

Cerebral hyperperfusion syndrome after intracranial stenting of the middle cerebral artery

Boby Varkey Maramattom

Abstract

Cerebral hyperperfusion syndrome (CHS) is a rare complication following cerebral revascularization. It presents with ipsilateral headache, seizures, and intracerebral hemorrhage. It has mostly been described following extracranial carotid endarterectomy and stenting and it is very unusual after intracranial stenting. A 71-year-old man with a stuttering stroke was taken up for a cerebral angiogram (digital subtraction angiography), which showed a dissection of the distal left middle cerebral artery. This was recanalized with a solitaire AB stent. After 12 h, the patient developed a right hemiplegia and aphasia. Computed tomography brain showed two discrete intracerebral hematomas in the left hemisphere. This is the first reported case of CHS following intracranial stenting from India.

Keywords: Cerebral hyperperfusion syndrome, cerebral revascularization complication, intracranial stenting and cerebral hyperperfusion

Access this article online

Website: www.ijccm.org

DOI: 10.4103/0972-5229.192064

Quick Response Code:



Introduction

Although cerebral hyperperfusion syndrome (CHS) is well documented after carotid endarterectomy and carotid artery stenting, only a few cases have been described after intracranial stenting.^[1-5] After the Stenting versus Aggressive Medical Therapy for Intracranial Arterial Stenosis and Vitesse Stent Ischemic Therapy trials demonstrated the inferiority of intracranial stenting compared to aggressive medical treatment, this procedure has been largely abandoned.^[6,7] However, intracranial stenting is still used in carefully selected patients with good results.^[8]

Cerebral hyperperfusion is defined as a >100% increase in cerebral blood flow (CBF) compared to the baseline and it is generally associated with postprocedural hypertension. CHS has an estimated incidence of 0.4%–2.7% after CE and usually presents with ipsilateral headache or migrainous phenomena, seizures, or intracerebral hemorrhage (ICH). I would like to report

an unusual case of CHS following middle cerebral artery (MCA) stenting.

Case Report

A 71-year-old man presented to us with fluctuating motor aphasia of 3 h duration. Magnetic resonance imaging of the brain showed multiple acute infarcts in the left MCA territory and he was started on antiplatelets and statins. By the next day morning, he had developed global aphasia and transient right-sided weakness. His blood pressure (BP) was 150/90 mm Hg and he was taken up for a four-vessel digital subtraction angiography which showed a possible dissection with a thrombus in the distal left MCA [Figure 1]. After obtaining consent, a 4 mm × 15 mm solitaire AB neurovascular modeling device (ev3, Irvine, USA) was placed across the lesion into the superior MCA

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

From:

Department of Neurology, Aster Medcity, Kochi, Kerala, India

Correspondence:

Dr. Bobby Varkey Maramattom, Department of Neurology, Aster Medcity, Kochi - 682 023, Kerala, India.
E-mail: bobvarkey@gmail.com

For reprints contact: reprints@medknow.com

How to cite this article: Maramattom BV. Cerebral hyperperfusion syndrome after intracranial stenting of the middle cerebral artery. *Indian J Crit Care Med* 2016;20:620-1.



Figure 1: (a) Top left panel shows an irregularity in the left middle cerebral artery M1 segment, suggestive of dissection. (b) Top right panel shows a patent middle cerebral artery poststenting. (c) Bottom panels; computed tomography scan images showing left temporal and frontal intracerebral hematomas

division with good recanalization. About 5000 U of intravenous heparin was administered during the procedure. Postprocedure, the patient was sedated and ventilated, but had severe hypertension, exceeding 240/140 mm Hg which was difficult to control even with multiple antihypertensives. The next morning, a routine computed tomography (CT) brain (12 h later) showed two discrete intracerebral hematomas (ICH) in the left frontal and temporal areas [Figure 1]. Transcranial Doppler (TCD) showed elevated mean flow velocities of >130 cm/s in the left MCA. Antiplatelets were discontinued and he was started on antiedema measures. Coagulation parameters were normal. On examination, now he had a dense right hemiplegia and global aphasia. His BP was brought down to baseline levels only after 5 days. Two weeks later, a repeat CT showed resolution of the ICH and no fresh infarcts. The patient had a residual Wernicke's aphasia and right hemiplegia at follow-up even 6 months later.

