Raychev, J Clin Case Rep 2018, 8:8
DOI: 10.4172/2165-7920.10001163

Journal of Clinical Case Reports

Case Report Open Access

Stent-Retriever Angioplasty with *In-Situ* Aspiration in a Patient with Acute Basilar Artery Occlusion Due to Underlying Atherosclerosis

Raychev R*

Department of Neurology, Stroke Centre, University of California, Los Angeles, USA

Abstract

Introduction: Despite the proven benefit of stent-retriever thrombectomy for acute ischemic stroke due to large vessel embolic occlusion, acute revascularization in setting of underlying atherosclerotic occlusion remains challenging. Here, we present a case report of novel revascularization technique, which can be applied in acute ischemic stroke due to suspected atherosclerotic intracranial occlusion.

Case description: A 92-year-old female with multiple vascular risk factors presented with severe neurologic deficits due to acute basilar artery (BA) occlusion. No improvement was noted after IV TPA and mechanical thrombectomy with Solitaire FR and Penumbra ACE was undertaken. Underlying focal atherosclerotic disease was seen upon Solitaire deployment. The device was left deployed for 10 minutes and then partially reheated into the ACE to reduce the radial force and minimize vessel injury during the pull. The partially constrained device was then retrieved under continuous aspiration at the site of the lesion. Flow was completely restored, and she recovered without any residual deficits.

Conclusion: This novel technique of temporary "stent-retriever angioplasty" followed by retrieval of a partially constrained device in combination with local *in-situ* aspiration may be used for acute revascularization in setting of intracranial atherosclerosis as an alternative to balloon angioplasty and stenting.

Keywords: Acute stroke; Intracranial atherosclerosis; Acute revascularization; Stent retriever; Aspiration; Plaque

Introduction

Multiple recent randomized trials unequivocally demonstrated the overwhelming benefit of endovascular thrombectomy (EVT) for acute ischemic stroke (AIS) due to large vessel anterior circulation occlusion [1-5]. However, the benefit of acute revascularization within the posterior circulation has not been investigated in randomized trials. Furthermore, the currently available devices for acute ischemic stroke due to large vessel occlusion are effective in retrieving clots of proximal embolic source, rather than *in-situ* atherothrombotic [6]. The Wingspan system is the only FDA-cleared device for endovascular treatment of intracranial atherosclerotic stenosis (ICAS). However, intracranial stenting with Wingspan failed to demonstrate benefit over standard medical therapy, and it is currently approved only for patients with recurrent strokes and TIA after proven failure of best medical therapy as per SAMMPRIS trial protocol [7]. Given the established high-risk of intracranial angioplasty and stenting, particularly within the perforator-rich basilar artery (BA), the endovascular revascularization methods for acute ischemic stroke in patients with ICAS remain limited.

A 92-year-old female with multiple vascular risk factors presented with severe neurologic deficits due to acute basilar artery (BA) occlusion. No improvement was noted after IV TPA and mechanical thrombectomy with Solitaire FR and Penumbra ACE was undertaken. Underlying focal atherosclerotic disease was seen upon Solitaire deployment. The device was left deployed for 10 minutes and then partially re-sheathed into the ACE to reduce the radial force and minimize vessel injury during the pull. The partially constrained device was then retrieved under continuous aspiration at the site of the lesion. Flow was completely restored, and she recovered without any residual deficits. This novel technique of temporary "stentriever angioplasty" followed by retrieval of a partially constrained device in combination with local *in-situ* aspiration may be used for acute revascularization in setting of intracranial atherosclerosis as an alternative to balloon angioplasty and stenting.

Case Presentation

A 92-year-old female with history of hypertension, renal insufficiency, coronary artery bypass graft, and coronary stenting (on dual antiplatelet therapy), presented to ED with acute onset of severe dysarthria, gaze deviation, left sided hemiplegia involving the face, arm and leg. Her NIHSS on presentation was 14. Despite her advanced age and comorbidities, the patient was completely independent at baseline (mRS 0).

