. Carotid endarterectomy reduces the incidence of subsequent neurologic events in symptomatic patients with internal carotid artery stenosis of >70% . So carotid endarectomy for prevention of strokes is the recent trend.There is paucity of literature in our country about the relationship of carotid artery stenosis with stroke.

MATERIAL AND METHODS

The present study was conducted in Post Graduate Department of Medicine and Emergency Department, S. N. Medical College, Agra, comprising of 54 cases. The diagnosis of Cerebrovascular accident was made by the WHO definition "Rapidly developed clinical sign of a focal disturbance of cerebral function of presume vascular origin and of more than 24 hours duration". All cases of acute cerebrovascular accident admitted in P.G. Department of Medicine and Emergency Department, S. N. Medical College, Agra constituted the material for the present study. Study consisted of 54 patients, six were excluded.

The exclusion criteria were : cases of Cerebrovascular accident due to trauma, cases of encephalitis, septic, viral, bacterial or fungal meningitis, simulating Cerebrovascular accident, subarachnoid haemorrhage, cerebral infarction due to tuberculous arteritis, neurological deficit due to metabolic causes, and causes, and cases of eclampsia, pre-elcampsia and post eclampsia.

All the cases of cerebrovascular accident were subjected to detail clinical history with special reference to age, sex, risk factors for stoke and atherosclerosis, hypertension, smoking hypercholesterolemia, diabetes, high blood lipid. Detailed enquiry was made to evaluate past history of diabetes mellitus, hypertension, previous history of strike, ischemic heart disease and rhematic heart disease. History was also taken regarding smoking, alcoholism, oral contraceptives, gout and long history of migraine. Attempt was made to find out history of hypercholesterolemia. Special enquiry was made to hypertension, diabetes mellitus, coronary heart disease and stroke with family.

Thorough physical examination and detailed neurological assessment was made in each cases. All the cases were categorized into TIA, CITIS, cerebral embolism and cerebral thrombosis cereal haemorrhage as per criteria.

OBSERVATIONS

Fifty four cases admitted in P.G. Department of Medicine and Emergency Department, S. N. Medical College, Agra constituted the material for the present study . 6 cases were excluded from study. 1 patient did not give consent, 3 patients died within one hour of admission and 2 cases left against medical advice during first weeks of admission.The mean age of all the cases of stroke was 62 with range of 40-90 years

TABLE -1 AGE AND SEX INCIDENCE OF STROKE

Age	Sex				Total	
	Male		Female		Total	%
	No.	%	No.	%		
40-50	7	53.8	6	46.2	13	27.1
51-60	12	63.2	7	36.8	19	39.6
61-70	9	90.0	1	10.0	10	20.8
71-80	3	75.0	1	25.0	4	8.3
81-90	2	100.0	0	-	2	4.2
Total	33	68.7	15	31.3	48	100.0

Types of strokes in 48 patients included in this study. 32 (70.73%) patients had ischaemic infraction and 14(29.27%) cases had transient ischaemic attacks. The clinical profile of 34 patients of ishaemic infaction : 23 cases presented with right sided weakness and 11 cases with left sided weakness of 23 cases of right side weakness 18 had hemiparesis. Of 11 cases of left sided weakness 8 cases had hemiplegia and 3 hemiparesiss.Out of 18 cases of right side weakness Broca's aphasia was observed in 12 cases and speech was normal in 11 cases. Out of 11 cases of left sided weakness 5 cases showed dysarthria and 6 cases were normal.

TABLE NO. 2 CAROTID ARTERY DOPPLER STUDY

	Type of ICA Stenosis	No.	Percentage
1.	Normal (No. of ICA Stenosis	15	31.25
2.	Rt. ICA Involvement	13	27.10
3.	Left ICA Involvement	15	31.25
4.	Bilateral ICA involvement	5	10.42

Carotid artery Doppler study was performed in 48 cases. The percentage of different types of carotid artery stenosis in cases of strokes has been depicted in table

