



CASE REPORT

Corynebacterium minutissimum infecting pseudomeningocele: A rare case



Vandana Kalwaje Eshwara ^{a,*}, Frenil Munim ^a, Arjun Shetty ^b, Anurag Gupta ^b, Jagadhane Nitin ^b, Chiranjay Mukhopadhyay ^a

^a Department of Microbiology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India

^b Department of Neurosurgery, Kasturba Medical College, Manipal University, Manipal, Karnataka, India

Received 25 November 2011; accepted 25 April 2012

Available online 24 September 2012

KEYWORDS

Corynebacterium minutissimum;
Infection;
Pseudomeningocele

Invasive infections by *Corynebacterium minutissimum* are rarely documented. The significance of laboratory isolation of this bacterium from a sterile specimen such as cerebrospinal fluid is difficult to determine as it usually colonizes the skin. However, repeated isolation in a clinical setting should be treated appropriately. Here we report a first case of infected pseudomeningocele by *C. minutissimum* in an adult woman operated on for falcatentorial psammomatous meningioma. The patient was treated successfully with linezolid.

Copyright © 2012, Taiwan Society of Microbiology. Published by Elsevier Taiwan LLC. All rights reserved.

Introduction

Corynebacterium minutissimum is the causative agent of erythrasma that is a superficial skin fold infection most commonly at the interdigital regions of the feet. The organism is rarely associated with extracutaneous diseases.¹ *Corynebacterium* species normally colonize human skin. When these bacteria are isolated from the clinical specimen, differentiation between colonization,

infection, and contamination by the organisms is difficult to determine. We report the first case of infected pseudomeningocele by *C. minutissimum* in an adult woman operated on for falcatentorial psammomatous meningioma.

Case report

A 55-year-old lady was admitted to the neurosurgery ward with complaints of headache and blurring of vision for the past few months. She was conscious, alert, and her neurological examination was unremarkable except for the presence of bilateral papilledema. She was not diabetic or hypertensive. Her white blood cell count, platelet count, hemoglobin concentration, liver and renal function tests

* Corresponding author. Department of Microbiology, Kasturba Medical College, Manipal University, Manipal 576104, Karnataka, India.

E-mail address: vandanake@gmail.com (V.K. Eshwara).

were within normal limits. The serology tests for human immunodeficiency, hepatitis B, and hepatitis C viruses were negative. The contrast-enhanced computed tomography (CT) of the brain obtained at admission was suggestive of a large meningioma arising from the falcotentorial junction with extension into the posterior 3rd ventricular region with secondary hydrocephalus. The lesion had extensive areas of calcification and showed intense post contrast enhancement (Fig. 1). The patient underwent total excision of the lesion on the 5th day of admission in the hospital via a modified right-sided Poppen's approach along with a left frontal burr hole and insertion of external ventricular drainage (EVD). Histopathological examination of the lesion was suggestive of psammomatous meningioma with dystrophic calcification.

Cefotaxime (3 g per day) and amikacin (1 g per day) were given perioperatively. Phenytoin, mannitol, steroid and furosemide were started as anti-epileptic and antiedema measures. She developed aphasia in post-operative period, secondary to hematoma at the EVD site. The surgical wound healed well initially. However, the patient developed a gradually increasing swelling at the wound site two weeks post-operatively, suggestive of pseudomeningocele (Fig. 2). The CT of the head showed an extensive extradural and subgaleal collection without hydrocephalus. About 110 ml of clear straw-colored cerebrospinal fluid (CSF) was aspirated from the swelling and sent for microbiological and cytological analysis, which revealed a white blood cell count (WBC) of 50×10^6 cells/L, including 57% neutrophils, 4% lymphocytes and 2% eosinophils. Gram staining of the CSF specimen showed few pus cells but no bacteria, and culture did not yield any organism.

Meanwhile, the patient developed erythematous rashes all over her body and ulcers around the lips, which were diagnosed as Stevens–Johnson syndrome due to phenytoin. Steroid therapy was continued and tapered slowly, and lesions reduced with treatment. As the scalp swelling was increasing in size, around 200 ml of clear, yellow-colored CSF was aspirated again after 6 days of initial aspiration and sent for analysis. Gram staining showed numerous pus cells, numerous Gram-positive bacilli suggestive of *Corynebacterium* spp. Culture of the CSF on 5% sheep blood agar and chocolate agar yielded *Corynebacterium* spp., which was confirmed as *C. minutissimum* by the Vitek 2 system



Figure 1. CT image of the head showing the calcified falcotentorial meningioma with secondary hydrocephalus.

