

¹Eric Kreps, MD, ¹Vedant Gupta, MD

¹Division of Cardiovascular Disease, University of Kentucky

Disclosures: No disclosures

Introduction

Lyme disease is a tick-borne illness that seldom affects the state of Kentucky, however per the CDC isolated cases in central Kentucky have been reported¹. Although rare, Lyme carditis has been implicated in 4%-10% of untreated *Borrelia burgdorferi* infections². We report a case of third-degree atrioventricular block (AVB) as the sole manifestation of early disseminated Lyme disease in the state of Kentucky.

Case Presentation

- 25 y/o M w/o PMHx p/w presyncope.
- 1 mo. PTA, went camping in Sadieville, KY.
- 2 wk. PTA, presents to urgent care with fever 102°F, malaise, rash on back/right axilla and popliteal region. Tx with steroid taper for presumed mononucleosis after monospot and COVID test negative.
- Night before presentation, notes acute onset lightheadedness while in seated position with weakness. Symptoms persisted until AM and presented to PCP.
- In office: Bradycardic; EKG showed 3rd degree AVB with a junctional escape rhythm at 46 BPM. (Image 1)
- Admitted to CCU. Remained hemodynamically stable while in 3rd degree AVB.
- ROS on admit:** (-) F/C, night sweats, chest pain
- (+) fatigue, lightheadedness
- SH:** Denies EtOH. + MJ and e-cigarette use

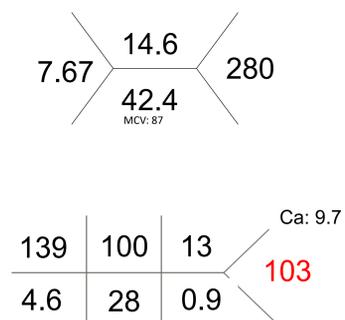
Physical Exam

- Gen: CM in NAD, resting in bed
- Vitals: T: 99.3°F, HR: 43, BP: 117/60, RR: 12, SpO₂ 99% on RA
- CV: bradycardic, regular, nL S₁, S₂, no murmurs
- Pulm: CTAB, no wheeze, nL WOB on RA.
- GI: no TTP, NABS
- EXT: WWP, no edema, no rashes, no palmar rashes

References

- <https://chfs.ky.gov/agencies/dph/dchp/itb/Pages/tick-borne.aspx>
- Lyme carditis. Fish AE, Pride YB, Pinto DS. Infect Dis Clin North Am. 2008;22(2):275.
- Lyme disease. Steere AC. N Engl J Med. 1989;321(9):586.
- The early clinical manifestations of Lyme disease. Steere AC, Bartenhagen NH, et al. Ann Intern Med. 1983;99(1):76.
- Lyme carditis: an important cause of reversible heart block. McAllister HF et al. Ann Intern Med. 1989;110(5):339.
- Range of atrioventricular conduction disturbances in Lyme borreliosis: a report of four cases and review of other published reports. van der Linde MR, Crijns HJ, et al. Br Heart J. 1990;63(3):162.

Figure 1:



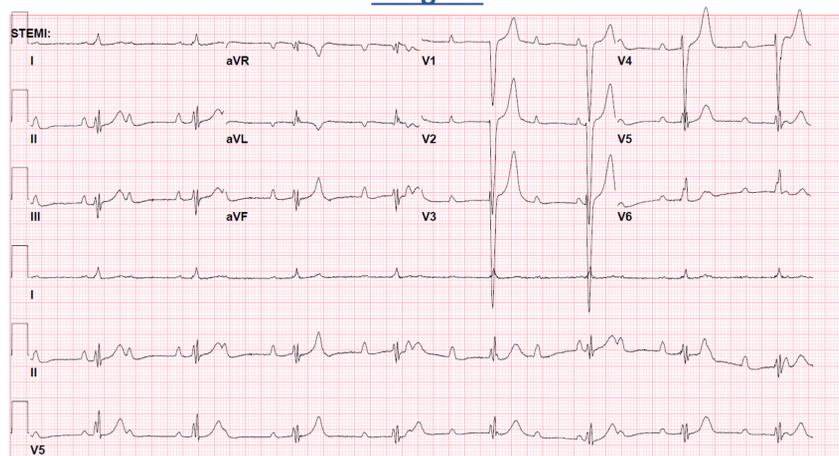
HIV, HCV: Negative
Trop-T, HS: <6 ng/L
Urine Tox.: + THC
UA: Sg 1.013, pH 7, Tr Ketones
A1c: 6.5

Alk Phos: 30
AST: 19
ALT: 30
T. Bili: 0.8
Prot: 7.8
Alb: 3.7

CRP: 29.7
ESR: 29
TSH: 1.76
NT-proBNP: 597 pg/mL
COVID-19 PCR: neg
Lactic Acid: 1.2

CMR:
1. Mildly dilated left ventricle with normal global systolic function (EF 58%). LVEDVI: 109 ml/m² (57 - 105).
2. Normal sized right ventricle with normal global systolic function (EF 62%).
3. No CMR evidence for LV scar (fibrosis or infarction). Normal ECG.
4. No significant valvular abnormalities.
CXR: nL

Image 1:



Presentation EKG: Sinus tachycardia with complete heart block and junctional escape with IVCD

