

ORIGINAL RESEARCH

Study on clinico-radiological pattern of posterior circulatory stroke

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ABSTRACT

Background: In the United States, around 800,000 individuals experience a stroke annually. While the majority of these cases involve ischemic strokes affecting areas of the brain supplied by the anterior circulation (AC), it is estimated that approximately 20–25% of ischemic strokes occur within the posterior circulation (PC) territory. Hence; the present study was conducted for assessing clinico-radiological pattern of posterior circulatory stroke. **Materials & methods:** A total of 100 patients with presence of posterior circulation ischemic stroke were enrolled. Patients with transient ischemic attack (TIA) and concomitant anterior circulation infarction were not included in the study. Patients were analyzed using structured pro forma for demographics, and stroke risk factors. Clinical profile of all the patients was recorded. All patients were subjected to computerized tomography (CT) scan, and or magnetic resonance imaging (MRI) following standard protocol. **Results:** A total of 100 patients were evaluated. Mean age of the patients was 63.5 years. Among them, 66 percent were males while the remaining 33 percent were females. 51 percent of the patients were of rural residence while the remaining were of urban residence. Vertigo, Ataxia, Vomiting, Headache, Cranial neuropathy, Dysphagia and Visual symptoms were seen in 62 percent, 52 percent, 50 percent, 48 percent, 42 percent, 33 percent and 22 percent of the patients respectively. On radiographic assessment, involvement of Posterior cerebral artery, PICA, SCA and AICA was seen in 55 percent, 30 percent, 10 percent and 3 percent of the patients respectively. **Conclusion:** Post-concussion syndrome (PCS) represents a significant yet challenging diagnosis due to its diverse manifestations. It is essential for emergency physicians to maintain a heightened awareness of PCS, identify key risk factors along with pertinent clinical signs and symptoms, and conduct a thorough history and neurological examination.

Key words: Posterior circulatory, Stroke, Radiological

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INTRODUCTION

In the United States, around 800,000 individuals experience a stroke annually. While the majority of these cases involve ischemic strokes affecting areas of the brain supplied by the anterior circulation (AC), it is estimated that approximately 20–25% of ischemic strokes occur within the posterior circulation (PC) territory. The mortality rate associated with posterior circulation strokes (PCS) ranges from about 3.6% to 18.6%, depending on the specific stroke registry examined.^{1, 2} Traditionally, it has been believed that the prognosis for PCS is generally more favorable compared to anterior circulation strokes (ACS); however, this perspective has been called into question in recent literature. The complexity of PCS poses significant challenges for clinicians, as it can manifest in a wide variety of presentations, from overt symptoms to more subtle signs, and it is likely more prevalent than is commonly recognized.^{3, 4}

Posterior circulation strokes exhibit a range of clinical manifestations that are distinct from those associated with anterior circulation strokes, particularly concerning their etiology, clinical characteristics, and outcomes. Symptoms of posterior circulation strokes may include vertigo, ataxia, nausea, headaches, abnormalities in cranial nerve function, bilateral long tract neurological signs, "locked-in" syndrome, altered consciousness, as well as complex ocular symptoms or cortical blindness. The intracranial segment of the posterior circulation is significantly more susceptible to atherosclerotic changes than its anterior counterpart. These strokes represent approximately 20% of all stroke cases and are associated with considerable mortality and morbidity; however, some studies have indicated a lower mortality rate among individuals experiencing infarcts in the vertebrobasilar territory.^{5- 7}Hence; the present study was conducted

for assessing clinico-radiological pattern of posterior circulatory stroke.

excel sheet and was subjected to statistical analysis using SPSS software.

MATERIALS & METHODS

The present study was conducted for assessing clinico-radiological pattern of posterior circulatory stroke. A total of 100 patients with presence of posterior circulation ischemic stroke were enrolled. Patients with transient ischemic attack (TIA) and concomitant anterior circulation infarction were not included in the study. Patients were analyzed using structured pro forma for demographics, and stroke risk factors. Clinical profile of all the patients was recorded. All patients were subjected to computerized tomography (CT) scan, and or magnetic resonance imaging (MRI) following standard protocol. All the results were recorded in Microsoft

RESULTS

A total of 100 patients were evaluated. Mean age of the patients was 63.5 years. Among them, 66 percent were males while the remaining 33 percent were females. 51 percent of the patients were of rural residence while the remaining were of urban residence. Vertigo, Ataxia, Vomiting, Headache, Cranial neuropathy, Dysphagia and Visual symptoms were seen in 62 percent, 52 percent, 50 percent, 48 percent, 42 percent, 33 percent and 22 percent of the patients respectively. On radiographic assessment, involvement of Posterior cerebral artery, PICA, SCA and AICA was seen in 55 percent, 30 percent, 10 percent and 3 percent of the patients respectively.

