

A STUDY OF CLINICAL, AETIOLOGICAL PROFILE AND OUTCOME IN ISCHAEMIC POSTERIOR CIRCULATORY STROKE

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ABSTRACT

BACKGROUND

The posterior circulation strokes account for 10 to 15% of all strokes. The posterior circulation ischaemia ranges from fluctuating brainstem symptoms caused by intermittent insufficiency (so called VBI) to many syndromes like lateral, medial medullary, total medullary, locked in and top of basilar artery syndrome. Population based studies have shown that in India the annual incidence rates of stroke are 119 - 145 and 84 - 262 in rural and 334 - 424 in urban areas per 100,000 population respectively. The incidence in Indian studies was approximately 12.3%. Basilar Artery Occlusion (BAO) represents 8 to 14% of all posterior circulation strokes and carries mortality of over 90%.

The aim of this study was to evaluate the clinical and aetiological profile of ischaemic posterior circulatory stroke and to assess the outcome of ischaemic posterior circulatory stroke.

MATERIALS AND METHODS

The present descriptive study was conducted in patients attending neurology outpatient department, emergency department of Narayana Medical College, Nellore with acute ischaemic posterior circulation stroke from January 2014 to June 2015. This study included 130 patients of posterior circulation ischaemic stroke. Patients with age > 18 years who presented with signs and symptoms of posterior circulation ischaemic stroke were evaluated by clinical examination and confirmed by imaging, either by CT/ MRI brain were included. Patients with head injury, ICSOL (Intracranial Space Occupying Lesion), haemorrhagic stroke, CVT (Cerebral Venous Thrombosis), SAH (Subarachnoid Haemorrhage), Recurrent Strokes and Anterior Circulation Ischaemic Stroke were excluded. The patients were subjected to routine biochemical investigations including complete haemogram, renal function tests and serum electrolytes, fasting lipid profile, coagulation profile, serum homocysteine, serum APLA (Antiphospholipid Antibody) IgG, IgM, 2D Echocardiography, neck vessel Doppler, imaging of the brain with CT (Computerised Tomography) and MRI (Magnetic Resonance Imaging). MRA (Magnetic Resonance Angiography) study could be done only for few patients, because of financial constraints. The patients were evaluated clinically and monitored during the course of disease. The Stroke Severity (at admission, discharge, 3 months) and outcome at 3 months were assessed with NIHSS (National Institute of Health Stroke Scale). The data values were entered into MS-Excel and statistical analysis was done by using IBM SPSS Version 20.0. For categorical variables, the data values were represented as number and percentages.

RESULTS

Posterior Circulation Ischaemic Stroke was predominantly noted in males (61%) when compared to females. Mean age of patients was 59.81 +/- 11.55 years. Hypertension (84.6%) was the leading modifiable risk factor followed by diabetes mellitus (33.1%). The most common clinical feature is vertigo/giddiness (48.5%). Large vessel atherosclerosis (84.6%) was the most common aetiology observed followed by cardioembolic stroke of other determined aetiology and small vessel disease. The mortality was observed in 6 patients out of 130 patients due to raised intracranial tension with consequent herniation of the cerebellum.

CONCLUSION

Posterior circulation stroke generally carries a good prognosis depending on infarct location and size except for basilar artery thrombosis, which has a grave prognosis with high mortality.

KEY WORDS

Ataxia, Basilar Artery Thrombosis, Stroke, Vertigo.

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BACKGROUND

The World Health Organisation (WHO) defines stroke as "rapidly developing clinical signs of focal (or global) disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death with no apparent cause other than vascular origin."¹

The posterior circulation stroke is classically defined by infarction occurring within the vascular territory supplied by the vertebrobasilar arterial system.²

The posterior circulation ischaemia ranges from fluctuating brainstem symptoms caused by intermittent insufficiency (so called vertebrobasilar insufficiency) to many syndromes like lateral, medial medullary, total medullary, locked in, top of basilar artery syndrome. Population based studies have shown that in India the annual incidence and prevalence rates of stroke are 119 - 145 and 84 - 262 in rural and 334 - 424 in urban areas per 100,000 population respectively.^{3,4,5} The posterior circulation strokes account for 10 to 15% of all strokes. The incidence in Indian studies was approximately 12.3%.⁶ Basilar artery occlusion (BAO) represents 8 to 14% of all posterior circulation strokes and carries mortality of over 90%.³

Aims and Objectives of the Study

1. To study clinical and aetiological profile of ischaemic posterior circulatory stroke.
2. To study the outcome of ischaemic posterior circulatory stroke.