Initial head CT demonstrated no evidence of haemorrhage or early ischemic changes (Figure 1). She received IV TPA within 2 hours of onset, however her symptoms persisted and endovascular thrombectomy was undertaken. R CCA injection demonstrated robust flow within the bilateral PCA and top of the BA, suggestive of proximal occlusion within the posterior circulation (Figure 2A). L vertebral artery injection confirmed complete occlusion of the mid BA (Figure 2B). Given the location of the occlusion within the mid-distal BA segment with preserved flow at the top, as well as luminal irregularity of the L vertebral artery, an underlying ICAD was suspected. 6FR shuttle sheath was placed in the L subclavian artery (Figure 2C), followed by insertion of coaxial system consisting of ACE reperfusion catheter over a Marksman microcatheter over a Synchro 2 microguidwire. The microsystem was navigated in the left P1 segment, followed by advancement of the ACE into the vertebrobasilar junction (Figures 3A and 3B). The ACE provided additional support and allowed smooth

***Corresponding author:** Raychev R, Department of Neurology, Stroke Centre, University of California, Los Angeles, USA, Tel: 562-546-4657; E-mail: rudoray@gmail.com

Received August 17, 2018; **Accepted** September 03, 2018; **Published** September 07, 2018

Citation: Raychev R (2018) Stent-Retriever Angioplasty with *In-Situ* Aspiration in a Patient with Acute Basilar Artery Occlusion Due to Underlying Atherosclerosis. J Clin Case Rep 8: 1163. doi: 10.4172/2165-7920.10001163

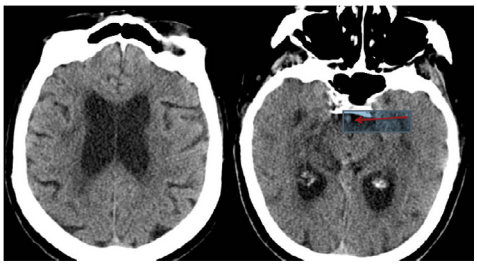

Figure 1: Initial head CT. No visible early ischemic changes and hyperdense BA (arrow).

Figure 2A: RICA injection demonstrating robust flow within posterior circulation *via* the P-comm A and top of the BA (arrow).

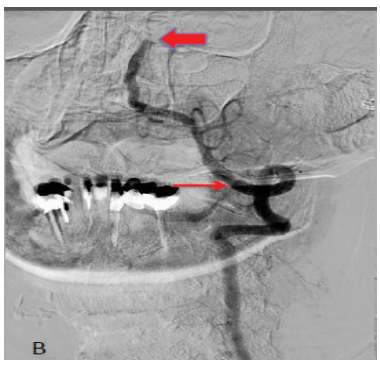

Figure 2B: Left vertebral artery injection demonstrating complete occlusion of the mid-distal BA (large arrow). The luminal caliber of the intracranial portion of the vessel is irregular with a mild focal stenosis at the V3 segment (small arrow), suggestive of ICAD.

Figure 2C: 6 FR Shuttle sheath at the proximal left subclavian artery (arrow).

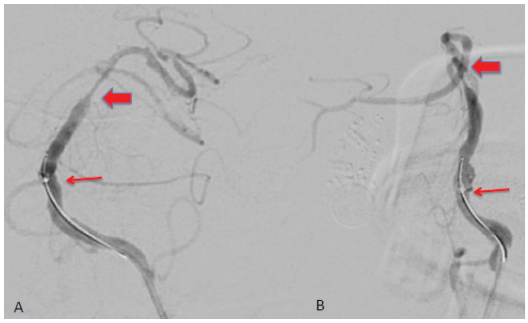

Figure 3 (A and B): AP (**A**) and lateral (**B**) views of L vertebral artery injection via ACE (small arrow) after deployment of Solitaire FR, demonstrating focal stenosis at the mid-distal BA (large arrow).

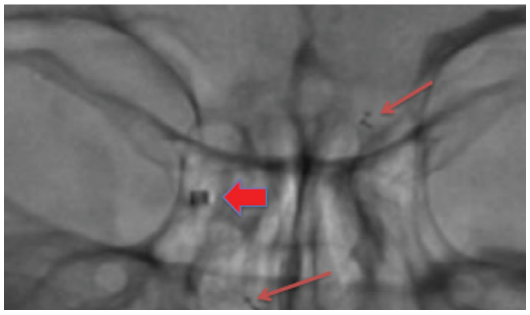

Figure 4A: Un-subtracted AP cranial projection demonstrating the proximal and distal ends of the solitaire (small arrows). The solitaire is partially constrained by the ACE (large arrow).

