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Case report

First reported case of pneumonia caused by *Cedecea lapagei* in America

Luis Antonio Sanchez Lopez[a,*], *Bárbara Saenz Ibarra*[b], *Jess Alberto Cárdenas de la Garza*[c], *Felipe de Jesus Martin Perez Rada*[d], *Ana Isabel Sepúlveda Nuñez*[e], *María Guadalupe Rodríguez López*[f]

[a] *Department of Infectology at the Unidad de Alta Especialidad, Monterrey, Mexico*
[b] *Hospital General de Zona, Monterrey, Mexico*
[c] *Hospital Universitario de Monterrey, Monterrey, Mexico*
[d] *Intensive Care Unit at Unidad de Alta Especialidad, Monterrey, Mexico*
[e] *Department of Epidemiology at the Unidad de Alta Especialidad, Monterrey, Mexico*
[f] *Department of Preventive Medicine and Public Health at the Hospital Universitario de Monterrey, Monterrey, Mexico*

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ABSTRACT

Cedecea represents a genus in the Enterobacteriaceae family that has been rarely associated with human infection. The clinical relevance of *Cedecea lapagei* has yet to be elucidated. This is the first reported case of pneumonia due to *C. lapagei* in a patient with acute promyelocytic leukemia.

A 34-year-old patient was admitted to the "Area # 4 General Hospital" in Monterrey, Mexico. He had a 6-day history of asthenia, fatigue, fever of 38 °C, multiple painful oral lesions and gum bleeding. He had been to the dentist's office three days before for management of his symptoms and was prescribed erythromycin. The patient denied any chronic disease and he was allergic to penicillin. He had smoked 20 cigarettes per week for 15 years and drank alcohol occasionally. On examination, he had multiple oral ulcers with whitish borders and petechiae around and under the tongue. The rest of the examination was normal. Laboratory results showed pancytopenia, hemoglobin 8.2 g/dL, total white blood cell count 0.927 k/μL and platelets 84.4 k/μL.

One day after admission, a bone marrow biopsy and aspirate were performed. The patient developed melena and his temperature rose to 39 °C. Broad-spectrum antibiotic therapy was initiated with levofloxacin and imipenem, under the suspicion of an abdominal infectious process. Biopsy and aspirate results were obtained two days later, establishing the diagnosis of acute promyelocytic leukemia; chemotherapy with idarubicin, cytarabine and all-*trans*-retinoic acid (ATRA) was begun. Fever persisted for the next three days and he developed signs of disseminated intravascular coagulation and acute pulmonary edema that were successfully treated. Two days later, a control chest X-ray showed bilateral, cottony infiltrates suggesting fungal or staphylococcal infection.

* *Corresponding author at*: Departamento de Infectología, Unidad de Alta Especialidad #25, Monterrey, Mexico.
E-mail addresses: luis.antonio.sanchez@udem.edu.mx, saenz.barby@gmail.com (L.A.S. Lopez).
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Levofloxacin and imipenem were replaced with cefepime, amphoterecin B, and vancomycin. He had no fever for three days and appeared to be improving. The patient then developed vomiting of gastric contents, diarrhea and diffuse, severe abdominal pain. A computed tomography reported findings compatible with neutropenic enterocolitis. Amphoterecin B was withdrawn and treatment with metronidazole was initiated. An exploratory laparotomy was performed documenting two liters of intra-abdominal free fluid and cecum necrosis; total colectomy and ileostomy were performed. After surgery, the patient was transferred to the hospital's Intensive Care Unit (ICU) where he developed acute renal injury, RIFLE-F. ATRA was withdrawn, a hemodialysis catheter was placed and he required mechanical ventilation by intubation.

