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

Abstract

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 observed (0.4-2.1%) (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.

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 observed (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 suspicion 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/mm³, 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 tricuspid valves pulmonary and tricuspid 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
was observed in the sizes of the vegetations in the echo-
cardiography and no isolation occurred in the blood cul-
ture. The treatment continued until the 45th days and then
the patient was discharged to be examined in the next
declinic 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
cefazidine (150 mg/kg/day, three doses) and ciprofloxa-
cin (30 mg/kg/day, two doses) was started. In the echo-
cardiography, 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). \textit{P. aeruginosa} isolated in the five
intermittent blood cultures (Table 1). Since fever dropped
on the third day of the treatment, the treatment was main-
tained 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 con-
dition of the patient improved.

![Figure 1. Vegetation on the pulmonary and tricuspid valves in
the transthoracic echocardiography (arrow)](image1)

![Figure 2. Vegetation on the VDS patch in the transthoracic
echocardiography and leakage current on the patch](image2)

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. \textit{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 chil-
dren, it has a high level of morbidity and mortality (4, 5).
The risk factors include congenital heart disease, rheu-
matic heart disease, replacement cardiac valve, endocar-
ditis 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 \textit{Streptococcus}
viridans and \textit{Staphylococcus aureus} (7, 8).

\textit{P. aeruginosa} frequently causes endocarditis on nor-
mal valves and in intravenous drug dependents. The
endocarditis of which \textit{P. aeruginosais} the agent is rarely
seen in in childhood and is seen in hospitalized patients
receiving long-term antibiotic treatment or on whom car-
diac catheterization is implemented. In most of the report-

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Piperacillin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cefoperazone</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cefazidime</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Gentamycin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Netilmicin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Amicasin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Imipenem</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Meropenem</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cefepime</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**Table 1. The antibiotics that blood culture-growing \textit{P. aeruginosa}
strains are sensitive to (+)**
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 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 quinolones 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-responsive 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 antibiotic-resistant (10). Since we failed to obtain a successful result in our case through antibiotic therapy, 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 antibiotic therapy 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.

**References**