TABLE NO. 3 CLINICAL PROFILE OF STROKE

S. No.	Clinical Manifestation	No.	Percentage
1	Hemiplegia(a) Right -18 (b) Left – 8	26	76.47
2	Hemiparesis(a) Right -5 (b) Left – 3	8	23.52
3	Speech Disturbance (a)Right -12(b) Left – 5	17	50.0
4	Ipsilateral 7th CN UMN weakness	19	55.8
5	Seizures	8	23.52
6	Headache	5	14.7
7	Level of Consciousness		
	(a) Mental obtundation	4	11.56
	(b) Loss of Consciousness upto 48 hrs	14	41.17
	(c) Loss of consciousness 24-72 hrs	9	26.47
	(d) Fully conscious	7	20.58

The clinical profile of 34 patients of ishaemic infaction has been depicted in 4. 23 cases presented with right sided weakness and 11 cases with left sided weakness of 23 cases of right side weakness 18 had hemiparesis. Of 11 cases of left sided weakness 8 cases had hemiplegia and 3 hemiparesiss.Out of 18 cases of right side weakness Broca's aphasia was observed in 12 cases and speech was normal in 11 cases. Out of 11 cases of left sided weakness 5 cases showed dysarthria and 6 cases were normal.

TABLE -4 RISK FACTORS IN STROKE

RISK FACTORS	NO.	PERCENTAGE
Hypertension	16	42.85
Diabetes	14	28.57

Result

The mean age of this study was 62 years with maximum number of cases in the 51-60 age group. Males predominated over females in the ratio of 2. 2:1.Maximum number of cases were of ischaemic infarction followed by a transient ischaemic attacks. Right sided hemiplegia predominated over left sided in cases of ischaemic infarction. Broca's aphasia and ipsliateral 7th CN UMN weakness were main feature in cases of ischaemic infarction. Left sided cortical infarction was more common that right in case of ischaemic infarction.

Coming to risk factors, hyperlipidema was seen in maximum percentage of patients (76.47%) ; hypertension and smoking were also seen in 64.2% and 70.58% respectively of the patients of ischaemic infarction. Hemiparesis/ monoparesis was the main features seen in 85% cases of stroke. Right and left side both were equally distributed. Hyperlipidemia (85.71%) was the predominant risk factor in cases of TIA. Though hypertension, diabetes mellitus and smoking were also seen in 42.85%, 28.57% and 28.37% cases respectively.

ICA stenosis was observed in 85.3% cases of ischaemic infarction, left ICA stenosis was more commonly observed and significant stenosis of more than 40% was seen in 90.9% cases of left ICA stenosis. Right ICA stenosis was observed only in 26.47% cases and steonsis of greater than 40% was in 87.5% cases of right ICA stenosis.So in most of the cases of ischaemic infarction there is impressive correlation between the clinical profile and degree of diameter stenosis of ICA.

Coming to risk factors in ischaemic infarction, hyperlipidemia (raised LDL and raised serum cholesterol) was observed in maximum percentage of patients (24 cases), suggesting a impressive correlation of hyperlipidemia to the carotid atherosclerosis.Internal carotid artery stenosis was observed in 64.28% cases of TIA (9 cases), So most of the patients of TIA had contralateral ICA stenosis, in the present study as it was expected and it supports the previous studies.

Statistical Analysis

The observations recorded in all the groups were tabulated and statistical analysis carried out by using appropriate statistical software SPSS 17. Student 't test for inter group comparison was used. P-value >0.05 was taken to be statistically insignificant & P-value <0.05 was taken statistically significant whereas P-value <0.01 taken to be statistically highly significant.

Discussion

Analysis of data from major hospitals in India indicates that of all hospital cases 1% to 4.5% of medical and 15% to 20% of neurological admission are due to cerebrovascular strokes. 40% to 50% of cerebrovascular strokes are associated with atherosclerotic disease involving the extra cranial carotid arteries.