MATERIALS AND METHODS

The present descriptive study was undertaken in patients attending Neurology Outpatient Department, Emergency Department of Narayana Medical College, Nellore with acute ischaemic posterior circulation stroke over a period of 1-½ year from January 2014 to June 2015. Total 130 patients aged above 18 years were included in this study, who presented with posterior circulation ischaemic stroke. Patients with head injury, ICSOL (Intracranial Space Occupying Lesion), haemorrhagic stroke, CVT (Cerebral Venous Thrombosis), SAH (Subarachnoid Haemorrhage), recurrent strokes and anterior circulation ischaemic stroke were excluded. The patients were subjected to routine biochemical investigations including complete haemogram, renal function tests and serum electrolytes, fasting lipid profile (Total cholesterol, triglycerides, very low-density lipoprotein (VLDL), high-density lipid (HDL) level, low-density lipid (LDL) level, coagulation profile, serum homocysteine, serum APLA (Antiphospholipid Antibody), IgG, IgM, 2D echocardiography, neck vessel Doppler, imaging of the brain with CT (Computerised Tomography), MRI (Magnetic Resonance Imaging). MRA (Magnetic Resonance Angiography) brain was done only for few patients because of financial constraints. The patients were evaluated clinically and monitored during the course of disease. The stroke severity (at admission, discharge, 3 months) and outcome at 3 months were assessed with NIHSS (National Institute of Health Stroke Scale).

Statistical Analysis

The data values were entered into MS-Excel and statistical analysis was done by using IBM SPSS Version 20.0. For categorical variables, the data values were represented as number and percentages.

RESULTS

In this present prospective study of 130 patients with posterior circulation ischaemic stroke, 79 were males and 51 were females with a mean age of 59.81 +/- 11.548 years. The age range is between 38 and 88 years as shown in Figure 1.

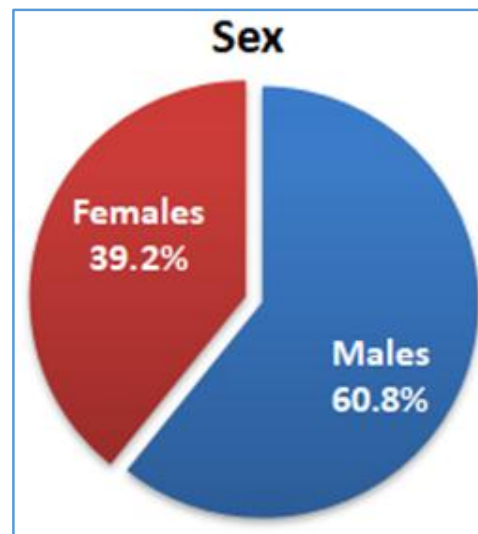


Figure 1. Sex Distribution

Vertigo/ giddiness was reported in 63 patients (48.5%), headache in 50 patients (38.5%), visual symptoms in 50 patients (38.5%), ataxia in 47 patients (36.2%), vomiting in 37 patients (28.5%), cranial neuropathy in 28 patients (21.5%), speech disturbances in 22 patients (16.9%), hemisensory disturbances in 22 patients (16.9%), deviation of angle of mouth in 15 patients (11.5%), unilateral limb weakness in 15 patients (11.5%), dysphagia in 12 patients (9.2%), hoarseness of voice in 8 patients (6.2%), nasal regurgitation of liquids in 8 patients (6.2%), altered sensorium in 6 patients (4.6%), ptosis in 5 patients (3.8%) as shown in Figure 2.

