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CASE REPORT

Difficulties in Diagnosing Posterior Circulation Stroke: A Clinical and Radiological Correlation in Emergency Department and its Implication from Blood Pressure Management

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Abstract

Posterior circulation stroke makes up 30% of cases of stroke. It has a variety of symptoms which are difficult to be correlated with radioimaging finding and leads to late diagnosis. This is due to its complexity in blood supply to many vital areas of the brain. Factors in radiological aspects like artefacts over posterior fossa in computed tomography of the brain contribute to the difficulties in its diagnosis. We present a case of late diagnosis of posterior circulation stroke due to challenges in correlating clinical and radiological findings. A 56-years-old woman with underlying hypertension experienced sudden onset of left eye ptosis associated with blurring of vision for a week as chief complaints when seeking medical attention. Her condition further deteriorated with reduced Glasgow Coma Scale which warranted emergency intubation for airway protection. The diagnosis of posterior circulation stroke was established late after efforts in further exploring for other symptoms and serial neuroimaging scans. Drastic fluctuation of blood pressure could explain the worsening of her condition. She eventually passed away because complications from sepsis secondary to hospital acquired pneumonia. This case illustrates the implication of difficulties in diagnosing posterior circulation stroke is delay in delivering timely management which results in morbidity and mortality. Hence, medical personnels in the emergency department should aware of these challenges in diagnosing posterior circulation stroke.

Keywords

Posterior circulation stroke, Blood pressure, Anatomy, Radioimaging

Abbreviations

CT: Computed Tomography; BP: Blood Pressure; HR: Heart Rate; RR Respiratory Rate; GCS: Glasgow Coma Scale; MRC: Medical Research Council; IV: Intravenous

Introduction

Posterior circulation of the brain is started by vertebral arteries that form the basilar artery which branches into posterior cerebral arteries and smaller arteries. These arteries supply to posterior structures of the brain mainly occipital lobes, brainstem and cerebellum. Posterior circulation stroke can present as many different symptoms because of its complexity in blood supply. Factors like artefacts over posterior fossa limit the sensitivity to detect stroke using CT of the brain which is the first line of radioimaging modality in emergency setting. Thus, these factors contribute to the difficulties in diagnosing posterior circulation stroke as illustrated in this case.

Case Presentation

A 56-years-old lady with underlying hypertension experienced sudden onset of left eyelid drooping associated with blurring of vision for a week as chief complaints at the emergency department. Vital signs on arrival were BP of 269/146 mmHg, HR of 109 beats per minute, RR of 20 breaths per minute, temperature of 36.8 °C and oxygen saturation of 99% under room air. Her GCS was full. Clinical examination showed

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bilateral pupils were 3 mm reactive, left eye partial ptosis and reduced power of right upper and lower limbs - MRC Scale of 4. CT of the brain showed well-defined hypodensities at left midbrain, left occipital, left external capsule and bilateral thalami in keeping with chronic infarcts. Impression of an unlikely acute stroke was made. She was treated for hypertensive emergency with IV labetalol 5 mg bolus followed by IV infusion of glyceryl trinitrate. BP was reduced to 164/104 mmHg within a day of intravenous antihypertensive medicine subsequently followed by overlapping with oral antihypertensive medicines.

On day 2 at the emergency department, her GCS was reduced to E1V4M5. Vital signs were BP of 246/121 mmHg, HR of 72 beats per minute, RR of 20 breaths per minute, temperature of 37 °C and oxygen saturation of 99% under room air. Examination showed the left pupil was 4 mm and fixed while the right pupil was 2 mm. Repeat CT brain showed multifocal chronic infarcts with ill defined hypodensities in bilateral thalami suggestive of possible acute infarction. IV labetalol infusion was initiated to optimise her BP. Aspirin 300 mg was served.

Her GCS was further deteriorated to E1V2M5 on day 3 at the emergency department. Further inquiry from her family members only revealed that she also had dizziness, slurring of speech, unsteady walking and weakness of right sided limbs. Examination showed bilateral pupils were 4 mm and fixed. She was intubated for airway protection subsequently in view of GCS deterioration and desaturation. Repeat CT brain showed bilateral thalamic and midbrain infarct evolution. Final impression was revised to arteries of Percheron infarct based on clinical symptoms and radiological findings (Figure 1). She passed away on the day 13 of admission with complications of sepsis secondary to hospital acquired pneumonia and acute kidney injury.

Discussion

Stroke is one of the common presentations to the emergency department. The acronym of BE FAST assists medical personnel to screen for patients having an acute stroke by identifying sudden onset of symptoms: B stands for balance loss; E stands for sudden loss of eye sightedness; F stands for facial symmetry; A stands for weakness of limbs; S stands for slurring of speech and T stands time of symptom onset. Despite wide use of this screening tool, some stroke cases are missed at the level of the emergency context especially in posterior circulation strokes compared to anterior circulation strokes [1].

There are many difficulties that contribute to the missed opportunities to recognise it. Localization of clinical signs to the area of infarction is hindered by the complexity of posterior circulation vasculature includes various anatomical variants and collateral circulation. This is because it gives a wide range of signs and symptoms especially the atypical one [2,3]. Our patient reported sudden onset of left eyelid drooping associated with blurring of vision at first which was an atypical symptom of stroke [4]. This case also showed an artery of Percheron infarct which is a rare variant of posterior cerebral circulation which manifests non-classical stroke symptoms like altered mental status, oculomotor dysfunction and memory impairment [5].

