

Aggressive Medical Management Followed by Interval Balloon Angioplasty and Stenting in an Acutely Symptomatic Patient with Intracranial Stenosis

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Abstract

A 58-year-old man presented with acute onset of neurological deficits. Magnetic resonance imaging showed bilateral cerebellar infarctions. Computed tomography angiogram, and T1 SPACE magnetic resonance imaging showed occlusion of the dominant left vertebral artery. Catheter angiography showed near occlusion of left vertebral artery with luminal thrombus. Angiography performed after 3 weeks of medical therapy showed recanalization of the left vertebral artery but with high-grade stenosis which was successfully treated by percutaneous transluminal angioplasty and stenting. Our case report demonstrates that lesion characterization is important to identify candidates for aggressive medical management with interval percutaneous transluminal angioplasty and stenting, especially when the mechanism of stroke is due to acute plaque destabilization.

Keywords: Angioplasty, interval angioplasty, intracranial atherosclerotic disease, intracranial stenosis, plaque stabilization, stenting

Introduction

Intracranial arterial stenosis (ICAS) is responsible for 50% of strokes in certain populations with nearly one-third of patients presenting with recurrent stroke within 2 years.¹ In the Stenting and Aggressive Medical Management for Preventing Recurrent Stroke in Intracranial Stenosis (SAMMPRIS) trial, patients who underwent percutaneous transluminal angioplasty and stenting (PTAS) had a much higher 30-day rate of stroke compared to medical management.² Currently, medical management remains the mainstay of treatment for ICAS; however, the long-term outcome remains dismal.^{3,4} Patients with stroke from acute plaque destabilization undergoing PTAS in the acute phase have a higher risk of periprocedural complications.^{5,6} Plaque stabilization with medical therapy with interval PTAS can be a safe and effective option in this subgroup.

Case Presentation

A 58-year-old man with known history of coronary artery disease, hypertension, diabetes mellitus, hyperlipidemia, and 47 pack-year of smoking presented to emergency department with unsteadiness, dysarthria, and inability to fixate eyes. Vital signs and physical examination were unremarkable except for horizontal nystagmus. The National Institute of Health Stroke Scale (NIHSS) score was 1. Lab findings were unremarkable except for leukocytosis and elevated blood sugar. Computed tomography of the head was unremarkable. Computed

tomography angiogram of the head demonstrated intradural left vertebral artery occlusion with predominant posterior inferior cerebellar artery termination of the right vertebral artery (Figure 1A). Acute infarcts were seen in the bilateral cerebellar hemispheres in diffusion-weighted images (Figure 2). Dual antiplatelet therapy, atorvastatin for hyperlipidemia, and insulin for hyperglycemia were initiated. A catheter angiogram confirmed near complete occlusion of the left intradural vertebral artery with intraluminal thrombus and trickle flow into the basilar artery (Figure 3). Collateral flow to the basilar artery

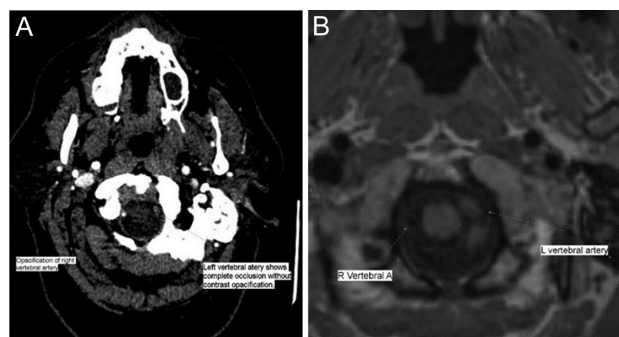


Figure 1. (A) Axial CTA of neck demonstrates complete luminal occlusion. (B) Axial TIWI MRI brain redemonstrates complete occlusion of left vertebral artery. CTA, computed tomography angiogram; MRI, magnetic resonance imaging; TIWI, T1 weighted.