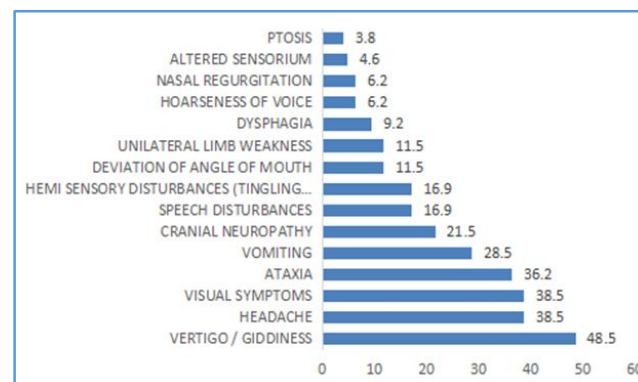


Figure 2. Clinical Signs and Symptoms

Hypertension is the most common risk factor observed in this study. N= 110 patients had hypertension (84.6%), whereas diabetes mellitus was seen in 43 patients (33.1%). N= 78 patients (60%) were smokers and alcohol intake history was present in 48 patients (36.9%). N= 13 patients (10%) had Coronary Artery Disease (CAD) and Rheumatic Heart Disease was diagnosed in 6 patients (4.6%). Lone Atrial Fibrillation was present in 11 patients (8.5%). Only 5 patients had chronic kidney disease as a comorbid illness. 5 patients had stroke in young age group in this study. Four patients were having elevated homocysteine level and one patient was tested positive for anti-phospholipid (IgG, IgM) antibodies. Coagulation profile and serum electrolytes (sodium, potassium) were normal in all patients as shown in Figures 3 and 4.

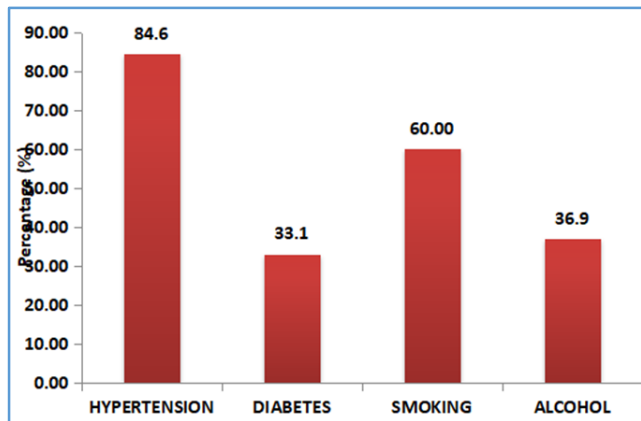


Figure 3. Risk Factors

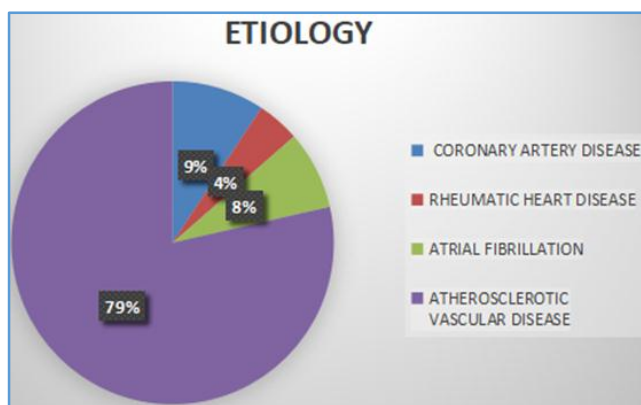


Figure 4. Aetiology

Significant haemodynamic changes (> 50% stenosis) on neck vessel Doppler were seen in 110 patients (84.6%). 2D echocardiography was normal in 51 patients (39.2%). Only Left Ventricular Hypertrophy (LVH) was seen in 68 patients (52.3%). Only lone Atrial Fibrillation (AF) in 3 patients (2.3%). LVH and AF on 2 patients (1.5%), LVH, AF, mitral stenosis was seen in 6 patients (4.6%) as shown in Figure 5.