On his second day in the ICU, the patient developed dyspnea, copious yellow sputum and a 40 °C fever. The chest X-ray showed bilateral alveolar infiltrates. Two blood and sputum cultures were obtained. On the fifth day in the ICU, he developed disseminated intravascular coagulation for a second time. By the sixth day, the blood cultures were negative but the sputum cultures documented the presence of the Gram-negative bacterium *Cedecea lapagei* by VITEC 2 analysis (bioMérieux Inc.). The bacterium was resistant to amikacin, ampicillin, aztreonam, cefazolin, cefepime, ceftriaxone, ciprofloxacin, ertapenem, imipenem, meropenem, moxifloxacin, nitrofurantoin, piperacillin/tazobactam and trimethoprim/sulfamethoxazole. It was moderately sensitive to ampicillin/sulbactam, gentamicin and tobramycin. The bacterium was completely sensitive only to tigecycline. His antibiotics were replaced with tigecycline and vancomycin. Two days later, the fever and dyspnea abated and the chest X-ray and sputum cultures were negative by the seventh day; we considered that the *C. lapagei* pneumonia had resolved. The following day, the patient again developed a 38 °C fever spike and a new sputum culture revealed the presence of *Pseudomona putida*, sensitive to cefepime. For the next five days, blood and sputum cultures were negative and he had no fever, so dexamethasone was added to his chemotherapy protocol. The next day, he presented severe gastrointestinal and pulmonary bleeding that was successfully treated with fresh frozen plasma. Five days later, cefepime was withdrawn and the endotracheal cannula was replaced with a tracheostomy. Upon clinical and laboratory improvement (hemoglobin 11.2 g/dL, total leukocyte count 14 k/μL, platelets 331 k/μL), he was transferred to the Internal Medicine floor. After nine days of clear clinical improvement, the patient again had fever and symptoms suggesting a urinary tract infection; the urinary catheter was removed and treatment with imipenem and levofloxacin was initiated. After 72 hours with no fever, the patient was released; he was stable and asymptomatic and was referred to the Hematology Department for follow-up.

Cedecea is a genus in the Enterobacteriaceae family. Six strains have been identified: *Cedecea davisae*, *C. lapagei*, *C. neteri*, *C. species* 3, *C. species* 5 and *C. species* 6. Only *C. davisae*, *C. lapagei*, *C. neteri* and *C. species* 6 have been known to, rarely, cause infections in humans.[1–9]

Morphologically, *C. lapagei* is a short and mobile Gram-negative bacillus. It is catalase-positive, oxidase-negative, arabinose-negative, arginine-positive, it reduces nitrates to nitrites, blackens esculin iron agar and produces acid with D-arabitol, cellobiose, maltose, D-mannitol, D-mannose, salicin and trehalose.[10] *C. lapagei* can be distinguished from other *Cedecea* strains by its ability to grow in media lacking thiamine and because it is quickly detected in the Voges–Proskauer test following the O' Meara method.[11]

C. lapagei has been identified as a human pathogen on three occasions.[6,12,13] The first infection was reported at the Veterans Affairs Medical Center at the University of Tennessee Center for Health Sciences, in a peritoneal fluid sample obtained from a 55-year-old patient after a liver transplant. The infection in this immunocompromised host was successfully treated with vancomycin and gentamicin, as well as ceftazidime and gentamicin added to the peritoneal dialysis solution.[12] The second case involved a patient with bacteremia after a chemical burn with cement and type II diabetes mellitus. The bacteremia and the wound infection were both successfully treated with cefotaxime and amikacin.[6] The third report was of a Turkish patient with chronic obstructive pulmonary disease and subarachnoid hemorrhage that developed pneumonia due to *C. lapagei*, apparently due to secretion aspiration from the upper respiratory tract. The patient had a good clinical response to meropenem and amikacin therapy but subsequently died due to the subarachnoid hemorrhage.[13]

Our case is the fourth report of *C. lapagei* infection and the second case of pneumonia. All four patients had risk factors for opportunistic infection (acute leukemia, liver transplant, type 2 diabetes mellitus and chronic obstructive pulmonary disease). Laboratory results in three cases confirmed the successful treatment of the infections and the fourth patient died before this information was available.[6,12,13]

This is the first case report of pneumonia due to *C. lapagei* in Mexico, in an immunocompromised patient with a hospital course complicated by multiple infections. However, an important limitation in our study is the lack of pathogen identification by molecular techniques since these are not available in our hospital.

Conflict of interest

The authors declare no conflicts of interest.

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