Recurrent laryngeal nerve paralysis due to subclinical Lyme borreliosis

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Abstract
Objective: We report an extremely rare case of recurrent laryngeal nerve paralysis due to subclinical Lyme borreliosis.

Method: Case report presenting a 15-year-old girl referred with hoarseness and soft voice.

Results: Right-sided recurrent laryngeal nerve paralysis was observed using videolaryngoscopy. Imaging was used to exclude intracranial, cervical and intrathoracic embryological lesions, vascular malformations and tumours. Laboratory and electrophysiological investigations were used to exclude inflammatory and paraneoplastic processes, endocrinopathy and metabolic disorders. Serological testing was positive for Lyme disease. Parenteral ceftriaxone therapy was commenced. The patient’s nerve paralysis showed complete recovery on the seventh day of antibiotic treatment; this was confirmed by videolaryngoscopy.

Conclusion: Recurrent laryngeal nerve paralysis is an extremely rare complication of neuroborreliosis associated with Lyme disease. In patients with recurrent laryngeal nerve paralysis in whom the clinical history is uncertain and the usual diagnostic methods give negative results, screening with anti-borrelia immunoglobulin M is suggested.

Key words: Lyme Disease; Neuroborreliosis; Recurrent Nerve Paralysis; Cephalosporins

Introduction
Lyme borreliosis is a multisystem, tick-born, infectious disease caused by the Borrelia burgdorferi bacteria, with a clinical course progressing in stages involving predominantly the skin, joints and nervous system. In Central Europe, the arthropodal vector of Borrelia burgdorferi is the Ixodes ricinus tick. In Hungary (population 10 million), 1500 to 2000 cases of Lyme borreliosis are diagnosed every year.

Early, non-disseminated Lyme disease features an erythema chronicum migrans rash and influenza-like general symptoms, both of which usually resolve within six weeks. Further stages of Lyme disease are characterised by variable combinations of cardiac, neurological, rheumatological, ophthalmological and dermatological symptoms. Cranial nerve paralysis (involving the facial and/or glossopharyngeal nerves) is a frequent manifestation of early disseminated Lyme neuroborreliosis, and is usually combined with carditis and lymphadenosis cutis benigna. Recurrent laryngeal nerve paralysis is a rare and unusual complication of Lyme disease, and has been previously reported only three times. These three adult patients had no other neurological or prodromal symptoms, and the diagnosis of isolated Lyme neuroborreliosis was established from the suspicious clinical history, recurrent laryngeal nerve palsy and positive Lyme disease serology. Diagnosis of Lyme borreliosis is based on clinical suspicion and anti-borrelia serology results; however, a positive antibody result must always be assessed in the light of the clinical picture.

We herein present the case history of a teenage, female patient with recurrent laryngeal nerve palsy due to subclinical Lyme disease, confirmed by anti-borrelia enzyme-linked immunofluorescent assay and Western blot results.

Case report
A 15-year-old girl presented with a six-week history of a hoarse, soft voice. The hoarseness was worse in the evening. No stridor or swallowing difficulties were reported. No other general symptoms were observed (e.g. fever, weakness, weight loss). The patient’s parents had observed some tick bites, with a transitory exanthematous rash, on her gluteal and abdominal regions, three months earlier.

Videolaryngoscopic examination revealed right-sided recurrent laryngeal nerve paralysis. The right vocal fold was fixed in a paramedian position, whereas the left vocal fold was unaffected. The laryngeal mucosa and piriform sinuses appeared normal. Voice tonality and duration (8 seconds) had significantly deteriorated. The right vocal fold showed irregular stroboscopic movements (228 Hz) compared with the left side. Various imaging, laboratory and electrophysiological investigations were performed in order to elucidate the differential diagnosis of idiopathic recurrent laryngeal nerve paralysis (Table I).

Serological examinations were performed to test for adenovirus, cytomegalovirus (CMV), Epstein-Barr virus (EBV), herpes simplex virus types one and two, varicella zoster virus, enteric cytopathogen human orphan virus, respiratory human enteric orphan virus and Toxoplasma...
gondii infection; serum levels of immunoglobulin (Ig) M and G were analysed using antigen-specific enzyme-linked immunosorbent assay. Serum levels of anti-borrelia IgG and IgM were assessed using enzyme-linked fluorescent immunoassay (Vidas™; Biomerieux, Paris, France, Switzerland) was applied for 14 days. The paralytic right nerve paralysis and an uncertain clinical history, serum level was positive: four bands were differentiated on the blot (i.e. p34 (outer surface protein B), p83, p39

Conservative medical treatment with vitamin B1 (50 mg twice daily orally), speech training and electrical stimulation of the recurrent laryngeal nerve (Galvan-Farad therapy using external direct current) were ineffective. An increase in anti-borrelia IgM serum levels was observed, confirming subclinical Lyme disease (i.e. isolated neuroborreliosis). Therefore, intravenous ceftriaxone treatment (2000 mg/day, in a 100 ml sodium chloride infusion over 30 minutes; Rocephin™, Roche, Rüsselsheim, Switzerland) was applied for 14 days. The paralytic right vocal fold showed complete recovery by the seventh day of antibiotic treatment, confirmed by videolaryngoscopy. Voice tonality and duration (22 seconds) had also normalised, and the right vocal fold showed regular stroboscopic movements compared with the left side.

**Discussion**

Neuroborreliosis can appear in unusual cranial nerves without significant prodromal symptoms. Recurrent laryngeal nerve paralysis can only be diagnosed as being due to neuroborreliosis if Lyme disease serology is positive and investigation for the aforementioned differential diagnosis gives normal results. In patients with recurrent laryngeal nerve paralysis and an uncertain clinical history, serum screening for anti-borrelia Ig is suggested. Parenteral application of third generation cephalosporins is effective treatment for Lyme neuroborreliosis.

**References**


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