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Research Article

A Study of the Angiographic Profile and Risk Factors in Patients of Ischemic Stroke

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ABSTRACT:

Introduction: Stroke is the third commonest cause of death in India and there is a higher incidence of stroke in young in India than in the developed countries. With an increasing aging population, the stroke burden in India can be expected to reach epidemic proportions. Ischemic stroke accounts for 70-85% of all strokes. The present study was conducted in a tertiary level large neurological centre between 2007-2009 to study the risk factors associated with ischemic stroke and its correlation with angiographic profile.

Material & Methods: In this study group of 161 patients, patients were between 15-70 years of age and all cases included were those who presented with first ever ischemic stroke. Patients who had documented cardiovascular causes like RHD, Atrial fibrillation & mechanical heart valves were excluded. Other category who were not included were those with hypercoagulable states like pregnancy, postpartum state and malignancies. Patients were assessed for conventional risk factors for stroke and also procoagulant factors. All patients underwent a DSA of neck and intracranial vessels. The DSA profile was then correlated with their risk factors.

Results: Angiographic abnormalities were found in 36% of patients, most of the abnormalities were in extracranial vasculature. Intracranial vascular lesions were seen in 14% of patients which is much higher than western literature where intracranial disease was in 4-6% of cases.

Patients were divided in two groups those who had risk factors and angiographic abnormalities vs those who had angiographic abnormalities and no risk factors.

Conclusion: There was no significant statistical difference between the two groups who had risk factors and angiographic abnormalities vs those who did not have risk factors and angiographic abnormalities disease, thus risk factors do not predict the likelihood og angiographic abnormality. Other significant conclusion was that stroke in young (17-45yrs) had more procoagulant abnormalities and those in the middle aged and elderly had more of conventional risk factors.

KEY WORDS: ISCHEMIC STROKE**,** STROKE-IN-YOUNG, DIGITAL SUBSTRACTION ANGIOGRAPHY, PROCOAGULANT STATE

Introduction :

Stroke is the third commonest cause of death worldwide[1] and there is a higher incidence of stroke in young in India than in the developed countries[2]. The Indian Council of medical research has a stroke surveillance , it indicates that cases of Stroke have shot up drastically in the last three decades. In a survey three decades ago the prevalence was 39-79/100,000 but recent studies show that prevalence is nearly 250-300 per 100,000. With an increasing aging population, the stroke burden in India can be expected to reach epidemic proportions[3]. Ischemic stroke accounts for 80-85% of all strokes. The present study was conducted in a tertiary level large neurological centre between 2007-2009, where all patients admitted with stroke were included in the study and a subsection of it who underwent an Invasive Angiography form the basis for discussion in this article.

AIM: The aim of this study was to study the conventional and procoagulant risk factors in patients of ischemic strokes and correlate these with the angiographic changes in the cranial vessels and ascertain whether the risk factors causes any significant angiographic disturbances.

MATERIAL & METHODS: In this study group, the total number of the patients was 161. The patients were between 15-70 years of age. Only those patients who consented for a

DSA were included in the study.

Inclusion Criteria

All cases of first ever ischemic stroke were included in the study. The diagnosis of ischemic stroke was made on the basis of clinical examination and confirmed with CT or MRI brain.

Exclusion Criteria

Patients who had documented cardiovascular causes like RHD, Atrial fibrillation & mechanical heart valves were excluded.

Other category who were not included were those with hypercoagulable states like pregnancy, postpartum state, malignancies like GI malignancies, urological malignancy.

Risk Factor Assessment

Risk factor assessment was done clinically and with laboratory tests in which conventional and procoagulant risk factors were assessed. DSA was done in a Biplanar angiography laboratory by a trained interventional radiologist.

OBESERVATION & RESULTS:

A total of 364 patients of ischemic stroke were admitted to hospital over two years' period. Out of the 364 patients, 161 were included in the study. Males constituted 94% of the study group. There was a bias towards younger patients (mean age-38.03 years), as these were the ones who agreed for a DSA and in whom DSA could be performed safely as the younger patients were without antecedent complications. Assessment of severity of strokes was not a part of this study however sub types of ischemic strokes as per TOAST International Criteria were as follows[4].

Large artery atherosclerosis-	48.4%
Small vessel occlusion-	17.4%,
Stroke of other determined aetiology-	1.9%
Stroke of undetermined aetiology-	32.3%

Anterior circulation strokes constituted 82.6% and posterior circulation 17.4%. The vascular territory involvement of different vessels is given in Table 1.

Risk factors assessment was done for conventional risk factors and procoagulant factors.

Conventional risk factors included hypertension, diabetes mellitus, hyperlipidemia, smoking, coronary artery disease, transient Ischemic attacks and family history of cerebrovascular accident.

