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CASE REPORT

Delayed Displacement of Enterprise Stent in Treating Symptomatic Intracranial Atherosclerotic Stenosis: A Case Report

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Abstract: A 53-year-old patient was admitted to the stroke unit with sudden onset of weakness on the left side and dysarthria. This patient had been diagnosed with symptomatic intracerebral artery stenosis two months previously and had been administered dual oral antiplatelet agents and an aggressive dose of atorvastatin. The patient underwent percutaneous transluminal angioplasty and stenting two weeks after admission. Interventional treatment was technically successful when a self-expandable Enterprise stent was used. She was followed up for 2 years after discharge, without any cerebrovascular incidents. Repeat CTA revealed delayed displacement of the Enterprise stent and a discussion was had.

Keywords: complication, intracranial atherosclerotic stenosis, percutaneous transluminal angioplasty and stenting

Introduction

Intracranial atherosclerotic stenosis (ICAS) is the main cause of ischemic stroke and contributes to 46.6% of the stroke etiology in China.[1] According to the latest guidelines for secondary prevention of stroke and transient ischemic attack with severe intracranial atherosclerotic stenosis (70–99%), percutaneous transluminal angioplasty and stenting (PTAS) can only be considered for patients who have not benefited from aggressive medical therapy (AMT).

As an off-label stent, the Enterprise stent has been proven to be associated with a high technical success rate and low perioperative complications for the treatment of ICAS. Stroke recurrence due to in-stent restenosis is the most notable adverse event during follow-up of patients treated with an Enterprise stent.[2] However, delayed displacement of Enterprise stents has not been previously reported.

Case Presentation

A 53-year-old patient was admitted to the stroke unit with sudden onset of weakness on the left side and dysarthria. The patient was diagnosed with ischemic stroke after CT and hemorrhage was excluded. She had a history of TIA 2 months prior, and the criminal artery was identified by digital subtraction angiography (DSA) as the M1 segment of the middle cerebral artery (MCA) with 80% severe stenosis (Figure 1). She had been treated with dual oral antiplatelet agents and an aggressive dose of atorvastatin for two months before a new ischemic incident.

This patient was administered Alteplase and the NIHSS score (ranging from 0 to 42, with higher scores indicating worse neurologic deficits) declined from 7 to 3, 7 days after admission. When aggressive medical therapy failed, the patient underwent PTAS 2 weeks after stroke. Predilatation was performed with a 2 mm balloon (Neuro RX, Sinomed, China) and stent deployment was accurately performed with a 4×16 mm self-expandable Enterprise 2 VRD stent (Codman Neurovascular, Raynham, Massachusetts, USA), with residual stenosis of about 20% (Figure 2).

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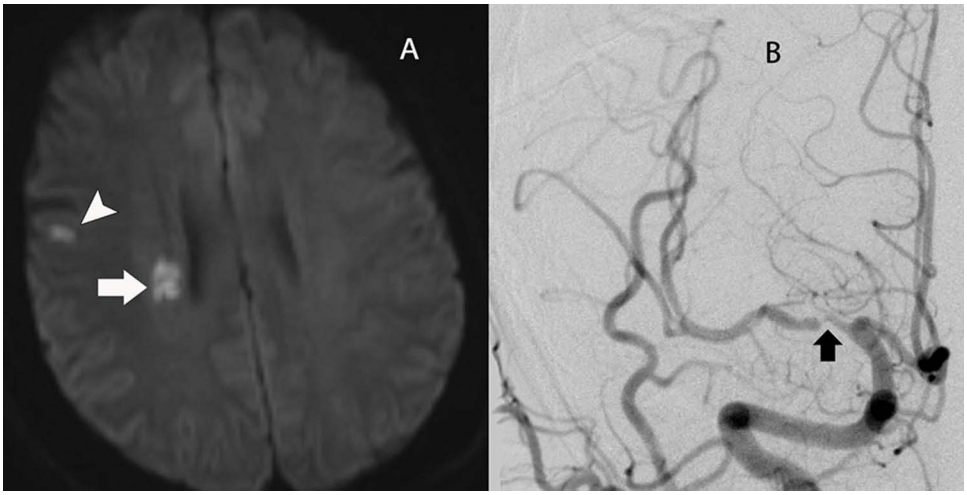