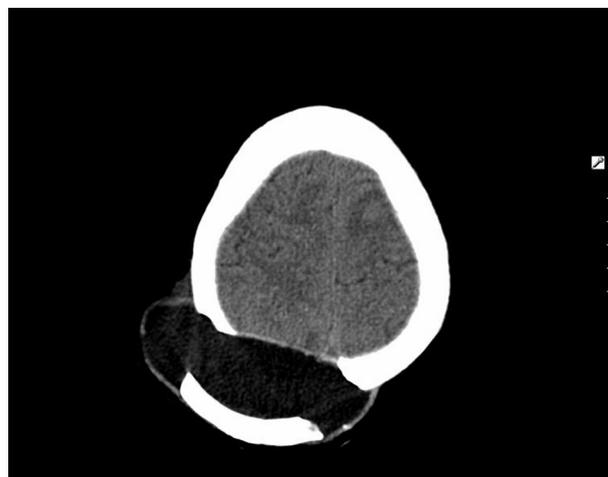


Figure 2. CT image of the head showing development of pseudomeningocele at the site of the surgical wound.

(bioMérieux, Marcy l'Étoile, France). The isolate was susceptible to erythromycin, tetracycline, clindamycin, linezolid, teicoplanin, and vancomycin by the Kirby Bauer disc diffusion method. Interpretative guidelines for *Streptococcus* spp. were used in analyzing susceptibility results.² Although the patient had fever spikes during this period, specific antimicrobial therapy was not initiated on the basis of microbiological report as the isolate was presumed to be a skin contaminant. Fever spikes continued and swelling was still increasing. Repeat aspiration of 175 ml CSF 2 days later showed similar Gram stain results and culture yield. This time the presence of intracellular Gram-positive bacilli and repeated isolation of *C. minutissimum* were considered significant and prompted the start of therapy with intravenous linezolid 600 mg twice daily. The onset of bacterial infection was also supported by cytochemical analysis. The CSF revealed a glucose level of 28 mg/dL; protein concentration, 210 mg/dL; and a WBC count of 1600×10^6 cells/L, including 96% neutrophils and 4% lymphocytes. Fever spikes came down after 2 days but swelling was still increasing. Subsequent scalp aspiration of CSF showed the same organism but the number was reduced. After 14 days of treatment with linezolid, scalp aspiration was repeated for CSF examination, which was sterile and cytochemical parameters were near normal. The patient became afebrile, and subsequently underwent a theco-peritoneal shunt insertion after completion of linezolid therapy. Pseudomeningocele diminished significantly and the patient improved gradually over time.

Discussion

Nondiphtherial *Corynebacterium* species have increasingly been identified as human pathogens. Both *C. jeikeium* and *C. urealyticum* are established human pathogens, while *C. pseudodiphtheriticum*, *C. amycolatum* and *C. minutissimum* are reported to cause infections, mostly nosocomial.³ For examples, a few cases of central venous-catheter associated bacteremia of *C. minutissimum* have been reported.⁴ In the laboratory, *C. minutissimum* is differentiated from

C. jeikeium from its ability to grow rapidly and being non lipophilic. Another bacterium that is mistaken for *C. minutissimum* is *C. amycolatum* but the former produces moist colonies while the latter is dry or waxy.³

C. minutissimum is a Gram-positive, non-spore forming, facultative anaerobic bacillus causing cutaneous eruptions of erythrasma which is the most common cause of interdigital foot infections.¹ However, the invasive infections such as bacteremia, peritonitis, endocarditis, pyelonephritis, mastitis, cellulitis, meningitis, and endophthalmitis are rarely reported.^{4–10} Although one case of primary *C. minutissimum* meningitis⁴ and two of post-neurosurgery infections by *C. jeikeium* were reported, this is the first report of *C. minutissimum* infection of pseudomeningocele following brain surgery.^{11,12}

Corynebacteria are frequent inhabitants of normal skin and mucous membranes and frequently contaminate blood cultures. As this organism is a part of normal skin flora, the colonized bacteria would have entered the pseudomeningocele during scalp aspiration. Although exact pathogenic mechanism of this bacterium is unclear, it is possible that inoculation of the bacteria into sterile space would have led to the disease due to immunocompromised state. Earlier reports also show that majority of the infections by *C. minutissimum* were either in immunocompromised patients in those who had an indwelling device causing a breach in the skin barrier. Initial isolation of this organism from the CSF culture was overlooked. However, subsequent and repeated isolation of the same organism from CSF along with presence of polymorphonuclear cells with intracellular organisms and clinical condition of the patient raised the suspicion of infected pseudomeningocele by *C. minutissimum*.

