



# Enfermedades Infecciosas y Microbiología Clínica

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## Scientific letter

### Upper limb abscess due to an unusual *Clostridium* species in an immunocompetent child



#### *Absceso en extremidad superior por una especie inusual de Clostridium en una niña inmunocompetente*

The microorganisms that most frequently cause skin abscesses are *S. aureus* and *S. pyogenes*. However, anaerobic bacteria are also a common aetiology in wound-associated infections.<sup>1</sup> Among them, the *Clostridium* genus is particularly important, as its spores can infect wounds and open fractures, with *C. perfringens*, *C. histolyticum*, *C. novyi* and *C. septicum* being the most common. Here we present a case of an upper extremity abscess due to an unusual species of *Clostridium*.

A 5-year-old girl, fully vaccinated and with no relevant medical history, suffered an injury after impaling it on a piece of wood while playing in the park. In paediatric Accident and Emergency, she was given a dose of IV amoxicillin and the fragment was removed without apparent complications, so she was discharged with a one-week course of oral cefadroxil. However, check-up of the wound a week later showed the patient had developed cellulitis and spontaneous drainage from a purulent-looking collection. It was decided to admit her to paediatric surgery, she was prescribed IV amoxicillin-clavulanic acid therapy, and a microbiological study of the collection was requested. On day three of admission, Ultrasound-Doppler detected a 2.5 cm residual fragment of wood in the patient's elbow, so surgery was scheduled to remove it. During surgery, the fragment was removed, lavages performed with vancomycin, hydrogen peroxide and Betadine®, and the wound was closed. On day six of admission, the antibiotic therapy was discontinued and the patient was discharged due to the good appearance of the wound. Paediatric orthopaedics carried out weekly outpatient check-ups, and the patient was definitively discharged at the third check-up due to resolution of the condition.

On arrival at the laboratory, the skin abscess sample was cultured under aerobic and anaerobic conditions. At 48 h, the aerobic culture was negative, while in the blood agar medium for anaerobes (Wilkins Chalgrens®) supplemented with amikacin, there was scant growth of flat, transparent colonies with irregular edges and slightly β-haemolytic. Using MALDI-TOF (Bruker®), the microorganism was identified as *C. subterminale* with a score of 1.9, but not unanimously. The definitive identification was carried out by detection of the 16S rRNA gene using real-time PCR and subsequent Sanger sequencing of the fragment. After comparing the sequence obtained in the Basic Local Alignment Search Tool (BLAST) NCBI database, the identification of *C. subterminale* was confirmed. Antibiotic sensitivity was determined by E-test as described in the corresponding section of Sociedad Española de Enfermedades

**Table 1**  
Susceptibility study of *C. subterminale* using E-test.

Antibiotic	MIC (mg/l)	Status
Penicillin	0.032	Sensitive
Amoxicillin/clavulanic acid	≤ 0.016	Sensitive
Piperacillin/tazobactam	0.064	Sensitive
Cefoxitin	1	—
Meropenem	0.006	Sensitive
Clindamycin	0.094	Sensitive
Moxifloxacin	0.19	—
Metronidazole	0.032	Sensitive

Infecciosas y Microbiología Clínica (SEIMC) [Spanish Society of Infectious Diseases and Clinical Microbiology] procedure 11. The EUCAST 2023 breakpoints for *C. perfringens* were followed, as shown in Table 1.

*C. subterminale* is a saprophytic soil bacterium, closely related to *C. botulinum* group IV, which has been occasionally associated with skin and soft tissue infection,<sup>2,3</sup> pleuropulmonary infection<sup>2,4</sup> and bacteraemia,<sup>5–7</sup> and the production of botulinum toxin type A has also been reported.<sup>8</sup> A 2022 literature review<sup>9</sup> suggests that *C. subterminale* infection primarily affects patients with underlying disease and immunosuppressed patients. In terms of treatment, drainage or surgical debridement was essential in all cases, and, although antibiotics were administered in each case, an antibiogram was only available for two of the 14 patients.

Here we present a case of *C. subterminale* infection in a wound caused by a wood fragment in a 5-year-old immunocompetent girl with no other medical history. The patient was initially treated with cefadroxil (unlikely activity) and subsequently with amoxicillin-clavulanic acid (sensitive). However, this case did not resolve until the abscess was drained. We believe that further studies are necessary to evaluate whether antibiotic therapy provides additional benefit to drainage in these infections and, if so, which antibiotic is the most appropriate. This case reinforces the need to consider *C. subterminale* as a cause of infections, even in healthy paediatric patients, and assess the utility of anaerobic culture of abscesses, and to confirm identification at the species level by molecular biology.

