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Case report

Anti-infective therapy without antimicrobials: Apparent successful treatment of multidrug resistant osteomyelitis with hyperbaric oxygen therapy

Elsa Goerger[a], Estelle Honnorat[a,b], Hélène Savini[d], Mathieu Coulange[c], Eric Bergmann[c], Fabrice Simon[d], Piseth Seng[a,b,e], Andreas Stein[a,b,e,*]

[a] Service Des Maladies Infectieuses, Centre Hospitalo-Universitaire de la Conception, 147 boulevard Baille, 13005 Marseille, France
[b] Centre Interrégional de Référence des Infections Ostéo-articulaires Méditerranée Sud, 147 boulevard Baille, 13005 Marseille, France
[c] Centre De Médecine Hyperbare, Pôle RUSH, Hôpital Sainte-Marguerite, Marseille, France
[d] Service de Maladies Infectieuses, Hôpital d'Instruction des Armées Laveran, 13013 Marseille, France
[e] Aix-Marseille Université, URMITE, CNRS UMR 6236, Faculté de Médecine, 27 Bd Jean Moulin, 13385 Marseille Cedex 05, France

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Introduction

Infections due to multidrug-resistant bacteria have spread in the world and cause significant morbidity and mortality [1]. Bone and joint infection due to multidrug-resistant bacteria has become a major problem, limiting the efficacy of targeted treatment and compromising outcomes. Indeed, antimicrobial options are limited and extensive surgical procedures are required.

Adjunctive hyperbaric oxygen therapy (HBO) has been reported as an effective treatment in soft tissue infection caused by anaerobic bacteria, such as gas gangrene, necrotizing fasciitis and Fournier's gangrene. HBO has also been extensively used to improve wound healing in the treatment of diabetic foot infections and osteitis [2]. We report an apparent successful treatment of OXA-48 type carbapenemase-producing *K. pneumonia* osteomyelitis with HBO without any concomitant antimicrobial.

Case presentation

In December 2012, a 65-year-old French man was admitted to the infectious disease unit of the Laveran military teaching hospital in Marseille for a necrotic wound on the right foot. He treated with insulin regimens for an uncomplicated and controlled type 2 diabetes mellitus. The patient had no peripheral vascular disease. During a trip for thalassotherapy in Tunisia in November 2012, he was admitted to the emergency unit for excoriations and contusions on his right leg after a fall in a bathroom. A few days later, he was admitted to the intensive unit care (ICU) for septic shock, a complication of the skin infection on his right lower leg. The microbial analysis of blood cultures and wound swabs revealed negative. He was treated with norepinephrine and three-weeks of antimicrobial treatment i.e. amoxicillin/clavulanic acid, ofloxacin and fusidic acid. At the three weeks of his hospitalization, he was discharged from the ICU and was transferred from Tunisian hospital to the infectious disease unit of the Laveran military teaching hospital in Marseille, France.

On his arrival in Laveran hospital, he was afebrile, his pulse was 135 beats/min and he was normotensive. The physical examination showed painless ulcerations with a (7 × 6 cm) necrotic appearance

* Corresponding author at: Centre Interrégional de Référence des Infections Ostéo-Articulaires Méditerranée Sud; Service des Maladies Infectieuses, CHU de la Conception, 147, boulevard Baille, Marseille, France.
E-mail address: andreas.stein@ap-hm.fr (A. Stein).

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Fig. 1. Wound images on his admission.

on the dorsum of the right foot, (2 × 1.5 cm) on the plantar of the right foot, (5.5 × 2.1 cm) internal and (6 × 2 cm) external malleoli and the (3.5 × 2 cm) right calf. The extensor digitorum longus tendons of the third, and fourth toes were exposed with a positive results of the probe-to-bone test. He also had an induration of the right leg and the distal portion and inner right thigh (Fig. 1).

Magnetic resonance imaging (MRI) of the leg showed an osteoarthritis of the midfoot with hypointense on T1 and hyperintense on T2 of midfoot and a talocrural joint effusion (Fig. 2) associated with a serious loss of skin substance at level of the dorsum foot, the lateral malleolus, the talus bone, the right foot muscles, and tenosynovitis of posterior tibial tendon (Fig. 3). Laboratory investigations revealed a high level of C-reactive protein (64.3 mg/L), a normal leukocyte count and a low hemoglobin concentration (7.5 g/L). Multiple skin and deep samples tested positive for OXA-48-type carbapenemase-producing *K. pneumoniae*. Urine and stool samples also tested positive for OXA-48-type carbapenemase-producing *K. pneumoniae*.

In December 2012, he was transferred to the reference center for bone and infectious disease in Marseille. All antimicrobials were stopped and hyperbaric oxygen treatment and wound care including a daily wound cleaning with antiseptic (povidone-iodine) covered with a sterile dressing with silver (AQUACEL® Ag Surgical dressings, ConvaTec Inc), were provided after a multidisciplinary discussion. No topical antibacterial was used in wound care. The patient was placed in isolation during hospitalization. The clinical outcome noted a rapid improvement with persistence

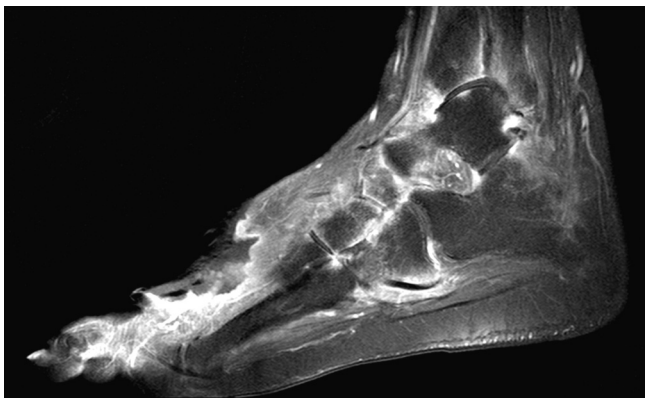

Fig. 2. Magnetic resonance imaging (MRI) of the leg showed an osteoarthritis of the midfoot and a talocrural joint effusion associated with a serious loss of skin substance at level of the dorsum foot.