Silvestrini M et al in one similar prospective, blinded longitudinal study like us conducted in an outpatient neurovascular department, studied impaired cerebral vasoreactivity and risk of stroke in patients with asymptomatic carotid artery stenosis.Standards for treating patients with asymptomatic carotid artery stenosis have been difficult to establish because of the lack of evidence for factors influencing these patients' prognoses. However, preliminary evidence suggests that an alteration in cerebral hemodynamic function may play a relevant role in the occurrence of stroke in patients with carotid artery disease.The Objective was to investigate the relationship between cerebrovascular reactivity to hypercapnia and cerebrovascular events in patients with severe unilateral asymptomatic carotid artery stenosis.

The overall annual rate for all ischemic events was 7.9%. Seventeen patients (18%) had ischemic events, all but 1 of which were ipsilateral to the carotid artery stenosis. Among factors considered, only lower breath-holding index values in the middle cerebral artery ipsilateral to carotid artery stenosis were significantly associated with the risk of an event (hazard ratio, 0.09; 95% confidence interval, 0.02-0.38; P=.001, by multivariate analysis. These results suggest a link between impaired cerebrovascular reactivity and the risk of ischemic events ipsilateral to severe asymptomatic carotid .[1]

Craven TE did a case control study evaluation of the associations between carotid artery atherosclerosis and coronary artery stenosis. Study was to evaluate the consistency, strength, and independence of the relation of carotid atherosclerosis to coronary atherosclerosis, they quantified coronary artery disease risk factors and extent of carotid atherosclerosis in 343 coronary artery disease patients and 167 disease-free control patients. The relation remained strong after control for age in men and women older than 50 years and in

women younger than 50 (p less than 0.001 for men and women greater than 50 years, p = 0.003 for women less than or equal to 50) but did not persist after control for age in men younger than 50. Logistic models that included coronary disease risk factors, with or without B-mode score, as independent variables and presence or absence of coronary disease as the outcome variable indicated that the extent of carotid atherosclerosis was a strong, statistically significant independent variable in models for men and women older than 50 years of age. Next, we examined the usefulness of B-mode score as an aid in screening for coronary artery disease in men and women older than 50 years.

Classification rules, both including and excluding B-mode score, were developed based on logistic regression and, for comparison, recursive partitioning (decision trees). The performance of these rules and the bias of their performance statistics were estimated. The improved classification of the study sample when B-mode score was incorporated in the rule was statistically significant only for men (p = 0.015). However, the addition of B-mode score was found to 1) increase the median discrimination score for both sex groups based on the logistic model, and 2) yield better sensitivities and specificities for rules based on recursive partitioning. Thus B-mode score is strongly, consistently, and independently associated with coronary artery disease in patients older than 50 and is at least as useful as well-known risk factors for identifying patients with coronary artery disease.[2]

The causes of stroke in patients with asymptomatic carotid-artery stenosis have not been carefully studied. Information about causes might influence decisions about the use of carotid endarterectomy in such patients.Therefore Inzitari D et al studied the causes and risk of stroke in patients with asymptomatic internal-carotid-artery stenosis.They studied patients with unilateral symptomatic carotid-artery stenosis and asymptomatic contralateral stenosis from 1988 to 1997. The causes, severity, risk, and predictors of stroke in the territory of the asymptomatic artery were examined and quantified.The risk of stroke at five years after study entry in a total of 1820 patients increased with the severity of stenosis. Some patients had more than one stroke of more than one cause. In the territory of an asymptomatic occluded artery (as was identified in 86 patients), the annualized risk of stroke was 1.9 percent.

Strokes with different causes had different risk factors. The risk factors for large-artery stroke were silent brain infarction, a history of diabetes, and a higher degree of stenosis; for cardioembolic stroke, a history of myocardial infarction or angina and hypertension; and for lacunar stroke, age of 75 years or older, hypertension, diabetes, and a higher degree of stenosis.The risk of stroke among patients with asymptomatic carotid-artery stenosis is relatively low. Forty-five percent of strokes in patients with asymptomatic stenosis of 60 to 99 percent are attributable to lacunes or cardioembolism. These observations have implications for the use of endarterectomy in asymptomatic patients. Without analysis of the risk of stroke according to cause, the absolute benefit associated with endarterectomy may be overestimated.[3]

A prospective study was initiated in January 1980 by Roederer GO et al . The natural history of carotid arterial disease was studied in asymptomatic patients with cervical bruits. They followed it with Duplex scanning of consecutive series of 167 asymptomatic patients with cervical bruits. Patients were seen at six month intervals for the first year and yearly thereafter. Based on previously validated criteria, disease at the carotid bifurcation was classified into 6 categories: Normal, 1-15% diameter reduction, 16-49%, 50-79%, 80-99%, and occlusion.