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## Diagnostic accuracy of LIAISON MeMed VB® for bacteremia in the Emergency Department



### Precisión diagnóstica de LIAISON MeMed BV® para la bacteriemia en el servicio de urgencias

Dear Editor,

Patients in accident and emergency departments (A&E) with infection represent 15–20% of all patients seen daily in Spain.<sup>1</sup> The severity of clinical presentation and short-term (30 days) mortality rates have increased over the last ten years, particularly in patients who meet sepsis criteria, have significant comorbidities, are immunocompromised, older or have significant bacteraemia confirmed from the A&E. The mortality rate in these patients is two to three times higher than in other patients with the same condition.<sup>1</sup>

In this scenario, the early and appropriate administration of antibiotic therapy (AB), control of the source of infection, and immediately making other decisions (for example, requesting additional tests, obtaining blood cultures and other microbiological samples and the intensity of haemodynamic support), have a direct impact on the survival of patients with severe bacterial infection and bacteraemia.<sup>2</sup>

In recent years, there has been an ever greater search for tools to help with early predicting of diagnosis, prognosis and, along with the possible bacterial aetiology, the suspicion of bacteraemia. Biomarkers of inflammatory response and infection (BMIRI)<sup>3,4</sup> have proven useful in predicting and detecting the existence of true bacteraemia, both as independent predictors<sup>3,5,6</sup> and as part of predictive models of bacteraemia.<sup>7–9</sup> Of all the BMIRI, procalcitonin (PCT) is also very sensitive and specific in predicting bacterial infection and in guiding towards the pathogen causing the infection, its clinical course (to sepsis and septic shock) and mortality risk.<sup>3,5</sup>

A new test has recently been described based on abnormal concentrations of different proteins produced in the immune response. Called LIAISON® MeMed®, the test scores based on a model that correlates the results of three soluble host proteins, making it possible to distinguish between the bacterial or viral origin of an infection.<sup>10</sup> However, to date, no studies have been published assessing the ability of LIAISON® MeMed® to predict bacteraemia. This diagnostic test includes a score based on the combination of the concentration of three circulating proteins in blood of BMIRI induced by both viruses and bacteria: (1) tumour necrosis factor-related apoptosis-inducing ligand (TRAIL), which is elevated as an expression of viral infection and decreased in bacterial infection; (2) interferon gamma-induced protein 10 (IP-10), which is increased more in viral

and to a lesser extent in bacterial infections; and (3) C-reactive protein (CRP), which shows an opposite pattern to IP-10. The presence of unrelated host proteins involved in different pathways could improve diagnostic accuracy.<sup>10</sup>

In this context, our aim was to investigate the ability of the MeMed® test to predict bacteraemia in adult patients in A&E in whom infection is suspected and to compare its performance with PCT. We conducted this observational, prospective cohort study on adult patients seen in an A&E with a clinical diagnosis of an infectious process from whom we were able to take samples to run laboratory and microbiological tests (blood cultures [BC] in all cases). Cases were included by opportunity (when investigators were on duty). The dependent variable considered was the diagnosis of true bacteraemia (TrB), which was defined, according to criteria already published by the authors in other articles,<sup>8,9</sup> as the isolation of normally pathogenic bacteria in one or both of the two BC with consistent signs and symptoms. Contaminated BC was defined as isolation in a single BC bottle of coagulase-negative *Staphylococcus* (CONS), *Bacillus* spp., *Streptococcus* from the group viridans, *Micrococcus* spp., *Propionibacterium* spp., *Corynebacterium* spp. or other Gram-positive bacilli when the absence of clinical significance was interpreted in these cases (confirmed based on the history and/or at the discretion of the physician on duty and microbiology).

The predictive ability was analysed with the area under the receiver operating characteristic (ROC) curve (AUC) and the sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) of PCT and the LIAISON® MeMed® test. A total of 345 patients were included, 61 (17.7%) with TrB (the isolated microorganisms considered as TrB or significant bacteraemia are shown in Table 1). The mean age was 66.48 (SD 18.84) years; 58% were male. The MeMed® AUC-ROC for predicting TrB was 0.94 (95% CI: 0.87–1.00;  $p < 0.001$ ), while the PCT AUC-ROC was 0.83 (95% CI: 0.77–0.89;  $p < 0.001$ ). With a cut-off point (CP) >65 points for the MeMed® test, we obtained an AUC-ROC of 0.91 (95% CI: 0.83–0.98;  $p < 0.001$ ), Se: 85%, Sp: 93%, PPV: 97% and NPV: 64%. Meanwhile, with a CP for PCT of  $\geq 0.51$  ng/mL, we obtained an AUC-ROC of 0.82 (95% CI: 0.76–0.88;  $p < 0.001$ ), Se: 74%, Sp: 85%, PPV: 93% and NPV: 56%.

In conclusion, in adult patients seen in A&E with clinically suspected infection, the LIAISON MeMed® test has an acceptable ability to predict TrB and performs better than PCT.

## CRedit authorship contribution statement

The four authors declare that they were responsible for the design, development and preparation of the article.