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CASE REPORT

Linezolid resistant *Staphylococcus epidermidis* in a patient with a knee replacement[☆]

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KEYWORDS

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PALABRAS CLAVE

Estafilococos coagulasa-negativos;
Infección protésica;
Linezolid;
Resistencia a antibióticos

Abstract *Staphylococcus epidermidis* is the most prevalent species of coagulase-negative staphylococci (CNS). It accounts for over 65% of all staphylococci isolated from samples. In recent years the increasing relevance of CNS as pathogens is evident, mainly causing bacteraemia and prosthetic device infection. Linezolid, being an effective antibiotic against this pathogen, and due to its ease of use and oral posology, is becoming the treatment of choice in outpatients. However, the continued use of this drug is causing the development of resistant strains. We describe a prosthetic infection due to linezolid resistant *S. epidermidis* that appeared in a patient who had been previously treated with this drug for 16 days due to the isolation of *Bacillus* sp. This case was not related to a resistant strain hospital outbreak.

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Staphylococcus epidermidis resistente a Linezolid en paciente portador de prótesis de rodilla

Resumen *Staphylococcus epidermidis* es la especie más prevalente de los estafilococos coagulasa negativos (ECN). Supone más del 65% de todos los estafilococos aislados en las muestras. En los últimos años el protagonismo como patógenos es manifiesto, fundamentalmente causando bacteriemia e infección de material protésico. El linezolid, por ser un antibiótico eficaz frente a este patógeno y ante su facilidad de uso por vía oral, está siendo de elección en el tratamiento de estas infecciones en el domicilio. Sin embargo el uso continuado de este fármaco está causando la aparición de resistencias. Presentamos el caso clínico de una infección protésica por *Staphylococcus epidermidis* resistente a linezolid en un paciente en el que previamente se había

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aislado *Bacillus* sp., motivo por el que había recibido este antibiótico durante 16 días. El caso no estuvo relacionado con un brote intrahospitalario de *Staphylococcus epidermidis* resistente a linezolid.

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Introduction

Staphylococcus epidermidis (*S. epidermidis*) is the most prevalent species of the coagulase-negative staphylococci (CNS), representing more than 65% of all staphylococci isolated in specimens. These bacteria have become prominent as pathogens in recent years, causing bacteraemia and foreign body infections, primarily. The majority of *S. epidermidis* infections are nosocomial in origin.¹

S. epidermidis is the leading cause of nosocomial bacteraemia associated with intravascular devices. Foreign body infections (catheters, prosthetic heart valves, vascular and joint prostheses, for example) are typically slow to progress, with local clinical manifestations (suppuration, pain, and dysfunction of the implant) more pronounced than systemic manifestations (fever and leukocytosis).²

Linezolid is the antibiotic of choice for home treatment of these infections because it is effective against this pathogen and easy to use in oral form. Continued use of this drug is causing resistance to appear, however, especially in intensive care units. We present a case of resistance to linezolid arising from brief use of this drug.

Clinical case

The patient was an 81-year-old female who was allergic to vancomycin and beta-lactams. Highlights of her medical history included arterial hypertension, hypochromic microcytic anaemia, irritable colon, sigmoid diverticulosis, anxious-depressive syndrome, and obesity hypoventilation syndrome. She had undergone the following surgeries: appendectomy, phakectomy, hysterectomy, right total knee replacement in 1999, and left total knee replacement in 2000. The patient was admitted in February of 2011 for aseptic loosening of the right knee prosthesis. She underwent a replacement in one time where, because of poor bone quality, the choice was made to implant an oncological prosthesis (MUTARS). On intra-operative cultures, a *Bacillus* sp. was isolated in less than half of the specimens obtained. Even so, the decision was made to initiate treatment with linezolid and rifampicin (which was continued for 16 days) to prevent failure of the prosthetic implant because the Traumatology Service thought that, if this prosthesis failed, it would be impossible to implant another one. The patient did not progress well post-operatively, and irrigations of the area were required. *S. epidermidis* resistant to linezolid was isolated from specimens taken in the operating room.

Discussion

Resistance to linezolid is determined by the presence of 23S ribosomal RNA mutation G2576T.³ However, the detection

of plasmid-borne cfr-mediated resistance genes in staphylococci recovered from human specimens in the United States adds another dimension to the threat against linezolid's clinical efficacy.⁴

LEADER, the surveillance program monitoring linezolid resistance in United States hospitals, reported that isolations of linezolid-resistant CNS increased by 0.2% in 2004 and 1.63% in 2008.⁵ Although resistance surveillance programs around the world show that linezolid resistance is rare,⁵ the emergence of resistant strains at medical centres in a particular locality has become a major concern. Several outbreaks of resistant strains have been reported to date among patients admitted to ICU and to a cancer treatment centre.^{3,6-8} Genetic studies during these outbreaks demonstrated that the isolations were related—most of them originating from a single resistant strain that was probably selected following increased antibiotic pressure. It has been shown that linezolid therapy during the 3 months prior to CNS isolation is a risk factor for infection with resistant CNS.³ The resistant strain becomes established as part of the skin flora and colonizes the environment, as well, thereby making it possible for patients who have never been on linezolid therapy to be infected with resistant CNS, most likely transmitted patient-to-patient or by healthcare personnel.⁶⁻⁸

The appearance of linezolid resistance is noteworthy, in this case, for it was not in the context of a hospital outbreak, and the patient, who had not previously taken this antibiotic, was treated for only 16 days.

Evidence level

Evidence Level IV.

Conflicts of interest

The authors have no conflicts of interest to declare.

Ethical Disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this investigation.

Confidentiality of Data. The authors declare that no patient data appears in this article.

Right to privacy and informed consent. The authors declare that no patient data appears in this article.

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