

Original Article

Adequacy of Infective Endocarditis Prophylaxis Before Dental Procedures among Solid Organ Transplant Recipients

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ABSTRACT. Infective endocarditis (IE) is a life-threatening condition with high morbidity and mortality. The current IE guidelines recommend antibiotic prophylaxis only in patients with certain cardiac conditions and before certain dental procedures. However, there is not enough data about solid organ transplant (SOT) recipients. In this study, we aimed to investigate the IE prophylaxis in general dental and periodontal surgical procedures among our SOT recipients. Medical records of 191 SOT recipients (32 liver transplant recipients, 54 heart transplant recipients, and 105 kidney transplant recipients) who were admitted to our hospital between January 2016 and January 2018 were evaluated. A total of 65 patients who underwent dental procedures were included in the study. We investigated the adequacy of IE prophylaxis according to the current guidelines. Two groups were created according to whether they received antibiotic prophylaxis or not. The mean age was 44.2 ± 13.6 years, and 66.1% were male. The majority of patients (67.6%) received antibiotic prophylaxis. The most commonly used antibiotic was amoxicillin (48.8%). Among the procedures, 23.1% were classified as invasive and 76.9% were classified as noninvasive. No complication was observed after invasive and noninvasive dental procedures. There were no complications in both antibiotic prophylaxis and no-prophylaxis groups. According to our results, IE prophylaxis has been used appropriately in SOT recipients in our center. No serious infection has been reported. In addition, no complication due to antibiotic use was also observed.

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Introduction

Infective endocarditis (IE) remains a highly morbid and fatal condition. The current IE guidelines recommend prophylaxis only in a small subset of patients to avoid the development of drug-resistant microorganisms.¹ The

main recommendations come from retrospective analyses and expert opinions.

Solid organ transplantation (SOT) remains the most effective treatment option for end-stage renal disease, end-stage heart failure, and hepatic insufficiency. Immunosuppressive therapies play a critical role in the prevention of rejection, but they also have several undesirable side effects. Infections by different organisms are the most common cause of mortality in the immunosuppressed SOT recipients.² Although infections are important cause of mortality among SOT recipients, there is very limited data in the literature supporting the endocarditis prophylaxis before dental procedures among SOT recipients.

In this study, we aim to investigate our local customs and the role of IE prophylaxis among our SOT recipients.

Materials and Methods

Study design and population

This was a single-center retrospective study. Medical records of 65 patients who underwent a SOT in our hospital and seen at our dental clinic between January 2016 and January 2018 were evaluated retrospectively. Patients who did not have a dental procedure were excluded. Our study was approved by the local ethics committee, and the protocols conformed to the ethical guidelines of the 1975 Declaration of Helsinki.

The dental procedures were classified into invasive and noninvasive. Invasive procedures included periodontal surgery, connective tissue, and bone extraction from the oral cavity, such as tooth extraction, gingivitis, biopsy, and subgingival scaling, which are likely to cause transient bacteremia. Other procedures, such as whitening, polishing, root canal treatment, and dental impressions, were considered non-invasive procedures.³

Two groups were compared according to the administration of antibiotic prophylaxis. Comorbidities such as diabetes mellitus, any kind of atherosclerotic disease, pulmonary disease, and neurological diseases were also documented.

Adequacy of IE prophylaxis was evaluated according to 2017 American Heart Association/American College of Cardiology (AHA/ACC) Focused Update of the 2014 AHA/ACC Guideline for the management of patients with valvular heart disease.¹

Statistical Analyses

The Statistical Package for the Social Sciences (SPSS) version 17.0 (SPSS Inc, Chicago, IL, USA) was used for statistical analyses. Continuous variables were expressed as mean \pm standard deviation. Categorical variables were expressed as percentages. All continuous variables were checked with the Shapiro-Wilk normality test to show their distributions. Continuous variables with normal distributions were compared using the Student's t-test. For categorical variables, the Chi-square test was used. Values for $P < 0.05$ were considered statistically significant.

Results

A total of 65 SOT recipients who have seen our dental clinic were included in the study. The mean age was 44.2 ± 13.6 years, and 66.1% of the patients were male. The median duration after SOT was 14 months (8–41 months). Twenty-two patients did not have any comorbidities. The most common dental procedure was tooth extraction which included broken tooth extraction, embedded tooth extraction, and rotten tooth extraction. The majority (66.1%) of patients undergoing dental procedures received antibiotic prophylaxis. Invasive procedures were more common among patients who received antibiotic prophylaxis ($P = 0.001$). Conversely, noninvasive dental procedures were more common among patients who did not receive antibiotic prophylaxis ($P = 0.018$) (Table 1). Comorbidities were similar between groups. Amoxicillin was the most commonly used antibiotic (48.8%). The other antibiotics prescribed for prophylaxis were cefazolin (25.3%), ampicillin (13.6%), cefadroxil (11.6%), and cefotaxime (<1%). IE prophylaxis was indicated in 11 of

Table 1. Characteristics of patients.

