



Original Research Article

Cross sectional descriptive study of clinical and radiological profile of patients presenting with recurrent ischemic stroke in a tertiary care centre of South India

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ARTICLE INFO

Article history:

Received 18-01-2022

Accepted 29-01-2022

Available online 05-03-2022

Keywords:

Stroke

Recurrence

Risk factors

ABSTRACT

Introduction: Even with recent advances in the management of ischemic stroke, incidence of recurrence is quite frequent. Identification of risk factors is of prime importance especially during the first episode of ischemic stroke. Imaging in stroke has pivotal role to play in understanding the stroke and also the recurrence risk. Hence we present a study about clinical and radiological profile of recurrent ischemic stroke patients.

Materials and Methods: The study was conducted for a period of five consecutive years with a sample size of 100 patients. It is a cross sectional descriptive study where in data was collected and analysed among various variables necessary. Patients with recurrent ischemic stroke were examined and investigated. Continuous variable is expressed as mean +SD or median (Range) if non- normally distributed. Categorical data is expressed in proportions.

Results: Recurrence of the ischemic stroke was commonly seen in the patients with uncontrolled blood pressure, hyperglycemia, dyslipidemia, ischemic heart disease and patients with large artery atherosclerosis. Incidence was higher among male patients, patients above 60 years of age and stroke involving MCA and ACA territories.

Conclusion: Identification of the risk factors responsible for the recurrence at the first episode of ischemic stroke and appropriate management are of prime importance. Apart from clinical and biochemical parameters, considering the radiological parameters like extent of stenosis and appropriate dosing and choice of medication also is of utmost importance in preventing the recurrence of stroke.

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1. Introduction

Worldwide the second leading cause of morbidity and mortality and 5th cause in the first world countries is attributed to stroke.¹⁻⁴ Even with recent advances in stroke management, recurrences are seen frequently in our day to day practice among all age groups.^{5,6} The risk factors responsible for stroke recurrence may not be same across all age groups, and are yet to be explored. Recurrence rates of ischemic stroke in various studies, are observed to range from 7%-20% at 1 year to 16%-35% at 5 years.^{7,8}

An increased risk of recurrence was observed in about half of patients following recovery from an ischemic stroke especially in the initial few days or weeks following the stroke. It was observed that risk of recurrence was highest during the first week following the index event.⁹ Risk factors known so far can be classified into modifiable and non-modifiable and understanding of the same helps in planning further management and predicting recurrence risk in a patient. Recurrence of ischemic stroke causes significant functional dependence, loss of working years and also affects the socioeconomic outcome. Identification of these risk factors responsible for recurrence is of utmost importance to avoid the recurrences and improve the quality

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of life in patients, hence the study.^{10,11}

2. Aim

To understand clinical profile and identify the risk factors causing recurrence of ischemic stroke in patients presenting to our tertiary care centre.

3. Materials and Methods

Study was conducted for period of five years in a tertiary care hospital of South India. The study included a sample size of who satisfied the case definitions of Recurrent Ischemic Stroke. Ischemic stroke was defined as an episode of neurological dysfunction caused by focal cerebral, spinal, or retinal infarction.

3.1. Study Population

All cases presenting to our hospital diagnosed with recurrence of ischemic stroke were included in the study. A complete history of compliance of medications, single antiplatelet or dual antiplatelet, use of statins, antihypertensive, oral hypoglycemic agents or use of insulin for control diabetes, history of previous ischemic or haemorrhagic stroke, history of patients blood sugars record, blood pressure record, habits like smoking and alcohol was collected based on their previous reports and documents available. A complete clinical examination was done and clinical findings like fever, headache, vomiting, hemiparesis, hemiplegia, cranial nerve weakness, papilledema, blurring of vision, high blood pressure, high blood sugars, seizures or any focal deficits were noted and analysed by neurophysician on duty. Help was taken for fundus examination, to look for papilledema and any hypertensive or diabetic eye changes were noted. Necessary blood investigations like serum urea, creatinine, sodium, potassium, fasting and post prandial blood sugars, lipid profile and serum homocysteine was performed. Electrocardiogram and a 2 Dimensional Echocardiography of heart was performed. Neuroimaging either MRI Brain and MR Angiography (Both Intracranial and Extracranial) was done. Carotid Vertebral Doppler was done in cases where it was necessary. All the above mentioned variables were analysed and risk factors identified.

