

Intracranial Stenting; Our experience in managing symptomatic intracranial atherosclerotic disease

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Introduction: Intracranial atherosclerotic stenosis (ICAS) is one of most common causes of stroke; it has the highest rate of recurrence compared with other aetiologies¹. ICAS is especially more prevalent among the Asians². The high recurrence rates of strokes due to intracranial atherosclerosis could be accounted for various reasons. First, patients with ICAS are prone to encounter hypoperfusion haemodynamics, especially under poor collateral conditions³. Second, plaques in stenotic arteries are usually highly vulnerable (due to large lipid cores, thin fibrous caps and intraplaque haemorrhage)⁴. These plaques are prone to rupture into downstream arteries, leading to embolic stroke in the territory of the responsible artery. Furthermore, these patients are often comorbid with heightened risk factors strongly correlated with stroke recurrence, including hypertension, metabolic disorders, dyslipidaemia⁵.

We hereby present a series of cases of intracranial stenting at our institute with long term follow up.

RESULTS: Over a period of last 8 years, there are 55 patients within the age group of 43 to 72 years who have been treated at our institute for intracranial atherosclerosis. We were able to follow up the patients for periods varying from 1 month for the most recent cases to 5 years. Of the long term follow up patients, 17 were lost in follow up after 3 years.

All the patients presented with symptomatic disease with transient ischemic attacks or acute ischemic stroke of the involved territory. The ischemic events were related to hypoperfusion. In this group, 42 were males and 13 were females. There were 35 patients were smokers, 29 had history of coronary disease and 31 were diabetic. All the patients were loaded with dual antiplatelets: Aspirin 150 mg and Clopidogrel 75 mg for 2-3 days before the procedure except in 3 cases where patient was loaded in Aspirin and Prasugrel. Most of the patients were treated 7 days after the procedure except 2 patients who experienced repeated episodes of TIA/ Stroke even after best medical management – who had to be treated in acute phase.

Majority of the cases involved anterior circulation including intracranial internal carotid artery and middle cerebral artery (M1 segment) (45 patients), with rest of the patients of posterior circulation i.e. basilar artery and V4 segment of vertebral artery (10 patients).

A variety of stents were used in these cases. Wingspan (Stryker), Enterprise (Codman), Solitaire (Medtronic), Xience Prime Balloon expandable stent, Credo (Acandis) stents were used for the procedures. Pre-dilatation of the stenosed segment was done using balloons including Neurospeed balloon, Ryujin balloon, Gateway balloon. Figure 1 and 2 show representative cases from anterior and posterior circulation respectively.

Post procedure management of the unstable patients was done in intensive care unit (ICU). Rest of the patients were observed in ICU for 24 hours. Rehabilitation therapy was initiated in the patients as soon as the clinical condition permitted.

Two patients experienced intracranial hemorrhage in the territory of stenting of which one patient expired in the immediate post stenting period. The other patient recovered. Three patients had deteriorated due to increase in infarct in 24 hours of which 2 patients improved. One patient had TIA in same territory after 7 months. Angiographic follow up showed 2 patients having asymptomatic intimal hyperplasia inside the stent lumen.

DISCUSSION: Role of intracranial stenting vs medical management in intracranial atherosclerosis has been a matter of controversy. Several studies and randomised controlled trials have been conducted to elucidate the role of stenting versus best medical management in intracranial atherosclerosis. The results of Stenting and Aggressive Medical Management for the Prevention of Recurrent stroke in Intracranial Stenosis (SAMMPRIS) trial and VISSIT Intracranial Stent Study for Ischemic Therapy trial have not been encouraging accounting for the higher rate of periprocedural complications which included subarachnoid and intraparenchymal haemorrhage^{6,7}. However, the limitations of these studies included suboptimal protocols for stenting group eg: limited operator experience, with no uniform protocol for anaesthesia and intensive care, and higher usage of heparin and antiplatelets in this group⁸.

The recent better designed trials including the Chinese multicentre registry for intracranial stenting, Wingspan stent system post market surveillance study (WEAVE trial), and China Angioplasty and stenting for symptomatic Intracranial severe stenosis (CASSISS trial) have

demonstrated much better results. These cases were selected more optimally which included adequate operator experience, exclusion of cases with infarct due to perforator occlusion and timing of stenting after the acute event⁹⁻¹¹.