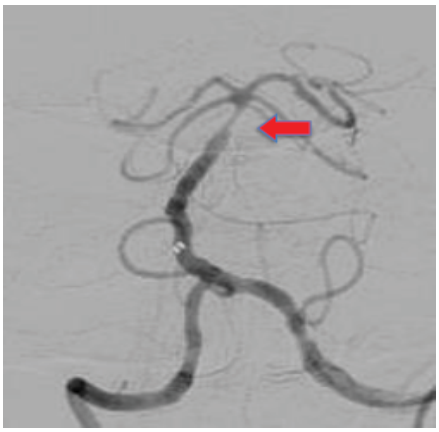

Figure 4B: Post-retrieval angiogram demonstrating full revascularization with residual focal stenosis (large arrow).

navigation of the microsystem across the lesion. Next, a Solitaire 4 × 20 mm was deployed across the occlusion. Deployment angiogram demonstrated severe focal luminal narrowing without any intraluminal filling defects, consistent with atherosclerotic plaque. The Solitaire was left deployed for prolonged time (15 minutes) and serial control angiograms demonstrated persistent antegrade flow within posterior circulation with persistent focal stenosis. Given the potential risk of plaque dissection during retrieval of the fully deployed stentriever, a decision was made to partially re-capture the device by advancing the ACE into the origin of the stenotic segment (Figure 4A). Continuous

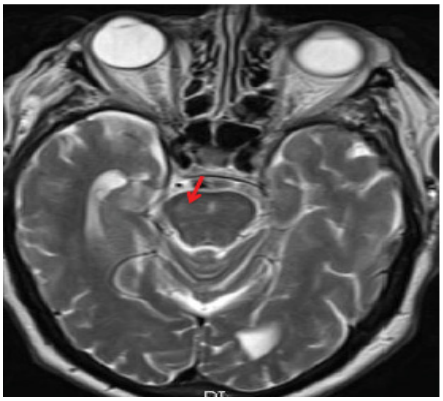

Figure 5: T2 MRI sequence 48 hours after stroke onset demonstrating only small area of faint hyperintensity in the L paramedian pons.

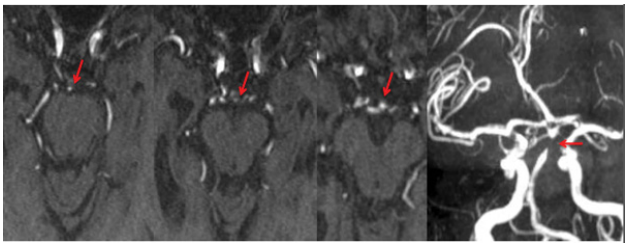

Figure 6: Axial and 3D TOF MRA 30 days after procedure demonstrates persistent patency of the BA with residual severe stenosis (arrows).

aspiration via the ACE was applied at the face of the lesion for approximately 1-2 minutes, followed by retrieval of the partially constrained Solitaire. Post retrieval angiogram demonstrated robust antegrade flow in the posterior circulation with residual moderate-severe focal stenosis at the mid-distal basilar artery (Figure 4B).

Outcome

The patient's deficits resolved almost immediately after the procedure. Her 24 hours NIHSS was only 2. Follow up MRI within 48 h (Figure 5) demonstrated small infarct in the L paramedian pons and TOF MRA within 30 days demonstrated persistent vessel patency and severe stenosis with preserved flow within the posterior circulation and (Figure 6). At 30 days the patient had no residual deficits and was back to her pre-morbid functional state (mRS 0).