Table 1: Demographic data

Variable	Number	Percentage
Mean age (years)		63.5
Males	66	66
Females	33	33
Rural residence	51	51
Urban residence	49	49

Table 2: Clinical profile

Variable	Number	Percentage
Vertigo	62	62
Ataxia	52	52
Vomiting	50	50
Headache	48	48
Cranial neuropathy	42	42
Dysphagia	33	33
Visual symptoms	22	22

Table 3: Vascular territory as assessed radiologically

Vascular territory	Number	Percentage
Posterior cerebral artery	55	55
PICA	30	30
SCA	10	10
AICA	3	3
Unlocalizable	2	2

PICA, posterior inferior cerebellar artery; AICA, anterior inferior cerebellar artery; SCA, superior cerebellar artery

DISCUSSION

Beyond the minority of cases associated with vascular anomalies of the PC previously discussed, several pathological and demographic differences must be considered when determining stroke etiology. Multiple stroke registries have been analyzed to investigate the patient characteristics and most common etiologies of PC stroke. Ischemia resulting from intracranial pathology can arise from several mechanisms, including tissue hypoperfusion, in situ thrombosis, or artery-to-artery thromboembolism. In cases of mild intracranial disease, the impact on cerebral hemodynamics may be negligible. However,

as the degree of stenosis escalates, compensatory reflex vasodilation occurs due to insufficient or failing collateral circulation, aimed at augmenting cerebral blood volume (CBV) and maintaining normal cerebral blood flow (CBF). As CBF continues to decline, the oxygen extraction fraction will increase. The breakdown of these compensatory mechanisms is referred to as "misery perfusion." Patients presenting with tandem lesions involving both extracranial and intracranial sites, or those with bilateral disease, are more likely to experience the clinical ramifications of hemodynamic alterations. "Tandem lesions" are frequently observed in individuals with vertebral

artery atherosclerosis and posterior circulation strokes.⁸⁻¹⁰ Hence; the present study was conducted for assessing clinico-radiological pattern of posterior circulatory stroke.

A total of 100 patients were evaluated. Mean age of the patients was 63.5 years. Among them, 66 percent were males while the remaining 33 percent were females. 51 percent of the patients were of rural residence while the remaining were of urban residence. Vertigo, Ataxia, Vomiting, Headache, Cranial neuropathy, Dysphagia and Visual symptoms were seen in 62 percent, 52 percent, 50 percent, 48 percent, 42 percent, 33 percent and 22 percent of the patients respectively. On radiographic assessment, involvement of Posterior cerebral artery, PICA, SCA and AICA was seen in 55 percent, 30 percent, 10 percent and 3 percent of the patients respectively. Observational studies concerning cerebellar infarctions have indicated a functional independence rate of 69% at three months post-event, alongside a mortality rate of 7%. The prognosis is primarily influenced by the extent of accompanying brainstem lesions and the initial risk posed by ischemic mass effect, which is observed in 10–20% of cases and typically affects the territory of the posterior inferior cerebellar artery (PICA). The prognosis for basilar artery occlusions (BAOs) is particularly notable due to various clinical complexities. Initially, these conditions may be overlooked, as a significant reduction in consciousness and the absence of lateralizing neurological signs are uncommon in acute stroke presentations. Furthermore, BAOs are associated with one of the poorest prognoses among stroke types, unless early recanalization therapy leads to swift clinical recovery. Lastly, the efficacy of acute endovascular treatment (EVT) for BAOs remains to be definitively established.¹¹⁻¹³

Mehndiratta Met al analyzed 80 participants of posterior circulation ischemic stroke from a registry of 944 participants attending a tertiary care referral university hospital. Posterior circulation ischemic stroke accounted for 80 (8.5%) of 944 of all strokes and 80 (10.45%) of 765 of ischemic stroke. Sixty-three were males with mean age 51.7 ± 14.4 years. Twenty-one participants were young (defined as age less than 45 years). Hypertension was found to be the most common risk factor (63.75%). Vertigo was the most common clinical symptom reported in 45 (56.25%) cases. Sixty-eight (85%) patients had large artery disease, 8 (10%) had documented cardioembolic source, 3 (3.75%) small artery disease, and 2 (2.5%) vasculitis. Posterior cerebral artery was most commonly involved. Topographically distal intracranial involvement was most frequent (66.25%) followed by proximal (30%) and middle intracranial territory (3.75%). Their study demonstrated the occurrence of posterior circulation stroke in relatively younger age group compared to the Western world.¹⁴ Imam YZ et al described PCS in large multiethnic cohorts. In total, 1,571 patients were

identified. The incidence of PCS was observed to be rising and ranged from 6.3 to 13.2/100,000 adult population over the study period. Men were 82.4% of the total. The mean age was 54.9 ± 12.7 years (median 54 years, IQR 46, 63). Middle east and north Africa (MENA) patients comprised 616 (39.2%) while others were 954 (60.7%); of these, the majority (80.5%) were from South Asia. Vascular risk factors were prevalent with 1,230 (78.3%) having hypertension, 970 (61.7%) with diabetes, and 872 (55.5%) having dyslipidemia. Weakness (944, 58.8%), dizziness (801, 50.5%), and slurred speech (584, 36.2%) were the most commonly presenting symptoms. The mean National Institute of Health Stroke Score (NIHSS) score was 3.8 ± 4.6 (median 3, IQR 1, 5). The overall most frequent stroke location was the distal location (568, 36.2%). The non-MENA cohort was younger, less vascularly burdened, and had more frequent proximal stroke location ($p < 0.05$). Dependency or death at discharge was seen in 39.5% and was associated with increasing age, and proximal and multilocation involvement; while at 90 days it was 27.4% and was associated with age, male sex, and having a MENA nationality.¹⁵

CONCLUSION

Post-concussion syndrome (PCS) represents a significant yet challenging diagnosis due to its diverse manifestations. It is essential for emergency physicians to maintain a heightened awareness of PCS, identify key risk factors along with pertinent clinical signs and symptoms, and conduct a thorough history and neurological examination.

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