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CASE REPORT

Successful revascularization therapy in altered mental state patient with posterior circulation stroke and left subclavian artery partial obstruction: a case report and review of literature

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ABSTRACT

Background: This case report highlights the successful revascularization therapy and favorable functional outcome in a rare and challenging case involving basilar artery occlusion and left subclavian artery partial obstruction.

Case Presentation: We report a patient presented with a high National Institutes of Health Stroke Scale score and altered mental state following collapse. Timely intervention, with multidisciplinary team approach including mechanical thrombectomy and intravenous thrombolysis, led to a remarkable neurological recovery. The discussion emphasizes the significance of prompt revascularization in cases of posterior circulation stroke and underscores the need for further research on multiple arterial obstructions.

Conclusion: This case illustrates the potential for positive prognostic indicators even in complex scenarios, ultimately improving patient outcomes in such critical conditions.

Keywords: Basilar artery occlusion, left subclavian artery, stroke, thrombectomy.

Introduction

A stroke is a neurological deficiency caused by an abrupt focused insult to the central nervous system due to an ischemia infarction or a blood collection inside the brain or ventricular system [1]. Stroke can lead to altered mental status of a patient or even death. A change in a person's cognitive functioning or state of consciousness is referred to as altered mental status. An altered mental state has a broad differential diagnosis, including stroke, and it is a strong indication for hospitalization and neurologic consultation [2]. Although posterior circulation strokes are significant, they might be more difficult to evaluate than anterior circulation strokes [3]. The vertebral arteries and the basilar artery supply the posterior circulation, which includes the brainstem, cerebellum, and visual processing centers in the occipital lobes. This causes a wide range of symptoms with unique presentations. Furthermore, it is time sensitive since delayed diagnosis and treatment can result in severe impairment or even death [3].

We report a case of effective revascularization therapy and successful functional outcome in a patient with basilar artery occlusion (BAO) and left subclavian artery partial obstruction. The patient underwent mechanical thrombectomy after resuscitation in the emergency department (ED) and intravenous thrombolysis and was discharged home after admission and evaluation with a good neurological outcome.

Case Presentation

A 46-year-old male with a past medical history of hypertension and a heavy smoker was brought by

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emergency medical services after being found unconscious at his workplace during his night duty. His last reported well-being was at 9:40 PM when he complained of dizziness, followed by body weakness, and subsequently collapsed. He arrived at the ED at 10:36 PM. Upon arrival, the patient was unresponsive, in a decerebrate position, with snoring breath, and had a Glasgow coma Scale (GCS) score of 7 out of 15. Initial vitals showed blood pressure (BP) of 173/90 mmHg, heart rate of 104 beats/minute, respiratory rate of 20/minute, oxygen saturation of 100%, and temperature of 36°C. Physical examination revealed left eye deviation and a positive Babinski sign. The initial National Institutes of Health Stroke Scale (NIHSS) score was 35, and the modified Rankin scale was 4. An electrocardiogram (ECG) showed sinus tachycardia, and initial venous blood gas revealed a pH of 7.35 and lactate of 4.1 (Figure 1).

Due to his low GCS, the patient was intubated within 30 minutes of arriving at the ED to protect his airway. Code stroke was activated then the patient was shifted to the computed tomography (CT) department. A plain head CT (Figure 2) showed no bleeding, while head and neck CT angiography (CTA) (Figures 3 and 4) revealed basilar artery thrombosis and partial thrombosis of the left subclavian artery. Intravenous thrombolysis was indicated, Tenecteplace (0.25 mg/kg), 17.5 mg IV bolus, patient's weight 70 kg, was administered according to our hospital protocol for thrombolysis in ischemic stroke at 12:46 AM, followed by mechanical thrombectomy at 1:15 AM after consultation with a neurointerventionist.