Figure 1 (**A**) Diffusion weighted image revealed acute ischemic infarction foci in right parietal lobe (white arrowhead) and para-lateral ventricle (white arrow). (**B**) DSA determined that the MCA M1 segment was the criminal artery with severe stenosis (black arrow).

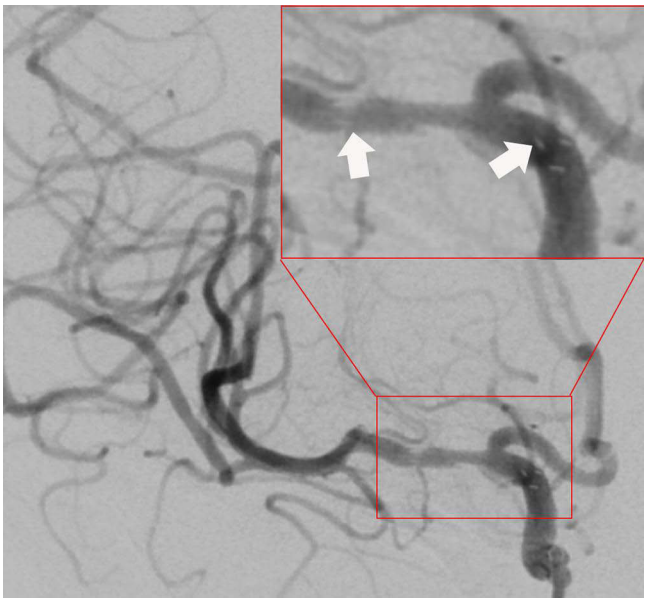

Figure 2 A 4×16 mm Enterprise stent was implanted to accurately cover the stenosis (white arrows show the distal and proximal markers of the stent).

The patient was followed up for 2 years after discharge and experienced no cerebrovascular incidents. The patient did not undergo an MRI scan after PTAS. Repeat CTA revealed stent displacement from the MCA to the distal internal carotid artery (ICA) (Figures 3 and 4).

Discussion

Enterprise stents are closed-cell braiding-type stents initially designed for the coiling of intracerebral aneurysms. In recent years, Enterprise stents have been used more frequently for symptomatic intracerebral artery stenosis owing to their high technical success ratio and relatively low perioperative complication rates.[3] Our report on this case aims to caution against a probable further, rare, complication associated with an Enterprise stent.

Delayed stent displacement has been reported in carotid angioplasty and stenting (CAS) using Carotid Wallstent (Boston Scientific Corporation, Natick, MA, USA), which is also a closed-cell braiding-type stent.[4] Stent shortening

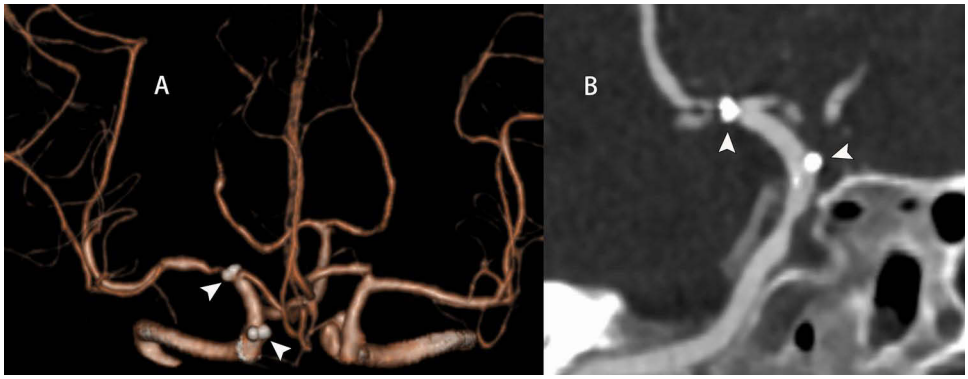

Figure 3 (**A** and **B**) Repeat CTA after 2 years revealed stent displacement (white arrowheads show the distal and proximal markers of the stent).

