Bilateral medial medullary infarction: a case report
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Abstract
We present the report of a young male patient who was diagnosed with acute bilateral medial medullary infarction (MMI) on Diffusion-Weighted Magnetic Resonance Imaging (DW-MRI). Corroboration with the Apparent Diffusion Co-efficient (ADC) map enabled timely and accurate diagnosis of the rare stroke syndrome. On follow up 9 months after the diagnosis and subsequent treatment, the patient showed significant improvement on all fronts.

Keywords: Bilateral Medial Medullary Infarction, Diffusion-Weighted Magnetic Resonance Imaging.

Introduction
Bilateral medial medullary infarction (MMI) is a rare stroke syndrome and only a handful of cases have been described. The classical signs of MMI consist of contralateral hemiparesis, lemniscal sensory loss, ipsilateral lingual palsy1 and contralateral pharyngeal palsy.2 Patients with bilateral MMI syndrome often present with tetraparesis, bilateral loss of deep sensation, dysphagia and speech difficulties. Diagnosis of bilateral MMI has become easily possible with the advent of Diffusion-Weighted magnetic resonance imaging (DW-MRI). We report the case of a young patient who was diagnosed with bilateral MMI based on clinical and MRI features.

Case Report
A 35-year-old man presented to the emergency with sudden onset tetraparesis that started 5 hours back. According to the patient, he was at his office when he felt a ‘pins and needles’ sensation all over his body. Within the next 5 minutes, he felt mild weakness in his arms and legs which progressively worsened, and within 10 minutes of the onset of symptoms, he was completely tetraplegic. The patient was taken to a local hospital where an MRI brain was performed and reported normal, after which the patient was shifted to Shifa International Hospital, Islamabad.

The patient underwent an MRI C-spine with contrast which demonstrated a sharply demarcated ‘heart-shaped’ area of hyperintense signal in bilateral antero-medial medullae on axial T2WI (Figure-1) which was imperceptible on T1WI, fluid attenuated inversion recovery (FLAIR) and showed no post contrast enhancement. Diffusion Weighted Images (DWI) demonstrated a corresponding area of restricted diffusion (Figures-2a, 2b). On the basis of these findings, he was diagnosed to have acute bilateral MMI. He then underwent a cerebral computed tomography (CT) angiography and perfusion study which demonstrated no abnormality.

His complete blood count (CBC) showed mildly raised
total leukocytes count (14700), normal haemoglobin, lipid profile and HbA1c (Glycosylated Haemoglobin). His fasting serum homocysteine level was raised 29.73µmols.

**Discussion**

MMI account for fewer than 1% of vertebrobasilar strokes and rarely occur bilaterally.\(^3\) Patients with bilateral MMIs often present with quadriplegia as the initial symptom and carry a poor functional prognosis.\(^4,5\) If not clinically suspected, the condition can be misdiagnosed as Guillain-Barré Syndrome (GBS) in the early stages.\(^6\)

The medulla oblongata has a vast and unique vascular network and its arterial supply arises from the anterior and posterior spinal arteries in addition to the perforating arteries and the long circumferential artery that arise from the basilar or vertebral arteries.\(^7\) Infarcts involving the medulla oblongata are categorised on the basis of its vascular supply into four territories: anterior-medial territory, anterior-lateral territory, lateral territory, and posterior territory.\(^7,8\) The ‘heart-sign’ is believed to appear when the former two regions are involved.\(^6\)

A variable number of causes for MMIs have been previously described including vertebral artery dissection,\(^9\) stenosis/occlusion of vertebral artery and the occlusion of anterior spinal arteries.\(^10\)

Often the lesion has been described in elderly patients\(^11\) with known co-morbidities. In our case, however, a young healthy patient with no known co-morbidities who presented with the classical symptom of quadriplegia was diagnosed to have bilateral MMI on MRI. His laboratory work-up, however, demonstrated mildly elevated serum homocysteine levels. Modest elevations of serum homocysteine levels have previously been associated with acute myocardial infarction, stroke and aortic atherosclerosis.\(^12\)

DW-MRI is the current gold standard in the diagnosis of acute ischaemic stroke\(^13\) and can detect ischaemic changes within minutes of the onset of symptoms.\(^14\) Within minutes of ischaemia, infarcted areas show up as hyperintense signal areas on DWI with corresponding hypointense signal areas on apparent diffusion co-efficient (ADC) map consistent with restricted diffusion.

In our case, DW-MRI with corresponding ADC map enabled the timely and accurate diagnosis of bilateral MMI. The patient’s last follow-up was in April 2012,
about 9 months from his initial symptoms. He was on physiotherapy and rehabilitation and had significantly improved. He could move all four limbs voluntarily and could walk and stand for long periods with little support. His slurred speech was slow to recover, but had also shown significant improvement by then.

**Conclusion**

Bilateral MMI is a rare stroke which can also be seen in young patients with no known co-morbidities. Modest elevation of serum homocysteine levels may play a role in the development of stroke in such patients. MRI with diffusion-weighted imaging is an accurate way of diagnosing bilateral MMI in the acute setting leading to timely diagnosis and treatment and consequently decreasing the possibility of long-term disability.

**References**