The following day, the patient was extubated, and his GCS improved to 15 out of 15, with the ability to open his eyes to verbal commands and move all four limbs spontaneously against gravity. However, during his hospital stay, he developed acute respiratory failure, and a chest X-ray (CXR) (Figure 5) showed increased bilateral perihilar vascular congestion and he was treated for aspiration pneumonia very well.

Cardiac evaluation through an echocardiogram reported an ejection fraction of 76% and no structural valve disease. A magnetic resonance imaging of the brain reported multifocal areas of recent infarcts in the left cerebellar hemisphere, both sides of the pons, as well as tiny recent ischemic changes in other areas. In addition,

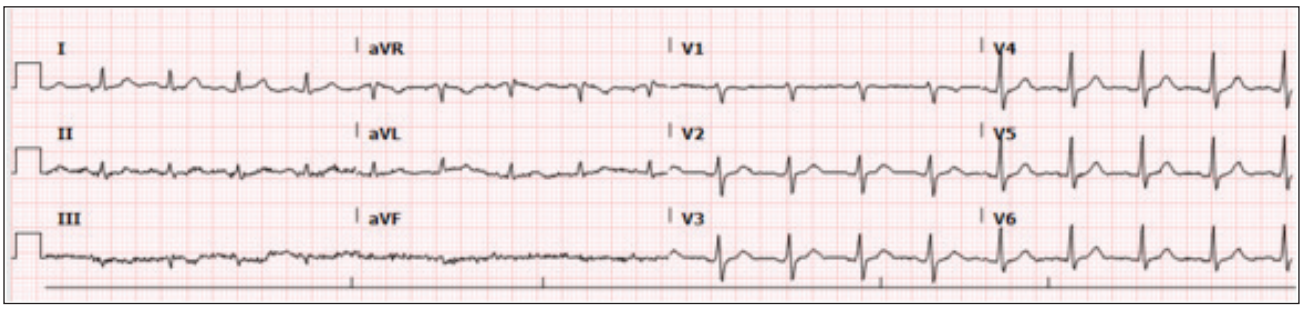

Figure 1. *ECG showing sinus tachycardia.*

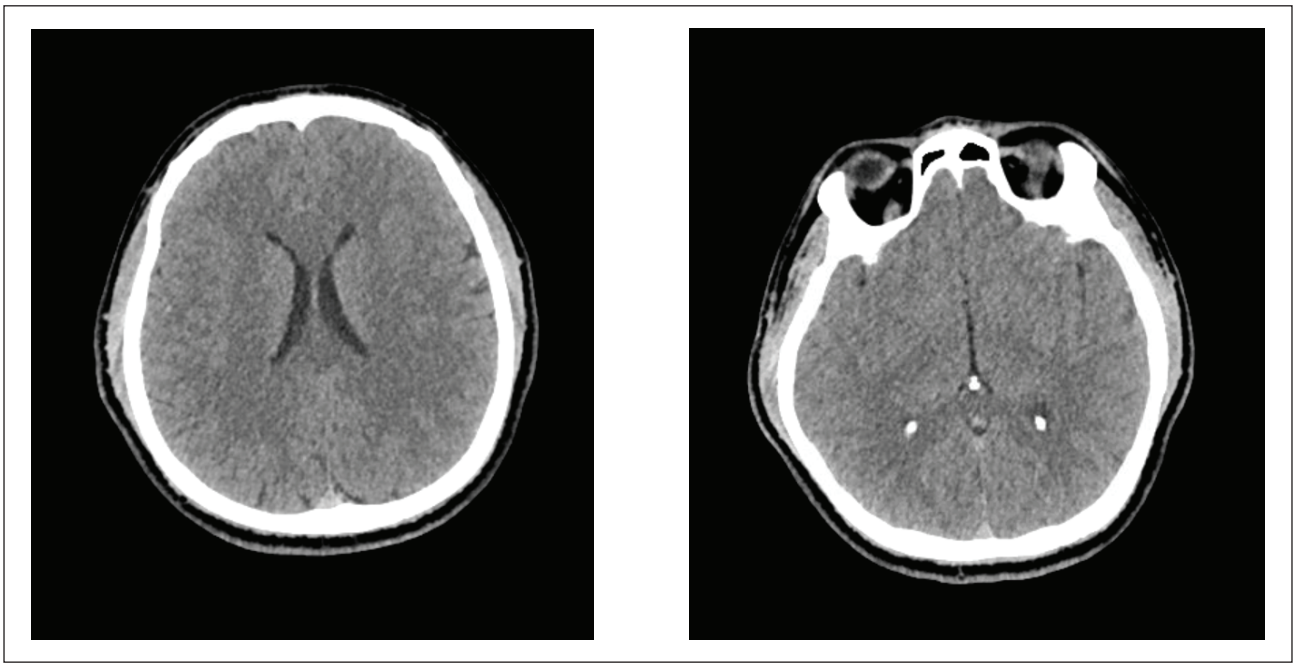

Figure 2. *Noncontrast CT of the head, no intracranial hemorrhage.*

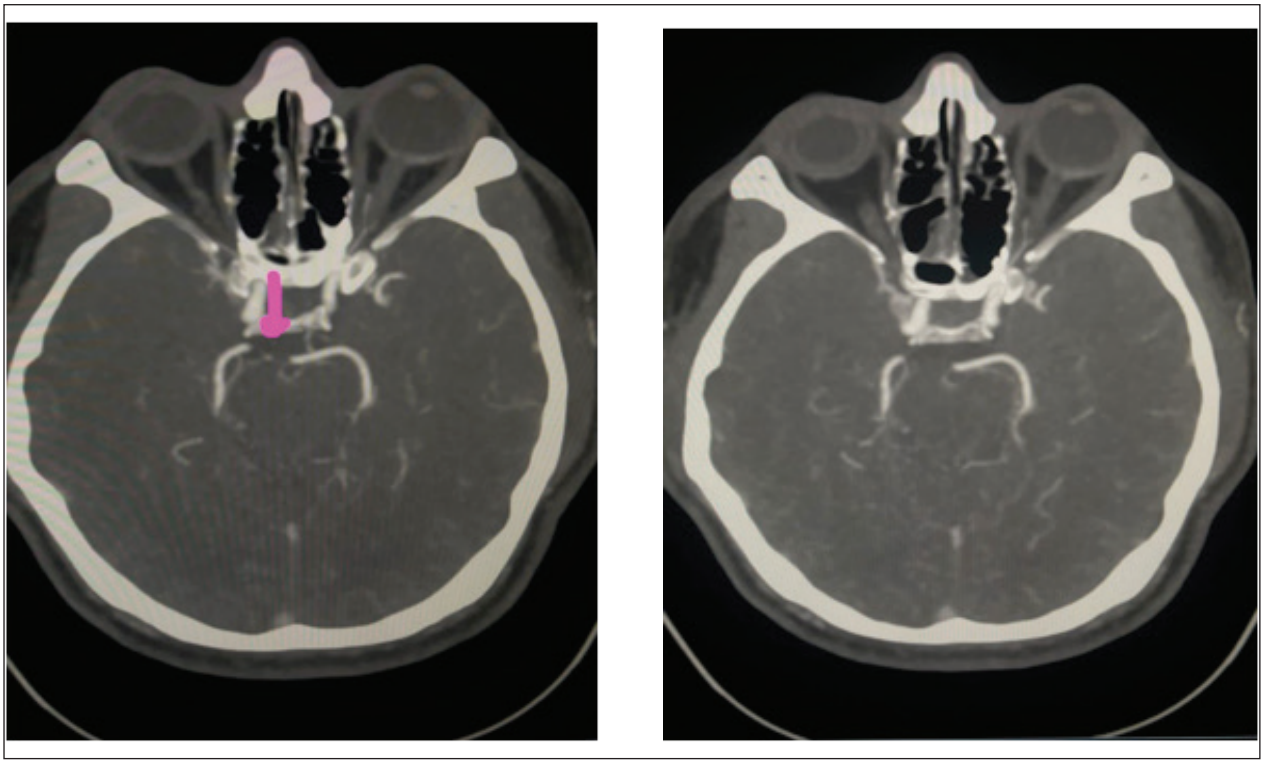

Figure 3. *CTA of the brain. A: BAO. B: BAO pointed with arrow.*

mild chronic small vessel disease was observed in white matter regions, likely related to cerebellar and small posterior circulation infarcts. The patient was discharged after 8 days from admission day, on anticoagulation therapy with plans for reimaging in 6-8 weeks, including a CTA of the left subclavian artery. At a follow-up clinic visit after 6 days from discharge, he showed significant improvement, demonstrating good mobility, eating, talking, and overall movement.

