Extensive meningoencephalitis, retrobulbar neuritis, and pulmonary involvement in a patient of neurobrucellosis

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We report an unusual case of neurobrucellosis who presented with headache, vision loss, confusional state, retrobulbar neuritis, and left hemiparesis. Neuroimaging studies showed features of ischemic infarct and white matter abnormalities. Pulmonary involvement in form of lobar pneumonia of left basal lobe was another unusual manifestation. Diagnosis was based on the rising titers of antibrucella antibody. Patient showed remarkable improvement on triple drug therapy in form of doxycycline, rifampicin and streptomycin.

Key words: Brucellosis, dmyelination, optic neuritis, stroke

Introduction

Brucellosis is a common zoonotic disease endemic in many parts of the world. Of all *Brucella* species, *Brucella melitensis* is commonest cause of human disease. Brucellosis, like tuberculosis, is a chronic granulomatous infection caused by intracellular bacteria. The organisms are Gram-negative rods that are transmitted by consumption of uncooked meat or unpasteurized dairy products.[1] Brucellosis is an under diagnosed disease. It is partly because of unawareness about the disease among the treating physicians.[2,3] Neurological involvement is a rare but serious complication of Brucellosis, it can appear during the active phase of disease or later.[4,5] We report an unusual case of neurobrucellosis who, in addition, had pulmonary involvement.

Case Report

A 45-year-old man presented with dry cough, bifrontal throbbing headache, and low-grade fever of 15 days duration. Patient was a former by occupation and was in contact of cattle. Subsequently, he developed vision loss. General examination revealed a toxic febrile state with pulse rate 98 per minute and blood pressure was 120/90 mm Hg. Neurological examination revealed a drowsy and disoriented state. Patient was blind and could not perceive even light rays. Fundus examination was normal. Extra-ocular movements were full. Both pupils were semi-dilated and non-reacting to light. Patient had left hemiparesis. Power in left upper and lower limbs was 3/5. Deep tendon jerks were brisk and both planters were extensor. There were no signs of meningeal irritation. Rest of his systemic examination was unremarkable.

Investigations revealed normal hemogram including ESR, which was 20 mm in first hour. All biochemical parameters were normal. Enzyme-linked immunosorbent assay for human immunodeficiency virus 1 and 2 and VDRL tests were non-reactive. Patient also had lobar pneumonia; the left basal lobe was involved [Figure 1]. Cerebrospinal fluid (CSF) examination showed protien-69 mg/dL, sugar-59 mg/dL, cell $<5/mm^3$ (all lymphocytes). Gram's stain, acid-fast bacillus stain, and India ink preparations of CSF sediments were negative. CSF serological studies for toxoplasmosis and herpes were negative. Blood serum agglutination titers, done twice,

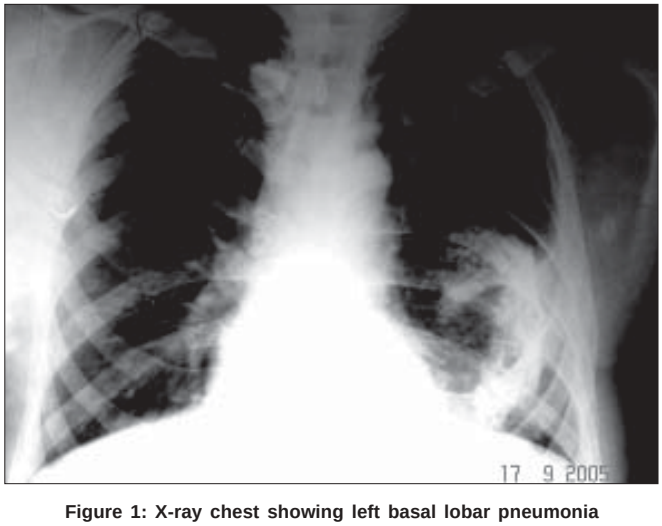

Figure 1: X-ray chest showing left basal lobar pneumonia

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showed rising antibody titers for *Brucella melitensis*. The titer was initially 1:40 and later after 8 days was 1:160. Neuroimaging studies showed normal computed tomography (CT) of head. Brain fluid attenuated inversion recovery MR image showed a cortical infarct in right middle cerebral artery territory, a hyperintense signal in the territory of the anterior cerebral artery along with a lacunar infarct in left periventricular white matter [Figure 2]. There were focal areas of contrast enhancement. MR angiography showed normal course, caliber and branching pattern of major intracranial arteries. Transthoracic echocardiography was normal. Patient was treated with a six weeks treatment regimen comprising of doxycycline 100 mg twice daily, rifampicin 600 mg along with streptomycin injections 1 gm daily. Patient became afebrile and confusional state recovered within 14 days of treatment. During this period the X-ray chest also became normal. At six months follow up, his focal deficit recovered and vision had also improved from no vision to finger counting at 2 feet. Fundus examination at follow-up did not reveal any abnormality. Patient could perform his daily activities with some assistance. Repeat MR imaging after six months showed decreased size of infarct along with mild focal atrophy.

