

Bilateral Ocular Muscle Paralysis with Hemianopia due to stroke: A case report and review of literature.

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Abstract

Globally, stroke stands as the second leading cause of death and is the primary contributor to chronic severe adult disability. Its prevalence may differ regionally or nationally, but its significance in global mortality remains consistent. Strokes can present with many different symptoms most commonly being hemiparesis, dysarthria, aphasia or dizziness. We present a rare case of a 36-year-old female who presented with blurred vision on waking up associated with marked inability to move her eyes below the 180-degree plane. She was diagnosed with an Acute Ischaemic Stroke (AIS), thrombolysed and discharged with a Modified Rankin Score of 0.

1. Introduction

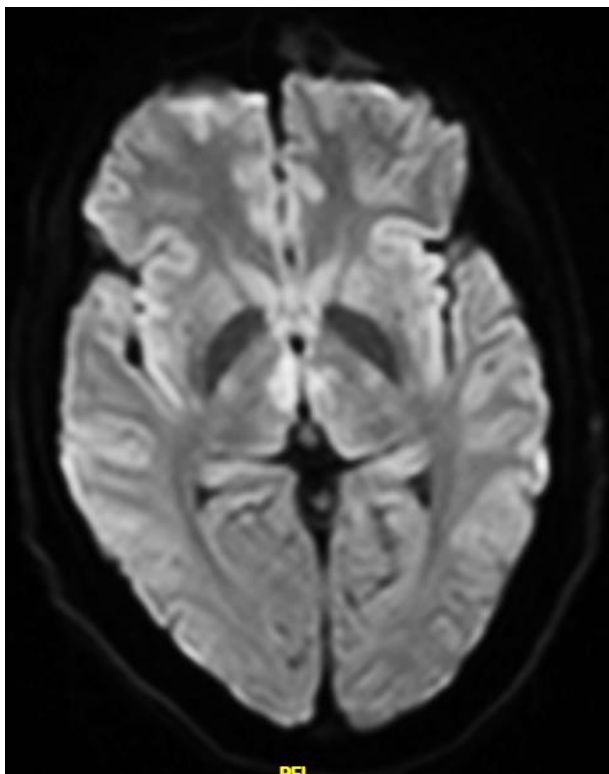
Globally stroke stands as the second leading cause of death and is the primary contributor to chronic severe adult disability.¹ 68% of all strokes are ischaemic and 32% are hemorrhagic which may manifest as a myriad of neurological deficits. The crude prevalence rate of stroke in India was 147/100,000 and an annual incidence rate was 36/100,000. Women have slightly higher age adjusted prevalence rate as opposed to men.^{2,3} While motor and sensory impairments are commonly recognized stroke manifestations, the realm of visual disturbances ensuing from a stroke is vast and complex. Visual symptoms during stroke range from hemianopia, visual field defects, visual loss and gaze defects amongst others.⁴ Most visual defects reported during strokes have been due to occipital lobe ischaemia.⁵ Our case describes a young female with bilateral medial thalamic infarct presenting with homonymous hemianopia and gaze defect.

Case Presentation

A 36-year-old female presented to the emergency department (ED) with a past history of varicose veins with blurred vision noticed upon waking up at around 7:30 am. This was associated with a diminished visual field, marked by an inability to shift her gaze below the 180-degree plane. Upon examination, pulse rate was 100/minute, blood pressure was 100/70mmHg, respiratory rate was 20/minute, saturation was 100% on room air and the random blood glucose was 135mg/dl. On neurological examination the patient showed signs of hemianopia that is she could not see past the 180 degree plane of the visual field but also both upper and lower limb strength remained intact and the patient had no positive cerebellar signs. A

CODE STROKE was announced and she was immediately shifted for Magnetic Resonance Imaging (MRI) of the brain, which revealed a bilateral medial thalami infarct with negative result on Fluid attenuated inversion recovery (FLAIR) modality. A subsequent computed tomography(CT) Angiogram was not suggestive of any large vessel occlusion. In view of these findings, thrombolysis using recombinant tissue plasminogen activator (0.9mg/kg) was administered over an hour post 10% bolus as per international protocols. Post-thrombolysis, the patient's visual field showed marked improvement. The patient was able to gaze past the 180degree plane. Stroke protocol laboratory investigations (complete blood count, urea, creatinine and coagulation profile) did not reveal any abnormalities. A venous Doppler and an echocardiogram were done which revealed no abnormalities.