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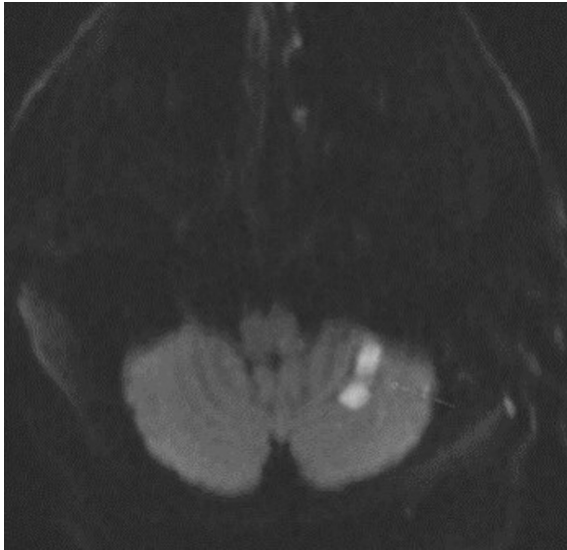


Figure 2. DWI images show diffusion restriction in cerebellar hemisphere suggestive of acute infarction. DWI, diffusion-weighted image.

from the P1 segments via bilateral fetal posterior cerebral arteries was noted. In magnetic resonance imaging (MRI), T1 SPACE sequence demonstrated replacement of left vertebral artery flow void with heterogeneous T1 signal in the intradural segment (Figure 1B). With a working diagnosis of an acute plaque disruption superimposed on an underlying stenosis, PTAS after 3 weeks of optimal medical therapy was planned. One day prior to the scheduled procedure, the patient came to the emergency department with worsening intermittent dizziness, blurry vision, difficulty with balance, and difficulty swallowing. The NIHSS score was 2. Computed tomography of the head was unremarkable. Catheter angiography demonstrated complete resolution of the thrombus in the left vertebral artery with focal-high grade stenosis (70%) (Figure 4). Angioplasty with a 2.5 × 15 mm Gateway balloon was followed by stenting



Figure 3. Left vertebral artery digital subtraction angiography (DSA) shows complete occlusion before origin of PICA. PICA, posterior inferior cerebellar artery.

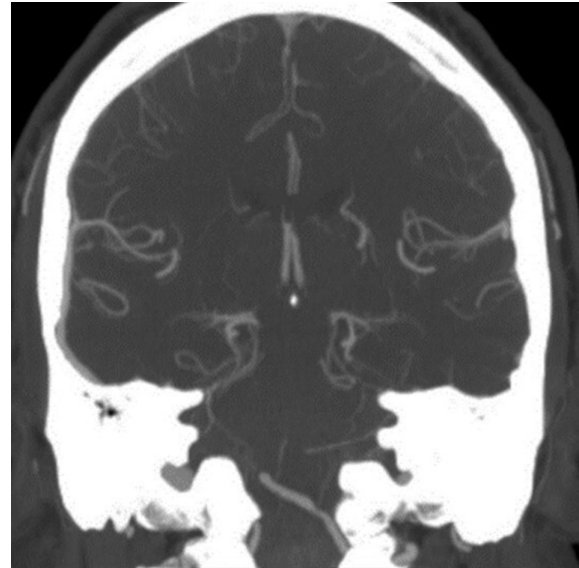


Figure 4. Maximum intensity pixel coronal images of CTA of head demonstrates improvement in narrowing of vertebral artery stenosis after 3 weeks course of dual antiplatelet therapy. CTA, computed tomography angiogram.

with a 4.5 × 20 Wingspan stent. Additional angioplasty was performed using a 4 × 15 mm Gateway balloon (Figure 5) with excellent results. Dual antiplatelet and statin therapy were continued. The patient was symptom-free till the last follow-up 1 year post-stenting.

