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Research Article

POSTERIOR CIRCULATION ISCHAEMIC STROKE – CLINICAL, RADIOLOGICAL AND RISK FACTOR PROFILE

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A B S T R A C T

Introduction: Stroke is a major cause of mortality and morbidity in India. Posterior circulation strokes represent approximately 20% of all the ischemic strokes. It is a clinical syndrome associated with ischemia due to embolic occlusion, stenos is or thrombosis of the posterior circulation arteries such as the vertebral, basilar, posterior cerebral arteries and their branches. Many patients can present with complaints of vertigo, nausea and vomiting which could be misdiagnosed as labyrinthine or vestibular disorders. This study was done to establish the clinical profile and risk factors profile of posterior circulation ischemic stroke.

Materials: This observational retrospective study was performed in the Department of Neurology at SRMSIMS, Bareilly for duration of 24 months (February 2018 to March 2020). Patients of posterior circulation ischemic stroke patients with age more than 18 years who were admitted in neurology ward, meeting the inclusion criteria were studied .Their clinical presentations and risk factor profile was analyzed. A total of 330 ischemic stroke cases were admitted during this period, 41 out of which had posterior circulation stroke.

Observations: The age group of the cases with posterior circulation ischemic stroke ranged from 32-82 years with a mean age of 57. A male predominance was seen with a Male: female ratios of 4:1.Amongst the risk factors in the subjects, hypertension, diabetes mellitus and previous history of stroke were most common. Alcohol consumption, smoking and dyslipidemia were present in 40% of the subjects .It was observed that the majority of the cases had vertigo (58%), which was followed by motor weakness (51%), slurred speech (43%), headache (43%) and ataxia (48%).Cerebellar infarct was the most common radiological pattern of the posterior circulation ischemic stroke and was seen in 60% of cases. The mortality rate was 14.7% in our study.

Conclusions: Posterior circulation stroke patients presented with a variety of symptoms. It was analyzed that a significant proportion of the total stroke cases were attributable to PCS which usually occurred after 50 years of age and was more common in elderly men .Ischemic type of posterior circulation stroke and infratentorial site (cerebellum) were the most common findings .CT and MRI were useful in the early diagnosis of stroke . Early recognition, prompt care and management are necessary for a better outcome in PCS patients.

INTRODUCTION

The world health organization (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. Some of the recent studies have analyzed the stroke pattern in our country with a prevalence rate of 471.58/100000 population. Recent studies regarding stroke indicate that 7% of medical and 45% of all the neurological admissions were due to stroke. It was analyzed that the fatality rate was 9% at hospital discharge and 20% at 28 days.3 Large vessel intracranial atherosclerosis is the most common cause of ischemic stroke in India. The common risk factors include hypertension, diabetes, obesity, cardiac diseases, smoking, alcohol and Dyslipidemia.

The posterior circulation consists of two vertebral arteries, one basilar artery, two posterior cerebral arteries, and also their branches. These arteries supply the brain stem, thalamus, cerebellum, occipital region and medial temporal lobes. Stroke

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syndromes are generally classified into anterior and posterior circulation stroke based on their blood supply.

Posterior circulation stroke can present itself in various presentations which differ from strokes in anterior circulation in terms of clinical features and outcomes. It can be associated with vertigo, ataxia, cranial nerve abnormalities, vomiting, headache, impaired consciousness, and ocular signs. It accounts for nearly 20% of all strokes, with high mortality and morbidity. We analyzed posterior circulation ischemic stroke with special reference to its risk factor profile, radiological and clinical characteristics. A total of 41 patients with posterior circulation ischemic stroke from a total number of 330 patients of stroke who presented to the neurology IPD over a period of 2 years were studied.

MATERIALS AND METHODS

The study was a Retrospective observational study and was conducted in the Department of Neurology, Sri Ram Murti Medical Institute of Medical Sciences, Bareilly. The period of study was from February 2018 to March 2020(24 months).
All the patients of posterior circulation stroke who were admitted in the Department of neurology with signs and symptoms of stroke were included. Patients of hemorrhagic stroke were excluded.

The cases were given a detailed neurological examination and a comprehensive examination of the respiratory, abdominal, cardiovascular systems was done. A detailed history in regards to the risk factor profile including hypertension, smoking, alcoholism, drug history, dyslipidemia, diabetes mellitus, coronary artery disease, transient ischemic attack and previous stroke was documented. Subjects were examined for signs of posterior circulation stroke such as altered sensorium, cranial nerve palsies, ataxia, nystagmus, visual field defects and dysarthria.

They were investigated for all the basic biochemical, hematological parameters , 2-D Echo ECG, X-Ray, Lipid profile ,Blood sugars were done along with neurological imaging such as CT Head and/or MRI Brain .