Patients were evaluated to assess: the occurrence of new neurological symptoms, the stability of the lesions at the carotid bifurcation, and the possible role of risk indicators on disease changes. During follow-up, ten patients became symptomatic (6 with TIA's and 4 with stroke). The development of symptoms was accompanied by disease progression in 8 patients. By life table analysis, the annual rate occurrence of symptoms was 4%. The mean annual rate of disease progression to a greater than 50% stenosis was 8%. When progression in all categories was considered, 60% of the sides showed some disease aggravation.

The presence of or progression to a greater than 80% stenosis was highly correlated (p = 0.00001) with either the development of a total occlusion of the internal carotid artery or new symptoms. The major risk factors associated with disease progression were cigarette smoking, diabetes mellitus, and age. Those patients under 65 years of age were most likely to show progression. Despite high rates of disease progression, this study further supports the contention that it is prudent to follow a conservative course in the management of asymptomatic patients presenting with a cervical bruit.[4]

Norris JW, Zhu CZ etal sought to determine the risks of stroke, myocardial ischemia, and vascular death in patients with asymptomatic carotid stenosis.Six hundred ninety-six patients with asymptomatic carotid stenosis referred to the Doppler laboratory were followed prospectively for a mean time of 41 months. These patients were studied both clinically and by carotid Doppler ultrasound, including evaluation of the effect of stroke risk factors.Transient ischemic attacks occurred in 75 patients and stroke in 29, while 132 had ischemic cardiac events. Five patients died from stroke and 59 from cardiac causes. Annual stroke rate was 1.3% in patients with carotid stenosis less than or equal to 75% and 3.3% in those with stenosis greater than 75%. Ipsilateral stroke rate was 2.5% in patients with greater than 75% carotid stenosis. Annual cardiac event rate was 8.3% and death rate 6.5% in patients with severe carotid stenosis.With carotid stenosis less than or equal to 75%, the stroke rate is negligible (1.3% annually) whereas the combined risk of cardiac ischemia and vascular death is as high as 9.9%. With stenosis greater than 75%, combined transient ischemic attack and stroke rate is 10.5% per year, with 75% of events ipsilateral to the stenosed artery.[5]

Kallikazaros I et al studied whether carotid artery disease detected by ultrasonography can be a clinically useful marker for the presence of severe coronary artery disease (CAD) in patients evaluated for chest pain .Duplex ultrasonography and quantitative coronary angiography were used to assess carotid and coronary artery atherosclerosis in 225 consecutive patients .CAD was present in 197 patients (88%). Fifty-seven patients (25%) had 1-vessel disease, 52 (23%) had 2-vessel disease, 53 (24%) had 3-vessel disease, and 35 (16%) had left main stem CAD (LMS-CAD). The incidence of severe CAD (3-vessel disease or LMS-CAD) was 24% and 63% in the normal and impaired ejection fraction (EF. In the entire study population, the presence of severe CAD was determined by age, male sex, and carotid disease; in the impaired EF group by age and carotid disease; and in the normal EF group only by age. Carotid disease has a high negative (92%) and a high positive (91%) predictive value for the presence of severe CAD in the subgroup with normal and impaired EF, respectively.So to conclude , patients evaluated for chest pain, carotid disease is significantly correlated with severe CAD. Furthermore, in patients with impaired left ventricular systolic performance the presence of carotid disease reflects the presence of severe CAD, while in patients with normal EF the absence of carotid disease reflects the absence of severe CAD.[6]
Screening and carotid endarterectomy have been advocated for asymptomatic carotid stenosis. However, the risk of stroke without treatment has not been adequately defined. European Carotid Surgery Trialists Collaborative Group investigated the risk of stroke in the distribution of the asymptomatic carotid artery in 2295 patients randomised in the European Carotid Surgery Trial.. The stroke risk in the 127 patients with severe (70-99%) carotid stenosis was 5·7% (95% CI, 1·5-9·8). Given these low stroke risks, the potential benefit of endarterectomy for asymptomatic carotid stenosis is small. Population screening is not justified and endarterectomy for asymptomatic carotid stenosis should only be performed in the

context of well organised randomised controlled trials.[7]