Discussion

Neurobrucellosis has diverse clinical presentation. The nervous system may be affected both in acute and chronic stages of the disease.[1,5] It can affect both central and peripheral nervous system. The central nervous system (CNS) is involved in 5-7% of cases in most studies. Meningitis, encephalitis, meningoencephalitis, meningovascular disease, brain abscesses, and demyelinating syndromes have all been reported.[1,5] Three types of imaging abnormalities in CNS are seen in neurobrucellosis: inflammation, white matter changes and vascular insult. Inflammation may cause granulomatous formation or enhancement of the meninges, perivascular space or lumbar nerve roots.[5,6]

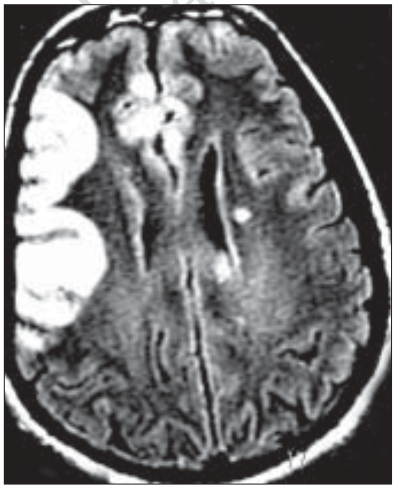

Figure 2: Brain fluid attenuated inversion recovery MR image showing a cortical infarct in right middle cerebral artery territory, a hyperintense signal in the territory of the anterior cerebral artery along with a lacunar infarct in left periventricular white matter

White matter changes in brain manifest as hyperintense lesions on T2-weighted images. The first pattern is a diffuse appearance affecting the arcuate fibers region, the second pattern is periventricular and the third one is a focal demyelinating appearance. The nature and cause of these white matter changes are not known, but they may be due to an autoimmune reaction. The white matter involvement may mimic other inflammatory or infectious disease, such as multiple sclerosis, acute disseminated encephalomyelitis or lyme disease.[6]

The exact mechanism by which the organism reaches nervous system is uncertain but after gaining entry into the body, it invades the reticuloendothelial system from where it reaches the blood stream causing bacteremia and later reaches the meninges. When host immunity declines, the organism proliferate and invade other nervous system structures.[7] The bacteria can have direct effect on central nervous system causing meningitis or meningoencephalitis or it can release an endotoxin, which mainly affects the vascular endothelium causing panarteritis leading to occlusion which result into cerebral ischemia and infarction. Vessel involvement in *Brucella* may also develop secondary to cardiac embolization leading to necrosis of the occluded vessel and forming mycotic aneurysm that may rupture and lead to subarachnoid hemorrhages/cerebral haemorrhage. In fact, endocarditis remains the principal cause of mortality. It usually involves the aortic valve and typically requires immediate surgical valve replacement.[1,6] Another potential mechanism of focal deficit in neurobrucellosis is white matter demyelination the cause of which is uncertain, but it may be due to direct effect of organism on myelin or it may be immune mediated.[8] In our patient clinical examination and transthoracic echocardiography did not reveal any cardiac abnormality. Cerebral angiogram was also normal. Our case has left sided hemiplegia and MR imaging of brain revealed multiple ischemic infarcts that are most likely secondary to vasculitis.

Our patient also had bilateral retrobulbar neuritis. In brucellosis, isolated acute visual impairment due to optic nerve involvement is an unusual presenting feature.[9,10] In an old series Puig Solanes *et al.* reported optic nerve involvement in up to 10.7% of the cases.[11] Possibly our case was similar to a Spanish case report in which visual loss was secondary to demyelinating optic neuritis.[10]

Another interesting feature in our case was unusual pulmonary involvement in form of lobar pneumonia. A multinational review of cases with respiratory complications indicated that approximately 16% of cases had pulmonary involvement.[12]

Neurobrucellosis is a treatable disease with a favorable outcome. Its diagnosis needs a high index of suspicion. A combination neurological manifestation as well as

pulmonary involvement make our case unusual.

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