



Right-Sided Endocarditis Secondary to *Aeromonas hydrophila*: A Case Report

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Abstract

Right-sided endocarditis represents a distinct clinical condition observed in individuals with a history of parenteral drug use or those with implanted pacemakers or other intracardiac devices. *Aeromonas* infections, although uncommon in humans, particularly endocarditis cases, are exceedingly rare. Here, we report the case of a 72-year-old female with a medical history of arterial hypertension and chronic kidney disease undergoing hemodialysis via a tunneled permanent central venous catheter. She presented with chills and a fever of 38.3°C. Physical examination revealed a grade 3 protosystolic murmur at the tricuspid focus. Blood cultures from central and peripheral sites yielded growth of *Aeromonas hydrophila*. Transthoracic echocardiography demonstrated a fusiform, semi-mobile vegetation measuring 16 x 15 mm at the outlet of the superior vena cava, suggestive of endocarditis. Intravenous fluoroquinolones were initiated based on antibiogram results, leading to resolution of imaging findings after a 21-day treatment course.

Key word: endocarditis, aeromonas, aeromonas hydrophila, central venous catheters: fluoroquinolones.

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Introduction

Right-sided endocarditis is a distinct clinical entity typically seen in patients with a history of parenteral drug addiction or those with pacemakers or other intracardiac devices(1). Unlike left-sided endocarditis, it carries a more favorable prognosis and requires different management approaches(2). Fever in patients with such risk factors should prompt suspicion of endocarditis, necessitating confirmation through blood cultures and echocardiography, either transthoracic (TTE) or transesophageal (TEE), depending on anatomical considerations(3). Although *Aeromonas hydrophila* infections in humans are rare, with gastrointestinal, skin, and soft tissue infections being more common, instances of endocarditis are exceptionally rare(4). This study aims to present a case of right-sided endocarditis secondary to *A. hydrophila* in a female with a central venous catheter (CVC) for hemodialysis.

Clinical Cases

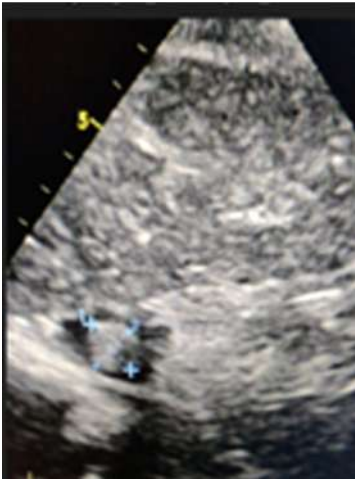
A 72-year-old female with a history of arterial hypertension and chronic kidney disease undergoing hemodialysis-type renal replacement therapy using tunneled permanent CVC during her hemodialysis session, the patient presented chills and fever quantified at 38.3°C, with a direct interrogatory denying respiratory and urinary symptoms. She had central and peripheral blood cultures taken and was referred to the emergency room for a diagnostic/therapeutic approach. She was admitted with vital signs of blood pressure 94/59 mm Hg, heart rate 78 beats per minute, respiratory rate 18 breaths per minute, temperature 36.5°C, and oxygen saturation 96% in room air. The physical examination revealed the presence of a grade 3 protosystolic murmur in the tricuspid focus. Laboratory studies were performed, which were interpreted as metabolic acidosis (pH 7.09, HCO₃-17.6), grade 1 normocytic normochromic anemia (hemoglobin 10.9 g/dL), severe thrombocytopenia (platelets 37x10⁹/L) and mild euvolemic hypoosmolar hyponatremia (sodium 132.8 mmol/L). A chest x-ray and a general urine test were taken,

both without alterations, and the patient was transferred to the internal medicine floor.

Due to the suspicion of endocarditis, the cardiology service was consulted, which performed a TTE, which reported among its findings an image suggestive of vegetation at the outlet of the superior vena cava, fusiform, semi-mobile, measuring 16 x 15 mm, without valves alterations and preserved left ventricular ejection fraction (LVEF)(Figure 1).

