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Case Report

Embolectomy in Patient with Basilar Artery Occlusion and Poor Neurological Exam

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ABSTRACT

Background: Acute basilar artery occlusion (BAO) is generally associated with a poor prognosis and mortality rates up to 85% in non-recanalized patients. Emergent recanalization is essential to improve outcomes in this patient subgroup.

Objective: To show that good patient outcomes, modified Rankin score (mRS) 0-2, can be achieved in patients presenting with acute BAO and poor or no neurological exam.

Methods: We retrospectively analyzed the hospital course of a patient presenting with acute BAO and absent brainstem reflexes who underwent emergent revascularization.

Results: The patient was discharge with cranial nerve III palsy but was otherwise neurologically intact.

Conclusions: Patients presenting with acute BAO and poor or no neurological exam should be considered for emergent endovascular intervention. Despite the high risk of morbidity and mortality, this subgroup of patients can still have good functional outcomes.

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Introduction

Acute basilar artery occlusion (BAO) is generally associated with a poor prognosis and mortality rates up to 85% in non-recanalized patients [1]. Emergent recanalization is essential to improve outcomes in this patient subgroup. In this study, we report a case of acute BAO with absent brainstem reflexes that underwent emergent revascularization. We aim to illustrate that good patient outcomes, modified Rankin score (mRS) 0-2, can be achieved in patients presenting with acute BAO and poor or no neurological exam.

Case Presentation

A 52-year-old male with a past medical history of hypertension was found unresponsive in a parked car and emergently intubated in the field. On physical exam, the left pupil was 7mm dilated and nonreactive, the

right pupil was 3mm and nonreactive, and brainstem reflexes were absent. Computed tomography (CT) head demonstrated no acute intracranial abnormality. CT angiogram (CTA) head/neck revealed bilateral severe vertebral artery stenosis, bilateral vertebral artery dissections, proximal left vertebral artery thrombus, and basilar artery occlusion (Figure 1A). Time of symptom onset was unknown, and tissue plasminogen activator (tPA) was not given.

The patient was taken for emergent revascularization, and intraoperative angiogram confirmed occlusion (Figure 1B). An Ace 68 Penumbra aspiration catheter was used over a XT27 over a synchro wire. First, the synchro wire was advanced and the guiding catheter Neuromax was advanced to origin of the vertebral artery. With flow reversed via Ace 68 catheter, the XT27 was advanced over synchro wire on heparinized drip with simultaneous suctioning via the Ace catheter. The Ace catheter was advanced intracranially and placed in apposition with the clot.

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Cessation of blood suction confirmed the catheter made contact with the clot. As the XT27 passed the clot, microinjection was performed to confirm XT27 location distal to the clot. With the clot trapped, the stent retriever Trevo was deployed with simultaneous suctioning to prevent embolic showering. The XT27 was then removed to increase suctioning via ACE. After waiting 4 minutes, the stent was pulled back into the ACE catheter with continued suctioning. Angiographic runs were performed, which confirmed successful recanalization (TICI 3). Successful revascularization was achieved with a Penumbra aspiration catheter and stent retrieval device (Figure 1C).

On day 1 post-mechanical thrombectomy (MT), the patient was awake, alert, and following commands. The patient had residual cranial nerve III palsy but was otherwise neurologically intact at discharge.

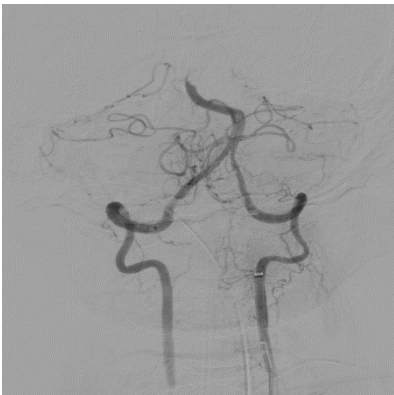


Figure 1A: Angiogram image before mechanical thrombectomy.



Figure 1B: Coronal CT image revealing occlusion of the basilar tip.

Discussion

Acute BAO does not have a clear treatment protocol and is associated with high rates of mortality, treated or untreated [2, 3]. Previous studies regarding the treatment of BAO are largely focused on outcomes of intravascular thrombolysis, while data on treatment with MT is relatively limited [4]. In this study, we presented a case of BAO with absent brainstem reflexes who underwent emergent endovascular intervention. The patient had residual cranial nerve III palsy but was otherwise neurologically intact at discharge. We aim to illustrate that patients presenting with acute BAO and poor or no neurological exam should be considered for emergent endovascular intervention. Outcomes of patients presenting with acute BAO are heavily dependent on early and effective recanalization as well as operative techniques [3]. The rationale

proposed for the positive outcomes associated with mechanical embolectomy is the decreased time to recanalization. MT allows for immediate reperfusion, while intravascular thrombolysis takes time to effectively dissolve a thrombus.



