The role of a rapid diagnosis in *Ralstonia pickettii*-induced hospitalization in a frail patient.

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Introduction

Ralstonia pickettii is an opportunistic bacillus enclosed in pseudomonas species, reclassified into the genus burkholderia of low virulence emerging nosocomial pathogens [1-6]. The use of contaminated solutions induces the development of systemic infections [7], particularly in immunocompromised patients [8-10]. We report a frail patient that developed a serious bacterial infection after dialysis, quickly identified using a Maldi-TOF technology.

Description

We describe a 69-year old man, with a clinical history of myeloma (2008), diabetes Type II, renal failure (grade IV), and colon cancer that presented us with acute asthenia and fever (38°C). He was quickly hospitalized, and referred that symptoms and fever appeared at the end of dialysis. A blood sample was taken for both biochemical and microbiological evaluation. Microbiological analysis revealed a severe increase in Procalcitonin Plasma Levels (PCT, 21.12 ng/mL; normal range<0.5 ng/mL), and blood culture isolated a Gram-negative bacterium. Biochemical blood tests documented a significant decrease in blood cells (red cells 2.66; white cells 3.53, platelets 102) and in haemoglobin (8.5 gr/dL; normal values 13.8 gr/dL to 17.2 gr/dL). Taken together clinical and laboratory data were suggestive of a bacterial sepsis; therefore an empirical treatment with ceftazidime (2 gr/day) was started. Three days later, both clinical evaluation and laboratory test documented the persistence of infection (fever 38.5°C; C-reactive protein 41.5; PCT 36.2, red cells 2.65; white cells 3.52, platelets 100, LPS 0.48, haemoglobin 8.7 gr/dL). The venous catheter for dialysis was removed, and a blood sample was taken for a new microbiology evaluation. Laboratory culture on blood Agar plate isolated a non-fermenting Gram-negative oxidase-positive bacillus. Using an automated mass spectrometry microbial identification system with Maldi-TOF technology (Biomarieux), it was identified as *Ralstonia pickettii*. Antibiogram documented a high resistance to cefotaxime (MIC 8) and ceftazidime (MIC 16) and a susceptibility to imipenem (MIC 0.25) and meropenem (MIC 2). An intermedium resistance was reported for ciprofloxacin (MIC 0.5) and piperacillin/tazobactam (MIC 8). Ceftazidime was dismissed and meropenem (2 gr/day) was added, with a clinical improvement in about 10 days.

Discussion

In a previous study, Chen et al. [11] reviewing literature data reported that several gram-positive and gram-negative bacteria can form biofilms on medical devices (e.g. *Enterococcus faecalis*, *Staphylococcus aureus*, *Staphylococcus epidermidis, Streptococcus viridans, E. coli, Klebsiella pneumoniae, Proteus mirabilis and Pseudomonas aeruginosa*). In particular, these authors documented that amongst them, *S. aureus* and *S. epidermidis* cause about 40% to 50% of prosthetic heart valve infections, 50% to 70% of catheter biofilm infections and 87% of bloodstream infections [11]. Considering these epidemiological data, in absence of bacteria isolation, an inappropriate treatment could be started. In the present case a treatment with ceftazidime was started without improvement of infection. Several years ago, Kimura, et al. and Anderson, et al. [12, 13] described the presence of *Ralstonia pickettii* in a wide range of temperature (15°C to 42°C) and in saline solution [12, 13]. Moreover, Dobrowsky, et al. [14] detected *R. pickettii* in dialysis water treatment facilities equipped with Chlorinated Polyvinyl Chloride (PVC-C) piping, suggesting that PVC-C promotes growth of *R. pickettii* biofilms, while residual organic carbon in purified dialysis water is sufficient for promoting substantial growth of planktic *R. pickettii* and can form biofilms inside plastic catheters. In a recent review Yiek, et al. [15] found 11 reports of hemodialysis-associated outbreaks and, even if uncommon they reported that tubing within the dialysis machine may be the site of biofilm development. These authors observed that patient became infected because the dialysis water exceeded the maximum amount of chemical and microbial contaminants due to lack of disinfection. Moreover, treated water is often stored in reservoirs where it is distributed to dialysis machines, and it has been documented that water stagnancy induced bacterial contamination of the water in the pipe systems [16].

Conclusion

Other sources of contamination were related to inadequate cleaning procedures that left leaking connections of the RO tubing. Biofilm-forming bacteria and other microorganisms present in cleaning solutions could have entered the water system through this opening. It is known that tubing connections are critical segments of the system and are a possible site for biofilm development.

In our patient we can suppose that the infection could be related to dialysis, in fact symptoms appeared after the dialysis, and other causes of infection were ruled out. However, we are not able to document it, but this study supports the use of Maldi-TOF mass spectrometry in the detection of uncommon microorganisms to induce both a rapid identification and an appropriate antimicrobial treatment.

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