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Case Report

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Successful Recovery after Delayed Thrombectomy for Acute Basilar Artery Occlusion: A Case Report

Leila Afshar Hezarkhani[1,2], Payam Sariaslani[1,2], Fatemeh Feyzi [3], Milad Mohamad Yari[1,2*]

1. Department of Neurology, Imam Reza Hospital, Kermanshah University of Medical Sciences, Kermanshah, Iran.
2. Neuroscience Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran.
3. Medical Faculty, Kermanshah University of Medical Sciences, Kermanshah, Iran.

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ABSTRACT

Top of the Basilar Syndrome (TOBS) is a rare neurological condition caused by occlusion of the distal basilar artery, often resulting in significant morbidity. TOBS is particularly challenging to diagnose in younger patients with atypical risk factors. A 34-year-old man presented with vertigo following strenuous exercise. Initial misdiagnoses delayed treatment, and subsequent imaging revealed left vertebral artery dissection and basilar artery occlusion. Endovascular thrombectomy performed 41 hours and 45 minutes after symptom onset achieved a Thrombolysis in Cerebral Infarction (TICI) score of 2B. Despite complications, including hydrocephalus and pneumonia, multidisciplinary management led to significant recovery, with the patient's modified Rankin Scale (mRS) score improving from 4 at discharge to 1 at one year. This case underscores the importance of clinical vigilance, advanced imaging, and endovascular thrombectomy in managing TOBS. Even with delayed intervention, multidisciplinary care can facilitate favorable outcomes in young patients with rare presentations.

Introduction

Top of the Basilar Syndrome (TOBS) is a rare and life-threatening neurological condition caused by occlusion of the distal basilar artery, leading to ischemia in the midbrain, thalamus, and occipital lobes [1]. The condition is characterized by a spectrum of symptoms, including visual disturbances, altered consciousness, and motor deficits, often resulting in significant morbidity or mortality if not promptly recognized and treated. Despite its critical nature, TOBS remains challenging to diagnose due to its variable and nonspecific early symptoms, which can mimic benign conditions such as vertigo [2].

Recent advancements in imaging modalities, including diffusion-weighted MRI and CT angiography, have improved diagnostic accuracy, allowing earlier recognition of posterior circulation strokes [3]. Although administering tissue plasminogen activators is effective in ischemic strokes, the usage is limited to 4.5 hours from symptom onset [4]. Endovascular thrombectomy has emerged as a highly effective

*** Corresponding Author:**
Milad Mohamad Yari
Address: *Neuroscience Research Center, Imam Reza Hospital, Kermanshah University of Medical Sciences, Parastar Blvd, Kermanshah, Iran.*
E-mail: *Milad695@gmail.com*

treatment, even in extended therapeutic windows for selected patients [5]. However, the prognosis of TOBS depends heavily on timely diagnosis and intervention.

This case report highlights the rare occurrence of TOBS in a young, otherwise healthy male secondary to vertebral artery dissection, an uncommon cause of posterior circulation stroke. The patient's initial misdiagnosis as benign vertigo, leading to delayed treatment, underscores the diagnostic and therapeutic challenges in managing TOBS. Despite a prolonged time window to thrombectomy, the patient achieved substantial recovery, emphasizing the importance of clinical vigilance, advanced imaging, and multidisciplinary care in optimizing outcomes for such patients.

Case Presentation

A 34-year-old man with no significant medical history presented to the emergency department (ED) following an episode of vertigo after performing a barbell back squat workout. The initial evaluation, which included a non-contrast brain Computed Tomography (CT) scan, was unremarkable. He was treated with an intramuscular injection of promethazine (25 mg) for presumed benign vertigo and discharged. Approximately 14 hours later, the patient returned to the ED with confusion and dysarthria. His symptoms were attributed to an adverse reaction to promethazine, and he was discharged once more without further investigation. However, 11 hours after the second discharge, he presented again with a decreased level of consciousness (LOC). A repeat brain CT scan showed an infarction in the right hemisphere of the cerebellum. CT angiography (CTA) of the cervical and brain vasculature revealed right vertebral artery dissection and complete occlusion at the top of the basilar artery. Due to the severity of his condition, including LOC, the patient was intubated and transferred to our hospital after 16 hours. On arrival, the patient was intubated, with an initial National Institutes of Health Stroke Scale (NIHSS) score of 30. A non-contrast brain CT scan and brain and cervical CTA were repeated, confirming the previous findings (Figure 1).