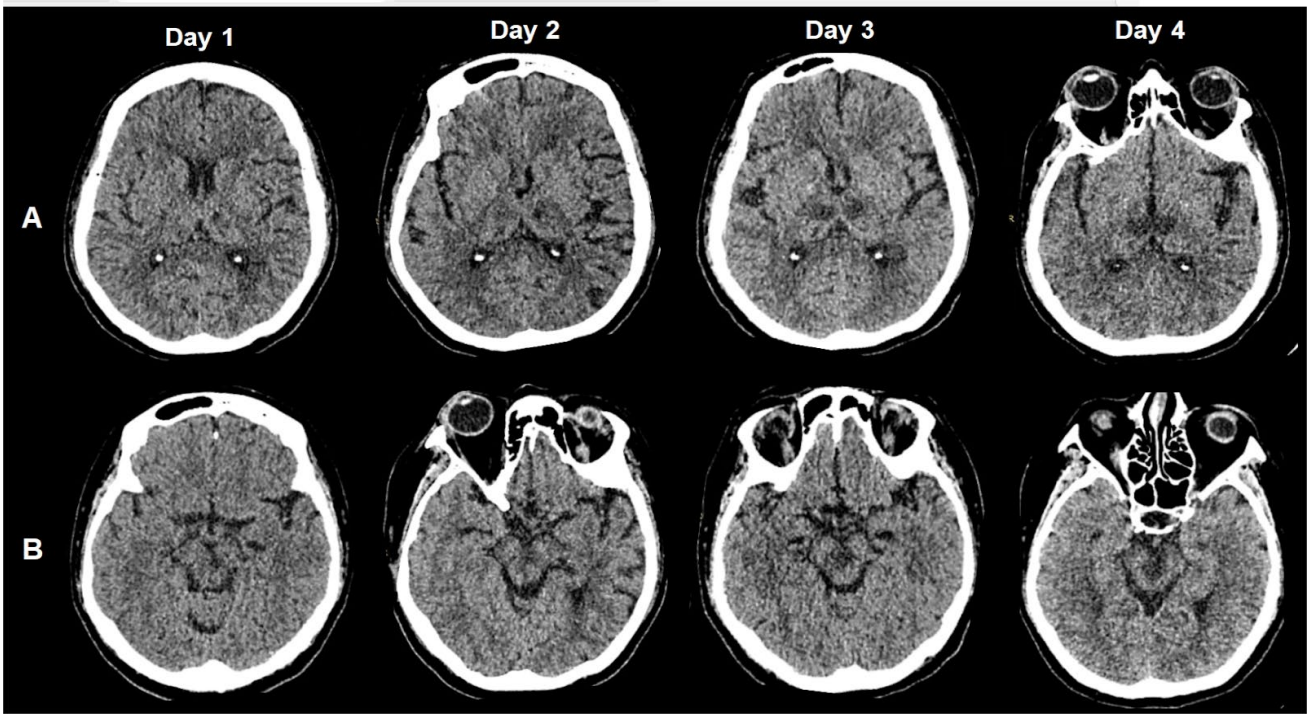

Figure 1: Shows the temporal evolution of a posterior circulation infarction on serial CT brain images at the level of thalami (row A) and midbrain (row B) from day 1 till 4 of hospitalisation.

Thus, knowing different variants of posterior circulation arteries with its area of supply assists the diagnosis of posterior circulation stroke [6]. Sometimes, patients or family members do not report all symptoms which are actually relevant in diagnosing stroke [7]. High index of clinical suspicion, detailed physical examination and history taking by attending doctor plays an imperative role to give diagnosis of stroke in time.

Radiological imaging assists the clinician in diagnosing stroke. Non contrast CT brain is the usually the first line imaging investigation to diagnose stroke because of fast image acquisition. However, its sensitivity only ranges from 7% to 42% which is affected by factors like small lesions, beam hardening artefacts and slow evolution of ischemic changes [8,9]. Her unspecific symptoms and finding of chronic infarct at the first CT were suggestive of other diagnosis rather than acute stroke. CT angiography of the brain can be adjunct to non-contrast CT which is more available to demonstrate the location of arterial occlusion could explain the manifestation of the symptoms [10]. But, it is not feasible for this case because of acute kidney injury. Magnetic resonance imaging of the brain is the best imaging to identify posterior circulation infarct but it is not easily available in the emergency setting and time consuming.

Optimal BP management is essential in posterior circulation stroke. Hemodynamic effects from strict BP control < 140/90 mmHg are more susceptible in patients with vertebrobasilar disease and impaired blood flow as chance of recurrent stroke may increase [11]. Adequacy of cerebral perfusion depends on the mechanism of cerebral autoregulation [12,13]. In patients with chronic hypertension, there are irreversible arterial changes which contribute to impaired cerebral autoregulation in the acute cerebrovascular events. According to the recommendation from the American Heart Association, antihypertensive agents can be given if BP ≥ 220/120 mmHg but not to reduce BP more than 15% within the first 24 hours of acute ischemic stroke [14,15]. Aggressive reduction of BP in this patient could precipitate the stroke. This can be explained by impaired collateral supply to the ischemic penumbra in the drastic reduction of blood pressure [16]. A study showed there is an association between larger BP fluctuation during hospital stay and increased risk of death after 3 months of stroke [17,18]. Thus, judicious use of antihypertensive agents is important in acute stroke with need of close monitoring of BP fluctuations.

Conclusion

Posterior circulation stroke can be misdiagnosed at the level of the emergency department due to difficulty in correlating between various signs and symptoms with finding from the first line of radioimaging modality which is CT brain. Hence, medical personnels in the emergency department have to aware about these difficulties to reduce the chance of misdiagnosis and its implication from improper blood pressure control. This can be enhanced by the knowledge on neuroanatomy to localise the lesion based on its signs and symptoms with the supplement from the radioimaging.

Funding

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Conflicts of Interest

None.

Author Contributions

All authors contributed to the writing equally.

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