Eastern Journal of Medicine 16 (2011) 272-273

Case Report

Phrenic nerve palsy as the sole manifestation of Lyme disease

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Abstract. Lyme disease is a tick borne spirochete infection caused by *Borrelia burgdorferi* that may present with multisystem involvement. It can affect both the central and peripheral nervous systems. The classical triad of Lyme neuroborreliosis called Bannwarth's syndrome includes lymphocytic meningitis, cranial neuropathy and radiculoneuritis. An ever increasing number of peripheral neuropathies have been associated with Lyme borreliosis. We present here an asymptomatic 57-year-old man with right sided diaphragmatic paralysis noted on a chest radiograph performed pre-operatively prior to a total knee replacement surgery. Lyme serology came back positive. Our case is unique as phrenic nerve palsy was the sole clinical manifestation of Lyme disease and it emphasis that Lyme disease be considered in the differential diagnosis of otherwise unexplained phrenic nerve palsy specially in patients residing in endemic areas.

Key words: Lyme disease; phrenic nerve palsy

1. Case report

A-57-year-old right handed non diabetic male residing in a heavily wooded Lyme endemic area of north Pennsylvania for the past 25 years was referred for neurological consultation after paralysis of right hemidiaphragm was noted on a routine chest radiograph performed as a part of pre-operative clearance prior to total knee replacement surgery for osteoarthritis of left knee. The paralysis was confirmed on fluoroscopy with a positive sniff test. Pulmonary function tests (PFT) suggested mild restrictive impairment with reduced FVC but the FEV1/FVC ratio was increased. He had no complaints of orthopnea or dyspnea on exertion.

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Received: 10.11.2010
Accepted: 27.12.2010

He had a history of asbestos exposure at work with chronic lung scarring that had remained stable on serial follow up. There was no history to suggest cervical or brachial plexus disorder and there was no PET evidence for malignancy. Examination of the neurological and respiratory systems revealed no abnormality. As he used to reside in an area endemic for Lyme disease, Lyme serology studies were requested in addition to other tests such as syphilis serology, sedimentation rate, C-reactive protein, serum protein electrophoresis and immune fixation. Nerve conduction studies (NCV) were not done as there was no clinical evidence to suggest any other cranial or peripheral neuritis. Polyvalent ELISA test and Western Blot (IgG+) came back positive so oral Doxycycline therapy was initiated. As our patient had never been tested for Lyme before, we were unable to determine when he seroconverted. A chest radiograph done a year prior to presentation did not reveal this diaphragmatic elevation. As his PFTs were relatively normal, he was cleared for knee surgery after his anesthesiologist was made aware of the diaphragmatic paralysis.

2. Discussion

Unilateral diaphragmatic paralysis due to phrenic nerve palsy has a broad differential. Causes include high spinal cord injury, neurodegenerative conditions such as motor neuron disease and carcinomatous infiltration of the brachial plexus (1). Diaphragmatic paralysis due to Lyme disease has been reported in the literature previously. Majority of the patients reported though had other coexistent central and peripheral nervous system manifestations or systemic manifestations of Lyme borreliosis (1, 2). Our case is unique in that phrenic nerve palsy was the sole manifestation of Lyme borreliosis.

Our patient was clinically asymptomatic with no complaints of orthopnea or exercise intolerance and phrenic nerve palsy was detected on chest radiograph done as a part of pre-operative clearance prior to total knee replacement surgery. Even though he had chronic lung scarring due to prior asbestos exposure his PFTs were relatively normal. In the absence of underlying lung disease, unilateral diaphragmatic paralysis is frequently asymptomatic and is a rare cause of respiratory failure (3,4). His physician though was justifiably concerned about anesthesia in the setting of unilateral diaphragmatic paralysis. We cleared him for surgery after informing his anesthesiologist about his diaphragmatic paralysis. After surgery the patient was lost to follow up, so we are unable to document resolution of phrenic nerve palsy after Doxycycline therapy. Though our case does not meet the internationally accepted diagnostic criteria for Lyme disease and the finding of positive Borrelia serology in a person living in a Lyme borreliosis endemic area may simply represent background asymptomatic seropositivity, we ruled out all other causes of phrenic nerve palsy and hence advise that Lyme disease be considered in the differential diagnosis of otherwise unexplained phrenic nerve palsy especially in patients residing in endemic areas.

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