She was further admitted into the stroke ICU and discharged after 3 days with a Modified Rankin Score of 0.



The Image shows a Bilateral Thalamic Infarct

Discussion

Stroke manifests as an abrupt neurological deficit stemming from a disruption in the brain's blood supply. The two primary mechanisms underpin this interruption: ischemic, resulting from a blockage, and haemorrhagic, stemming from bleeding.⁶

Rapid identification of a stroke is of utmost importance for which the mnemonic "BEFAST" can be used -^{7,8,9} Balance: An abrupt destabilization or loss of coordination; Eyes: Immediate visual aberrations in one or both eyes, analogous to the described paralysis; Face: A noticeable asymmetry or drooping of the face; Arm: Manifest numbness or frailty in one of the arms; Speech: Speech may be garbled or understanding it may become a challenge; and Time: Given the urgency, any manifestation warrants immediate medical attention.

Early detection and intervention are the cornerstones for the management of strokes. When the general public and first responders are equipped with easy-to-remember tools like these, it can speed up the identification process, allowing patients to receive the necessary treatment promptly. In the realm of stroke care, every second counts, and BEFAST serves as a potent reminder of the cardinal symptoms to watch out for.

In the stroke care continuum, the metric "door-to-needle" (DTN) time is indispensable. The recommended door to needle time is 60 minutes or less.¹⁰ Minimizing the DTN time is of paramount importance.

However, the clinical landscape is further complicated by entities known as "Stroke Mimics i.e., false positive account for 30-40% of all patients evaluated for stroke in the ED.¹¹ These are conditions that, while mirroring stroke symptoms, are not rooted in cerebrovascular etiologies. Examples of these mimics encompass migraines, wherein the aura can be confounded with a stroke, seizures which post-event can present with postictal paralysis or Todd's paralysis, sudden neurological deficits indicative of brain tumors, infections like meningitis or encephalitis, which may mimic acute neurological stroke symptoms and spinal cord lesions and vestibular dysfunction.¹² To parse out genuine strokes from these mimics, a comprehensive clinical evaluation, inclusive of medical history, physical examination, and diagnostic imaging (predominantly MRI), is imperative.

Positioned centrally within the brain, the thalamus is a deep cerebral structure that is important for proper neurological functioning. The thalamic vascular supply and syndromes associated with it identify four major vascular territories, predominantly branches of the posterior cerebral artery, such as the thalamoperforating and thalamogeniculate arteries bilaterally¹³. Thrombi in these arteries could culminate in a thalamic infarct, which can lead to anomalies in ocular motor functions.

Bilateral ocular muscle paralysis, or bilateral ophthalmoplegia, signifies a concurrent weakness or paralysis of the eye muscles, affecting the ability to coordinate various eye movements effectively. Patients afflicted by this condition might exhibit symptoms such as inability to move the eyes in unison, leading to double vision or an extensive limitation in the range of eye movement

The co-occurrence of bilateral ocular muscle paralysis with hemianopia in the setting of an ischaemic stroke is notably rare. The presentation that of a patient which has any gaze deficit or hemianopia-like features, presents in most cases as an occipital region infarct. Understanding the intricate relationship between stroke localization and its resultant visual disturbances is not only paramount for accurate diagnosis but also essential for formulating appropriate therapeutic interventions and prognostic evaluations.^{14,15}