The patient underwent endovascular thrombectomy in the catheterization laboratory. Using an Infinity™ long sheath (Stryker Corporation, Kalamazoo, MI, USA), Eric™ Stent Retriever (MicroVention Inc., Aliso Viejo, CA, USA), and Penumbra Aspiration System (Penumbra Inc., Alameda, CA, USA), thrombi were successfully removed from the basilar and left posterior cerebral arteries (PCA) over three passes. While the right PCA remained occluded, a Thrombolysis in Cerebral Infarction (TICI) score of 2B was achieved, indicating partial reperfusion. The total procedure time was 105 minutes. The symptom onset-to-puncture time was 41 hours and 45 minutes, and the door-to-puncture time at our center was 44 minutes.

Post-procedure, the patient was admitted to the intensive care unit (ICU). A follow-up brain CT scan on the second day of admission revealed infarcts in both

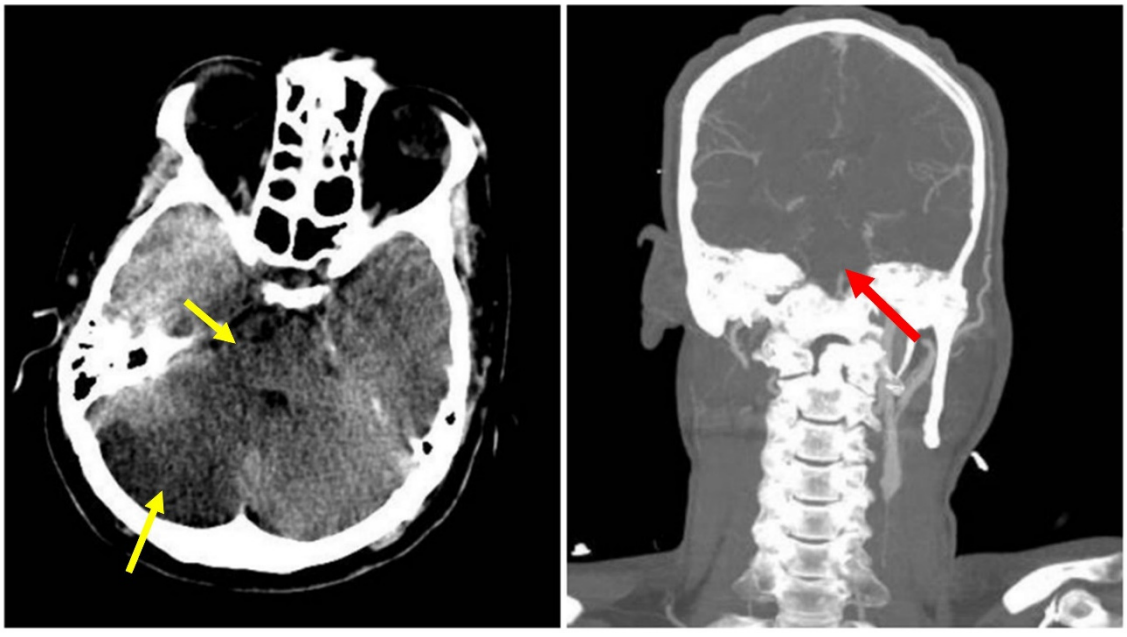

Fig. 1. Pre-thrombectomy brain CT scan and CT angiography. The yellow arrows indicate the infarct zone, and the red arrow indicates the basilar artery occlusion.