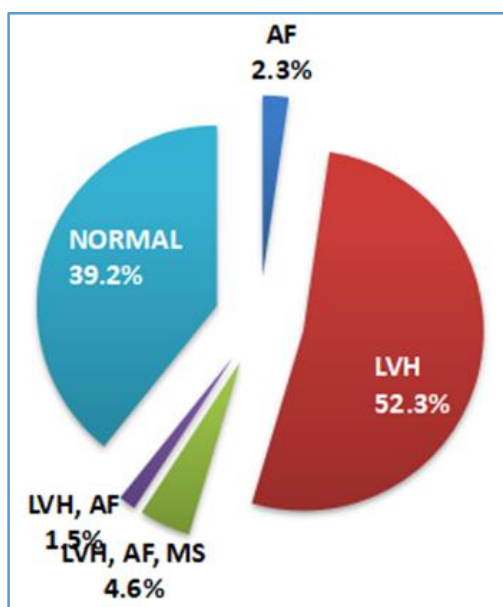


Figure 5. 2D Echocardiography Parameters

The posterior cerebral arterial territory was the most commonly involved followed by superior cerebellar arterial territory. The arterial territory involvement based on the imaging of brain included Posterior Cerebral Artery (PCA) in 64 patients (49.2%), Superior Cerebellar Artery (SCA) in 30 patients (23.1%), perforating branches of basilar artery (PICA) in 16 patients (12.3%), posterior inferior cerebellar artery (PICA) in 7 patients (5.4%), Anterior Inferior Cerebellar Artery (AICA) in 7 patients (5.4%), Basilar Artery (BA) thrombosis in 5 patients (3.8%). Both basilar artery and PICA in 1 patient (0.8%) respectively as shown in Figure 6.

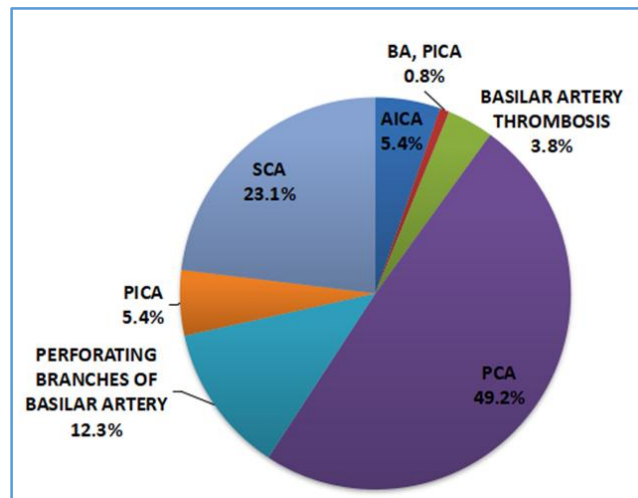


Figure 6. Arterial Territory Involvement in Posterior Circulation Strokes

Based on the TOAST Classification, the followings findings observed in this study includes large artery disease (84.6%) followed by cardioembolic (10%), then stroke of other determined aetiology (3.8%), lastly small vessel occlusion (1.5%) as shown in Figure 7.

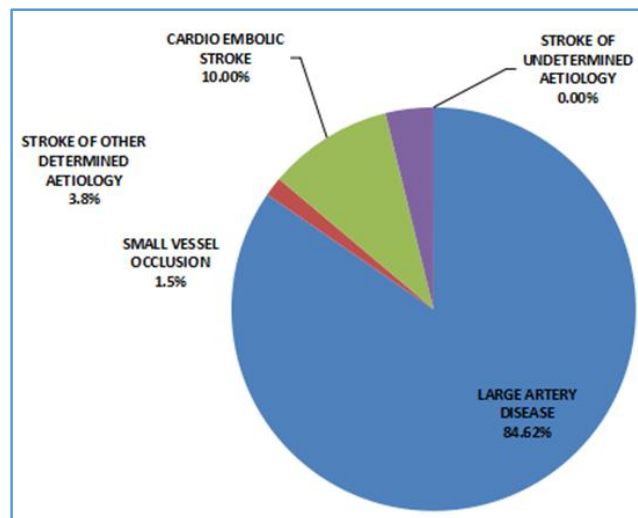


Figure 7. Toast Classification

Out of 130 patients 124 patients are alive, 6 patients died during hospitalisation (4.6%). Most of them had basilar artery thrombosis and 1 patient with basilar artery thrombosis with PICA involvement. Outcome of Ischaemic Posterior Circulatory Stroke was analysed based on NIHSS at

admission with NIHSS score > 8 in 103 patients (79.2%). At discharge, out of 124 patients NIHSS score > 8 was observed in 35 patients (26.9%). Only 4 (3.1%) patients had NIHSS score more than 8 score at 3 months follow-up and the remaining 120 patients (92.3%) had score less than or equal to 8 as shown in Figures 8, 9, 10.

