# *A Case of* Pseudomonas Endocarditis *that Required Surgical Intervention Despite Antibiotic Treatment*

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**Abstract**

Although infective endocarditis caused by Gram-negative microorganisms is rarely seen, it may lead to morbidity and mortality. Infective endocarditis caused by *Pseudomonas* strains is very rarely observed. A 3-year-old female patient with inlet-type ventricular septal defect and pulmonary stenosis was hospitalized upon a provisional diagnosis of infective endocarditis with findings of fever, tachypnea, tachycardia, and hepatomegaly, which developed 2 days after patch closure of the ventricular septal defect. A surgical operation was scheduled, because the patient manifested heart failure with growth of *Pseudomonas aeruginosa* in blood culture, and the infection could not be controlled for more than 3 months despite the appropriate combination of antibiotics. During the operation, the infected ventricular septal defect patch was removed, the tricuspid valve was repaired, and a vegetation was removed from the pulmonary valve. Although right-side cardiac valve-based endocarditis caused by *P. aeruginosa* can be treated with appropriate antibiotic therapy, early surgical treatment is thought to increase treatment success in patients with persistent bacteremia. *(J Pediatr Inf 2014; 8: 196-9)*

**Key words:** *Pseudomonas aeruginosa*, endocarditis, congenital heart defect, cardiac surgery

## Introduction

Although infective endocarditis caused by Gram-negative microorganisms is rarely seen, it may lead to morbidity and mortality (1). Infective endocarditis caused by Pseudomonas strains is very rarely (0.4-2.1%) observed (2, 3). In this report, we have presented a case of infective endocarditis caused by Pseudomonas aeruginosa whose condition recurred despite appropriate antibiotic use, but recovered after surgical treatment, and hoped to draw attention to the contribution to be made by surgical treatment.

## Case Report

A three-year-old female patient with an inlet type large ventricular septal defect (VSD) and pulmonary stenosis (PS) was hospitalized upon the suspection of infective endocarditis with findings of fever, tachypnea, tachycardia, and hepatomegaly, which developed 2 days after patch closure of the ventricular septal defect and given empiric vancomycin (40 mg/kg/days, four doses) and gentamycin (3 mg/kg/days, 3 doses). The following results emerged in the laboratory tests: 7,900/mm$^3$, reactive C protein (CRP): 200 mg/L (0-5), erythrocyte sedimentation rate (ESR): 85 mm/hour, rheumatoid factor (RF): 12 IU/mL (0-20), C3: 176 mg/dL (101-186), C4: 27.6 mg/dL (16-47). The patient, who had no infiltration in the chest radiography, was found to have vegetation in the tricuspit valves pulmonary and tricuspit in the transthoracic echocardiography (TTE); additionally, the patient had vegetation of the VSD patch and leakage in the patch (Figure 1, 2). As meropenem-sensitive *P. aeruginosa* isolated in the hemoculture, gentamycin was discontinued and meropenem (90 mg/kg/day, three doses) was given (Table 1). However, on the fifth day, fever and *P. aeruginosa* isolation in the blood culture continued. In response, since it was life-threatening infection and failed to respond to the treatment, vancomycin was discontinued and ciprofloxacin (30 mg/kg/day, two doses) was added. In due course, some decline

**Received:** 25.04.2013
**Accepted:** 11.10.2013
**Available Online Date:** 08.05.2014

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DOI:10.5152/ced.2013.1496

was observed in the sizes of the vegetations in the echocardiography and no isolation occurred in the blood culture. The treatment continued until the 45th days and then the patient was discharged to be examined in the next policlinic control.

When the patient was admitted again one week after discharge from hospital with the complaint of fever, it was considered as infective endocarditis, since no infections facts was found in the examination and treatment of ceftazidime (150 mg/kg/day, three doses) and ciprofloxacin (30 mg/kg/day, two doses) was started. In the echocardiography, suspicious vegetations were detected on the pulmonary and tricuspid valves. The following results were obtained in the laboratory tests; CRP: 54 mg/L (0-20), C3: 99.5 mg/dL (101-186), C4: 22 mg/dL (16-47), RF: 11 IU/mL (0-20). P. aeruginosa isolated in the five intermittent blood cultures (Table 1). Since fever dropped on the third day of the treatment, the treatment was maintained in the same way. The patient was discharged on the 40th day, as there was no growth in the blood cultures, acute phase reactants were normal and the general condition of the patient improved.