Procoagulant risk factors assessed were Serum Homocysteine, Antiphospholipid antibody, Protein C, Protein S, Antithrombin III and Activated Protein C resistance (APC). A total of 109 of the 161 patients had risk factors of which conventional risk factors were present in 78 patients (48.4%)and procoagulant risk factors in 48 patients (30%) (Table 2, 3, 4). Digital Substraction Angiography (DSA) abnormalities were seen in 58 patients of 161 patients (Table 5). A total of 44 patients out of 109 with risk factors had angiographic abnormalities (40.4%), while in the no risk factor group, 14 patients out of 52 (27%)revealed abnormalities on DSA. Out of 44 patients with abnormal DSA in risk factor group, 29 (80.5%) had extracranial abnormalities and 15 (68.1%) had intracranial abnormalities. (Table 6). Statistically when these two groups were compared there was no significance (p=0.1371) implying that presence of risk factors is not the only reason to have angiogrphic abnormality.

DISCUSSION

Angiographic abnormalities were found in 36% of patients presenting with first ever ischemic stroke. Most of these abnormalities (22%) were found in extracranial vasculature, intracranial vascular lesions were seen in 14% of patients which is much higher than western studies figures of 5%[5,6] . In this study if we look at patients who have risk factors and angiographic abnormalities (40%) and compare it with those who did not have risk factors but had angiographic abnormalities, there is no statistical significance between the two (P = 0.02) and thus the presence of risk factors does not predict the likelihood of angiographic abnormalities. Procoagulant risk factors accounted for 33% of DSA abnormalities and of these 29% were in the stroke in young age group who are vulnerable to recurrent attacks if not placed on appropriate therapy. Also, significant is the fact that no risk factors were identified in 24% of patients with angiographic abnormalities. Risk factors both conventional and procoagulant are an important cause of occlusion of cranial vessels and 76% of the patients who had angiographic abnormalities had presence of these risk factors.

CONCLUSION

In conclusion, it is important to note that a large subset of Indian patients especially young have procoagulant risk factors. Further evaluation by larger, case controlled studies is required to ascertain whether if these risk factors play a causative role in aetiology of stroke. Serum homocysteine and protein S were the commonest procoagulant risk factors identified. Digital Substraction Angiography is recommended in young stroke patients at least in the centres where facilities for intervention are available. However, a DSA is not mandatory and non-invasive modalities like MR Angiography and CT Angiography should normally suffice for screening of cranial vasculature both extracranial and intracranial. There was no significant correlation between occlusion of cranial vasculature with risk factors.

TABLE 1: Vascular Territories Involved In Ischemic Strokes

Vascular Territory	Percentage
Right Middle Cerebral Artery	43.00%
Left Middle Cerebral Artery	38.50%
Anetrior Cerebral Artery	1.20%
Posterior Cerebral Artery	4.35%
Pica (Post Inferior Cerebellar Artery)	5.80%
Cerebellar	4.35%
Basilar	2.90%

TABLE 2- Risk Factor Assessment

Risk Factors	Numbers	Percentage (%)
Conventional	78	48.4
Procoagulant	48	30
Convnetional & Procoagulant	17	11
No Risk Factors	52	32.3
Total	**161**	

TABLE 3- Conventional Risk Factors Numbers And Percentage

Risk factor	Numbers	Percentage %
Hypertension	43	27
Diabetes Mellitus	21	13
Hyperlipedemia	51	31.5
Smoker	45	28
CAD	17	10.6
TIA	11	7
Family History (CVA)	20	12.40%

TABLE 4- Procoagulant Abnormality Profile

Procoagulant factor	Percent %
Protein C Deficiency	17.4
Protein S deficiency	8.70%
Protein C&S deficiency	8.1
AT III Deficiency	3.7
APLA	2.5
Activated Protein C resistance	1.90%
Hyperhomocysteinemia	14.90%

TABLE 5- Dsa Abnormalities In Cranial VASCULATURE

Territory	Numbers	Percent %
Anterior circulation	48	30
Posterior Circulation	10	6
Extracranial vascular stenosis	36	22
Intracranial vascular stenosis	22	14

TABLE 6- Association Of Dsa Proven Occlusion /Stenosis With Risk Factors

Patient Profile	Angiographic Lesions (Total 58)	Percentage
Risk Factors (109 Patients)	44	44/109= 40.4%
No Risk Factors (52 Patients)	14	14/52= 27%
Extracranial Abnormalities With Risk Factors – 36	29	29/36= 80.5%
Intracranial Abonormalities With Risk Factors- 22	15	15/22= 68.1%

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