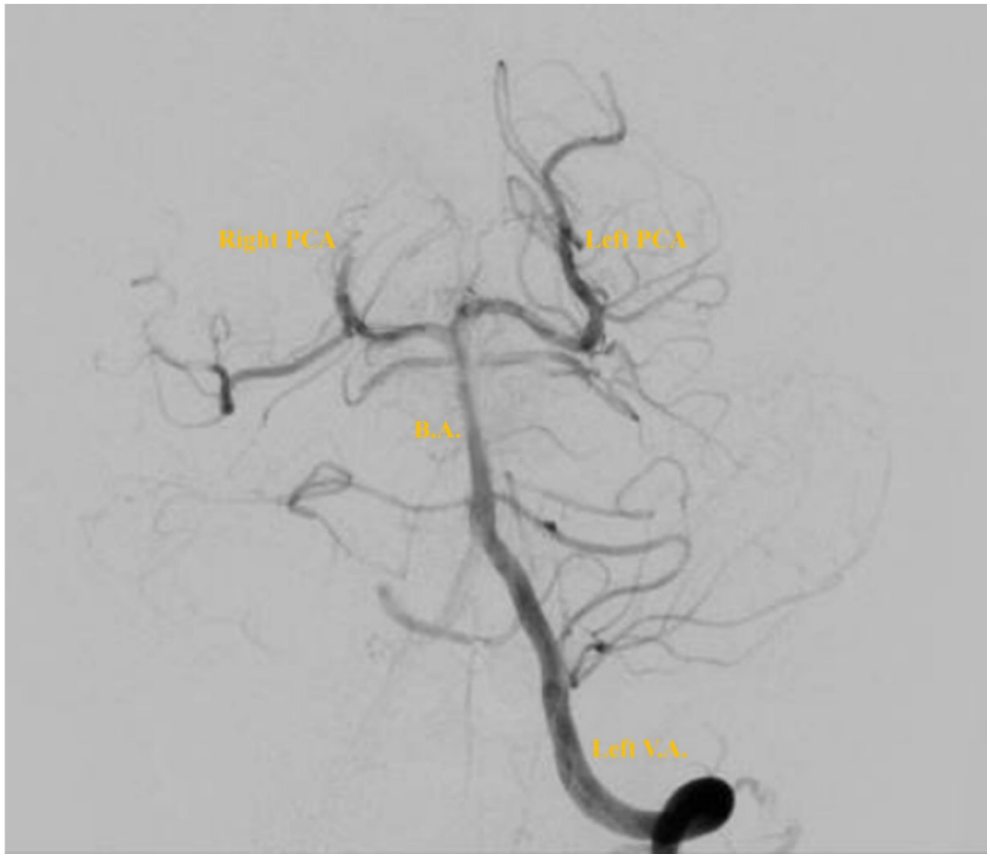

Fig. 2. Post thrombectomy brain angiogram.
Abbreviations: V.A: Vertebral Artery, B.A: Basilar Artery, PCA: Posterior Cerebral Artery

cerebellar hemispheres (preferably on the right side), the right temporal lobe, the right occipital lobe, and the right thalamus, along with evidence of cytotoxic edema. Mannitol therapy was initiated to manage cerebral edema.

On the third day, the patient demonstrated improved responsiveness to sound stimuli and established eye contact. He exhibited plegia in the right limbs and lower left limb, with 2/5 strength in the left upper limb. The patient was extubated. However, on the fourth day, his consciousness deteriorated again, he was intubated again, and a brain CT scan revealed hydrocephalus secondary to the mass effect of infarct edema on the fourth ventricle (Figure 3). External ventricular drainage (EVD) was placed surgically.

By the sixth day, the patient responded to pain stimuli with his left upper limb and exhibited 1/5 strength in other limbs. He was extubated but required re-intubation later due to respiratory distress. Purulent respiratory secretions prompted the initiation of meropenem for suspected pneumonia. On the eighth day, the patient developed a high-grade fever (39.5°C) with purulent discharge at the EVD site. Lumbar puncture revealed no evidence of meningitis. Following infectious disease consultation, colistin was added to the antimicrobial regimen, and the EVD was removed.

On the 13th day, the patient demonstrated improved consciousness, obeyed commands, and was extubated. By the 22nd day, both meropenem and colistin were discontinued, and the patient began receiving fluoxetine for psychological support. On the 29th day, new-onset pneumonia prompted the re-initiation of antibiotics (levofloxacin and ampicillin). Due to the resolution of symptoms, antibiotics were discontinued on day 35. Despite initial improvements, swallowing dysfunction necessitated the re-insertion of a nasogastric (NG) tube on the 38th day.

On the 39th day, the patient was transferred from the ICU to the neurology ward. He was discharged on the 44th day with dysarthria and an NG tube in place due to swallowing dysfunction. At discharge, his limb strength was graded as follows: right upper limb, 4/5; right lower limb, 3/5; left upper limb, 2/5; and left lower limb, 3/5. His modified Rankin Scale (mRS) score at discharge was 4.