Discussion

BAO is a type of acute ischemic stroke and it is a neurological emergency. Basilar artery located in the posterior cranial fossa. It mainly supplies the posterior circulation of the brain. Due to its rarity and high mortality, BAO can be considered a serious form of stroke, and about 5% of all strokes are caused by it [4]. It might be challenging to identify the signs and symptoms of a BAO stroke since they rely on the extent of the blockage and the particular brainstem areas that are impacted [5]. It may have an impact on several essential functions, including respiration, heart rate, BP, consciousness, and additionally neurological assessment [5]. The left subclavian artery originates directly from the aortic arch and the first branch is the vertebral artery that supplies the upper spinal cord, brainstem, cerebellum, and posterior part of the brain [6]. Physicians usually underdiagnose subclavian artery thrombosis due to low incidence, varied symptoms, and atypical presentation, which can be easily overlooked as muscular disorders or other less serious illnesses [6]. Left subclavian artery obstruction is four times more common than in the right subclavian artery obstruction [7]. Significant ischemia symptoms in the brain, upper limbs, and heart are occasionally caused by subclavian artery stenosis [7]. Patients with subclavian artery thrombosis are at increased risk for coronary artery disease, transient ischemic attack, and cerebrovascular ischemia or infarction because of the same etiology, and this risk is greatly correlated with the lesion on the left side [7].

The imaging methods to identify stroke in general are CTA, or magnetic resonance angiography (MRA) [8]. The positive predictive value is 13% when there is a systolic BP difference of more than 10 mm Hg between the two arms [9]. Duplex ultrasonography with color flow is a non-invasive diagnostic imaging technique for the diagnosis of subclavian artery thrombosis [9]. CT and MRA, which are used when intervention is necessary, are more accurate methods for diagnosis [9].

Intravenous thrombolysis and intravascular therapy (mechanical thrombectomy, arterial thrombolysis, and bridging therapy) are the major therapeutic options for BAO [10]. In patients with posterior circulation strokes, the duration of time prior to the treatment begins is a significant predictor of clinical outcome after thrombectomy [10]. Large-scale studies for anterior circulation stroke (ACS) have proven the superiority of endovascular therapy (EVT). EVT therefore appears to be effective in BAO, though it is yet unknown which patients would benefit most from it [11]. EVT for BAO is related to superior results when administered within 6 hours compared to when administered beyond 6 hours as stated by the American Heart Association/American Stroke Association Guidelines 2015. In addition, they state that the endovascular procedure should be regarded as

Figure 4. *CTA of the neck showing left subclavian artery partial occlusion (with arrow).*