Characteristics	Prophylaxis (+) N = 43	Prophylaxis (-) N = 22	P
Age (year, mean)	43±14.2	46.4±12.3	0.76
Male, n (%)	26 (60.4)	17 (77.2)	0.12
Invasive dental procedures, n (%)	13 (30.2)	2 (9)	0.001
Noninvasive dental procedures, n (%)	30 (69.7)	20 (90.9)	0.018
Comorbidities, n (%)	27 (62.7)	16 (72.7)	0.68
IEP indicated patients, n (%)	11	0	<0.001
IE or infectious complications	0	0	1.0

IE: Infective endocarditis, IEP: Infective endocarditis prophylaxis, Comorbidities: Diabetes mellitus, any kind of atherosclerotic disease, pulmonary disease, neurological disease.

65 patients (16.9%) according to AHA/ACC recommendations. Indications for IE prophylaxis in the order of frequency were mechanical prosthetic valve (five patients), heart transplant recipients with valve regurgitation (four patients), previous history of IE (one patient), and percutaneously placed atrial septal defect occluder device with a residual shunt (one patient). All of these patients underwent invasive dental procedures and received adequate prophylaxis. There were no patients who did not receive IE prophylaxis although indicated according to the relevant guideline (Table 1). Antibiotic-related skin rashes developed only in one patient and completely resolved with an antihistamine.

Discussion

In this study, we showed that the current IE guideline recommendations are applied successfully among our SOT recipients.

Immunosuppressive therapies are very important, especially during the first months after SOT to prevent acute rejection. High-dose immunosuppression used in the early period posttransplant increases the risk of infections even in the oral cavity.⁴ Because of this high risk, it is recommended that only emergency dental interventions is performed during the first three months after SOT and to postpone elective procedures.⁵

The median duration for dental procedures after SOT was 14 months among our patients, and this may explain the absence of any complications. Although duration for dental

procedures may vary between SOT recipients, we think that detailed examination and treatment of dental problems of all patients before SOT may prolong this duration as in our patients. In most of the transplantation centers, a dental examination is performed before SOT as we do in our hospital.⁶

Another finding of our study is that clinicians are more likely to use prophylaxis for invasive dental procedures rather than noninvasive procedures. Previous research performed among doctors working at transplant centers showed similar findings; most doctors reported that they recommended the use of prophylactic antibiotic therapy for all transplanted patients before dental procedures.⁷

Evidence for IE prophylaxis in SOT recipients before dental procedures is extremely limited.⁸⁻¹¹ No randomized trial in this special patient population has been done to date. Data available come from sporadic case reports. In the past, antibiotic prophylaxis was used to be recommended before dental procedures in all SOT recipients.⁸ More recent data showed that IE is considered to be a rare complication after SOT, even in heart transplantation recipients.^{12,13} The current IE guidelines recommend prophylaxis only in a small subset of patients.¹

The classic clinical features of IE, such as fever, new murmur, or splenomegaly, are usually not observed in SOT recipients.¹⁴ *Staphylococcus aureus* is the most common cause of IE and generally associated with inadequate treatment of previous infections.¹⁴ Fungus- and aspergillosis-related IE are also more common in SOT recipients compared to

the general population.¹⁴ Although IE is considered to be rare after heart transplantation, the mortality rate is extremely high and found to be 80%.¹⁵ Interestingly, despite the risk factors for heart transplant recipients, the cumulative IE incidence was found equal in liver and kidney transplant recipients.¹⁵

Study Limitations

There are several limitations of our study. It was based on a retrospective electronic data analysis and we only evaluated SOT recipients. There was not a control group. It was a single-center study, and our study population was relatively small. Subgroup analysis could not be performed due to the small number of patients.

Conclusion

Our findings demonstrate that the current IE guideline recommendations are applied successfully among our SOT recipients. Although administering antibiotic prophylaxis do not change infectious complications, clinicians seem to be prone to antibiotic prophylaxis for dental procedures. IE guideline recommends prophylaxis only in a limited group of patients, and there are no specific recommendations for SOT recipients. Larger prospective multicenter studies are needed to make specific recommendations in this special patient population.

Conflict of interest: None declared.

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