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Lyme Disease for Dentistry

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With the recent recognition of orofacial pain as a specialty in dentistry, it is incumbent on clinicians to have an awareness of all conditions that may be etiological factors. Orofacial pain is a frequent form of pain perceived in the face and/or oral cavity. It may be caused by diseases or disorders of regional structures, dysfunction of the nervous system, or through referral from distant sources.¹ With the advent of the specialty, the dental practitioner has assumed a leadership role among healthcare providers in treating orofacial pain. There is a significant prevalence of Lyme disease as a contributing factor requiring knowledge of this systemic disease in the differential diagnosis of non-odontogenic pain.

Lyme disease is a chronic, vector-borne infectious, and commonly debilitating disease, symptoms of which often include orofacial pain. Lyme disease patients may present to the general dentist, or specialist in orofacial pain or other dental specialties, with complaints ranging from migratory odontogenic pain, atraumatic arthrogenous temporomandibular pain, burning mouth and throat, neuralgias and neuropathies affecting the orofacial region, as well as unilateral and bilateral facial nerve paralysis.



Patients who present with a multisystem, multi-treatment history, with one or more of the aforementioned symptoms can be suspected of having Lyme disease or one of its coinfections. However, the diagnosis is often missed due to the fact that routine laboratory testing may not be helpful in diagnosing the disease, and the current diagnostic criteria of the Centers for Disease Control may be too restrictive. As a result, patients may be lost to early treatment while alternate diagnoses are pursued.

Case In Point

A 36-year-old female was referred for a facial pain evaluation. She was seeking a second opinion as to the need for an endodontic procedure. She reported severe, transient pain in the upper right quadrant. The "toothache" occurred for weeks at a time and diminished spontaneously, only to recur every two or three months. She had already undergone several endodontic procedures, including the maxillary left second premolar and first molar and the right mandibular first and second molars. This was followed by apicoectomy of the maxillary left second bicuspid, all with no relief. In fact, the pain became more intense. All endodontically-treated teeth

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Illustration 1: The common deer tick ⁶

were eventually extracted. Pain seemed to resolve after each extraction, only to recur in a different quadrant. Her past history included recurring, stabbing pain of the temporomandibular joints, which seemed to occur every few months and became disabling for weeks at a time. Pain would slowly diminish, only to return every few months. TMJ pain was accompanied by bilateral facial pain during chewing, described as jaw muscle fatigue that increased with continued function.

The patient's past medical history included migraine headache [physician-diagnosed], cervical pain with function, occasional numbness of her extremities, diffuse bilateral joint pain, persistent blurred vision, problems with concentration, and fatigue. She stated that she felt "depressed and handicapped." Since the onset of her problem the patient had lost 30 pounds.

The patient stated that she had been healthy until approximately three years ago when she had several episodes of "'big, swollen knees," which were treated by non-steroidal anti-inflammatory with apparent success. The knee problem resolved but left her with what she described as a "mild arthritis." Since that time, she experienced what was diagnosed as episodes of chronic sinusitis and sinus infection. There was occasional shortness of breath.

An astute clinician would recognize the multisystemic presentation is consistent with Lyme disease. In addition, comorbid infections associated with Lyme disease include Bartonella, often associated with severe odontalgia in apparently clinically and radiographically normal teeth.^{2,3,4} Other common coinfections associated with Lyme disease include Babesia and Ehrlichiosis.

Lyme disease is named after the city of Lyme, Connecticut. The story began in 1977 with increasing concern over a number of cases of apparent rheumatoid arthritis reported in children from a small area of the city, and particularly among a group of playmates. Epidemiologic studies determined that symptoms were caused by an infection mimicking autoimmune disease in many cases. The source, a vector borne spirochete transmitted by the bite of a deer tick of the genus lxodes. (Illustration 1) The newly discovered spirochete was named Borrelia burgdorferi after Dr. William Burgdorfer of the United States Public Health Service, who discovered and isolated the bacteria.⁵

The lifecycle of Borrelia burgdorferi involves ticks and large and small mammals. Infected ticks can be found anywhere in nature, especially in areas of forest floor debris, compost, and even in urban lawns and bushes. Mammalian carriers of the spirochete are infected when a tick takes a blood meal from any of these animals, particularly deer and other

Illustration 2: Reported cases of Lyme disease in the United States – 2018



	<1 yr		1-4 yrs		5-14 yrs		15-24 yrs		25-39 yrs		40-64 yrs		≥ 65 yrs			
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	Age Not Stated	TOTAL
Lyme Disease, Total	27	0.7	1,149	7.23	5,089	12.44	2,938	6.86	4,337	6.48	11,738	11.38	8,339	15.98	49	33,666
Confirmed	20	0.52	966	6.08	3,925	9.6	1,893	4.42	2,908	4.34	8,272	8.02	5,540	10.62	34	23,558
Probable	7	0.18	183	1.15	1,164	2.85	1,045	2.44	1,429	2.13	3,466	3.36	2,799	5.37	15	10,108

Data from most recent NNDS Annual Tables.