Figure 1C: Angiogram image after mechanical thrombectomy.

A study including 18 patients that presented unconscious with acute BAO and a mean National Institutes of Health Stroke Scale (NIHSS) of 27.08, reported outcomes of neuroendovascular intervention in this patient subgroup. All patients were treated with MT, eight were also treated with adjunct intra-arterial thrombolysis, and three with adjunct stent placement. The mean post-treatment NIHSS was 6.54, while mortality occurred in 5 patients. These results demonstrate that various combinations of endovascular intervention can drastically improve outcomes in this patient subgroup [5]. Another retrospective study evaluated the efficacy of MT compared to intravenous or intra-arterial thrombolysis. Amongst 28 patients treated with MT, 57% achieved a favorable outcome (mRS 0-2) at 3 to 8 months post-thrombectomy. Additionally, the rate of favorable outcomes increased to 73% when there was no evidence of acute infarction prior to treatment [6]. This data demonstrates that patient outcomes improve with endovascular intervention via mechanical thrombectomy compared to intravascular thrombolysis. To our knowledge, this is the largest study to date assessing the efficacy of mechanical thrombectomy for the treatment of BAO, yet the study is still limited by a small sample size. A study including 12 consecutive patients further demonstrates the benefit of performing MT prior to thrombolytic recanalization in patients with BAO. The tPA dose required and time to recanalization were significantly reduced by initial treatment with MT, which may reduce risk of hemorrhagic transformation. Delays in treatment are known to be associated with a greater risk of bleeding [7]. These results suggest that MT prior to tPA recanalization may increase the safety and efficacy of treatment [8].

Determining which patients with BAO will benefit from endovascular intervention poses a significant challenge. Data demonstrates that the degree of hypoattenuation on CTA quantified with the posterior circulation Acute Stroke Prognosis Early CT Score (pc-ASPECTS) or the Pons-midbrain index predicts the functional outcome in patients with BAO [9-11]. Another study aimed to look at pc-ASPECTS and Pons-midbrain index to predict the outcome of comatose patients in the Basilar Artery International Cooperation Study (BASICS). The study found that

comatose patients with BAO had higher mortality rates and lower rates of favorable outcomes compared to non-comatose patients. The study also found that comatose patients with a Pons-Midbrain index (PMI) score <3 had reduced mortality rates, but no relation to favorable outcomes when adjusting for age and baseline NIHSS score. pc-ASPECTS was not associated with death or favorable outcomes when adjusted for age, treatment, and baseline NIHSS score [12]. However, another study demonstrated that pc-ASPECTS <8 was associated with favorable outcomes and decreased mortality risk, which suggests that pc-ASPECTS may be a useful tool for predicting functional outcomes post-endovascular recanalization of BAOs [13]. Larger randomized control trials are needed determine whether pc-ASPECTS accurately predicts functional outcomes of patients with BAO post-recanalization. Despite the potential for high rates of recanalization via endovascular intervention, functional outcomes may not correlate. Choosing the right candidate for endovascular treatment is important in terms of prognosis. The pediatric population in particular may benefit from MT as a part of initial treatment for BAO. A case series reported that MT, both alone and in combination with thrombolysis, led to complete recovery in 5 of 11 pediatric cases [14-16]. The remaining cases had the following outcomes: 2 patients with NIHSS 3, 1 patient with NIHSS 16, 1 patient with NIHSS 2 at 3 months, and 1 patient with NIHSS 23 at 30-day follow-up [14, 17, 18]. Despite the small sample size, this report suggests that MT alone or prior to thrombolysis may provide therapeutic benefit in pediatric patients presenting with acute BAO.

Clinical history and NIHSS is typically more effective for the diagnosis of anterior circulation infarcts when compared to posterior circulation infarcts. This is problematic because prompt diagnosis of posterior circulation strokes, specifically BAOs, is critical to decrease poor neurological outcomes. When evaluating a patient for acute posterior fossa stroke, it is important to determine whether to obtain an MRI if CT imaging is unremarkable. One prospective study found that CT is insensitive (sensitivity of 41.8%, 95% CI 30.1-54.4%) for detecting acute posterior fossa stroke suggesting that diffusion weighted magnetic resonance imaging (DWI) is the preferred imaging modality. If infratentorial ischemia is suspected, prompt DWI should be obtained if CT imaging is unremarkable [19].

Conclusion

Patients presenting with acute BAO and poor or no neurological exam should be considered for emergent endovascular intervention despite the potential for poor outcomes, especially in young patients. Additional imaging such as DWI may be indicated in complicated cases.

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