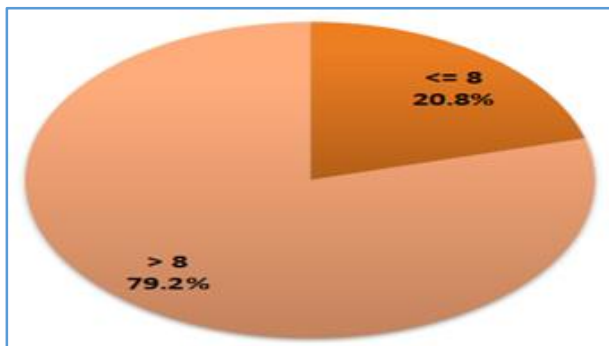


Figure 8. NIHSS at Admission

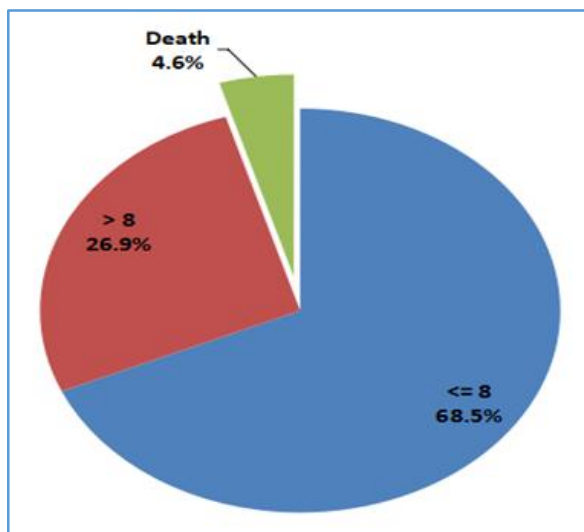


Figure 9. NIHSS at Discharge

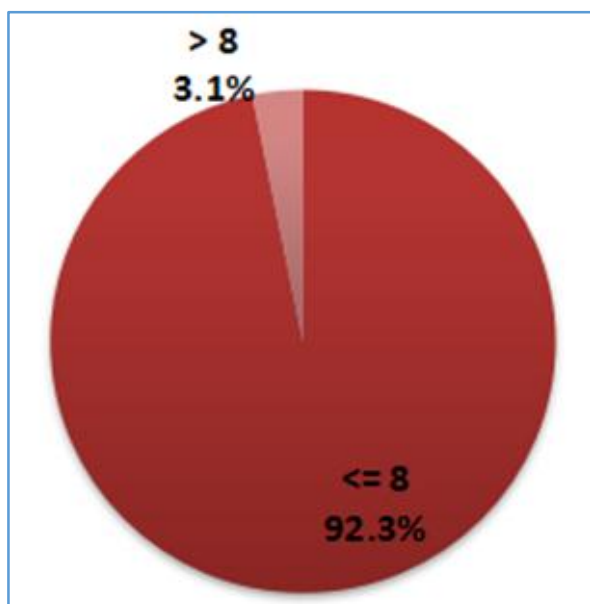


Figure 10. NIHSS at 3 months Post Stroke

DISCUSSION

The mean age of the patients in this study group was 59.81 years within a range between 38 and 88. These findings are closely resembling to the other studies done in India. The New England Medical Centre-Posterior Circulation Register (NEMC-PCR) demonstrated that majority of the patients were in age group between 66 and 75 years.⁴ Stroke occurs in relatively younger people in developing countries. Lower life expectancy in Indian population compared to the western world (66.46 vs. 78.4 years)⁴ could be the explanation for this difference. Posterior circulation stroke can have varied clinical presentations. Vertigo was the most common symptom (48.5%) in this study with similar findings observed in earlier Indian studies.⁵ Vertigo in posterior circulation stroke is due to the involvement of vestibular nucleus or its connections. In this study, headache and visual symptoms (field defects, blurring of vision, decreased vision, double vision) were observed of same frequency with a percentage of 38.5%. The headache is of dull aching type with a few patients presenting with sudden onset, moderate intensity headache, localising to the occipital area. The headache may be due to meningeal irritation and increased intracranial tension. None of the patients had prior history of migraine. Out of 38.5% patients with headache, only 28.5% of patients had vomiting. Headache and vomiting are more commonly seen in posterior circulation stroke than in anterior circulation stroke.⁷ Vomiting may occur due to the involvement of vestibular nucleus or chemoreceptor trigger zone (CTZ).⁵ Fisher reported that headache in anterior circulation strokes is generally frontal and it is ipsilateral to the lesion, while in posterior circulation stroke headache was localised to the occipital area.⁸ The explanation proposed to this difference is that the cerebral vasculature of the meninges in the posterior circulation is more heavily innervated by nociceptive afferents than the anterior circulation.⁸

