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LETTER - CLINICAL

Botryomycosis by *Klebsiella michiganensis* secondary to aesthetic procedure☆

Dear Editor,

Cutaneous botryomycosis is a rare chronic granulomatous bacterial infection that usually occurs in immunocompromised patients or with a history of previous trauma.[1]

A 64-year-old woman with a history of tensor thread placement one month prior to her condition, without comorbidities. She went to a private dermatologist for dermatosis on the left mandibular region, consisting of a nodule measuring 5 × 4 cm (Fig. 1), painful to palpation, with 9-months of evolution. A spindle incisional skin biopsy was performed, which reported a dense superficial and deep inflammatory infiltrate composed of histiocytes, Langhans-type multinucleated giant cells, neutrophils, and plasma cells, with the formation of a pseudofistula. The PAS stain showed a small grain composed of multiple filamentous bacteria (Fig. 2). Gram stain was negative. Molecular biology was performed, showing *Klebsiella michiganensis*. With the above, botryomycosis was diagnosed. The patient was treated with ciprofloxacin orally (500 mg every 12-hs) for three months, with complete remission.

Cutaneous botryomycosis has an insidious onset. The extremities are the most affected, while the head and neck are less frequently involved. It manifests with nodules, abscesses, fistulas, and ulcers with seropurulent discharge, which may have yellow grains like those of actinomycosis.[1]

Accidental or postoperative skin trauma favors this infection.[2] In this patient, the placement of tensor threads was the source of trauma and bacterial inoculation.

The granules in botryomycosis are basophilic, positive to Periodic acid-Schiff (PAS) stain, and may be detectable or not by Gram staining, depending on the causative agent.[3]

It must be differentiated from other diseases that produce papules, such as mycetoma, actinomycosis, and nocardiosis.[4] Histopathology, culture, and molecular biology are helpful to make this distinction.[3,5]

Figure 1 Nodule on left mandibular region.

The most frequent etiologic agent is *Staphylococcus aureus*, followed by *Pseudomonas aeruginosa*. Other causative microorganisms are *Escherichia coli*, coagulase-negative staphylococci, *Streptococcus* spp., and *Proteus* spp.[6] The isolation of *Klebsiella michiganensis* in this case is exceptional. Diagnostic confirmation required integrating clinical, histopathological, and molecular findings, using sequencing and RT-PCR targeting specific regions of the 16S rRNA gene, thereby confirming the diagnosis.

Klebsiella michiganensis (mi.chi.ga.nen.sis. NL adj. masc. *michiganensis*, from or belonging to the state of Michigan, USA, where the strain was isolated) is a bacterium first described in 2013, as one of the nine species of the *K. oxytica complex* within the genus *Klebsiella*. It is characterized by the formation of small, circular, mucoid, convex,

☆ Study conducted at the Hospital General ''Dr Manuel Gea González''.

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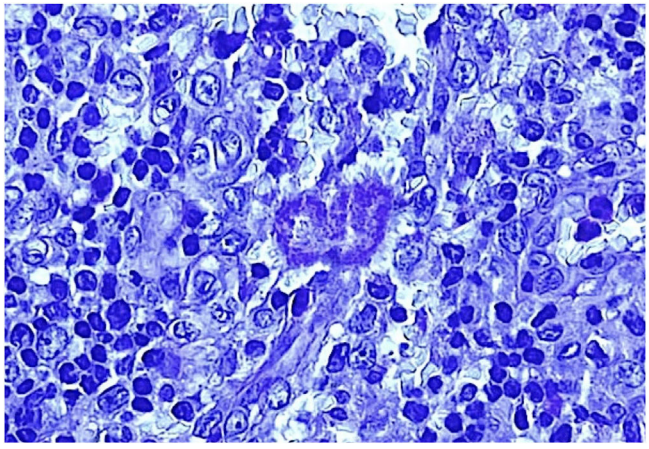

Figure 2 Small PAS-positive grain between granulomatous inflammatory infiltrate (PAS, 40×).

entire, opaque, and white colonies. The cells are straight bacilli, gram-negative, encapsulated, immobile, 0.5–0.8 μm in diameter and 1.0–2.0 μm in length, with facultative anaerobic metabolism.[5]

Treatment of botryomycosis is based on susceptibility-targeted antibiotics until the infection resolves. The ability of *K. michiganensis* to acquire and disseminate antimicrobial resistance genes is a matter of growing concern. Carbapenemase-producing strains, such as OXA-181 and NDM-1, have been reported to be associated with motile plasmids such as IncHI5 and IncFIB,[4,6] which present multiresistance to β-lactams, aminoglycosides, fluoroquinolones, and sulfonamides.[4] In our case, antibiotic resistance tests were performed, including the detection of genes such as blaKPC, NDM, or OXA, without finding mechanisms of resistance to fluoroquinolones in our strain, which explains the good clinical response to ciprofloxacin.

The present case constitutes the first report of cutaneous botryomycosis secondary to an aesthetic procedure caused by *Klebsiella michiganensis*, which broadens the etiological spectrum of this entity. Precise identification using molecular techniques was fundamental for diagnosis, highlighting the limitations of conventional methods for recently described species.

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Authors' contributions

Samantha Cruz López: Approval of the final version of the manuscript; critical literature review; preparation and writing of the manuscript.

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Conflicts of interest

None declared.

Editor

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