Statistical Anaysis

- Statistical analysis and p-value calculation was done by chi square test and z test.
- SPSS software was used for statistical analysis in this study.

RESULTS

A total of 41 cases of ischemic posterior circulation stroke were admitted during this period. There were 34(82.9%) male and 7(17.1%) female patients in our study. The ratio of male to female was 4:1. The age distribution ranged from 32-82 years with a mean age of 57. The maximum numbers of patients were in the 41-60 year age group followed by 10 patients in the 61-80 year group, as seen in table 1.

Table 1 Age Distribution and Sex Distribution in Patients with Posterior Circulation Stroke

Age group	Gender		Total (%)
(Years)	Male (%)	Female (%)	
0-20	0(0)	0(0)	0(0)
21-40	4(9.8)	0(0)	4(9.8)
41-60	19(46.3)	4(9.8)	23(56.1)
61-80	10(29.4)	3(7.3)	13(31.7)
81-100	1(2.4)	0(0)	1(2.4)
Total	34(82.9)	7(17.1)	41(100)

On analyzing the clinical features and signs , it was observed that the majority of the cases had vertigo (58%), which was followed by motor weakness (52%), slurred speech (43%), headache (43%) and ataxia (48%).Some of the patients also had other features such as seizures, numbness as seen in table - 2 .

It was also observed that the eye signs such as nystagmus and visual field defects were present in 3(7%) and 12(29%) respectively.

Table 2 clinical features in cases of Posterior Circulation Stroke

Clinical features/signs	Frequency	Percentage
Vertigo	24	58.5
Motor weakness	21	51.2
Ataxia	20	48.8
Slurred speech	18	43.9
Headache	18	43.9
Vomiting	16	39
Dysarthria	14	34.1
Altered sensorium	13	31
Others		
Seizures	5	12.2
Numbness	2	4.9

As for the risk factor profile, it was observed that there was a history of hypertension in 58% of the cases, diabetes in 46%, and coronary artery disease/DCMP in 41%, followed by a history of stroke/TIA in 48.8% of the total cases .It was also noted that 43% of the cases were alcoholics and 36% of them were smokers. On analyzing the dyslipidemic status amongst the cases, it was observed that the mean value of cholesterol was 181 mg/dl where as the mean LDL and TG's were 110 and 128 mg/dl respectively. It was also seen that this study included 19(46%) diabetic patients with a mean Hba1c of 6.9 as seen in table 3.

Table 3 Risk factors and Dyslipidemia amongst the cases

RISK FACTOR PROFILE	CASES (%)
HYPERTENSION	58%
DIABETES	46%
ALCOHOL	43%
PAST HISTORY OF CAD /DCMP	41%
SMOKING	36%
DYSLIPIDEMIA	64%
PAST HISTORY OF STROKE /TIA	48.8%

The most common involvement on neuroimaging found in the cases with posterior circulation stroke was Cerebellar infarcts 25 (60%), which was followed by brainstem infarcts (pons 11 (26%) and medullary 2 (4%)) and occipital and thalamic infarcts, found in 3(7%) and 2(4%) cases respectively as seen in table .4

Table 4 Neuroimaging Patterns in Posterior Circulation Stroke

NEUROIMAGING PATTERNS IN POSTERIOR CIRCULATION STROKE	
RADIOLOGICAL FINDING	NO OF PATIENTS (%) N=41
Cerebellar infarcts	25 (60%)
Brain stem infarcts	MIDBRAIN (Nil) PONDS-11(26) MEDULLA-2(4%)
Occipital	3(7%)
Thalamus	2(4%)
More than 1 site in Post. Circulation	14(34%)

DISCUSSION

In our study, we observed that out of a total of 330 of ischemic stroke patients who had been admitted in the neurology department over a period of 2 years, 41 of the cases had posterior circulation ischemic strokes. This accounted for 12.5% of all the strokes. Many of other studies have reported that of the total stroke cases, 80% of were Ischemic and 20% of the ischemic strokes involved the posterior Circulation.

In the study by Mehendiratta et al., majority (65%) of the subjects were in the age group of 40 to 60 years. This is consistent with findings of our study with 23% of the study subjects being in this age group. The New England Medical Center Posterior Circulation Registry (NEMC-PCR) also demonstrated that the majority of cases were in the age group of 66-75 years. In our study only 5 patients were older than 75 years, while in NEMC-PCR 27.7% of cases were in age group ranging more than 75 years. Male predominance was noted in our study and was also reported in another Indian study by Kora SA et al. In the study by P.K. Mohanty et al, it was seen that 148(10.52%) patients had PCS, with a male to female ratio of 3:1 with 75% of the cases being over 50 years.20

As for the risk factor profile , hypertension was the most common risk factor in studies of PCS done by Kora SA et al , E. Ratnavalli et al , Capalan et al , Uma et al and Dalal et al.9, , ,13This was consistent with findings of our study with 58% subjects being hypertensive .Incidence of smoking , and diabetes were comparable with the studies by E.Ratnavalli et al (20%) and by Uma et al (21%) respectively.20 The Other risk factors associated with PCS were alcohol consumption, hyperlipidemia, rheumatic heart disease, ischemic heart disease, cardiomyopathy, hyper coagulopathy, past history of TIA and stroke. , 20 P.K.Mohanty also observed that hypertension (41.9%) and tobacco abuse (23.6%) were the commonest risk factors.20 Similar were the findings in our study with cases having more than one associated risk factors as seen in table 5.