Ataxia was the 3rd most common manifestation in 36.2% of patients in this study. Ataxia in posterior circulation stroke is due to the involvement of cerebellum or its connections. Cranial neuropathy was observed in 21.5% patients. The cranial nerves III, IV, VI, VII, IX and X were involved. A study from China by Shi et al⁹ that analysed clinical characteristics in 216 patients with posterior circulation stroke found vertigo in 33.8% and ataxia in 30%. Shi et al study also demonstrated a higher percentage of patients with motor weakness (81.9) as compared to the present study. Dysphagia was observed in 9.2% of patients with pontine and medulla lesions. Altered sensorium was observed in 4.6% of patients, most of them are having comorbid illnesses with imaging showing basilar artery thrombosis. These patients had severe stroke at admission and poor outcome. Almost all the patients died during hospitalisation. The reason for mortality in these patients is increased intracranial tension with consequent cerebellar herniation.

Hypertension is the most common risk factor observed in this study (84.6%). Higher the blood pressure, the greater is the risk of stroke. Uncontrolled, accelerated hypertension causes both ischaemic and haemorrhagic stroke. The findings in this study correlated with studies of New England Medical Centre Posterior Circulation Registry- Lee et al, Uma et al, Kora et al.^{4,10,11} Evidence shows that efforts to control hypertension have been a major contribution to the recent

decline in death rate from posterior circulation ischaemic stroke. In this study, 33.1% patients had diabetes which correlated with other studies.^{4,12,13} Diabetes independently increases risk of ischaemic posterior circulation stroke with a relative risk of 2 to 6. Elevated blood glucose is an indicator of poor prognosis in cerebral ischaemia. In general neurologic outcome in diabetic patients with stroke was significantly worse than in non-diabetics. Posterior circulation stroke was noted at an earlier age in alcoholics than in non-alcoholics. Heavy alcohol consumption have an increased prevalence of hypertension with increased risk of early atherosclerosis of large blood vessels. Combination of smoking and alcohol abuse increases the risk multi-fold. In the present study, 48 patients (36.9%) had history of alcohol consumption. This percentage of prevalence correlates with other studies such as Mehendiratta et al.^{12,13} Along with smoking, alcohol is an independent modifiable risk factor. Cardiac disease (coronary artery disease) was seen in 13 patients (10%), Rheumatic heart disease was seen in 6 patients (4.6%) and Atrial fibrillation was noted in 11 patients (8.5%). Cardiac factors played an important aetiological factor as cardioembolic stroke and it is the 2nd most leading cause followed by atherosclerosis. These findings are consistent with studies by Lee et al, NEMC-PCR.^{4,12,13} Atrial fibrillation and RHD were the causative factors for cardioembolic stroke in this study.^{14,15,16} Out of 130 patients, significant haemodynamic changes in neck vessel Doppler (> 50% stenosis) were observed in 110 patients (84.6%). Large artery disease was the most common cause for posterior circulation stroke in this study. Similar findings were noted in earlier Indian and western studies.^{7,12,13,14} MRI brain revealed following arterial territory involvement in descending order PCA > SCA > perforating branches of the basilar artery > PICA > AICA > basilar artery thrombosis.^{12,13,17} According to TOAST classification of stroke in this study, aetiological factors found in the study were similar to earlier Indian and western studies. The order includes large artery disease > cardioembolic > stroke of other determined aetiology > small vessel occlusion. The mortality in this study is 4.6%, which is similar in other studies.^{18,19} National Institute of Health Stroke Scale (NIHSS) was taken as an indicator for outcome of stroke. The improvement was significant in the remaining 124 alive patients during 3 months follow-up. 120 patients had NIHSS score of < 8 (92.3%).

CONCLUSION

Posterior circulation stroke was present with varied symptoms such as headache, dizziness, vomiting and ataxia. There should be a high index of suspicion and patients should be sent for imaging at the earliest. These strokes generally carry a good prognosis depending on infarct location and size except for basilar artery thrombosis, which has a grave prognosis with high mortality.

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