

Corynebacterium striatum: An emerging nosocomial skin and soft-tissue pathogen

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ABSTRACT

The genus *Corynebacterium* is composed of Gram-positive, aerobic, non-motile, non-spore-forming bacilli that are widely distributed throughout the environment. They are usually found as commensals on the skin and are often considered as mere contaminants when isolated from clinical samples. We describe a patient with skin and soft-tissue infections due to *Corynebacterium striatum* following exploratory laparotomy identified by matrix-assisted laser desorption ionization-time of flight mass spectrometry. The clinical importance and pathogenic potential of *Corynebacterium* species, especially *C. striatum*, cannot be underestimated. This report is a reminder to physicians of the possible pathogenicity of non-diphtherial *Corynebacteria*.

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INTRODUCTION

The genus *Corynebacterium* is composed of Gram-positive, aerobic, non-spore-forming bacilli.¹ These are usually found as commensals on the skin and are often considered as mere contaminants when isolated from clinical samples. However, multiple studies have shown that certain species of *Corynebacterium* become pathogenic to humans under special conditions.²

Corynebacterium striatum (*C. striatum*) is an opportunistic pathogen, often multidrug-resistant, which has been associated with serious infections in humans.^{3–5} Cases of skin and soft-tissue infections caused by *C. striatum* are rarely reported. We describe a patient with skin and soft-tissue infections due to *C. striatum* following exploratory laparotomy identified by matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF).

THE CASE

A 78-year-old woman who had diabetes and hypertension presented to the surgical outpatient department of our hospital with a history of swelling and pain on the right side of her abdomen for 2 days. She had not passed flatus for 1 day and stool for 2 days. She also had a history of 5–6 episodes of non-projectile vomiting. Local examination revealed an 8 cm×8 cm non-reducible right paramedian swelling with no cough impulse. The abdomen was soft and non-tender. A diagnosis of strangulated right paramedian incisional hernia was made. The patient underwent exploratory laparotomy. Distal ileal resection and anastomosis with midline sheath closure and closure of the

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paramedian hernial defect were done. On postoperative day 4, she developed fever, pain and purulent discharge from the surgical site, for which the midline wound was opened and pus drained. The drained pus was sent for microbiological investigations. Initial laboratory investigations revealed a total leucocyte count of 9900/cmm, which later increased to 20 000/cmm with 82.3% polymorphonuclear leucocytes. Systemic examination was unremarkable, and no other focus of infection could be identified. After two sets of blood cultures were obtained, empirical treatment with parenteral cefoperazone–sulbactam (2 g twice daily) was started. Despite medications, the condition of the patient deteriorated. On postoperative day 7, copious amount of pus was drained from the operative site. Blood culture obtained on this occasion was sterile. Gram stain of the pus revealed numerous polymorphonuclear leucocytes and Gram-positive bacilli. Pus culture grew non-haemolytic cream-coloured colonies on 5% sheep blood agar (Fig. 1). Gram stain of the colonies again showed Gram-positive bacilli, morphologically resembling diphtheroids. Considering diphtheroids as commensals of the skin, the colonies were not processed further, and the report was dispatched with a request for a repeat specimen. However, similar bacterial colonies in pure culture grew from two consecutive pus samples, suggestive of probable association of bacteria with the surgical site infection. The organism was confirmed as *C. striatum* by MALDI-TOF mass spectrometry using the Biomérieux VITEK MS system (IVD database version 2.0) (USA), and antimicrobial susceptibility was performed. The organism was found to be susceptible to vancomycin, teicoplanin, daptomycin and linezolid, but resistant to penicillin, clindamycin, erythromycin, trimethoprim–sulphamethoxazole and cefoperazone–sulbactam. The patient was given injection vancomycin 1 mg i.v. twice daily, and she responded to the therapy. On follow-up, the abdominal wound was completely dry and healed.

DISCUSSION

Non-diphtheritic *Corynebacteria* when isolated from clinical specimens are often considered as contaminants. Although correctly identifying *Corynebacterium* species has been challenging, with the use of MALDI-TOF mass spectrometry in routine diagnostics, correct identification up to species level has been possible. Nonetheless, isolation of this organism presents challenging scenarios to the microbiologist to determine its clinical significance. Clinical and laboratory criteria to



FIG 1. Non-haemolytic cream-coloured colonies on 5% sheep blood agar

TABLE I. Clinical and laboratory criteria to determine the clinical importance of non-diphtherial corynebacteria

Sample	Clinical criteria	Culture results	Direct examination results
Pus	Clinical suspicion of infection with erythematous or purulent lesion	≥1 positive culture: Isolation of pathogen in pure culture	Gram-positive bacilli on Gram stain or ≥1 positive neutrophils per 100× field
Urine	Symptoms and signs of urinary tract infection, history of genitourinary surgery	≥10 ⁵ CFU/ml	≥5 white blood cell/high-power field
Blood culture	Clinical suspicion of sepsis	≥2 positive culture: Isolation of pathogen in pure culture	Not required
Cerebrospinal fluid	Seizure, altered mental status, signs of meningitis	≥1 positive culture: Isolation of pathogen in pure culture	≥1 positive criterion for bacterial meningitis score*
Other sterile fluids	Suspicion of infection	≥1 positive culture: Isolation of pathogen in pure culture	Gram-positive bacilli on Gram stain or ≥1 positive neutrophils per 100× field

*The bacterial meningitis score was determined as Gram-positive rods on Gram staining, cerebrospinal fluid (CSF) neutrophil counts ≥1000 neutrophils/L, CSF protein levels of ≥80 mg/dl, systemic neutrophil counts of ≥10⁴ neutrophils/L, or history of seizure before or at presentation CFU colony-forming units

determine the clinical importance of non-diphtherial corynebacteria are given in Table I.⁶

Several lines of evidence suggest that *C. striatum* isolated in this patient was pathogenic and responsible for the skin and soft-tissue infections, isolation of pathogen in pure culture on repeated cultures, definitive evidence of presence of infection, absence of any other focus of infection and infection responding to treatment.

Wound infections caused by *C. striatum* are often due to exogenous bacterial flora that penetrate into a site of injury, which could be the possible source of infection in our patient. Prolonged duration of hospitalization, chronic diabetes mellitus, administration of antibiotics and exposure to an invasive procedure have been recognized as risk factors for *C. striatum* infection.⁶ Chronic diabetes mellitus and prior surgery could be risk factors in our patient.

This organism is a multidrug-resistant pathogen with varied susceptibility profile amongst the isolates underscoring the importance of susceptibility testing.⁷ Our isolate was also multidrug-resistant.

Conclusion

This report is a reminder to physicians of the possible pathogenicity of non-diphtherial Corynebacteria. We recommend that all pure cultures of diphtheroids be identified

to the species level and their antimicrobial susceptibility be done so as to initiate prompt and appropriate treatment for a successful outcome.

Perioperative vigilance, timely submission of properly obtained cultures, rapid identification of the pathogen by MALDI-TOF mass spectrometry and treatment with appropriate antibiotics were responsible for the successful outcome in our patient.

Conflicts of interest. None declared

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