Our results are encouraging with good long term clinical and angiographic follow up. With evolution of stents and balloons for intracranial atherosclerosis and our growing experience better results are expected in future. However, larger numbers of cases are required to formulate guidelines for case selection, management and follow up of these patients. Standardisation of antiplatelet therapy is also of utmost importance long with management of co-morbidities in these patients.

To conclude, stenting for intracranial atherosclerosis can become the standard of care. We are looking at newer horizons for management of this debilitating condition prevailing in this sub-continent.

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FIGURES AND LEGENDS:

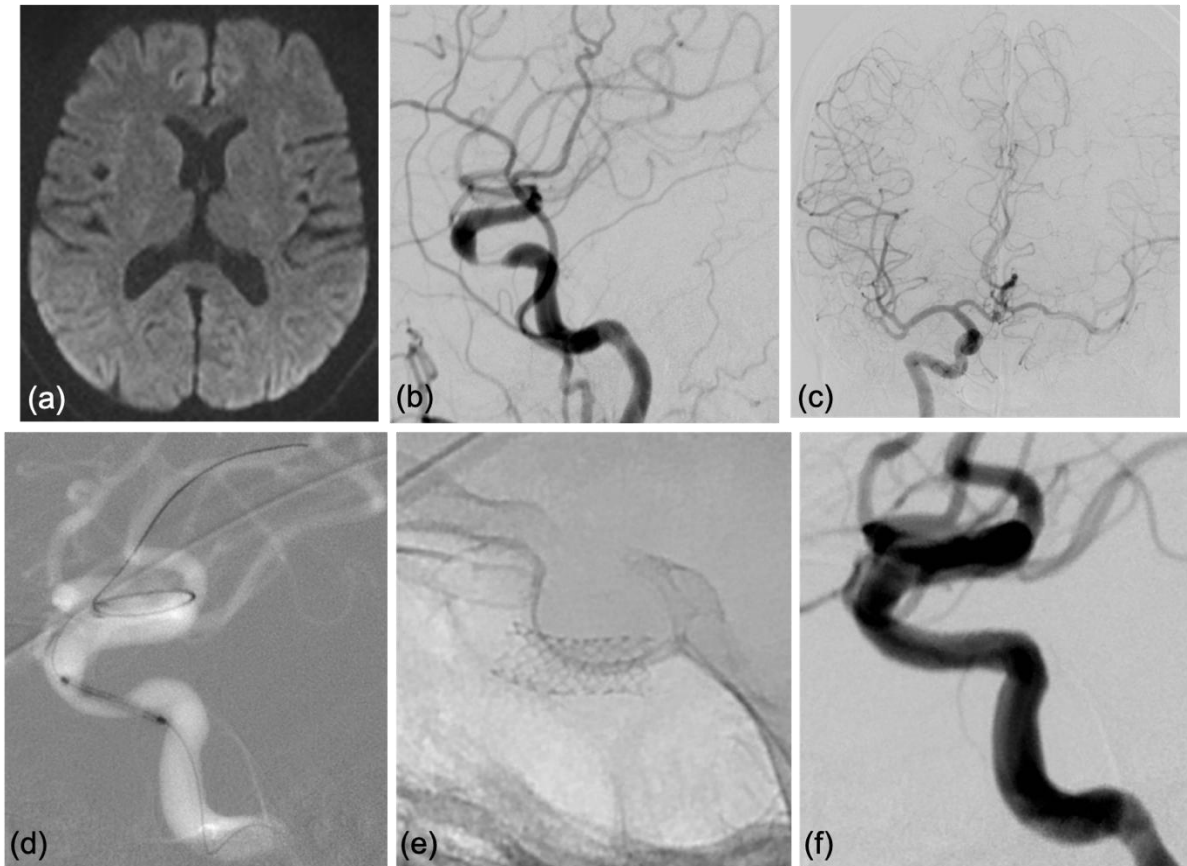


Figure 1: 47- year-old male presented with repeated episodes of TIA (a) Axial DWI shows no evidence of any acute infarct. (b) Left ICA injection lateral view shows critical stenosis in the horizontal cavernous segment. (c) Right ICA injection AP view shows filling of the left MCA across anterior communicating artery. (d) Road map of left ICA injection showing deployment of stent across stenosed segment. (e) Fluoroscopic image shows stent open in-situ. (f) Post procedure check angiogram shows reconstitution of normal caliber of the left ICA.