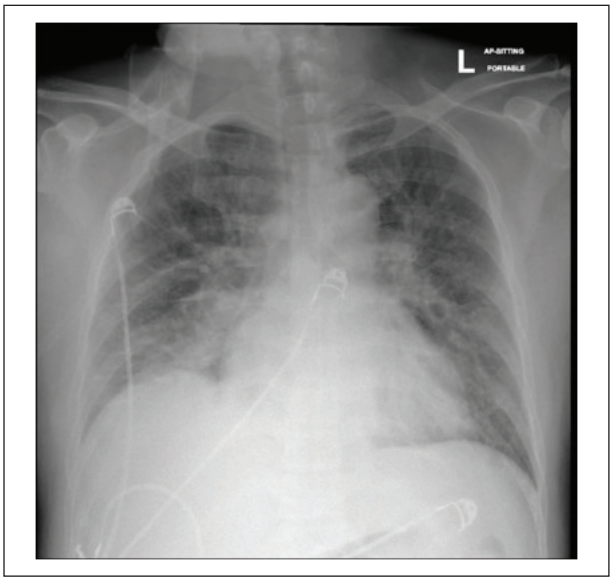

Figure 5. *AP portable CXR of the patient showing increased bilateral perihilar vascular congestion.*

off-label beyond 6 hours [12]. However, according to some studies, the EVT length of time may be increased in certain cases to 16 or 24 hours [13]. There are few studies on revascularization in BAO beyond 12 hours, and only case reports are found in the literature [13].

The best treatment option for subclavian artery thrombosis is endovascular intervention, which includes percutaneous transluminal angioplasty with stenting or ballooning [14]. Nearly half of the patients underwent pharmacomechanical thrombectomy (PMT) alone to treat subclavian artery thrombosis, while the other half got catheter-directed thrombolysis in addition to PMT [14]. It is interesting that people who had PMT alone had better results. Improved outcomes met the following criteria: a. greater rates of procedural success; and b. 12-month amputation-free survival [14].

Patients with poor functional outcomes across all BAO stroke patients had significantly higher NIHSS scores at admission especially in severely symptomatic cases, such as coma as initial presentation [15]. If there is no early, efficient therapy, the mortality and disability rates might reach up to 90% [16]. Despite developments in the treatment of acute stroke, about 70% of patients either die or suffer severe disabilities [17]. Early prediction of short- and long-term results in BAO patients can therefore aid in making treatment decisions [17]. A multicenter prospective cohort study published in 2021 showed that despite the high rates of recanalization attained following mechanical thrombectomy with minimal risk, BAO patients who were in a coma at presentation still had significant rates of poor outcome and mortality, particularly when an early extubating on day 1 was not achievable [18]. Early improvement may indicate BAO recanalization, but clinical deterioration or inability to improve may indicate unsuccessful recanalization or medical consequences [19]. The prediction of short- and long-term functional good results and the choice to continue life-sustaining medical and surgical treatments typically happen during the first 24 hours of a patient›s admission, despite the fact that the patient›s characteristics at that time can contribute to medical decision-making [19]. Early neurological tests, such as the NIHSS score at 24 hours and relative change in the NIHSS score, indicate both the degree of neurological abnormalities upon admission and the impact of EVT [20]. Nevertheless, the early prognosis for clinical results after BAO is yet unknown [20]. When patients with acute ischemic stroke (ACS) undergo MT, a higher NIHSS score upon admission is linked to a bad prognosis three months later [21]. Consequently, the neurological results following MT may be influenced by the poor clinical status upon admission [21].

Conclusion

This case study presents a case of both BAO and left subclavian artery partial obstruction, an unusual and uncommon occurrence that starts with a high NIHSS and ends with a favorable outcome on discharge. We discuss the approach, assessment, diagnostics, treatment, and outcomes. The purpose of this paper is to demonstrate the importance of timely revascularization therapy, together with a high NIHSS score, enabling patient survival to be optimal with favorable outcomes in multiple main arterial obstructions. In addition, it is crucial to promote the publishing of more studies concerning posterior circulation and demonstrating multiple arterial occlusions

while highlighting how many positive prognostic indications are currently understood.

List of Abbreviations

BAO	Basilar artery occlusion
BP	Blood Pressure
CT	Computerized tomographic
CXR	Chest X-Ray
ECG	Electrocardiogram
ED	Emergency Department
GCS	Glasgow Coma Scale
NIHSS	National Institutes of Health Stroke Scale

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Informed consent was obtained from the participant.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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