CASE REPORT

Bilateral medial medullary syndrome secondary to Takayasu arteritis

Anirudda Deshpande,¹ Vijay Chandran,¹ Aparna Pai,¹ Suryanarayana Rao,¹ Ranjan Shetty²

¹Department of Neurology, Kasturba Medical College, Manipal, Karnataka, India

²Department of Cardiology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India

Correspondence to

Dr Vijay Chandran,
vj_chandran@rediffmail.com

SUMMARY

Medial medullary syndrome (MMS) is a rare type of stroke which results due to occlusion of the anterior spinal artery or vertebral artery or its branches. In this case report we present a patient who developed MMS secondary to Takayasu arteritis (TA). TA is a chronic inflammatory arteritis primarily involving the arch of aorta and its branches, which in our patient resulted in occlusion of subclavian arteries as well as infarction of the medial medulla bilaterally. To our knowledge this is the first time that MMS has been found to occur secondary to TA.

BACKGROUND

The medial medullary syndrome (MMS) occurs due to paramedian infarction of the medulla oblongata secondary to occlusion of the vertebral or anterior spinal artery or their small branches. Medial medullary infarction is a rare occurrence and represents <1% of posterior circulation strokes.¹ In this report we describe a patient with bilateral MMS secondary to TA which is a chronic inflammatory arteritis of large vessels predominantly involving the aorta and its branches.² Through this report we aim to discuss the clinical features and varied presentation of MMS which is an uncommon type of stroke, briefly discuss the diagnosis of TA and its neurological complications.

CASE PRESENTATION

A 55-year-old woman presented with acute onset of vertigo, dysarthria, dysphagia and asymmetric weakness of all four limbs (left side more than the right side) of 1 week duration. She had initially been admitted at a hospital near her home where she had presented outside the window period for thrombolysis; she was treated with aspirin and was later referred to us for further management. She had a history of diabetes mellitus and had been evaluated 2 years earlier at another hospital for chronic diarrhoea and claudication of the upper extremities. The claudication was characterised by fatigue, tingling and pain while performing tasks using the upper limbs. Although the entire medical records could not be reviewed, the available investigation reports are enumerated below. The colonoscopy for chronic diarrhoea had revealed ileal and colonic ulcers; biopsy from the ulcers was reported as non-specific inflammation for which she was treated with empirical antitubercular therapy for 6 months with a provisional diagnosis of intestinal tuberculosis. Digital subtraction angiography (DSA) was

performed at the same admission for claudication of the upper extremity and had shown occlusion of bilateral subclavian arteries on the basis of which she was diagnosed to have TA. She was advised to take steroids for TA, which she took irregularly. In addition, she had been given the option of endovascular therapy which she refused. Her diarrhoea had improved gradually over few months but she had persistent upper limb claudication symptoms. Around 3 months prior to presentation at our centre she had discontinued all medications. On examination her upper limb pulses were not palpable and blood pressure recorded from the popliteal artery was 140/90 mm Hg; she was conscious and alert with nervous system examination revealing left-sided upper motor neuron type of facial palsy, dysarthria, quadriparesis (left side being weaker than the right side), bilateral extensor plantar response. She had no sensory deficit (touch, pain, vibration and joint position sense were tested) and her tongue movements were normal. During the course of hospital stay she developed emotional disturbances characterised by depressive thoughts, suicidal ideas, anxiety and hallucinatory behaviour.

INVESTIGATIONS

An MRI of the brain revealed bilateral medial medullary hyperintensity on diffusion weighted and T2-weighted sequences (figure 1A,B). DSA was repeated at this admission and it showed normal arch of aorta, carotid arteries and renal arteries, occlusion of bilateral subclavian arteries with non-visualisation of the vertebral arteries (figure 2A,B); these findings were identical to the angiogram performed 2 years earlier. Transthoracic echocardiogram was normal except for mild left ventricular diastolic dysfunction; transoesophageal echocardiogram was not performed. Routine ECG and telemetry monitoring did not reveal any arrhythmias. Her blood investigations showed high blood sugars with normal blood counts, renal and liver function were unremarkable, fasting lipid profile was in normal range, erythrocyte sedimentation rate was 22 mm/h; serology for antinuclear antibody, antinuclear cytoplasmic antibody, anticardiolipin antibody, HIV, syphilis and hepatitis B-surface antigen were negative.