Discussion

Risk factors for CHS include age >75 years, preexisting hypertension, high-grade stenosis with poor collateralization, decreased cerebrovascular reactivity, and increased peak flow velocities.^[9] Reperfusion of ischemic territories can also lead to "reperfusion injury," wherein oxidant production, complement activation, and increased microvascular permeability result in an impaired blood-brain barrier, intracerebral edema, and ICH. CHS is a devastating complication because of the high morbidity and mortality of nearly 60%–80% associated with this condition.^[5]

After cerebral revascularization, the advent of severe headache, seizures, or focal neurological deficits after cerebral revascularization should be presumed to signify CHS unless proved otherwise. TCD studies are helpful in monitoring elevated peak systolic velocities in the intracranial arteries as a marker of impending CHS.^[10] In about 15% of patients, TCD signals may be hampered by poor bone windows. In such patients, near-infrared spectroscopy may be a useful option to monitor CBF.^[11,12] All critical care physicians should be aware of this entity for better monitoring and prevention of this postprocedural complication in the ICU.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Liu AY, Do HM, Albers GW, Lopez JR, Steinberg GK, Marks MP. Hyperperfusion syndrome with hemorrhage after angioplasty for middle cerebral artery stenosis. *AJNR Am J Neuroradiol* 2001;22:1597-601.
- Rezende MT, Spelle L, Mounayer C, Pletin M, Abud DG, Moret J. Hyperperfusion syndrome after stenting for intracranial vertebral stenosis. *Stroke* 2006;37:e12-4.
- Gralla J, Rennie AT, Squire W, Rothwell PM, Kuker W. Fatal hemorrhage after attempted treatment of a basilar artery stenosis. Case report. *J Neurosurg* 2009;111:102-4.
- Zhang R, Zhou G, Xu G, Liu X. Posterior circulation hyperperfusion syndrome after bilateral vertebral artery intracranial stenting. *Ann Vasc Surg* 2009;23:686.e1-5.
- Meyers PM, Phatouros CC, Higashida RT. Hyperperfusion syndrome after intracranial angioplasty and stent placement. *Stroke* 2006;37:2210-1.
- Derdeyn CP, Chimowitz MI, Lynn MJ, Fiorella D, Turan TN, Janis LS, et al. Aggressive medical treatment with or without stenting in high-risk patients with intracranial artery stenosis (SAMMPRIS): The final results of a randomised trial. *Lancet* 2014;383:333-41.
- Zaidat OO, Fitzsimmons BF, Woodward BK, Wang Z, Killer-Oberpfalzer M, Wakhloo A, et al. Effect of a balloon-expandable intracranial stent vs medical therapy on risk of stroke in patients with symptomatic intracranial stenosis: The VISSIT randomized clinical trial. *JAMA* 2015;313:1240-8.
- Cheng L, Jiao L, Gao P, Song G, Chen S, Wang X, et al. Risk factors associated with in-hospital serious adverse events after stenting of severe symptomatic intracranial stenosis. *Clin Neurol Neurosurg* 2016;147:59-63.
- Adhiyaman V, Alexander S. Cerebral hyperperfusion syndrome following carotid endarterectomy. *QJM* 2007;100:239-44.
- Maltezos CK, Papanas N, Papanas TT, Georgiadis GS, Dragoumanis CK, Marakis J, et al. Changes in blood flow of anterior and middle cerebral arteries following carotid endarterectomy: A transcranial Doppler study. *Vase Endovascular Surg* 2007;41:389-96.
- Pennekamp CW, Immink RV, den Ruijter HM, Kappelle LJ, Ferrier CM, Bots ML, et al. Near-infrared spectroscopy can predict the onset of cerebral hyperperfusion syndrome after carotid endarterectomy. *Cerebrovasc Dis* 2012;34:314-21.
- Matsumoto S, Nakahara I, Higashi T, Iwamuro Y, Watanabe Y, Takahashi K, et al. Near-infrared spectroscopy in carotid artery stenting predicts cerebral hyperperfusion syndrome. *Neurology* 2009;72:1512-8.