CASE REPORT

Corynebacterium striatum empyema and osteomyelitis in a patient with advanced rheumatoid arthritis

Rajanshu Verma,¹ Gary R Kravitz²

¹Department of Hospital Medicine (UHS), United Hospital, Allina Health, St Paul, Minnesota, USA
²Infectious Disease Associates, St Paul, Minnesota, USA

Correspondence to
 Dr Rajanshu Verma,
 rajanshu@gmail.com

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SUMMARY

Corynebacterium striatum, which is a common coloniser of human skin and mucous membranes, is increasingly being recognised as an emerging pathogen. We present a case of a 69-year-old woman with empyema and osteomyelitis caused by *C. striatum*. To the best of our knowledge, this is the first case where these two infections from this bacterium were identified together in the same individual.

BACKGROUND

Corynebacterium striatum is a non-lipophilic, fermentative *Corynebacterium* inhabiting skin and mucous membranes of normal hosts and hospitalised patients.¹ Though *Corynebacterium* species have often been misconstrued as contaminants in blood and tissue culture, under appropriate clinical settings, there is enough evidence to suggest that this bacterium is a true pathogen and causes a wide variety of infections. A prototype patient is a severely ill immunocompromised individual with exposure to multiple antibiotics.

CASE PRESENTATION

A 69-year-old Caucasian woman presented with shortness of breath, right-sided abdominal pain and productive cough with fever for 2 days. Three months prior to this episode, she had been admitted to another hospital for necrotising pneumonia in the right lower lobe, with bilateral pleural effusions. She was, at the time, treated with amoxicillin-clavulanate for 7 weeks.

Her medical history was significant for chronic neck and low back pain, fibromyalgia, chronic fatigue syndrome, hypertension, complete heart block, torsade de pointes, gastric ulcer and severe rheumatoid arthritis. Surgical history was significant for knee and hip replacement, laparoscopic cholecystectomy, toe amputation (right third toe) and permanent pacemaker insertion. She had, between the ages of 20 and 25 years, smoked 1 pack of cigarettes/day, but had quit since then. She denied alcohol or illicit drug use.

Her prescription medications included long-term doxycycline for chronic replaced knee infection, aspirin, celecoxib, cyclobenzaprine, diazepam, diltiazem, lisinopril, tramadol, pantoprazole and prednisone 15 mg daily.

She had been suffering from rheumatoid arthritis for 28 years and had been on gold salts for 3 years, methotrexate for 2 years and prednisone for

20 years at an average dose of 15 mg/day with several intermittent burst increases in between. She had also been on etanercept for 3 years, adalimumab for 1 year and rituximab for 1 year, and had taken leflunomide, certolizumab, golimumab and abatacept as well for her rheumatoid arthritis. She had had no contact with farm animals and no exposure to birds.

On examination, the patient was in respiratory distress, breathing 32 times/min with an oxygen saturation of 85% on room air. Her blood pressure was 151/72 mm Hg, pulse 88/min and temperature was 99.8°F. Her weight was 52.4 kg, height 5'2" and body mass index was 21.1 kg/m². Pulmonary examination revealed diminished breath sounds in the right posterior lung base. Joint examination was consistent with advanced rheumatoid arthritis with bilateral ulnar deviation of fingers showing presence of 2nd–4th metacarpophalangeal joint nodular swelling in both hands. Ulceration of the second right toe was seen as well.

INVESTIGATIONS

Laboratory studies showed an elevated white cell count of 16.5×10^9 cells/mm³ (normal: 4.5 – 11×10^9) with 89% neutrophils. C reactive protein was 16.9 mg/dL (normal <0.5) and erythrocyte sedimentation rate was >120 mm/h (normal <31). A chest radiograph revealed right-sided pneumothorax with infiltrate and effusion in the right lung base (figure 1). CT scan of the lungs showed a localized pneumothorax and pleural effusion with

Figure 1 A portable anteroposterior chest radiograph showing right-sided pneumothorax with infiltrate and effusion in the right lung base.

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Figure 2 Coronal view CT scan of the lungs showing a loculated pneumothorax and pleural effusion.

bilateral pulmonary infiltrates (more on right), and atelectasis in the right lung base (figures 2–4). In addition, a cavitary lung mass in the right upper lobe with mediastinal adenopathy was present as well.