TREATMENT

She was treated with tablet aspirin 150 mg daily, tablet prednisolone 60 mg daily, tablet metformin IPR 1700 mg/day, tablet glimepiride 3 mg daily, injection human insulin mixtard 30/70 12-0-6 units subcutaneously, tablet quetiapine 25 mg daily,

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Figure 1 An MRI brain showing hyperintense signal changes in diffusion weighted (A) as well as T2-weighted imaging (B) involving the medial medulla bilaterally suggestive of acute infarct.

tablet calcium carbonate 500 mg with vitamin D₃ 250 IU daily and tablet pantoprazole 40 mg daily. The option of revascularisation by either endovascular or surgical approach was offered to the patient, she refused both.

OUTCOME AND FOLLOW-UP

Her psychiatric symptoms resolved with symptomatic therapy while in hospital. On follow-up 6 months later she had

developed no new complications due to TA; however, she continued to be dependent for all activities of daily living

DISCUSSION

Infarction of the medial medulla which results in MMS has been classically described as a triad of contralateral hemiparesis, contralateral proprioceptive impairment and ipsilateral tongue weakness. However, on reviewing the literature we found that

Figure 2 Digital subtraction angiogram with injection of the brachiocephalic trunk showing occlusion of the right subclavian artery with non-visualisation of the right vertebral artery and normal right carotid artery (A); injection of the left subclavian shows occlusion of the vessel with poor filling of the left vertebral artery (B).

the clinical features are variable. We identified two case series of MMS, one by Kim *et al*³ which had 18 patients and another by Toyoda *et al*⁴ which had 11 patients. The most common presentation of MMS in both these series was hemiparesis. The second most common clinical manifestation was hemisensory symptoms which in a few patients involved the face.³ Surprisingly, tongue weakness was an uncommon finding in both series; in fact, Kim *et al*³ noted that facial weakness was seen more often than tongue weakness. Since the pyramidal tract, medial lemniscus and hypoglossal nucleus are arranged anteroposteriorly in the medial medulla the clinical presentation is dependent upon the anteroposterior extent of the lesion; a lesion involving the anterior medulla sparing the posterior aspect will result in sparing of the hypoglossal nucleus thereby explaining the absence of tongue weakness. Nystagmus was another finding which was seen in a few patients in both series. Our patient had quadriplegia due to bilateral involvement which is rare and had left-sided upper motor neuron type of facial weakness without sensory manifestations or nystagmus. The facial palsy in patients with medullary infarction has been postulated to result from interruption of aberrant corticofacial fibres which descend to the level of the upper-middle medulla and are located ventromedially, decussate and then ascend in the dorsolateral medulla

to supply the facial nucleus.⁵ Schematic diagrams of an axial section of the medulla showing the area of infarction and a coronal section of the brainstem showing the aberrant corticofacial fibres are shown in figure 3. During the course of hospital stay our patient developed behavioural disturbances which have been described in patients with MMS³; in contrast to our patient most of them had a history of depression or had additional infarcts or lesions in the pons. The onset of behavioural disturbances was temporally related to the introduction of steroids and this may have played a role in their causation.