Table 5 Comparison of risk factors of different studies

RISK FACTORS	Ratnavali E et al[10]	Caplan et al[11]	Uma S et al	Kora S A et al[9]	Kavita k et al	OUR STUDY
Hypertension	23%	61%	35.5%	37%	60.5%	58%
Diabetes	20%	25%	21%	5%	28%	46%
Tobacco abuse	25%	35%	11.8%	52%	13%	36%
Ischemic heart disease/DCMP	5%	-	17.1%	5%	2.6%	41%
Rheumatic heart disease	-	-	10.5%	5%	2.6%	-
Dyslipidemia	-	25%	44.4%	10%	55.26%	64%

Posterior circulation ischemic stroke can have varied clinical presentations as in Vertigo which was the most common clinical finding in our study groups. It is due to the involvement of vestibular nucleus or its associated connections and is a predominant feature of lateral medullary syndrome and Cerebellar stroke especially due to PICA and AICA arterial territory involvement. Vertigo is usually accompanied with the involvement of other cranial nerves due to the high density of nuclei and tracts in the brain stem. Ataxia was the second most common manifestation in the cases. It is due to the involvement of cerebellum or its connections. Our study also showed that vomiting and headache was present in 39 % and 43% cases respectively. It could be to the involvement of the vestibular nucleus or the chemoreceptor trigger zone (CTZ). Motor weakness was seen in 51% of our cases.

A study in China by Shi et al analyzed clinical characteristics in 216 cases with posterior circulation stroke and found that dizziness in 33.8% and ataxia in 30% of the cases, which were less as compared to our observations.

This study also demonstrated that a relatively higher percentage of patients had motor weakness (81.9%) as compared to our study group. Majority of these neurological findings of our study are comparable with Kora SA et al and Patrick et al.9Amongst the 41 cases in our study 15 cases had eye signs. The NEMC-PCR study showed that visual field loss was in 84% of patients with posterior cerebral artery infarct. This could be due to different infarct location, size and vascular territory involvement in the different study subjects. It was also noted that Patients with watershed infarcts and multilevel infarcts more commonly had decreased alertness at admission. Our observations were conclusive of the fact that 48%of the cases with previous history of a cerebrovascular accident such as stroke /TIA had landed up with PCS. This is supported by facts stated by Changqing Zhang in his study.

Infratentorial location of ischemic stroke as reported by Kora SA et al and Bogousslavsky et al were 63% and 70% respectively.9, these finding were similar to findings in our study indicating that, of the infratentorial site, Cerebellar infarcts were the most common. P.K. Mohanty et al, had similar findings in his study where 72.3% patients had ischemic PCS with Infratentorial PCS (60.8%) of which, cerebellum was the most common site. Neurological findings of various studies have been compared in table 6.

Table 6 Comparison of neurological findings of different studies.

RADIOLOGICAL FINDING	Kora et al.**Error! Bookmark not defined.**	Kavita et al.**Error! Bookmark not defined.**	Our study
Cerebellar infarcts	33%	37%	60%
Brain stem infarcts			
Midbrain	6%	12.5%	30%
Pons			
Medulla			
Occipital	26%	25%	7%
Thalamus	6%	4%	4%

It was also noted that 17(41%) of the cases had cardiovascular involvement (DCMP/CAD).This could be a probable etiology of stroke as discussed by Deng Y, Karl G in their studies respectively.

The mortality rate of our study was 14.7%. Incidence of mortality was lower as compared to other studies such as Patrick et al study (25.6%) and Jones et al study (27.5%). , Survival rate was even lower in studies by Kora SA et al (47%) and Jones et al (35%). 9,25

CONCLUSION

Posterior circulation stroke accounted for 12% of the total ischemic strokes. A significant proportion of the posterior circulation strokes usually occurred after 50 years of age, were more common in men, with Infratentorial site (cerebellum)

being the most common. Hypertensions, diabetes, Dyslipidemia were the commonest risk Factors. Strict control of hypertension and diabetes Mellitus in these cases can be found to be beneficial for secondary prevention of stroke. CT and MRI are helpful in the early diagnosis of these cases. Early recognition and prompt care and management are necessary for a better outcome.

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