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Lars F. Westblade
Emory University

Farah Shams
North Shore Infectious Diseases Consultants, PC

Scott Duong
Hofstra University

Oosman Tariq
North Shore Infectious Diseases Consultants, PC

Alan Bulbin
North Shore Infectious Diseases Consultants, PC

See next page for additional authors

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Septic Arthritis of a Native Knee Joint Due to Corynebacterium striatum

Lars F. Westblade, Farah Shams, Scott Duong, Oosman Tariq, Alan Bulbin, Dava Klirsfeld, Wei Zhen, Smita Sakaria, Bradley A. Ford, Carey-Ann D. Burnham and Christine C. Ginocchio


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We report a case of septic arthritis of a native knee joint due to *Corynebacterium striatum*, a rare and unusual cause of septic arthritis of native joints. The isolate was identified by a combination of phenotypic, mass spectrometric, and nucleic acid-based assays and exhibited high-level resistance to most antimicrobials.

CASE REPORT

An 84-year-old male with a past medical history of poorly controlled diabetes, coronary artery disease, hypertension, deep vein thrombosis, and anticoagulant use presented with right knee pain and fever. A week prior to admission, he had fallen while trying to climb onto a bus.

Four days prior to admission, a right knee arthrocentesis at his primary care doctor’s office, by report, revealed grossly bloody fluid. This was followed by worsening right knee pain upon weight bearing and increasing right knee swelling followed by malaise and subjective fever with chills.

On presentation to the emergency department (ED), he was febrile to 38.5°C. The patient’s right lower extremity was edematous, and examination of the right knee revealed minimal erythema, tenderness to palpation, effusion, and a decreased range of motion secondary to pain. In the ED, his knee was aspirated under sterile conditions and yielded 35 ml of straw-colored cloudy fluid. Analysis of the fluid revealed a few calcium pyrophosphate crystals and a white blood cell count elevated to 52,500/μl with 80% neutrophils. A Gram stain of the specimen was negative for organisms. He was empirically started on vancomycin and cefepime and a white blood cell count elevated to 52,500/μl with 80% neutrophils. A Gram stain of the specimen was negative for organisms.

We report a case of septic arthritis of a native knee joint due to *Corynebacterium striatum*, a rare and unusual cause of septic arthritis of native joints. The isolate was identified by a combination of phenotypic, mass spectrometric, and nucleic acid-based assays and exhibited high-level resistance to most antimicrobials.
requirements (6). The rpoB gene sequence data were queried against GenBank (http://www.ncbi.nlm.nih.gov) and the European Nucleotide Archive (ENA; http://www.ebi.ac.uk/ena/). The best match returned from GenBank was C. striatum type strain CIP 81.15, with 97.3% similarity (434 bp/446 bp), while the next-best match was C. simulans type strain CIP 106488, with 94.0% similarity (419 bp/446 bp). The ENA returned a best match of C. striatum type strain CIP 106488, with 94.0% similarity (419 bp/446 bp). Taken together, the 16S rRNA gene and rpoB gene sequence data strongly support the phenotypic and mass spectrometric identification of C. striatum.

Antimicrobial susceptibility testing results for all four isolates were determined using an Etest (bioMérieux) method that was verified against the published CLSI test conditions (7). A 0.5 McFarland standard was prepared and cultured on Mueller-Hinton agar supplemented with 5% (vol/vol) sheep blood (Remel) for 48 h. Using breakpoints established by the CLSI (7), Etest values revealed that all four isolates were resistant to clindamycin, ciprofloxacin, tetracycline, and cephalaxine, with MIC values > 256 μg/ml, while all four isolates were susceptible to vancomycin (MIC of 1 μg/ml).

Corynebacterium species are opportunistic human pathogens, and due to their association with skin and mucous membranes in asymptomatic individuals, these organisms are often considered contaminants when isolated in culture (8). However, when isolated repeatedly in pure growth from a normally sterile body site, e.g., synovial fluid or blood, in a clinical context consistent with infection, they should be considered clinically relevant and identification to the species level and antimicrobial susceptibility testing is recommended (8).

C. striatum has been associated with invasive infections, including infective endocarditis, pulmonary infections, and prothetic joint infections (9–12). However, to the best of our knowledge, there are only four cases in the published literature describing septic arthritis of native joints due to C. striatum (PubMed [http://www.ncbi.nlm.nih.gov/pubmed]; terms “corynebacterium,” “striatum,” “septic,” and “arthrosis”) (11, 13–15), including two cases of septic arthritis of the shoulder (11, 15), one case of a septic elbow (13), and one case of septic arthritis of the knee (14). Thus, as far as we are aware, the case presented here is only the second case of septic arthritis of a native knee joint due to C. striatum.

The report of a previous case of native knee septic arthritis describes an 87-year-old male with a history of osteoarthritis and advanced heart failure who, following a fall, presented with a swollen knee (14). Aspirated synovial fluid revealed inflammatory cells without crystals, and both synovial fluid and blood cultures were negative. Approximately 3 weeks later, he returned with pneumonia due to Streptococcus pneumoniae and an inability to bear weight. Again, aspirated synovial fluid revealed inflammatory cells without crystals; however, upon two occasions C. striatum was recovered in pure culture within 24 h of culture inoculation. Interestingly, rather than attributing the infection due to direct inoculation of skin-associated C. striatum during aspiration of the joint, it was suggested that the infection was spontaneous and that the offending C. striatum isolate gained access to the patient’s circulation either during the episode of pneumonia or through open venous stasis ulcers.

There are significant similarities between our case and the aforementioned case, namely, the blunt trauma of the knee prior to presentation and the underlying immunosuppression associated with the patients. However, rather than interpreting ours as a second case of spontaneous infection of a joint due to C. striatum, we believe that iatrogenic inoculation of the joint with skin-associated C. striatum during the first knee aspiration likely resulted in the infection described in our case.

The identification of Corynebacterium species to the species level is often difficult or unreliable if phenotypic testing is the sole identification method utilized (8, 9). Therefore, to confirm the phenotypic identification of C. striatum, we utilized mass spectrometric and nucleic acid-based methodologies, with both methodologies convincingly identifying the isolates as C. striatum. Mass spectrometric identification of microbes, including Corynebacterium species, is revolutionizing the fields of clinical microbiology and infectious diseases and has the ability to rapidly identify Corynebacterium species to a level comparable to that achievable with the more labor-, time-, and cost-intensive sequence-based methods (16).

Antimicrobial susceptibility testing of Corynebacterium species should be performed if the isolate is considered clinically relevant, as antimicrobial susceptibility is not predictable on the basis of genus- and species-level identification (8). This is partially due to the fact that, historically, many laboratories were unable to reliably identify coryneform bacteria to the species level. Further, Corynebacterium species, especially C. striatum, demonstrating multiresistance have been recovered from clinical specimens, with isolates displaying resistance to several classes of antimicrobials, including beta-lactams, fluoroquinolones, macrolides, lincosamides, and tetracyclines. Typically, these multidrug-resistant isolates are susceptible only to vancomycin, daptomycin, and linezolid (8, 14). The isolates obtained from our patient were multidrug resistant; of all the antimicrobials assayed, vancomycin was the only antimicrobial that tested as susceptible.

This case further highlights the role of C. striatum in native joint infections. Additionally, it emphasizes the importance of identifying Corynebacterium species isolates recovered in multiple cultures to the species level and performing antimicrobial susceptibility testing due to the increased frequency of multidrug resistance in this genus.

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