

Pediatric Lyme Arthritis and the Overuse of MRI: A Retrospective Review of Imaging Appropriateness

Deepti Verma, BS, Matthew Egner, BS, Quincy Erturk, BA, Sandy Zeng, BS, Mariano Garay, MD, Elizabeth Garrett, MD, Patrick Gavigan, MD, Jessica Ericson, MD
Penn State College of Medicine, Hershey, PA

Contact Information:
Deepti Verma, BS
Penn State College of Medicine
dverma1@pennstatehealth.psu.edu
9172854933

Objectives

- To assess the use of MRI in treating pediatric musculoskeletal infections, especially Lyme disease
- To determine whether ordering imaging trends point to overuse in situations that could be treated clinically without advanced imaging.

Introduction

- The overlap in clinical presentations of Lyme arthritis, septic arthritis, and osteomyelitis often results in the overutilization of advanced imaging modalities, such as magnetic resonance imaging (MRI) and computed tomography (CT) in Lyme disease, which is otherwise solely a clinical diagnosis that does not require imaging.
- Such interventions not only increase healthcare costs but also subject children to unnecessary risks and prolonged hospitalizations.
- The primary objective of this study is to delineate the distinguishing features in terms of diagnostics and workup of Lyme arthritis compared to septic arthritis and osteomyelitis in pediatric patients

Methods

- We conducted a mixed retrospective and prospective chart review of pediatric patients diagnosed with osteomyelitis, septic arthritis, or Lyme arthritis at Penn State Hershey Medical Center between January 1, 2014, and March 1, 2024.
- Inclusion criteria comprised patients with bone or synovial fluid culture obtained, relevant ICD-9/10 codes, or evaluation for suspected MSK infection by Pediatric Infectious Diseases. Variables that were extracted included imaging (e.g., X-ray, CT, MRI, US), culture results, therapies, and outcomes.
- Descriptive statistics and comparative analysis were used to evaluate the usage of MRI by type of infection and relationship to surgical intervention.

Results

- Among 132 patients, 43 (33%) were diagnosed with Lyme arthritis, 41 (56%) with osteomyelitis +/- septic arthritis, and 15 (11%) with septic arthritis.
- Overall, 124 (94%) underwent imaging; 65 (52%) received an MRI. Lyme arthritis is clinically distinct from other groups and is typically treated nonoperatively. However, MRI was still commonly used across the cohort. Among Lyme arthritis patients, 11/43 (26%) had an MRI performed, yet only 3/11 (27%) of these patients underwent surgery compared to 78% and 67% of osteomyelitis and septic arthritis cases, respectively.
- Thus, 73% of MRIs in the Lyme arthritis subgroup did not change the course of medical treatment and were retrospectively deemed potentially unnecessary.

Table 1. Distribution of Osteoarticular Infections

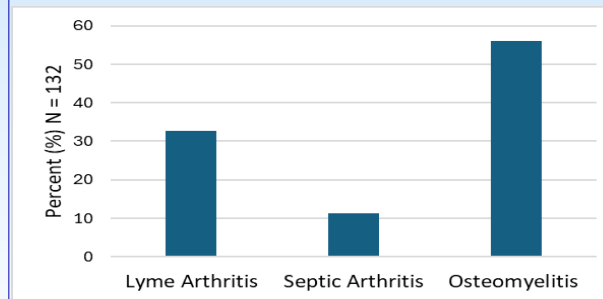
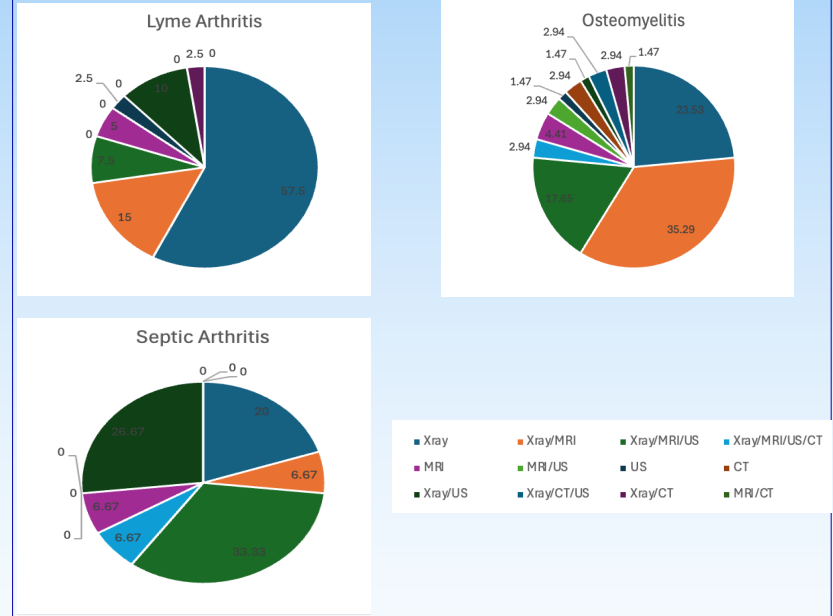


Table 2. MRI Utilization in Lyme Arthritis, Osteomyelitis, and Septic Arthritis

MRI Obtained	Total	Lyme Arthritis	Septic Arthritis	Osteomyelitis +/- Septic Arthritis	P*
Yes	65 (52%)	11 (27%)	8 (53%)	46 (68%)	<0.001
No	59 (48%)	30 (73%)	7 (47%)	22 (32%)	
Total	124	41	15	68	

Figure 1, 2, 3: Imaging Modalities Utilized in Lyme Arthritis, Osteomyelitis, and Septic Arthritis



Conclusions

- Despite low rates of surgical intervention and distinct clinical features, MRI was widely employed in pediatric Lyme arthritis despite characteristic clinical features and low rates of subsequent surgical treatment.
- These results suggest overutilization of MRI in Lyme arthritis workup, entailing detriments, such as needless sedation, expense, and imaging load. Efforts to improve diagnostic stewardship initiatives can decrease the use of low-yield MRI in favor of clinical-laboratory risk stratification.