The guidelines for testing antimicrobial susceptibility of nondiphtheria corynebacteria are not available by CLSI. However, there are few reports on susceptibility patterns of *C. minutissimum*.^{13,14} All the tested isolates were uniformly susceptible to vancomycin followed by imipenem, cefotetan, ampicillin, and ciprofloxacin. In the literature, most cases of *C. minutissimum* infection were successfully treated with ampicillin,^{4,7} however, in our case with drug allergic reaction status, linezolid was chosen as a safe alternative to vancomycin due to its lesser side effects.¹⁵ The therapy decisions have to be carefully made based on clinical presentations in individual settings.

Based on this case report, we emphasize that isolation of a nondiphtherial *Corynebacterium* from CSF in the right clinical setting should not be ignored in a symptomatic patient. The isolate should be identified to the species level and linezolid or vancomycin should be used empirically in these situations until obtaining antimicrobial susceptibility results. Appropriate clinico-microbiological correlation

helps to determine the significance of the isolate and guide early therapy.

Conflicts of interest

All contributing authors declare no conflicts of interest.

References

- Golledge CL, Phillips G. *Corynebacterium minutissimum* infection. *J Infect* 1991;23:73–6.
- Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing; twentieth informational supplement, M100-S15, CLSI, Villanova, PA, USA 2010.
- Funke G, von Graevenitz A, Clarridge 3rd JE, Bernard KA. Clinical microbiology of coryneform bacteria. *Clin Microbiol Rev* 1997;10:125–59.
- Dalal A, Likhi R. *Corynebacterium minutissimum* bacteremia and meningitis: A case report and review of literature. *J Infect* 2008;56:77–9.
- Berger SA, Gorea A, Sadler J, Dan M, Zilberman M. Recurrent breast abscesses caused by *Corynebacterium minutissimum*. *J Clin Microbiol* 1984;20:1219–20.
- Granok AB, Benjamin P, Garrett LS. *Corynebacterium minutissimum* bacteremia in an immunocompetent host with cellulitis. *Clin Infect Dis* 2002;35:e40–2.
- Herschorn BJ, Brucker AJ. Embolic retinopathy due to *Corynebacterium minutissimum* endocarditis. *Br J Ophthalmol* 1985;69:29–31.
- Guaedera J, Karnad A, Alvarez S, Berk SL. *Corynebacterium minutissimum* bacteremia in a patient with chronic myeloid leukemia in blast crisis. *Diag Microbiol Infect Dis* 1986;5:327–30.
- Van Bosterhaut B, Cuvelier R, Serruys E, Pouthier F, Wauters G. Three cases of opportunistic infection caused by propionic acid producing *Corynebacterium minutissimum*. *Eur J Clin Microbiol Infect Dis* 1992;11:628–31.
- Aperis G, Moyssakis I. *Corynebacterium minutissimum* endocarditis: a case report and review. *J Infect* 2007;54:e79–81.
- Morrison VA, Weinshel EL, Luikart SD. *Corynebacterium JK*: a new pathogen in ventriculostomy infections. *J Neurooncol* 1991;11:65–9.
- Morosi S, Marroni M, Egidi AM, Stagni G. Nosocomial post-neurosurgery meningitis due to *Corynebacterium jeikeium*. *Recenti Prog Med* 2005;96:291–2 [In Italian, English abstract].
- Williams DY, Selepak ST, Gill VJ. Identification of clinical isolates of nondiphtherial *Corynebacterium spp* and their antibiotic susceptibility patterns. *Diag Microbiol Infect Dis* 1993;17:23–8.
- Turk BG, Turkmen M, Aytimur D. Antibiotic susceptibility of *Corynebacterium minutissimum* isolated from lesions of Turkish patients with erythrasma. *J Am Acad Dermatol* 2011;65:1230–1.
- Viale P, Pagani L, Cristini F, Stefani R, Bergomi R, Colombini P, et al. Linezolid for the treatment of central nervous system infections in neurosurgical patients. *Scand J Infect Dis* 2002;34:456–9.