Post-discharge, the patient underwent intensive

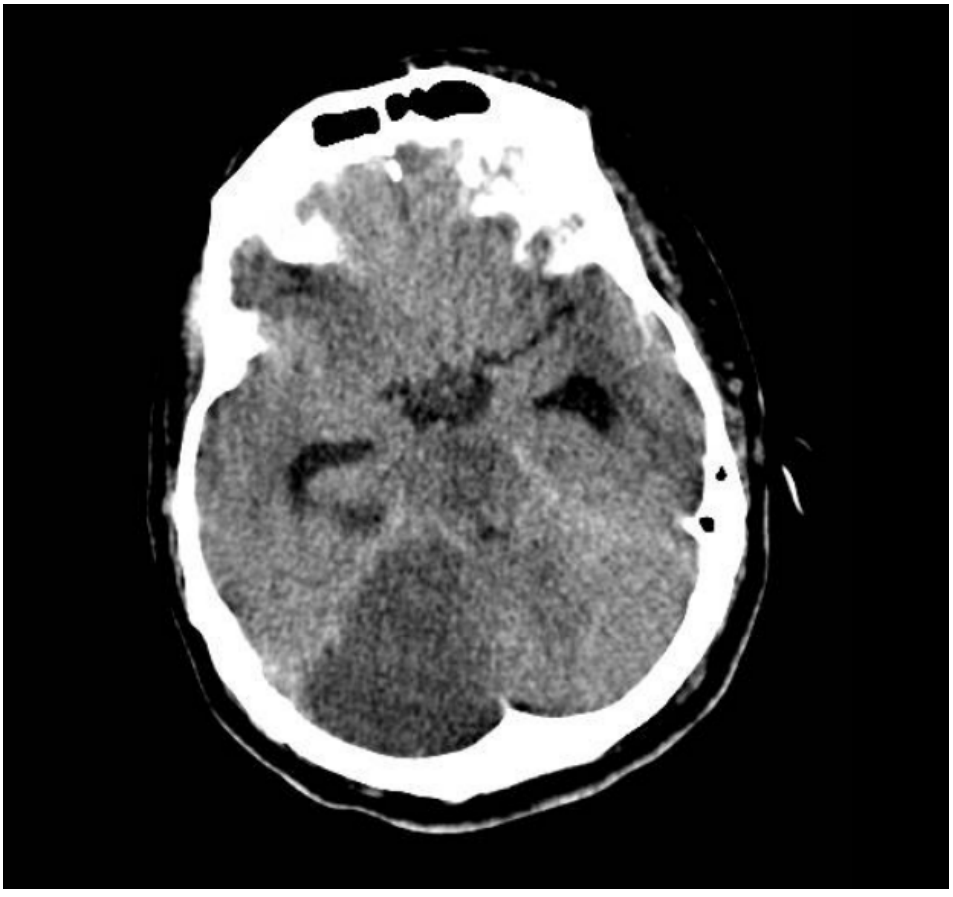

Fig. 3. Brain CT scan on the fourth day of admission showing edema and mass effects impacting the fourth ventricle due to the swelling and infarct edema.

physiotherapy, speech, and occupational therapy. One month after discharge, the NG tube was removed following recovery of swallowing function without aspiration. At a three-month follow-up via phone consultation, the patient's mRS score had improved to 3, reflecting moderate disability but functional independence. By 12 months, the patient demonstrated remarkable recovery, with normal speech and swallowing function. Limb strength returned to 5/5 in all limbs, except for a mild residual deficit in the right upper limb (4/5+). This outcome underscores the role of early rehabilitation in facilitating long-term recovery.

Discussion

TOBS is a rare and severe type of posterior circulation stroke caused by distal basilar artery occlusion, leading to ischemia in the midbrain, thalamus, cerebellum, and occipital lobes. It results in various neurological deficits and is linked to high morbidity and mortality, making prompt diagnosis and treatment essential, particularly when diagnosis and treatment are delayed. Therefore, rapid recognition and intervention are crucial [2, 6].

Initial evaluations, including a non-contrast brain CT, were unremarkable, leading to misattributing symptoms to benign vertigo and promethazine side effects. This caused a significant delay in diagnosis and treatment, with a symptom onset-to-puncture time of 41 hours and 44 minutes. Despite the delays, the patient showed remarkable recovery over 12 months, indicating that thrombectomy may be effective even in extended time windows for select patients [3, 5].

