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Case Report

Reversible myelopathy in *Plasmodium vivax* malaria: Report of a case and review of literature

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Malaria is a major health problem, accounting for up to 500 million febrile illnesses and several million deaths annually[1–2]. Malaria is endemic in India and continues to account for almost a 1000 deaths per year since 2002. Almost all of the mortality is accountable to *Plasmodium falciparum* infection[3]. Vivax malaria is generally thought as the "benign tertian malaria" and is unaccompanied by any adverse complications. Recently few complicated cases are being reported and the designation of benign malaria is being challenged[4]. Two recent retrospective analyses from India highlight this picture[4–5]. There are few reports of neurological complications in mono-infected vivax malaria patients[6]. We report a case of *P. vivax* infection in a patient who presented with reversible anterior spinal cord syndrome with MRI evidence of myelitis.

Case report

A 35 yr-old male patient was admitted to the SSKM Hospital, Kolkata, India on 12 August 2011, with high grade intermittent fever for two days and weakness in both the lower limbs for one day. He developed urinary incontinence and loss of pain sensation below mid abdomen. He did not report any weakness of upper limbs, res-

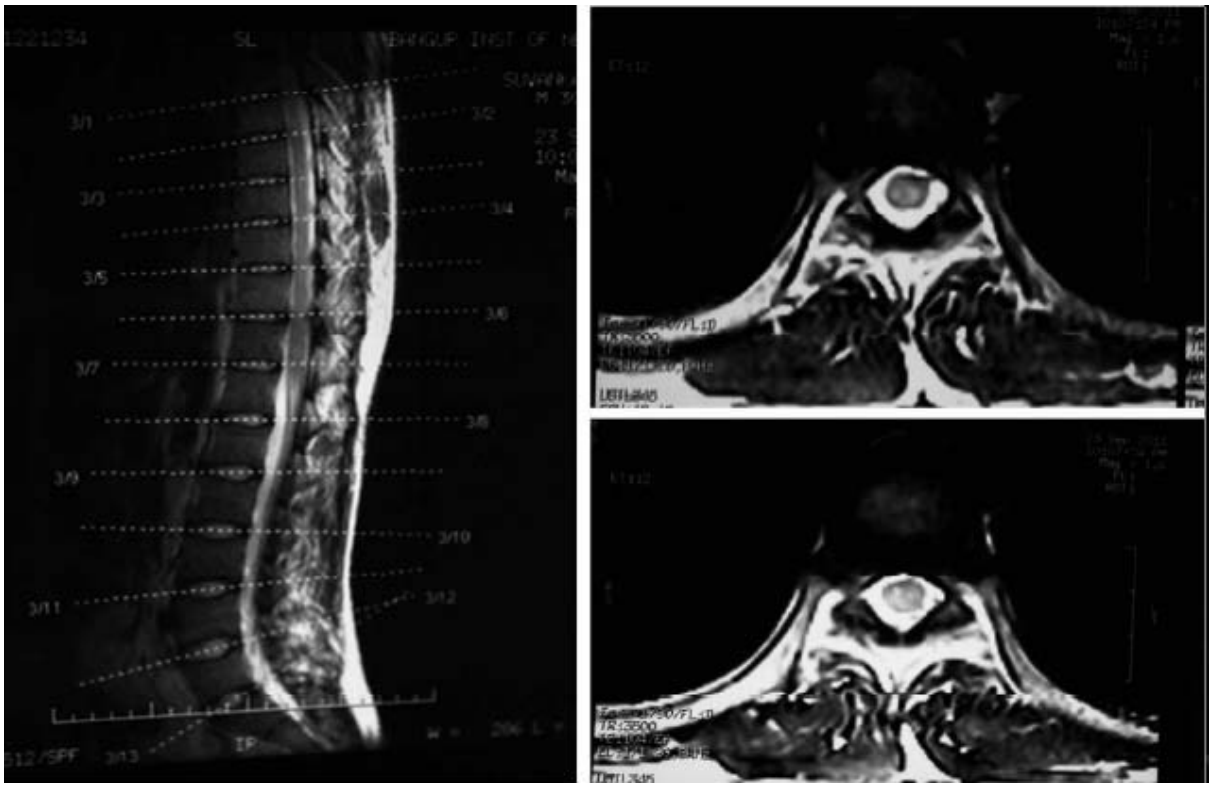

Fig. 1: T2 weighted MRI of dorsal spine showing hyperintensity at the level of T6–T7 spine.