Discussion

Patients with high-grade intracranial stenosis undergoing aggressive medical therapy have a recurrent annual stroke rate as high as 23%.^{3,4} A retrospective study by Tang et al³ (n = 114) demonstrated a more favorable functional outcome of stenting over the medical group (94.3% vs 78.7%, $P = .045$). A few non-randomized studies have suggested better outcomes with stenting; however, periprocedural adverse events remained high.^{3,7} In a prospective multi-center observational study by Xiong et al⁷, lower periprocedural complication rates were observed which was attributed to a greater time interval between symptom onset and PTAS (symptoms < 30 days = 100% in SAMMPRIS compared to <50%).

The variable outcome of medical management has been proposed to be related to the mechanism of stroke and infarct pattern. Embolic and perforator infarcts share common pathophysiology of acute plaque destabilization and showed no recurrence or lower recurrence rate, respectively. These same infarct patterns can be associated with an increased risk of periprocedural strokes when acutely treated with PTAS.⁶ Aggressive medical therapy to manage risk factors has been shown to decrease stenosis and stabilize plaque.⁸ Alexander et al⁵ also suggested that lesion characteristics were more important than degree of stenosis in predicting outcome following stenting. In a retrospective study by Alexander et al⁹ (n = 131), non-hypoperfusion stroke (embolic and perforator) pattern was shown to benefit from 7 to 14 days of delay in stenting.

Patients with different mechanisms of infarction (perforator vs. hypoperfusion vs embolic) in intracranial stenosis can have

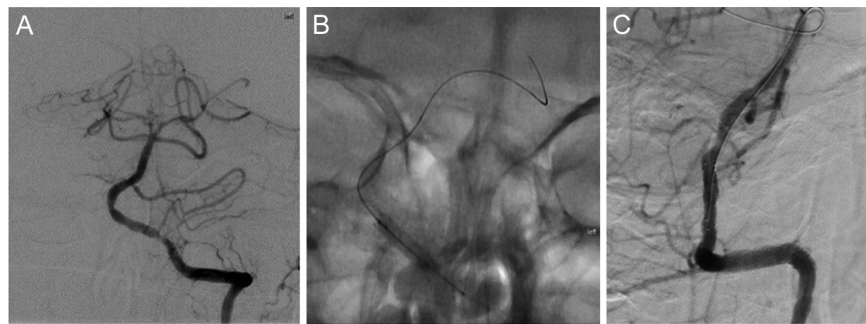


Figure 5. (A, B, and C) Left vertebral digital subtraction angiography images demonstrating post angioplasty images showing improvement in stenosis with no limitation to flow. Last image demonstrates stent placement over the region of prior stenosis in V4 segment of left vertebral artery.

overlapping imaging findings. Embolic and perforator strokes suggest an underlying unstable plaque. High-resolution vessel wall MRI may be useful to identify acute plaque destabilization.^{6,10} In a prospective study by Wu et al¹⁰ hyperintense plaque and plaque surface irregularity on MRI suggested an embolic pattern of infarction.

In our case, the MRI showed embolic strokes and the angiogram suggested vertebral artery thrombosis with trickle flow which raised the suspicion of plaque complication. This situation is analogous to a non-ST elevation myocardial infarction wherein there is a subtotal coronary occlusion.¹¹ While early coronary intervention and stenting are the norms, a more cautious approach is needed in the neurovascular arena since the risks of downstream embolization can be disastrous. Our patient scenario exemplifies the setting wherein acute endovascular treatment is not ideal. Our patient had embolic infarcts and responded well to aggressive medical management with a demonstrable change in the artery. However, patients may worsen after the presentation, which may force early intervention.

Conclusion

Initial plaque stabilization with aggressive medical therapy followed by staged PTAS seems to be a reasonable approach and has been suggested in very few small studies. Our patient report unequivocally demonstrated embolic strokes due to acute vessel thrombosis at presentation which resolved in the short term with aggressive medical therapy followed by a favorable response to stenting, supporting the approach of interval stenting in patients with stroke due to plaque complication.

Disclaimer: The views expressed in the submitted article are ideas based on our observations and is not an official position of the institution.

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