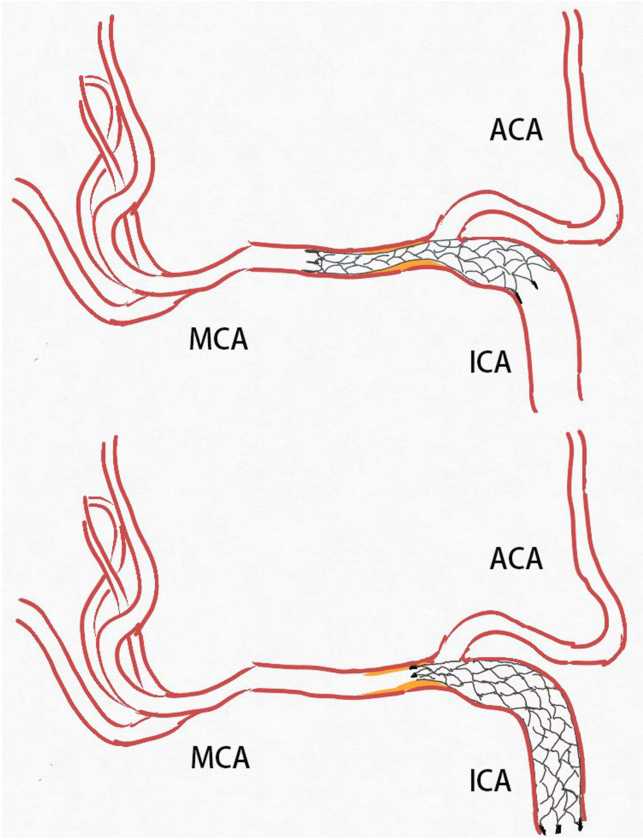

Figure 4 Schematic figure shows the delayed displacement of the stent.
Abbreviations: ICA, internal cervical artery; ACA, anterior cerebral artery; MCA, middle cerebral artery.

induced by a marked mismatch of diameters between the distal and proximal segments of the artery and inappropriate stent size were considered to contribute to the development of delayed stent displacement.

There are several possible reasons for the delayed displacement of the Enterprise stent in this case. First, an Enterprise stent was implanted from the M1 segment of the MCA to the distal ICA, to cover the stenosis. The marked mismatch in diameter between the M1 segment (2.5 mm) and distal ICA (4 mm) could have shortened the Enterprise stent. Second, according to the instructions, a sharp decline in the radial support power of the 4 mm Enterprise 2 VRD stent will occur when the diameter of the target artery is > 4 mm, which may also increase the likelihood of a delayed stent shift. This

patient had no clinical symptoms or signs resulting from the displacement. But either a decline in cerebral perfusion flow as a result of severe residual stenosis or distal infarction caused by thrombus might lead to ischemic stroke.

This case report has limitations. First, the follow-up image technique was different from that provided immediately after stent placement. Second, there was no MRI-DWI scanning image in the follow-up evaluation, which may lead to underestimating a radiographic ischemic event.

According to our experience, when treating intracerebral artery stenosis, Enterprise 2 VRD stents (including other closed-cell and braiding-type intracranial stents) should be avoided in arteries with marked differences in diameter between the distal and proximal segments.

Data Sharing Statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

Consent for Publication

The Department of Neurology and Stroke Center at The Fourth People's Hospital of Zigong City has approved the publication of this study. The patient in this case report provided written consent for his data to be published in this journal.

Disclosure

The author reports no conflicts of interest in this work.

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