Patient management should include lifestyle modification, focusing on smoking cessation, daily exercise (30 min/day), normal body mass index (≤25 kg/m2), and a Mediterranean diet. Pharmacological treatment can be added for blood pressure control and a lipid-lowering treatment to achieve LDL cholesterol <2.5 mmol/L (100 mg/dL) with an option of <1.8 mmol/L (<70 mg/dL) if feasible.

In diabetic patients, glucose control should be obtained, with the target glycated haemoglobin (HbA1c) <7%. Site-dependent therapy and revascularization strategy are discussed in the respective sections. However, the risk may increase to 3–4% per year in elderly patients or in the presence of contralateral carotid artery stenosis or occlusion, evidence of silent embolization on brain imaging, carotid plaque heterogeneity, poor collateral blood supply, generalized inflammatory state, and associated coronary or peripheral artery disease. Currently there are indications that the risk of stroke in patients with asymptomatic carotid artery disease is lower due to better medical treatment It must be emphasized that the management of patients with stroke should always be decided after multidisciplinary discussion, also including (depending on lesion site) specialists beyond the area of cardiovascular medicine, e.g. neurologists.[8,9]

Conclusion

Internal Carotid Artery stenosis was predominantly seen in cases of ischaemic infarction and TIA. There had been good correlation in clinical profile, radiological evidence on CT, hyperlipidemia as a risk and degree of diameter stenosis of internal carotid artery larger studies may be needed to confirm the result.

References:-

1. Silvestrini M, Vernieri F, Pasqualetti P, Matteis M, Passarelli F, Troisi E, Caltagirone C. Impaired cerebral vasoreactivity and risk of stroke in patients with asymptomatic carotid artery stenosis. Jama. 2000 Apr 26;283(16):2122-7.
2. Craven TE, Ryu JE, Espeland MA, Kahl FR, McKinney WM, Toole JF, McMahan MR, Thompson CJ, Heiss G, Crouse JR. Evaluation of the associations between carotid artery atherosclerosis and coronary artery stenosis. A case-control study. Circulation. 1990 Oct 1;82(4):1230-42.
3. Inzitari D, Eliasziw M, Gates P, Sharpe BL, Chan RK, Meldrum HE, Barnett HJ. The causes and risk of stroke in patients with asymptomatic internal-carotid-artery stenosis. New England Journal of Medicine. 2000 Jun 8;342(23):1693-701.
4. Roederer GO, Langlois YE, Jager KA, Primozich JF, Beach KW, Phillips DJ, Strandness DE. The natural history of carotid arterial disease in asymptomatic patients with cervical bruits. Stroke. 1984 Jul 1;15(4):605-13.
5. Norris JW, Zhu CZ, Bornstein NM, Chambers BR. Vascular risks of asymptomatic carotid stenosis. Stroke. 1991 Dec 1;22(12):1485-90.
6. Kallikazaros I, Tsioufis C, Sideris S, Stefanadis C, Toutouzas P. Carotid artery disease as a marker for the presence of severe coronary artery disease in patients evaluated for chest pain. Stroke. 1999 May 1;30(5):1002-7.
7. European Carotid Surgery Trialists Collaborative Group. Risk of stroke in the distribution of an asymptomatic carotid artery. The Lancet. 1995 Jan 28;345(8944):209-12.
8. Roubin GS, New G, Iyer SS, Vitek JJ, Al-Mubarak N, Liu MW, Yadav J, Gomez C, Kuntz RE. Immediate and late clinical outcomes of carotid artery stenting in patients with symptomatic and asymptomatic carotid artery stenosis: a 5-year prospective analysis. Circulation. 2001 Jan 30;103(4):532-7.