Recurrent Peritonitis Due To *Caulobacter crescentus* as a Rare Cause of Dialysis Technique Failure

We present the clinical case of a patient undergoing peritoneal dialysis (PD), suffering from relapsing peritonitis due to *Caulobacter crescentus*. Despite continual adapted treatments, she had to be transferred to hemodialysis due to relapses. The source of the infection was never determined.

CASE REPORT

A 63-year-old woman with end-stage chronic kidney disease due to autosomal dominant hepatorenal poliquistosis disease presented with peritonitis. She had been undergoing treatment with an automated PD program (Gambroxol trio, APD 8 exchanges of 1,550 mL for 51 minutes, total volume of 12,400 mL and total time of 8 hours 30 minutes, for 2 years).

Owing to clinical signs of peritonitis, peritoneal effluent was tested for a gram-negative bacillus, identified as *Campylobacter jejuni* (API Campy, bioMérieux, Durham, NC, USA). She was initially scheduled for observation, with vancomycin and ceftazidime administered intraperitoneally for 11 days and, thereafter, oral amoxicillin-clavulanic acid (according to antibiogram) for a further 15 days. Peritonitis reoccurred 10 days later and vancomycin and ceftazidime were administered intraperitoneally once again for the next 14 days. A new gram-negative bacillus, categorized as *Caulobacter crescentus/vibrioides* was identified (colony identification by matrix assisted laser desorption ionization coupled to time of flight mass spectrometry (MALDI-TOF MS), Bruker Daltonics GmbH, Germany, a recent procedure used in our laboratory, and confirmed by the taxonomy laboratory at the ISCIII, Spain). The treatment was continued for another 2 weeks and subsequently replaced with oral amoxicillin clavulanic acid (all of them according to antibiogram) for 7 days. During the following 2 months, the patient suffered 3 further occurrences, in which *Caulobacter crescentus* was again identified in the peritoneal effluent. However, she was successfully treated with the same antibiotherapy program as previously administered, resulting in a complete recovery.

Samples from all water sources close to the patient (at home and the surrounding vicinity) were taken in order to determine the source of infection, but the agent was not identified. Owing to the high incidence of peritonitis, despite the use of heparin as a preventive agent, the PD catheter was removed. Any bacteria was isolated in the catheter tip culture, and she was placed on a hemodialysis program, which prevented any further infections by *C. crescentus*.

DISCUSSION

Caulobacter spp. consist of gram-negative, aerobic and oligotrophic bacteria, belonging to Alpha proteobacteria, with

a complex cell cycle: after an asymmetric division, 2 different daughter cells are created: a 'swarmer cell' (flagellated) and a 'stalked cell,' which secretes a sticky substance attaching it to all surfaces (1). It is found in the ground, in the sea, and in fresh water sources (such as rivers, lakes, and drinking water, including tap and bottled water), as well as in the water for hemodialysis (2,3).

Our enquiries have uncovered only 1 reported case of the disease in humans caused by this bacteria: an episode of peritonitis in a patient on PD (4) in which, like in our case, it was ruled out that its isolation was due to contamination, and the source of infection could not be determined because of its ubiquitous nature (2,3). We suspected that it might be present in the PD solution bags, although this could not be proven, since they had not previously been tested. The pharmaceutical company responsible for supplying them confirmed that they had not received any reported instances of recurrent, or even sporadic, peritonitis caused by this organism from any other nephrology service.

The scarcity of data on human infections of such a ubiquitous microorganism may also be due to the fact that standard laboratory screening methods are unable to identify it, so the actual prevalence may be much higher than what is known. Our patient's first episode may also have been caused by this bacteria rather than *C. jejuni*, since both share a similar morphology and the API Campy method is unable to detect *Caulobacter spp.* However, in the following episodes, *C. crescentus* was diagnosed due to MALDI-TOF MS, which is able to detect and classify it, and was confirmed by genetic sequencing (5) (the 'gold-standard' of diagnostic methods). Although there are no particular clinical features which lead us to suspect *Caulobacter spp.*, we should nevertheless think of it in patients with relapsing peritonitis, especially in negative cultures regarding common bacteria (4).

In conclusion, we present the second case of peritonitis caused by *C. crescentus* and the first one of relapsing peritonitis. Increased effort is required to correctly determine the bacteria responsible for peritonitis, even when the presence of rare strains is suspected, and especially in relapsing peritonitis. New laboratory methods should be used, as well as genetic sequencing, which is the most reliable diagnostic method to date.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

Consolación Rosado*
Rosario Manzanedo
Rosario Ibáñez
Carmen Felipe
Amparo Sampedro
Carmen Sánchez-Fonseca
María Jesús Vega
Begoña Alaguero
Amelia Fidalgo

Carlos Chacón
Jesús Martín-García

Care Complex of Ávila, Service of Nephrology and
Microbiology, Ávila, Spain

*email: crosadorubio@hotmail.com

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