piratory embarrassment or any positive sensory symptoms. There was no history of recent immunization or any history suggestive of recent upper respiratory tract infection or skin infection. The patient was haemodynamically stable and was oriented to time, place and person. There was no evidence of meningeal involvement. Neurological examination revealed: increased muscle tone with difficulties in passive movement and 2/5 grade muscle power in both lower limbs; loss of pain, temperature and pressure (mild degree) sensations below the umbilicus suggestive of lateral and ventral spinothalamic tract involvement. Fine touch, vibration and position senses were normal in all the dermatomes. Lower abdominal and cremasteric reflexes were lost and plantar reflexes were bilaterally extensor. Deep tendon reflexes were brisk in the knees and the ankles. Examination of cranial nerve did not reveal any abnormality. Complete blood counts, serum electrolytes, liver and renal function tests were normal. Cerebrospinal fluid (CSF) had 8 cells/ml (all lymphocytes), protein 64 mg/dl, and glucose 68 mg/dl. CSF was negative for oligoclonal bands and his IgG index was 0.01. Peripheral blood smear examination showed trophozoites of *P. vivax*. Peripheral blood thick and thin smear examination and *Plasmodium* LDH test (done twice) did not show any parasitological evidence for *P. falciparum* infection.

His spinal MRI showed non-enhancing, long TR hyperintensity at the level of T6 – T7 spine suggestive of myelitis (Fig. 1). MRI of brain was normal. Serology for HIV-I and II, Herpes simplex virus and enteroviruses were negative. The patient was started a course of oral chloroquine followed by primaquine (30 mg once daily for 14 days). From the Day 4 of initiation of chloroquine therapy he gradually started to regain his muscle power. By the Day 6, his bladder complaint was diminished. After one month follow-up he has residual lower limb hypertonia and brisk jerks without any motor or sensory deficit.

DISCUSSION

Our patient presented with acute onset of fever with involvement of bilateral pyramidal, and anterolateral spinothalamic tracts without any evidence of posterior column involvement. Demonstration of vivax parasitaemia and antigenemia clinched the diagnosis with further aid from spinal MRI. Normal MRI of brain helped to exclude multiple sclerosis. The patient suffered from vivax malaria, complicated with reversible acute myelitis showing prompt response to antimalarial therapy.

Plasmodium vivax malaria usually shows a benign clinical course unlike *P. falciparum*, which often presents features of organ dysfunction[7]. In falciparum malaria, the *P. falciparum* erythrocyte membrane protein-1 (PfEMP-1) is important in pathogenesis[8]. This adhesion molecule is anchored at RBC membrane and interacts with a variety of host adhesion molecules causing sequestration of parasites in cerebral microcirculation with resultant hypoperfusion. Cytokines and chemokines like TNF, interleukins also play major role in endothelial dysfunction. All these factors trigger widespread activation of inflammatory process and endothelial damage[9]. *Plasmodium vivax* is devoid of PfEMP-1 and the parasite burden is usually less than *P. falciparum*[10]. This could possibly explain lower rate of complication in *P. vivax* malaria.

This scenario is changing rapidly with increasing number of complications being reported in *P. vivax* malaria. In 2009, Sharma and Khanduri[4] from Delhi, India demonstrated that thrombocytopenia, hepatic dysfunction, renal damage, positive direct Coomb's test and acute respiratory distress syndrome (ARDS) were associated with vivax malaria, but none of the 221 vivax malaria patients developed any neurological complications[4]. In another study in India among 50 vivax malaria patients, thrombocytopenia was the commonest complication followed by liver dysfunction (62%), respiratory involvement (28%), renal impairment (22%), shock (16%), severe anaemia (6%), and cerebral malaria in only two cases[5].

Neurological complications of *P. vivax* malaria are extremely rare, though these are increasingly being reported. The most common complication is cerebral malaria with the hallmark of encephalopathy. Some of the reports highlight the presence of meningeal signs in cerebral malaria complicating *P. vivax* infection in the absence of bacterial or other pathogens[11]. Other neurological complications reported in vivax malaria are, periodic paralysis[12], facial diplegia[13], aphasia with hemiparesis[14] and Guillain-Barre syndrome[15].

There are two reports of acute disseminated encephalomyelitis with vivax malaria. The first one reported in a 24 yr-old Japanese male person with neurological disturbances two weeks after complete recovery from *P. vivax* infection. MRI of the brain showed multiple high-intensity spotty lesions in the left cerebral cortex and subcortex[16]. In 2011, another group from Kolkata, India reported a case of diabetic woman with mixed *P. falciparum* and *P. vivax* infections. While recovering from the episode she developed acute onset bladder retention followed by paraparesis. MRI of spine showed T2 hyperintensities suggestive of resolving myelitis. MRI of the brain showed multifocal and confluent areas of demyelination mostly involving the corpus callosum and periventricular region[17].

Our case emphasizes the growing spectrum of neurological manifestations of vivax malaria. To the best of our knowledge, this is probably the first case report which shows reversible isolated spinal myelopathy with a clinical picture of anterior cord syndrome occurring as a complication of vivax malaria.

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