Discussion

ICAD is one of the leading causes of stroke worldwide, particularly in Asian countries with limited revascularization options in setting of AIS [8]. Despite the overwhelming success of EVT for treatment of AIS with sterndrives in embolic strokes, recanalization failure can be substantially higher in patients with ICAD, requiring adjuvant angioplasty and/or permanent stenting, which can be associated with high complication and mortality rate [9]. Although recent report demonstrated success of multimodal therapy with angioplasty with and without stenting following sterndrive in vertebrobasilar AIS [10], the risk of this procedure remains high. Angioplasty alone can be associated with significant plaque dissection, perforator occlusion due to "snow-ploughing" effect [11], endothelial denudation and elastic recoil, often leading to re-thrombosis and need for permanent stenting. Post hoc analysis of SAMMPRIS trial demonstrated that most symptomatic strokes in the treatment arm were due to perforator occlusion within the basilar artery [12]. In addition, more than half of the patients in the trial experienced delayed parenchymal haemorrhage in setting of dual antiplatelet therapy [12]. Determining the precise nature of the intracranial occlusion (ICAD *vs.* embolus) can also be difficult without full visualization of the entire lesion. The described technique of temporary stentriever deployment ensures immediate revascularization and better exploration of the occluded segment and underlying pathology. This method also takes advantage of the radial force of the device leading to immediate plaque disruption, without significant dissection and elastic recoil associated with balloon angioplasty. Furthermore, the ability to partially constrain the device minimizes the risk of endothelial denudation and dissection during the retrieval and prevents potential rethrombosis. The local *in-situ* aspiration of the thrombotic debris with ACE further promotes successful and durable revascularization.

Conclusion

Prolonged stent-retriever deployment in AIS due to large vessel occlusion due to underlying atherosclerosis may lead to permanent plaque disruption and preserved vessel patency Advancing the intermediate catheter halfway along the length of the stent-retriever may substantially reduce the radial force of the device prior to the pull and allows local aspiration of the atherosclerotic debris, further increasing the chance of successful revascularization. Retrieval the stent-retriever in a partially constrained fashion may substantially minimize the risk of endothelial damage and re-occlusion.

References

1. Berkhemer OA, Fransen PS, Beumer D (2015) A randomized trial of intraarterial treatment for acute ischemic stroke. New Engl J Med 372: 11-20.
2. Saver JL, Goyal M, Bonafe A (2015) Stent-retriever thrombectomy after intravenous t-PA *vs.* t-PA alone in stroke. New Engl J Med 372: 2285-2295.
3. Campbell BC, Mitchell PJ, Kleinig TJ (2015) Endovascular therapy for ischemic stroke with perfusion-imaging selection. New Engl J Med 372: 1009-1018.
4. Goyal M, Demchuk AM, Hill MD (2015) Endovascular therapy for ischemic stroke. New Engl J Med 372: 2366.
5. Jovin TG, Chamorro A, Cobo E (2015) Thrombectomy within 8 hours after symptom onset in ischemic stroke. New Engl J Med 372: 2296-2306.
6. Matias-Guiu JA, Serna-Candel C, Matias-Guiu J (2014) Stroke etiology determines effectiveness of retrievable stents. J Neurointervent Surg 6: 11.
7. Chimowitz MI, Lynn MJ, Derdeyn CP (2011) Stenting *versus* aggressive medical therapy for intracranial arterial stenosis. New Engl J Med 365: 993-1003.
8. Toyoda K, Koga M, Hayakawa M (2015) Acute reperfusion therapy and stroke care in Asia after successful endovascular trials: Stroke. J Cerebral Circ 46: 1474-1481.
9. Gascou G, Lobotesis K, Machi P (2014) Stent retrievers in acute ischemic stroke: Complications and failures during the perioperative period. AJNR 35: 734-740.
10. Gao F, Lo WT, Sun X (2015) Combined use of mechanical thrombectomy with angioplasty and stenting for acute basilar occlusions with underlying severe intracranial vertebrobasilar stenosis: Preliminary experience from a single Chinese centre. AJNR p: 18.
11. Levy EI, Chaturvedi S (2006) Perforator stroke following intracranial stenting: A sacrifice for the greater good? Neurol 66: 1803-1804.
12. Derdeyn CP, Fiorella D, Lynn MJ (2013) Mechanisms of stroke after intracranial angioplasty and stenting in the SAMMPRIS trial. Neurosurg 72: 777-795.