3.2. Study design cross

Sectional descriptive study.

3.3. Inclusion criteria

1. Patients diagnosed with recurrent ischemic stroke after taking clinical and MRI Brain picture into consideration.
2. Patients more than more 18 years of age.

3.4. Exclusion criteria

1. Patients less than 18 years of age.
2. Patients presenting with first episode of ischemic stroke.
3. Patients presenting with haemorrhagic stroke.
4. Patients presenting with Transient Ischemic Attack.
5. Patients presenting with hemiparesis or hemiplegia or any other focal deficit of other etiology and with MRI Brain not showing any ischemic areas.

In the present study we included total of 100 patients which had recurrent ischemic stroke. In our study it was observed that male sex had higher incidence of recurrence that is around 60%. Patients aged greater than 60 and 45 to 60 were at high risk for the recurrence as compared to younger (< 45 years) population. at admission (>140/90) and poor sugar control (pre prandial capillary plasma glucose >130mg/dl and post prandial capillary plasma glucose >180mg/dl and HbA1c >7%) were observed in most of patients. High blood pressure was seen in 56% of patients and 44% had poor diabetic control. Dyslipidemia was seen in 20% patients and Ischemic Heart Disease in 26% of patients. 6% patients had Hypothyroidism and 4% had associated chronic kidney disease.

80% of patients with recurrence where on treatment with single antiplatelet, aspirin, 75 or 150 mg and atorvastatin or rosuvastatin of variable doses of 10mg to 20mg. Only 20 patients out of 100 patients received dual antiplatelet (aspirin and clopidogrel) with either 75 or 150 mg dose.

62% of patients presenting with recurrence were associated with large vessel and 38% with Small vessel stroke. 76% of patients had multiple territory infarcts at presentation and 24% had single territory infarcts. 74% of patients had involvement of Anterior and MCA territory infarct and 26% had Posterior circulation infarcts at presentation. Watershed zone infarcts were seen to involve in 12% of patients. Most of the patients had normal doppler study accounting for around 86 patients, only 8 patients had significant stenosis i.e more than 70% stenosis and 4 of them had stenosis accounting for 50 – 70%. Regional wall motion abnormalities on two dimensional echocardiography was noted in 26% of patients.

Around 80% of patients showed significant improvement even after recurrence with some clinical deficits of stroke sequelae. 20 % of patients continued to have significant weakness even after appropriate treatment was given.

Table 1:

Age in Years	No. of Patients
<45	22
45-60	30
>60	48

Table 2:

Sex	No. of Patients
Male	60
Female	40

Table 3:

Blood Pressure at Presentation to ER	No. of Patients
<140/90	22
>140/90	78

Table 4:

2D-ECHO	No. of Patients
Presence of RWMA	60

Table 5:

MRI Brain	No. of Patients
MCA and ACA	74
Posterior Circulation	26
Watershed Zone	12
Large Vessel	62
Small Vessel	38
Multiple Infarct	24
Single Infarct	76

Table 6:

Factors	No. of Patients
Poor Glycemic Control	44
Significant Stenosis on MRA/Doppler (>70%)	8
50-70% Stenosis	6
Normal doppler	86

Table 7:

Associated Comorbidities	No. of Patients
Hypertension	56
Diabetes	44
Ischemic Heart Disease	26
Hypothyroidism	6
CKD	4
Dyslipidemia	20
Treatment taken first episode of stroke	No. of patients
Single antiplatelet and Statin	80
Dual antiplatelet and Statin	20