The pathophysiology of TOBS typically involves embolic or thrombotic occlusion of the distal basilar artery. In this patient, imaging confirmed right vertebral artery dissection as the proximal cause, a condition more commonly associated with trauma or exertion in younger individuals. The association with strenuous physical activity likely contributed to the arterial dissection. Dissection-related thromboembolism may have subsequently occluded the basilar artery [1].

Endovascular thrombectomy is the standard

treatment for large vessel occlusion strokes, including basilar artery occlusions. Although the optimal time window for the procedure is still under research, this case highlights the efficacy of mechanical thrombectomy in selected patients beyond the traditional 6 to 24-hour window [5]. Despite a delay of 41 hours and 45 minutes from symptom onset to intervention, the patient experienced significant neurological recovery in the following months. Comparisons with other cases of delayed thrombectomy in basilar artery occlusion provide important context for interpreting the significance of this case. The rarity of successful outcomes beyond the conventional therapeutic window is well-documented, with previous studies highlighting poor prognosis in most cases treated outside the 6 to 24-hour window. For example, a multicenter trial on basilar artery occlusion reported that outcomes for delayed thrombectomy were often unfavorable due to progressive ischemia and associated complications [2]. However, isolated cases, such as the one presented here, suggest that specific factors—including robust collateral circulation, younger patient age, and lack of significant comorbidities—may enable substantial recovery despite prolonged delays.

Post-procedure complications, such as hydrocephalus and infections related to EVD, were successfully managed. Hydrocephalus from cerebellar infarction required surgical EVD placement. Infectious issues, including fever and pus at the EVD site, were treated with broad-spectrum antibiotics after consultation, highlighting the need for multidisciplinary care in critically ill stroke patients [3].

This patient's long-term recovery highlights the remarkable potential for neurological plasticity, even in severe cases of posterior circulation stroke. By 12 months, the patient achieved an mRS score of 1, with near-complete recovery of limb strength and resolution of speech and swallowing dysfunction. Early initiation of physiotherapy, occupational therapy, and speech therapy was likely instrumental in this favorable outcome [1].

The decision to proceed with thrombectomy after a prolonged symptom onset-to-puncture time involved careful ethical considerations. While the outcome in this case was favorable, it may not be generalizable to all patients. Factors such as the patient's youth, absence of significant comorbidities, and preserved collateral circulation were likely pivotal. Future research is necessary to establish clearer guidelines on patient selection for delayed interventions.

Limitations

This case report has limitations. We lacked access to original brain CT and CT angiography from the initial emergency visit, relying on written reports, which limited our analysis. Additionally, technical issues with the imaging archive led to the loss of critical pre-thrombectomy angiograms, restricting documentation of the procedural course. However, we retained post-thrombectomy angiograms and pre-procedure CT angiography, enabling partial reconstruction of vascular pathology and treatment outcomes (Figure 2). The initial misdiagnoses of benign vertigo and drug-induced side effects highlight critical diagnostic pitfalls in the management of posterior circulation strokes. These errors delayed timely intervention and could reflect broader systemic challenges, including gaps in clinician awareness and resource availability. Addressing these challenges requires improved education on recognizing posterior circulation stroke symptoms, particularly in younger, atypical patients. Advanced imaging techniques, such as diffusion-weighted MRI or CT angiography, should be considered early in cases with unexplained vertigo or neurological deficits to avoid critical delays in treatment.

Conclusion

TOBS represents a challenging clinical entity requiring rapid diagnosis and aggressive management to optimize outcomes. This case illustrates the potential for significant recovery even after prolonged delays in treatment, highlighting the importance of advanced imaging, thrombectomy, and multidisciplinary care in the management of severe posterior circulation strokes. Additionally, it highlights the need for larger cohort studies to evaluate the safety and efficacy of thrombectomy beyond the conventional 6- to 24-hour therapeutic window. Developing predictive tools, including imaging biomarkers and clinical scoring systems, could aid in identifying patients most likely to benefit from late interventions. Moreover, research into the systemic factors contributing to diagnostic delays is essential to inform strategies that improve outcomes for posterior circulation stroke patients.

Ethical Considerations

Compliance with ethical guidelines

Written informed consent was obtained from the patient.

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Conflict of Interests

The authors declared no conflicts of interest.

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