Figure 1

Transthoracic echocardiogram that showed an image suggestive of vegetation at the outlet of the superior vena cava, fusiform, semimobile, and with dimensions of 16 mm x 15 mm



The blood cultures reports showed *A. hydrophila* growth, which was sensitive with a minimum inhibitory concentration (MIC) <8 µg/mL to chloramphenicol, tobramycin, gentamicin, trimethoprim/sulfamethoxazole, levofloxacin, and ciprofloxacin, in descending order (Table 1). It was decided to consult the Department of Infectious Diseases, who suggested starting levofloxacin 500 mg intravenously every 24 hours for 21 days.

Table 1
Central blood culture antibiogram

Antibiotics	MIC (µg/mL)	Interpretation
Amikacin	≤ 16	S
Aztreonam	≤ 8	I
Cefepime	≤ 8	I
Ceftazidime	≤ 8	I
Chloramphenicol	≤ 4	S
Ciprofloxacin	≤ 0.5	S
Gentamicin	≤ 2	S
Levofloxacin	≤ 1	S
Piperacilin/Tazobactam	≤ 16	S
Tetracycline	>8	R
Tobramycin	≤ 4	S
Trimethoprim/Sulfamethoxazole	≤ 2	S

I: Intermediate, R: Resistant, S: Susceptible.

A follow-up TTE was taken after seven days, which reported a decrease in vegetation to diameters of 13 x 15 mm, so the antibiotic scheme was continued, and new blood cultures were taken, with the same growth reported. After 15 days, it was decided to take a new TTE, in which vegetation was no longer observed, so it was decided to end the antibiotic regimen until the days previously indicated by the Department of Infectious Diseases and discharge the patient.

Discussion

Right-sided endocarditis pertains to infective endocarditis affecting the right heart chambers and their respective valves(5). Despite extensive literature on left-sided endocarditis, further research is warranted on this specific manifestation. Right-sided endocarditis constitutes 5-10% of all cases of infective endocarditis(5). The lower incidence can be attributed to relatively uncommon pathological conditions affecting the right-sided valves, including congenital malformations, variations in vascularity and endothelial characteristics, lower pressure gradients and jet velocities across the valves, reduced right-sided wall stress, and decreased oxygen content in venous blood(5). Upon comparison with our patient's medical history and imaging, congenital malformations were ruled out.

Right-sided endocarditis is frequently linked to intravenous drug use, intracardiac devices, and CVC, which have seen increased prevalence in recent years(6). Our patient did not have a history of intravenous drug use or an intracardiac device; however, she had a tunneled hemodialysis catheter, known as a permacath. Approximately 90% of right-sided endocarditis cases involve the tricuspid valve, primarily associated with intravenous drug use(5). In cases where CVC is a risk factor, instances of non-valvular endocarditis have been reported, such as our patient's case with vegetation at the outlet of the superior vena cava(6). When an intravascular catheter is inserted, a fibrin sheath may form, potentially leading to pericatheter thrombus development due to endothelial damage during catheter placement. Within 30 days, this thrombus can develop an endothelial layer resembling the vein and may persist even after catheter removal. It is theorized that these fibrin sheaths serve as a nidus for infection in the presence of bacteremia(6).

Echocardiography serves as the primary imaging modality for detecting right-sided endocarditis. Transthoracic echocardiography (TTE) offers valuable insights due to the anterior positioning of right-sided structures, facilitating close proximity to the TTE transducer (5). However, certain anatomical factors may impede optimal imaging, potentially limiting TTE sensitivity and necessitating transesophageal echocardiography (TEE) (5). Particularly in regions near or within the superior vena cava, like in our patient's case, TEE demonstrates superior sensitivity for detecting vegetations compared to TTE, with rates of 70-90% versus 20-30%. Various protocols have been described to enhance TTE detection sensitivity, including modified apical 5-chamber, modified parasternal short-axis of great vessels, and modified subcostal views (7). In our patient's case, a TEE was not

required, given the adequate visualization achieved with TTE.