4. Discussion

In our study it was observed that patients presenting with recurrent stroke had high blood pressure, uncontrolled diabetes mellitus and dyslipidemia. Incidence of patients with High blood pressure at presentation were higher compared to uncontrolled diabetes and dyslipidemia. Similar findings of Hypertension being one of the important risk factors were observed in studies by Leoo and colleagues.^{12,13} Appropriate control of Blood Pressure reduced the risk of recurrence in a study.^{13–16} In a study it was stated that hypertension is a significant modifiable risk factor in their patient population to prevent stroke recurrence.¹⁶ Stroke in young and elderly As in our study males had a higher incidence of recurrence compared to females, similar findings were observed in a study conducted in Taiwan.¹⁷ Unlike our study Taiwan study showed that stroke recurrence was more common in younger patients, where as our study showed that recurrence was higher in elderly population i.e patients with age greater than 65 years and middle age group i.e 45 to 65 years. In a study conducted in Finland, diabetes mellitus was reported to be a contributing factor for recurrent stroke mainly in older patients,¹⁸ similar to our study.

In line with our findings, in the study, Laloux and colleagues found that the proportion of patients with recurrent stroke who received inadequate antihypertensive medication was 39%.¹⁹

Presence of ischemic heart disease was slightly higher in incidence as compared to patients with dyslipidemia. It was also noted that 6 percent patients had associated hypothyroidism and another 4 percent had chronic kidney disease. We could assume that they might contribute to recurrence of ischemic stroke but a definite evidence of same was lacking in our study.

Around 80% of patients were receiving single antiplatelet and statin in the present study indicating a fact that in patients with suspected recurrence or known risk factors like Hypertension and Diabetes starting the patients on dual antiplatelets or single antiplatelet along with oral anticoagulation may prevent the recurrence of stroke. Further studies regarding the above combinations are needed.

Since 62% of patients were associated with large vessel disease, presence of large vessel disease in patients presenting with ischemic stroke may be regarded as one of the risk factors for recurrence of stroke. It was also observed that patients presenting with recurrence of stroke were often seen to involve multiple arterial territories. And among the arterial territories Anterior and MCA were most commonly involved in the present study. Similar findings were reported in a study conducted by Lovett and colleagues who reported that patients with large artery atherosclerotic disease have a high early risk of recurrent ischemic stroke compared with other etiologic subtypes, whereas patients with ischemic

strokes due to small vessel disease have the lowest risk of early recurrence.²⁰ Kocaman and colleagues also reported similar findings that large artery atherosclerosis is the most common etiology for recurrent ischemic stroke.¹¹ Prior studies have revealed that patients with stroke who have more than 70% stenosis of the internal carotid artery (ICA) had a higher rate of recurrent ischemic stroke, which indicates that severe symptomatic extra- or intracranial arterial disease was independently associated with 7-day and 90-day stroke recurrence in minor stroke patients.²¹ Hankey and colleagues reported that before settling down as the endothelium of the ulcerated plaque, atheroma is an acute on top of chronic disease, causing recurrent attacks of thromboembolism.²²

In our study 26% of patients were observed to have regional wall motion abnormality on two dimensional echocardiography and may be considered as one of the major risk factor for the recurrence of ischemic stroke, predominantly cardioembolic phenomenon.

5. Conclusion

Patients presenting with large vessel disease, multiple risk factors and higher burden of disease on brain imaging should preferably be started on dual antiplatelet and statins. Patients presenting with first episode of ischemic stroke should always be evaluated for the risk of recurrence, followed up regularly and educated regarding the risk of recurrence, significance of compliance of medications and its effect on day to day life to help improve and provide better patient care and quality of life.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Source of Funding

None.

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Cite this article: Awati AM. Cross sectional descriptive study of clinical and radiological profile of patients presenting with recurrent ischemic stroke in a tertiary care centre of South India. *IP Indian J Neurosci* 2022;8(1):31–34.