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Case Report

Compartmental syndrome of the upper limb due to *Moraxella lacunata* infection: a link to patera foot syndrome?Hugo-Guillermo Ternavasio-de la Vega^{a,*}, Alberto Marcos-García^b, Elena Pisos-Alamo^c, Margarita Bolaños-Rivero^d, Michele Hernández-Cabrera^{c,e}, José-Luis Pérez-Arellano^{c,e}^a Internal Medicine Department II, Hospital Universitario of Salamanca, Salamanca, Spain^b Hand and Upper Limb Unit, Orthopedic and Traumatology Department, Hospital Universitario Insular of Gran Canaria, Gran Canaria, Spain^c Infectious Diseases and Tropical Medicine Unit, Internal Medicine Department, Hospital Universitario Insular of Gran Canaria, Gran Canaria, Spain^d Laboratory of Microbiology, Hospital Universitario Insular of Gran Canaria, Gran Canaria, Spain^e Department of Medical and Surgical Sciences, Health Sciences Faculty, University of Las Palmas of Gran Canaria, Gran Canaria, Spain

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SUMMARY

We report a case of compartmental syndrome of the left upper limb secondary to a severe *Moraxella lacunata* infection, an unusual pathogen, occurring in a young black male immigrant to the island of Gran Canaria, Spain. We propose a pathophysiological relationship with patera foot syndrome.

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1. Introduction

During the last decade, immigration from under-developed African countries to European Nations, including Spain, has increased dramatically.¹ Because of the proximity of the African and Spanish coasts, illegal immigration is sometimes undertaken in small overcrowded boats called 'pateras', the journey taking several days. In the context described, we have found what appears to be a new syndrome: patera foot.² Briefly, this syndrome is defined by the presence of severe skin and soft tissue infection (SSTI) of the lower limbs, usually caused by Gram-negative bacteria, with the risk of amputation due to the development of compartmental syndrome. Considering that the syndrome appears in young healthy black people, a compartmental-like mechanism favored by limited skin compliance has been proposed. However this postulate has not yet been confirmed.

The aims of this article are: (1) to report *Moraxella lacunata* as a pathogenic agent in severe SSTI for the first time; (2) to report the first case of patera foot-like syndrome of the upper limb in

immigrants; (3) to support the compartmental-like mechanism of patera foot syndrome.

2. Case report

On September 3, 2008 a previously healthy, 18-year-old black male, of sub-Saharan origin from the Côte d'Ivoire, was admitted to the Orthopedic and Traumatology Department of the Hospital Insular of Gran Canaria (Gran Canaria Island, Spain) because of acute compartmental syndrome of his left forearm and hand. He had just reached the coast of Gran Canaria after several days crossing the ocean in a small overcrowded patera. Physical examination was remarkable for skin and soft tissue swelling, effusion, and intense pain with both active and passive finger movements. A radial pulse and distal capillary repletion were still present. Two lesions on the fifth finger of his left hand were seen as the portal of entry of the severe infection. Blood analysis revealed leukocytosis with left deviation, moderate dehydration, acute renal insufficiency, and rhabdomyolysis. An urgent fasciotomy, local debridement, and pus drainage of both the left hand and forearm were carried out (Figure 1, panels A and B). Samples were sent for Gram stain, cultures, and sensitivity investigations. Because of the high prevalence of Gram-negative bacteria in severe SSTIs in this collective of sub-Saharan

* Corresponding author. Tel.: +34 923291308; fax: +34 923 291293.

E-mail address: guillermoternavasio@gmail.com (H.G. Ternavasio-de la Vega).



Figure 1. Left upper extremity of the patient after initial fasciotomy (panels A and B) and after amputation of the fourth and fifth fingers and reconstructive surgery (panel C).

immigrants,² broad-spectrum antibiotic treatment with cefotaxime was initiated. Analysis of the purulent fluid revealed Gram-negative coccobacilli. *M. lacunata* grew in culture, which was sensitive to ampicillin, amoxicillin/clavulanate, cefazolin, cefuroxime, ciprofloxacin, and amikacin. The remaining microbiological studies, including blood, pharyngeal, and conjunctival exudate cultures, were negative. In light of previous reports of *M. lacunata* as an etiological agent in infective endocarditis,³ an echocardiogram was carried out; no endocardial compromise was found. Extensive and progressive debridement, including amputation of both the fifth and fourth left fingers, was necessary in order to control the infection. A skin allograft with limited functional results was carried out when it became possible (Figure 1, panel C). The patient was discharged after 54 days and deported to his country of origin, so follow-up was not possible.

3. Discussion

Moraxellae are Gram-negative, coccoid-shaped bacteria often found as commensals in the upper respiratory tract and considered to have a low pathogenic potential.^{4,5} Among them, *Moraxella catarrhalis* is the most important pathogen for humans and is a cause of sinusitis, otitis media, tracheitis, bronchitis, and pneumonia.⁶ Less frequently *Moraxella spp* have been present in cases of endophthalmitis,⁵ conjunctivitis,⁷ infectious arthritis,⁸ and spondylodiscitis.⁹ *M. lacunata* is classically associated with conjunctivitis⁷ and has not previously been shown in severe SSTIs. A few observations of wound infections caused by *Moraxella spp* other than *M. lacunata* have been described.^{4,10–12} Also, *M. lacunata* has been responsible for cases of invasive infection,¹³ osteoarticular infections such as spondylodiscitis⁹ and septic arthritis,¹⁴ and endocarditis.³

Another matter of interest is the source of the infection. Although *M. lacunata* is usually found as a part of the normal commensal flora of the upper respiratory tract, neither throat cultures nor conjunctival cultures were positive in our patient. However, it should be noted that those samples were collected after initiation of antibiotic treatment. Infective endocarditis as a possible secondary source of

infection was reasonably ruled out by echocardiogram. Therefore, the most likely source of infection was the respiratory tract.

Apart from the extremely rare and newly described presence of *M. lacunata* causing a compartmental syndrome, this case is remarkable for the occurrence of a severe SSTI in a sub-Saharan young male, leading to an ischemic condition of the upper limb, which ultimately required amputation. We have previously reported cases of SSTI of the lower limbs (named patera foot syndrome) in young immigrants who have crossed the ocean in small overcrowded boats and in inhuman conditions.² These people, as in the present case, frequently suffer from a type of SSTI whose pathogenesis is reminiscent of an ischemic process, with Gram-negative bacteria the cause of the clinical picture. This was our first experience of a severe infection of the upper limb similar to that of patera foot syndrome. This case partly supports our theory proposing that a compartmental syndrome, favored by a reduction in compliance of the skin in relation to race, may be implicated in the pathogenesis of patera foot syndrome.²

4. Conclusions

To the best of our knowledge, this is the first case of an *M. lacunata* human-skin infection. This case has strengthened our previous observation of an ischemic pathogenesis of the SSTI seen in sub-Saharan immigrants. The Gram-negative bacteria *M. lacunata* should be included in the list of organisms causing SSTI in this group of immigrants. Although, involvement of the lower limb is the clinical characteristic of patera foot syndrome, the upper limb can be affected.

Conflict of interest

The authors declare that they have no competing interests.

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