The optic tract is an essential component of the visual pathway, transferring visual information from the optic chiasm to the lateral geniculate bodies. Beginning with light hitting the retina, visual signals undergo conversion into electrochemical signals, then traverse structures like the optic nerve, optic chiasm, and optic tract before reaching the occipital lobe in the brain. Each optic tract processes half of the visual field, with lesions causing visual deficits like homonymous hemianopsia. These tracts can be affected in various conditions, including stroke, tumors, multiple sclerosis, and neurosurgery. The optic tract is nourished by branches from the posterior communicating and anterior choroidal arteries, both linked to the Circle of Willis. Lesions of the optic tract can result from several causes, most notably stroke, leading to defects like unilateral homonymous hemianopia. Magnetic resonance imaging (MRI) has become instrumental in diagnosing and distinguishing these disorders.¹⁶

Conversely, "Stroke Chameleons" falls on the opposite spectrum of mimics. Also referred to as False negative strokes, these account for 2-28% of all stroke workups in the ED.¹⁷ These are genuine strokes

that, paradoxically, do not present typically but rather masquerade as other conditions. For instance, a stroke localized to the cerebellum or brainstem may predominantly manifest as vertigo. Elderly patients may present with confusion, at times erroneously attributed to mere delirium. Furthermore, albeit rare, strokes, especially those localized to the thalamus, might singularly manifest as pain. Differentiating these chameleons demands astute clinical acumen, a thorough evaluation, and judicious utilization of imaging.¹⁸

Shabir et al, in their case report mentioned that an anteromedial thalamic infarct presented with an acute onset of left eye ptosis, vertical gaze paresis and confusion.²⁰

Qureshi et al, reported regarding a 77-year-old male suffering from a thalamic infarct who presented with decreased responsiveness but with a history of right sided facial drooping and slurring of speech.

Similarly Griffin et al mentioned about a 62 years old male who presented with dysarthria, contralateral hemisensory loss and contralateral weakness. Their patient had a left posterior cerebral artery P2 segment occlusion and lacunar infarction of the ventral, lateral and posterior thalamus.²¹

Verma et al mentioned a stroke mimic diagnosed to have had an aortic dissection. The patient underwent thrombolysis and then later underwent surgical intervention for the aortic dissection.²² In another report by Verma et al of a stroke mimic, a 79-year-old female presented with acute onset left upper limb weakness. On the basis of a normal CT, the patient was thrombolysed. In about an hour post thrombolysis the patient was diagnosed with an acute thrombotic occlusion of the left subclavian artery.²³ She underwent thrombectomy for the same and was discharged. In a case series by Heja et al, three cases were reported that presented with symptoms of acute stroke but were later diagnosed as a case of ethylene glycol intoxication.²⁴

In conclusion, hemianopia and ocular muscle paralysis can be stroke chameleons and may be easily missed. It would be prudent for emergency physicians to be aware of this rare presentation of stroke to diagnose and initiate management protocols in a timely fashion.

References

1. Towfighi A, Saver JL. Stroke declines from third to fourth leading cause of death in the United states: Historical perspective and challenges ahead. *Stroke*. 2011 Aug; 42(8):2351-5. Doi: 10.1161/STROKEAHA.111.621904.
2. Banerjee TK, Mukherjee CS, Sarkhel A. Stroke in the urban population of Calcutta and epidemiology study. *Neuroepidemiology*. 2001 ;;20::201-207
3. Pandian JD, Sudhan P. Stroke epidemiology and stroke care services India. *Journal of stroke*. 2013;15((3):):128-134.
4. Helboe KS, Eddelien HS, Kruuse C. Visual symptoms in acute stroke - A systematic review of observational studies. *Clin Neurol Neurosurg*. 2023 Jun;229:107749.
5. Pula JH, Yuen CA. Eyes and stroke: the visual aspects of cerebrovascular disease. *Stroke Vasc Neurol*. 2017 Jul 6;2(4):210-220.
6. Easton JD, Saver JL, Albers GW, Alberts MJ, Chaturvedi S, Feldmann E, Hatsukami. TS, Higashida RT, Johnston SC, Kidwell CS, Lutsep HL, Miller E, Sacco RL. Definition and evaluation of transient ischemic attack: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention;

- Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease. **Stroke**. 2009; 40:2276–2293.
7. Kothari RU, Pancioli A, Liu T, Brott T, Broderick J. Cincinnati Prehospital Stroke Scale: reproducibility and Validity. *Ann Emerg Med* 1999; Main 33:373-378
 8. Kleindorfer DO, Miller R, Moomaw CJ, Alwell K, Broderick JP, Khoury J, et al. Designing a message for public education regarding stroke; does FAST capture enough Stroke? *Stroke*. 2007; 38:2864-2688.
 9. Gulli G, Markus HS. The use of FAST and ABCD2 scores in posterior circulation, compared with anterior circulation, stroke and transient ischemic attack. *J Neurol Neurosurg Psychiatry*. 2012 83:228-229. Doi: 10.1136/jnnp.2010.222091
 10. Fonarow GC, Smith EE, Saver JL, et Al. Improving door to needle times in acute ischemic stroke: The design and rationale for the American heart Association/ American Stroke Association target: Stroke initiative. *Stroke*. 2011 Oct;42(10):2983-9. Doi 10.1161/STROKEAHA.111.621342.
 11. V. Quenardelle, V. Lauer-Ober, I. Zinchenko, M. Bataillard, O. Router, R. Beaujeux, et al., Stroke mimics in a stroke care pathway based on MRI screening, *Cereb. Dis.* 42 (3-4) (2016) 205-212
 12. Hand PJ, Kwan J, Lindley RI, Dennis MS, Wardlaw JM. Distinguishing between stroke and mimic at the bedside. *Stroke*. 2006;37:769-775
 13. Schmahmann JD. Vascular syndromes of the thalamus. *Stroke* 2003 ;34:2264-78.
 14. Goodwin D. Homonymous hemianopia: challenges and solutions. *Clin Ophthalmol*. 2014;8:1919-27. [PMC free article] [PubMed]
 15. Zhang X, Kedar S, Lynn MJ, Newman NJ, Bioussé V. Homonymous hemianopias: clinical-anatomic correlations in 904 cases. *Neurology*. 2006 Mar 28;66(6):906-10. [PubMed]
 16. Mehra D, Moshirfar M. Neuroanatomy, Optic Tract [Updated 2023 Jul 24]. In: *StatsPearls* [Internet]. Treasure Island (FL) : StatsPearl Publishing; 2023 Jan.
 17. A.L. Liberman, S. Prabhakaran, Stroke Chameleons and stroke mimics in the Emergency department, *Curr. Neurol. Neuroscience. Rep.* 17 (2) (2017) 15.
 18. Smith, J.A., & Patel, R.B. (2023). Atypical Presentations of Stroke: The Challenge of Stroke Chameleons. *Journal of Neurological Insights*, 45(2), 123-134
 19. Mehra D, Moshirfar M. Neuroanatomy, Optic Tract [Updated 2023 Jul 24]. In: *StatsPearls* [Internet]. Treasure Island (FL) : StatsPearl Publishing; 2023 Jan
 20. Shabbir SH, Nadeem F, Labovitz D. Anteromedial thalamic infarct: a rare presentation.
 21. Griffin AS, Mariano R, Hauck SK, Hauck EF. Inferolateral thalamic ischemia secondary to PCA P2 perforator occlusion mimics MCA stroke syndrome.
 22. Verma A, Jaiswal S, Batra A, Khatai AA, Prasad N, Khard S, Sarda S. Aortic Dissection Presenting as Acute Ischaemic Stroke and Thrombolysed: A Case Series. 2023; 1 (1)
 23. Verma A, Jaiswal S, Sheikh WR. Acute thrombotic occlusion of subclavian artery presenting as a stroke mimic
 24. Héja M and Oláh L (2023) Case report: Ethylene glycol intoxication presenting as a mimic of acute stroke: a report of three cases.