Table 1: Number of reported cases of Lyme disease and rates per 100,000 population, by age group-United States, 2018

large mammals. Once infected, an animal carrier remains infected with no apparent effect. The lifecycle of the tick spans approximately 24 months and it feeds several times. The spirochete is transmitted to immature ticks that feed on infected hosts and is passed on to other animals and humans. The distribution of Lyme disease is now throughout the United States and also many countries around the world.⁷ (Illustration 2) The distribution in the United States may be associated with the migratory patterns of birds, such as Canadian geese, and the movement of mice, raccoons, and other small mammals. Domestic and farm animals such as cats, dogs, horses, and cows can also carry the infected ticks. Pets often bring the ticks indoors.⁸ Lyme disease is not transmissible between humans.⁹

The saliva of the tick contains anesthetic properties making the tick bite painless and usually undetectable.¹⁰ Symptoms vary with the virulence of the strain of bacteria and resistance of the host and may not occur for days weeks or

Illustration 3: Erythema migrans



even years, making the diagnosis difficult.¹¹ In fact, some infected individuals never manifest symptoms at all. As seen in Table 1, as of 2018, nearly 34,000 cases were reported in the United States.¹²

The classic presentation of Lyme disease is the presence of a rash known as erythema migrans. Erythema migrans (EM) typically appears as a bull's-eye shaped rash at the site of the bite. (Illustration 3)

Confirmation of Lyme disease, according to the Centers for Disease Control and Prevention, requires the following:

Confirmed¹³

- A case of EM with exposure in a high incidence state (as defined above), OR
- A case of EM with laboratory evidence of infection and a known exposure in a low incidence state, OR
- Any case with at least one late manifestation that has laboratory evidence of infection.

Problematic with requirements for confirmation of Lyme disease include the fact that the EM rash may occur in locations not typically visualized by the patient making it difficult to confirm a case in the absence of direct observation of the rash. Another problem is that in many cases laboratory results may need to be repeated as frequently patients seroconvert from positive to negative during the course of the disease. In cases where a singular test is performed with a negative result, physicians may discount a diagnosis of Lyme disease without retesting. Commonly used tests are ELISA and Western blot immunoassays where on occasion, one may be positive and the other negative. Essentially, laboratory testing for Lyme disease may often be equivocal. While laboratory testing may not be consistent with a ---confirmed case, many Lyme disease clinicians rely on the clinical presentation leading to empirical treatment. During the course of treatment it is not uncommon to see sero-conversion.¹⁴ Testing for Bartonella is also required in the presence of unexplained dental pain.

The enigma of diagnosis of Lyme disease for dentists and physicians is its ability mimic a variety of conditions, typically autoimmune diseases. Symptoms related to Lyme disease that bring patients to the dentist include diffuse and nonspecific facial and dental pain, facial nerve palsy, headache, temporomandibular joint, and masticatory muscle pain. A key characteristic of clinical presentation of Lyme disease is its multisystemic manifestation. One explanation for the multisystemic presentation is the morphologic changes of the outer surface protein making up spirochete cell membrane. It presents to the immune system in a way that it often mimics host tissue. When the immune system attempts to mount an attack on what appears to be a foreign invader, because of the similarity to host tissue, musculoskeletal, synovial, neurologic, and cardiac systems are compromised.



The responsibility of the dental clinician is to have the diagnostic acumen to recognize systemic disorders causing pain in the dentition and orofacial region. Recognition of Lyme disease and tick-borne coinfections is difficult but should be suspected in the presence of multisystemic symptoms that fluctuate over time and affect different organ systems, with a typically long history of diagnostic uncertainties. These patients typically have a lengthy history of multiple dental procedures with no benefit, migratory oral pain, and associated features consistent with the systemic disorders. As stated, testing can be difficult, and treatment prolonged once a diagnosis is confirmed. Frequently, coinfections are present, requiring extensive and specific serological testing, which may include PCR as well as immunoassays. The key to assisting these often-longsuffering patients is to begin with the correct diagnosis.

More information may be found at:

Tickborne Diseases of the United States: A Reference Manual for Health Care Providers, Fifth Edition (2018). https://www.cdc.gov/ticks/tickbornediseases/ TickborneDiseases-P.pdf

Provided by Eastern Dentists Insurance Company (EDIC), September 2020. The information contained is only accurate to the day of publication and could change in the future. Dr. Heir has published papers, chapters and abstracts on topics related to the field of temporomandibular disorders and orofacial pain, serves on several editorial boards, and has authored chapters on the assessment of temporomandibular disorders and orofacial pain patient. He has published other chapters on TMJ surgery and neuropathic pain, and was the primary author of the nationally accepted Post Graduate Core Curriculum in Orofacial Pain. Dr. Heir currently serves on several commissions of the American Dental Association and is the section Editor for Pain Updates of The Journal of the American Dental Association. He is the current president of the American Board of Orofacial Pain.

In addition to temporomandibular disorders and orofacial pain, Dr. Heir's other interests have been recognized, and he is considered an authority on orofacial pain in Lyme Disease. In 1996, the Governor of New Jersey appointed him to the Governor's Lyme Disease Advisory Council for the State of New Jersey. Dr. Heir served as the Council's Vice Chair and remained on the Council during the terms of three Governors.

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