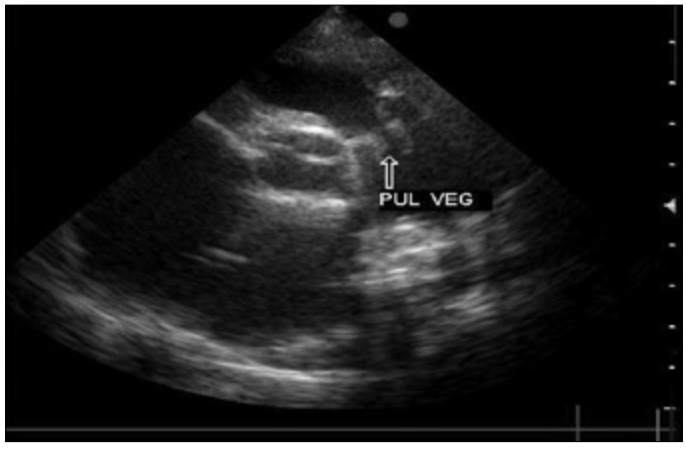


**Figure 1.** Vegetation on the pulmonary and tricuspid valves in the transthoracic echocardiography (arrow)

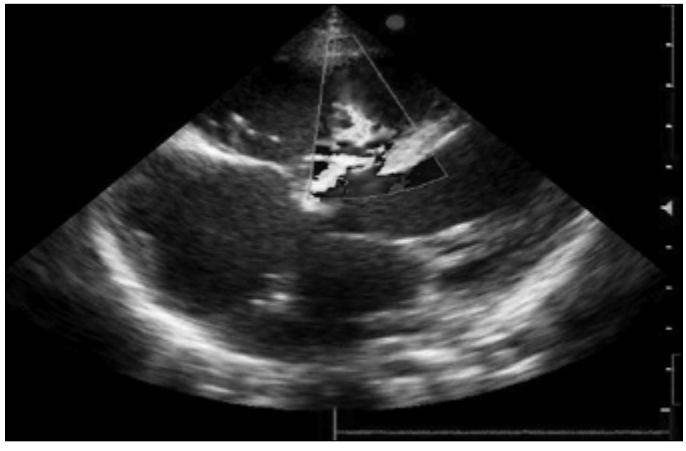

**Figure 2.** Vegetation on the VDS patch in the transthoracic echocardiography and leakage current on the patch

The patient admitted again two weeks after discharge from hospital with the complaint of fever, vegetations and leakage current (current gradient 95 mmHg) from left to right on the VSD patch on the pulmonary and tricuspid valves were found in the echocardiography. P. *aeruginosa* isolated in the blood culture (Table 1). Since the patient had the table of congestive heart failure and the failure to control the infection for three months despite appropriate combined antibiotic treatment, a surgical operation was scheduled. During the operation, the infected VDO patch was removed, tricuspid valve was repaired and vegetation was removed from the pulmonary valve. The patient was discharged having recovered in the post-operation period. No positivity was found in the control hemocultures and VSD patch. No problem has occurred in the eight-year-long follow-up of the patient.

## Discussion

Although infective endocarditis is rarely seen in children, it has a high level of morbidity and mortality (4, 5). The risk factors include congenital heart disease, rheumatic heart disease, replacement cardiac valve, endocarditis history and nosocomial bacteremia. Annual infective endocarditis incidence in children is 0.34-0.64/100.000 (6). The most common agents in children are *Streptococcus* viridans and *Staphylococcus aureus* (7, 8).

*P. aeruginosa* frequently causes endocarditis on normal valves and in intravenous drug dependents. The endocarditis of which *P. aeruginosais* the agent is rarely seen in in childhood and is seen in hospitalized patients receiving long-term antibiotic treatment or on whom cardiac catheterization is implemented. In most of the report-

**Table 1.** The antibiotics that blood culture-growing *P. aeruginosa* strains are sensitive to (+)

| | 1. Hospitalisation | 2. Hospitalisation | 3. Hospitalisation |
|---|---|---|---|
| Piperacillin | + | + | + |
| Cefoperazone | + | | + |
| Ceftazidime | | + | |
| Gentamycin | + | + | + |
| Tobramycin | + | + | + |
| Netilmicin | + | | + |
| Amicasin | + | | + |
| Ciprofloxacin | + | + | + |
| Ofloxacin | + | | + |
| Imipenem | + | | + |
| Meropenem | + | | + |
| Cefepime | | | + |

ed cases, it was implemented on the left valves of the heart. Despite the rare prevalence of left valves of the heart-related endocarditis, it has a high risk of mortality (9). Due to the congenital heart disease in our patient, the presence of fever after the surgery and lack of another examination finding to explicate the fever, initially infective endocarditis was suspected of and the diagnosis was confirmed by the echocardiography.

The recommended treatment for the infective endocarditis caused by Pseudomonas strains is to use broad spectrum penicillin (ticarcillin, piperacillin) together with tobramycin, or ceftazidime or cefepime at least for six weeks (10). In cases who are resistant to other antibiotics, successful results have been obtained in the treatment of *P. aeruginosa* endocarditis by the use of tobramycin and meropenem combination together (9, 11). Due to cartilage toxicity risk in children, the use of quinolons is limited. However, it has been stated in the diagnosis and treatment guide of infective endocarditis that ciprofloxacin can be used in patients who cannot tolerate ampicillin and cephalosporin (10). Furthermore, there are also studies in the literature illustrating that ciprofloxacin can successfully be used in pediatric infective endocarditis cases who are non-respondent to other antibiotics (12, 13). Despite the use of gentamycin and meropenem for infective endocarditis in our case, *P. aeruginosa* grew in the blood culture again. Therefore, ciprofloxacin was used in the treatment of our case and bacterial eradication was enabled.

*P. aeruginosa* comprises 1.3% of infective endocarditis requiring surgery (14). The medical treatment for the right-side cardiac valve-based infective endocarditis caused by *P. aeruginosa* has been successful in 50-75% of the cases. However, surgery is recommended for the cases who are antibiotherapy-resistant (10). Since we failed to obtain a successful result in our case through antibiotherapy, surgical treatment was performed and growth in blood culture did not recur. Although the removal of vegetation or valve without valve replacement as a surgical method is not recommended, it has been emphasized that valve replacement is to be performed in order to prevent permanent right ventricular dysfunction (10, 11).

## Conclusion

It has been observed that there are only few cases of recurrent *P. aeruginosa* infective endocarditis-diagnosed patients in the literature (11, 13). Despite recovery through appropriate antibiotherapy in the right-side cardiac valve-based endocarditis caused by *P. aeruginosa*, we are of the opinion that timely surgical treatment in bacteremia-persisting patients may increase the success of treatment.

**Informed Consent:** Written informed consent was obtained from the parents of the patient who participated in this case.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - Ö.K., Ş.O.; Design - Ö.K., Ş.O.; Literature Review - Ö.K., Ş.O.; Writing - Ö.K., Ş.O.; Critical Review - T.E., K.N.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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