By far, *Staphylococcus aureus* is the most common microorganism causing right-sided endocarditis, representing 60-90% of cases(5). From there, in descending order, there are coagulase-negative *Staphylococcus*, then *Streptococcus*, with a predominance of *S. pneumoniae*, then *Pseudomonas aeruginosa*, and finally the rest of the gram-negative bacteria, being the least frequent(5). Among the gram-negative bacteria reported to cause right-sided endocarditis, we have *Proteus mirabilis*, *Coxiella burnetii*, *Bartonella quintana*, and the species of *Aeromonas*(5,8). As far as we know, this would be the seventh reported case of endocarditis due to *Aeromonas*, five of them have been associated with *A. hydrophila*, and only one with *A. salmonicida*(4,8-12). *Aeromonas*-related endocarditis is very rare and has been associated with multiple immunocompromising factors such as cirrhosis and renal failure, chronic hepatitis B infection, human immunodeficiency virus, and hepatitis C virus infection in intravenous drug user, myelodysplastic syndrome, transfusion-related non-A, non-B hepatitis with cirrhosis, colon carcinoma in situ, and subacute thyroiditis(8). In the case of our patient, end-stage renal disease would be the risk factor for immunosuppression combined with the risk factor of the presence of the tunneled catheter. On the other hand, of the six cases previously reported, this would be the third in which, due to anatomy, the vegetation would be located on the right side of the heart.

Intravenous antibiotics are the keystone of treatment for right-sided endocarditis, having as priority the early and proper setting of the cultures, followed by the empirical antimicrobial therapy and subsequently the administration of a culture-antibiogram sensible antibiotic. The antibiotic therapy with 3rd- or 4th-generation cephalosporins or fluoroquinolones for *Aeromonas* infection is the rationale. Still, the drug of choice should always be tailored according to the local prevalence of drug resistance in *Aeromonas* and cultures. Penicillins and narrow-spectrum cephalosporins have shown variable antimicrobial activity against clinical *Aeromonas* isolates, so for the endocarditis, treatment is suggested a broad-spectrum cephalosporin for 4-6 weeks, in conjunction with an aminoglycoside for 2 weeks. Fluoroquinolones are indicated if the patient is allergic to beta-lactam agents or there is a concern for inducible beta-lactam resistance, in our case this antibiotic family was indicated due to the recommendation given by the infectious disease specialist and the results of the cultures and antibiogram, also in our patient the medical treatment time was shorter compared to that recommended in the literature, which was enough for its resolution(8).

Conclusion

This report documents an exceptionally rare case of right-sided endocarditis attributed to *Aeromonas hydrophila*. Among the patient's risk factors for right-sided endocarditis were end-stage renal disease and the presence of a CVC. In immunocompromised individuals and those with intracardiac devices, consideration should be given to less common

microorganisms. Further research is warranted to establish *Aeromonas* species as a potential causative agent of endocarditis in hemodialysis patients. Treatment with intravenous fluoroquinolone antibiotics for 21 days was successful in this case.

Author Contributions

Alexis A. Ponce Garcia: study conception and design, data collection, analysis and interpretation of results, draft manuscript preparation, reviewed the results and approved the final version of the manuscript. **A. Sofía Torres Hernandez:** data collection, reviewed the results and approved the final version of the manuscript. **Nancy A. Molina Mendoza:** data collection, draft manuscript preparation, reviewed the results and approved the final version of the manuscript. **Luis E. Fernandez Garza:** study conception and design, data collection, analysis and interpretation of results, draft manuscript preparation, reviewed the results and approved the final version of the manuscript.

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Disclosure statement

The authors report there are no competing interests to declare

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