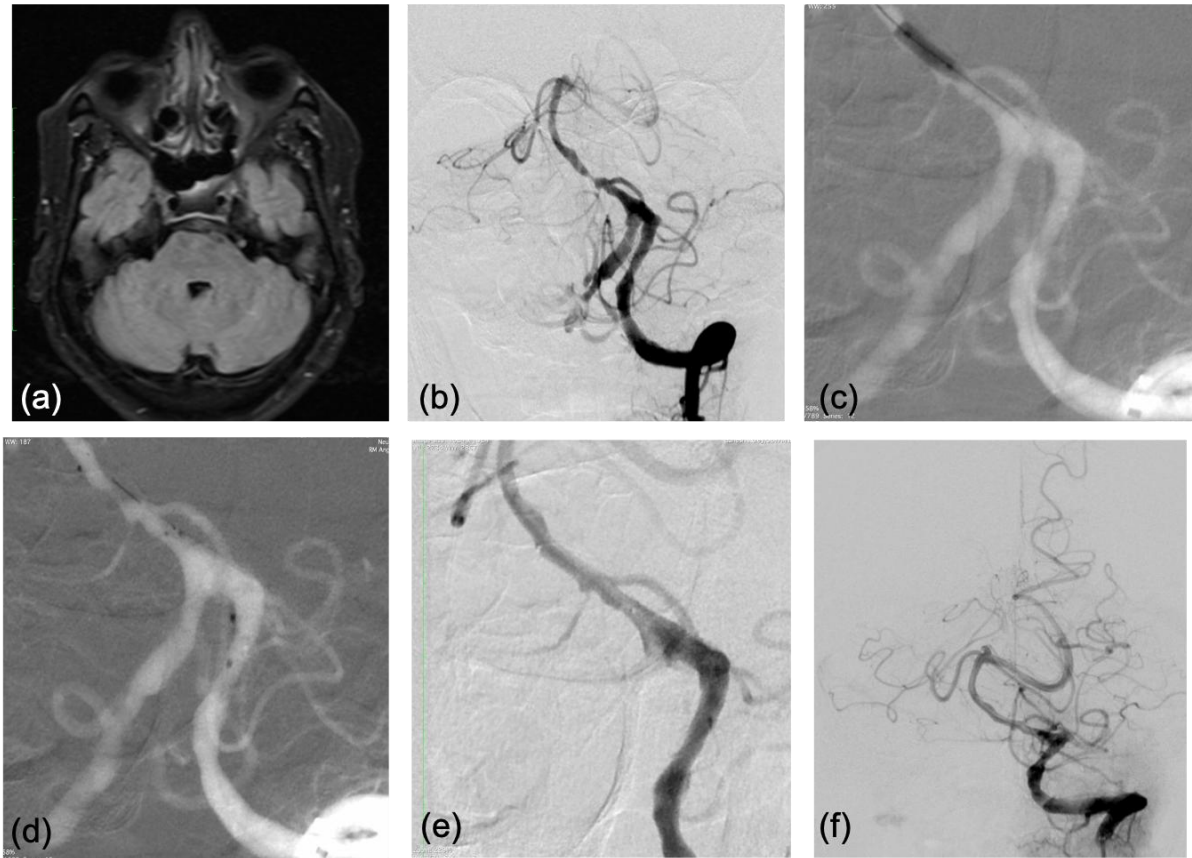


Figure 2: 53-year-old male presented with 3 episodes of TIA (a) FLAIR image axial shows no evidence of infarct. (b) Left vertebral artery injection AP view shows critical stenosis of mid basilar artery with poor flow in the distal intracranial circulation. (c) Road map with pre-stenting dilatation of the stenosed segment. (d) Road map acquisition during stent placement. (e) & (f) AP injection after stenting shows stent in situ with normalization of caliber of the basilar artery and good intracranial flow from the left vertebral artery.