According to the American College of Rheumatology criteria for TA⁶ if three of the following six features are met, that is, age of onset ≤ 40 years, extremity claudication, decreased brachial artery pulse, systolic blood pressure difference of >10 mm Hg between arms, bruit over subclavian artery or aorta, angiographic abnormality consistent with TA; TA can be diagnosed with a sensitivity of 90.5% and a specificity of 97.8%. Our patient had a history of upper limb claudication, absent brachial pulsations and had DSA consistent with TA and hence the diagnosis of TA is almost certain. TA has a varied presentation with a two-stage process being postulated; the first stage or 'pre-pulseless' stage is characterised by non-specific inflammatory features including fever, weight loss, night sweats, arthralgia and myalgia. Continued inflammation of the large vessels leads to fibrosis of the vessel wall leading to areas of stenosis with collaterals and aneurysm formation.² The arteritis preferentially involves large arteries primarily the aortic arch and its direct branches. The key features which help diagnose TA include younger age of onset, claudication of upper extremities, absence of vessel wall calcification, fibrotic and stenotic lesion with resultant ischaemia being more common than rupture. This is in contrast to the other large vessel vasculitis like syphilis (older age of onset, calcification, lack of stenosis), tuberculosis (dissection and rupture being common) and giant cell arteritis (older age of onset).² Neurological involvement in TA is most often secondary to ischaemia due to the steno-occlusive vascular lesions but may also result due to hypertension or thromboembolism.⁷ In addition, rare presentations including seizures⁸ cranial neuropathy due to compression from aneurysmal dilation of intracranial arteries⁹ and hypertrophic pachymeningitis¹⁰ have been reported.

Apart from neurological symptoms our patient also had a history of chronic diarrhoea which was evaluated and found to be as a result of inflammatory ulcers in the ileum and colon. Although the biopsy findings were non-specific, she was treated with empirical antitubercular therapy based on the suspicion of intestinal tuberculosis. This could have been a manifestation of Crohn's disease (CD). Intestinal tuberculosis as well as CD are chronic granulomatous diseases which affect the gastrointestinal tract and they have an overlapping clinical presentation and pathology.¹¹ Differentiating between the two can become extremely difficult especially in countries like ours where there is a high prevalence of tuberculosis and a rising incidence of CD.¹¹ In certain situations a course of antitubercular therapy with long-term follow-up has been advised by some authors as an aid in clarifying the diagnosis.¹¹ The above considerations could have led to the initiation of antitubercular therapy in this patient. Although her diarrhoea did improve, the response to antitubercular therapy cannot be taken as a confirmatory evidence of intestinal tuberculosis as she had also been started on steroids. Moreover, CD has a variable course. We believe the presence of clinical features and investigations compatible with TA and concurrent intestinal pathology may be an indicator of an underlying pathophysiological link between the two. Several

Figure 3 (A) Schematic diagram of an axial section of the medulla with recognised anatomical structures; in addition, a theoretical depiction of the aberrant descending and ascending corticofacial loop fibres (labelled in bold and italics) is shown. The shaded regions represent the possible area of infarction in this patient. (B) Schematic diagram of a coronal section of the entire brainstem showing the descending corticofacial fibres as well as the aberrant corticofacial fibres which descend into the medulla. Involvement of this aberrant loop can lead to facial palsy in a medullary lesion.

case reports and series have highlighted an association between TA and inflammatory bowel disease, specifically CD.¹² Interestingly CD is also associated with hypercoagulability and the concurrent presence of TA with inflammation of the vessel wall has been postulated to play a mutually additive role in the development of stroke.¹³

MMS commonly results due to atherothrombotic involvement of the vertebral or anterior spinal artery. The complete occlusion of the subclavian arteries with normal carotid and coronary arteries would be extremely unusual for atherosclerosis; a cardioembolic aetiology also appears untenable as the subclavian arteries were completely occluded and baseline cardiac evaluation was normal; hence we believe that the most probable explanation for stroke in our patient is secondary to TA involving the vertebral arteries. To our knowledge this is the first time that TA has been identified as the aetiology for medial medullary infarction.

Learning points

- ▶ Medial medullary syndrome (MMS) is a rare type of stroke secondary to occlusion of the vertebral artery, anterior spinal artery or its branches.
- ▶ Clinical presentation is usually with hemiparesis and/or hemisensory symptoms. Facial palsy and hypoglossal palsy are the common cranial neuropathies which are seen in MMS.
- ▶ Takayasu arteritis (TA) is a rare chronic inflammatory arteritis which affects the arch of aorta and its branches resulting in fibrosis and stenosis of affected vessels.
- ▶ TA is most often seen in young adults and presents with upper extremity claudication and is an uncommon cause of stroke.

Contributors All authors played a significant role in the diagnosing and management of the patient. In addition, all authors drafted the article and had approved the final version.

Competing interests None.

Patient consent Obtained.

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