TREATMENT

The patient was given supplemental oxygen and started on levofloxacin; a chest tube was inserted on the right side to treat the pneumothorax/effusion. Infectious disease team was consulted and her antibiotic was switched to imipenem. Pleural fluid analysis revealed glucose <5 mg/dL, lactate dehydrogenase 11 148 IU/L, 92% neutrophils and Gram stain showing 4+ Gram-positive rods. Her sputum had 3+ Gram-positive bacilli as well. Early suspicion was of pulmonary nocardiosis. Though her aspergillus IgG was positive, her aspergillus antigen came back negative. Acid-fast bacilli stain, fungal culture of pleural fluid were negative as well. However, pleural fluid culture grew 4+ *C. striatum*. This was resistant to penicillin and ceftriaxone but sensitive to imipenem and vancomycin. Given the loculated effusion/empyema, a video-assisted thoracic surgery (VATS) decortication and wedge resection of cavitary right upper lobe lung nodule were performed by thoracic surgery. Tissue culture of the right lung and culture from the lung cavity grew 4+ *C. striatum* as well. Pathology was consistent with necrotising granulomatous inflammation. Culture from chest tube drainage on postoperative day 11 showed 1+ *C. striatum*. The patient was then switched to intravenous vancomycin. She had a protracted course during the hospital stay and her chest tubes

Figure 3 Axial view CT scan of the lungs showing a loculated pneumothorax and pleural effusion with bilateral pulmonary infiltrates (more on right), and atelectasis in the right lung base.

Figure 4 Axial view CT scan of the lungs showing a loculated pneumothorax and pleural effusion with bilateral pulmonary infiltrates (more on right), and atelectasis in the right lung base.

(those inserted after VATS) were removed on postoperative day 17.

Podiatry was consulted for a subluxated and ulcerated second right toe showing exposed bone, for which she underwent amputation. Bone culture grew 4+ *C. striatum*. Pathology showed evidence of chronic osteomyelitis.

OUTCOME AND FOLLOW-UP

The patient was discharged to a nursing home on postoperative day 18 (after VATS) with two more weeks of intravenous vancomycin.

DISCUSSION

C. striatum is a ubiquitous coloniser of human skin and mucous membranes. There is increasing evidence of it being an emerging pathogen, especially in immunocompromised individuals or those with prosthetic devices, where it causes opportunistic infections. There is usually a history of prior antibiotic exposure in most cases. The first case of *C. striatum* was published in 1980 in a patient with chronic lymphocytic leukaemia with lung infection.²

C. striatum has been implicated as an infectious agent in surgical wound infections, leg ulcers, pneumonia, empyema, breast abscess, pancreatic abscess, keratitis, phlebitis, cystitis, peritonitis, balanitis, urinary tract infections, chorioamnionitis, meningitis, decubitus ulcers, central venous catheter/peritoneal dialysis catheter/fistula related infections, native/prosthetic valve and pacemaker-related endocarditis, prosthetic joint infection, septic arthritis and osteomyelitis.^{3–4} Concerns have been raised on human-to-human transmission of this pathogen as well.^{5–6} A few outbreaks of nosocomial infections from *C. striatum* have been reported in the literature in intensive care unit settings.^{7–10}

Corynebacterium pneumonia/empyema has previously been reported in immunocompromised (HIV, transplant organ recipients) patients.^{11–13} Our patient was immunocompromised from long-standing advanced rheumatoid arthritis and its extensive immunosuppressive therapy, as delineated above.

Diagnosis of *C. striatum* may be difficult as clinical laboratories may misidentify the organism as coagulase-negative staphylococci while using automated identification. Furthermore, colonies of *C. striatum* may be confused with coagulase-negative staphylococci, thus making Gram stain of the bacterium essential in its identification.¹⁴

Treatment of *C. striatum* infection includes institution of appropriate antibiotic therapy and may involve possible removal of foreign material (if present) to ensure complete eradication of the nidus of infection. There is growing concern over resistance of *C. striatum* to penicillins, macrolides and cephalosporins, as seen in our case,¹⁵ even though earlier studies reported susceptibility to penicillins.¹⁶ Though our strain was susceptible to imipenem, clonal multidrug resistant strains resistant to carbapenems, levofloxacin and tetracycline, have been reported. The only drugs that remain effective against multidrug resistant strains include glycopeptides (eg, vancomycin, teicoplanin), linezolid, daptomycin, quinupristin/dalfopristin and tigecycline.¹⁷

To the best of our knowledge, this is the first case reporting empyema and osteomyelitis caused by *C. striatum* in the same patient.

Learning points

- ▶ *Corynebacterium striatum* is a common coloniser of human skin and mucous membranes.
- ▶ *C. striatum* should be considered an emerging pathogen (and not a contaminant) under appropriate clinical settings.
- ▶ Treatment should be based on antibiotic sensitivities given the rising resistance to several commonly used antibiotics.

Contributors Both the authors were involved in taking care of the patient. RV, from the internal medicine team, saw the patient. GK provided expertise from an infectious diseases standpoint. Both the authors contributed to and approved the manuscript.

Competing interests None declared.

Patient consent Obtained.

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