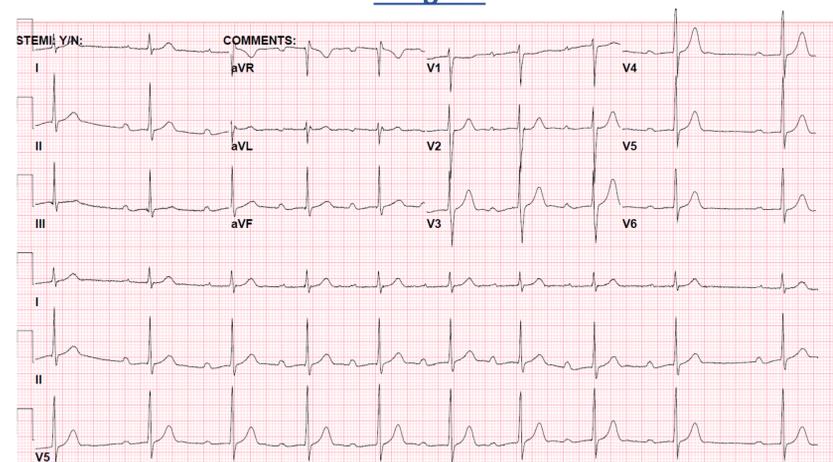
Hospital Course

- Upon further history taking; pt. removed ticks from neck and left leg after camping. With tick exposure, subacute rashes and prior fevers, was empirically started on CTX for presumed tick-borne illnesses.
- Hospital day 2: AVB improved to Mobitz I, underwent a CMR which showed a mildly dilated LV with normal ejection fraction but otherwise no myopericarditis.
- Hospital day 3: EKG showed 1st degree AVB with PR > 300ms. (Image 2)
- Hospital day 4: PR continued to shorten, d/c with PO doxycycline.
- Repeat EKG in office one month later showed resolution of conduction abnormalities. (Image 3)

Tick Panel Testing

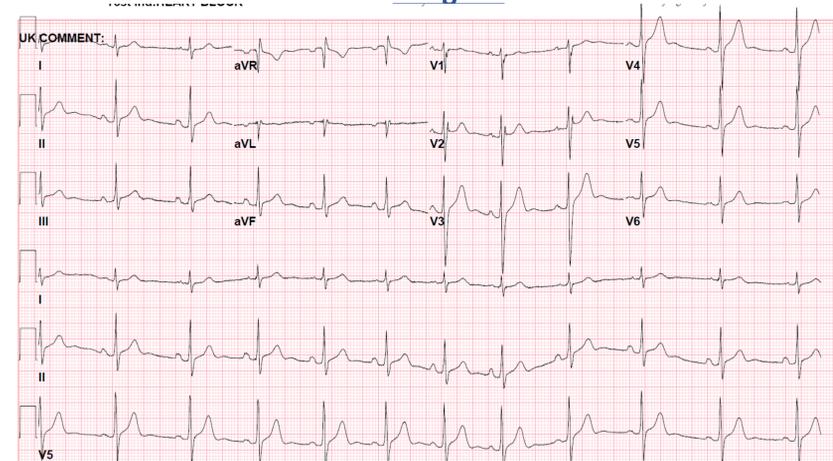
- Early disseminated Lyme Dx:** presence of epidemiologic and clinical features of Lyme disease in conjunction with positive Lyme serologic testing. Two-tiered testing with ELISA followed by Western blot.
- Lyme AB screen: 4.05 LIV
 - 0.99 LIV or Less: Negative:
 - 1.00 - 1.20 LIV..... Equivocal:
 - 1.21 LIV or Greater: ... Positive:
- B. burgdorferi AB, IgM Immunoblot: + Band(s) present: 41, 39, 23 kDa.
 - + test: any 2 or more bands present: 23, 39, or 41 kDa.
- B. burgdorferi AB, IgG Immunoblot: + Band(s) present: 66, 45, 41, 39, 23 kDa.
 - + test: any 5 or more bands present: 18, 23, 28, 30, 39, 41, 45, 58, 66, or 93 kDa.
- Ehrlichia and Anaplasma Species by PCR: Negative

Image 2:



Hospital day 3: Sinus bradycardia with sinus arrhythmia and first degree AVB.

Image 3:



One-month follow-up EKG: NSR with sinus arrhythmia.

Discussion

- Lyme disease occurs at different stages: early localized, early disseminated and late Lyme³.
- Early Localized:** occurs 7-14 days after infected Ixodes tick bite. Characteristic erythema migrans (EM) rash. Signs and symptoms of a viral syndrome.
- Early Disseminated:** weeks to months after exposure. Rare due to early treatment. Acute cutaneous, neurologic, or carditis symptoms. May have multiple EM lesions in areas other than the tick bite sites as a sign of spirochetemia⁴.
- Late Lyme:** months to years after infection. Arthritis in one or multiple joints. May have neurologic sequelae; polyneuropathy or encephalomyelitis.
- Lyme carditis:** occurs in early disseminated stage. AVB and/or typically mild myopericarditis. Pathophysiology unclear.
 - Occurs in 1% of patients with Lyme, more common if untreated early stage².
 - EM rash present in history or exam in 75% of pts w/ carditis. Joint involvement in 65%. Meningo-encephalitis (+/- CN VII palsy) 35%².
 - AV block in up to 87% of carditis cases⁵.
 - Occurs rapidly with varying levels of AVB.
 - PR prolongation > 300ms associated with progression to 3rd degree AVB.
 - Abnormalities may occur at different areas of conduction system, including bundle branches⁶.
 - With treatment, AVB lessens to 1st degree within one week, total resolution at 6 weeks⁵.
 - Very rarely persists and PPMs are not warranted⁵.
 - Tx:** CTX 2gm daily until AVB improves. Once PR < 300ms, transition to PO Doxycycline 100mg BID for 14-21 days.

Conclusions

- Lyme carditis-associated AVB quickly resolves with appropriate treatment and a permanent pacemaker is rarely warranted⁵. Most notably, careful history taking was crucial in identifying the cause of 3rd degree AVB and quickly starting on empiric therapy, as he remained without other signs of early disseminated Lyme at the time of presentation.